Liberty Utilities (CalPeco Electric) LLC (U 933-E)

2021 Wildfire Mitigation Plan Update

Public Version

March 5, 2021

TABLE OF CONTENTS

0. Glossary of defined terms 3
1. Persons responsible for executing the WMP 10
1.1. Verification 14
2. Adherance to statutory requirements 15
3. Actuals and planned spending for mitigation plan 18
3.1. Summary of WMP initiative expenditures 18
3.2. Summary of ratepayer impact 19
4. Lessons learned and risk trends 20
4.1. Lessons Learned: how tracking metrics on the 2020 plan has informed the 2021 plan 20
4.2. Understanding major trends impacting ignition probability and wildfire consequence 25
4.2.1. Service territory fire-threat evaluation and ignition risk trends 27
4.3. Change in ignition probability drivers 30
4.4. Research proposals and findings 31
4.4.1. Research proposals 31
4.4.2. Research findings 32
4.5. Model and metric calculation methodologies 32
4.5.1. Additional models for ignition risk probability, wildfire and PSPS risk 32
4.5.1.1. Model #1: 33
4.5.2. Calculation of key metrics 38
4.6. Progress reporting on past deficiencies 39
5. Inputs to the plan and directional vision for WMP 48
5.1. Goal of Wildfire Mitigation Plan 48
5.2. The objectives of the plan 48
5.3. Plan program targets 54
5.4. Planning for workforce and other limited resources 56
5.4.1. Target role: Vegetation inspections 57
5.4.2. Target role: Vegetation management projects 58
5.4.3. Target role: Asset inspections 60
5.4.4. Target role: Grid hardening 60
5.4.5. Target role: Risk event inspections 62
6. Performance metrics and underlying data 64
6.1. Recent performance on progress metrics, last 5 years 64
6.2. Recent performance on outcome metrics, annual and normalized for weather, last 5 years 64

TABLE OF CONTENTS

6.3. Description of additional metrics 64
6.4. Detailed information supporting outcome metrics 64
6.5. Mapping recent, modelled, and baseline conditions 65
6.6. Recent weather patterns, last 5 years 65
6.7. Recent and projected drivers of ignition probability 65
6.8. Baseline state of equipment and wildfire and PSPS event risk reduction plans 66
6.8.1. Current baseline state of service territory and utility equipment 66
6.8.2. Additions, removal, and upgrade of utility equipment by end of 3-year plan term 66
7. Mitigation initiatives 68
7.1. Wildfire mitigation strategy 68
7.2. Wildfire Mitigation Plan implementation 78
7.3. Detailed wildfire mitigation programs 79
7.3.1. Financial data on mitigation initiatives, by category 79
7.3.2. Detailed information on mitigation initiatives by category and activity 79
8. Public Safety Power Shutoff (PSPS), including directional vision for PSPS 142
8.1. Directional vision for necessity of PSPS 142
8.2. Protocols on Public Safety Power Shut-off 144
8.3. Projected changes to PSPS impact 150
8.4. Engaging vulnerable communities 151
8.5. PSPS-specific metrics 152
9. Appendix 153
9.1. Definitions of initiative activities by category 153
9.2. Citations for relevant statutes, Commission directives, proceedings and orders 162

0. GLOSSARY OF DEFINED TERMS

Term	Definition
10-hour dead fuel moisture content	Moisture content of small dead vegetation (*e.g.*, grass, leaves, etc. that burn quickly but not intensely) that can respond to changes in atmospheric moisture content within 10 hours.
Access and functional needs populations	Per Cal. Gov't Code § 8593.3 and D.19-05-042, individuals who have developmental or intellectual disabilities, physical disabilities, chronic conditions, injuries, limited English proficiency or who are non-English speaking, older adults, children, people living in institutionalized settings, or those who are low income, homeless, or transportation disadvantaged, including, but not limited to, those who are dependent on public transit or those who are pregnant.
Authority Having Jurisdiction (AHJ)	Party with assigned responsibility, depending on location and circumstance.
Asset (utility)	Electric lines, equipment, or supporting hardware.
At-risk species	Species of vegetation that are particularly likely to contact power lines in the event of high winds and/or ignite if they catch a spark.
Baseline (ignition probability, maturity)	A measure, typically of the current state, to establish a starting point for comparison.
Carbon dioxide equivalent	Tons of greenhouse gases (GHG) emitted, multiplied by the global warming potential relative to carbon dioxide.
Circuit mile	Total length in miles of separate circuits regardless of the number of conductors used per circuit
Contractor	Any individual in the temporary and/or indirect employ of the utility whose limited hours and/or time-bound term of employment are not considered as "full-time" for tax and/or any other purposes.

Critical facilities and infrastructure	For brevity in the 2021 WMP, "critical facilitates and infrastructure" may be shortened to "critical infrastructure" and/or "critical facilities" throughout the WMP. Critical facilities and infrastructure is defined in accordance with the definition adopted in D.19-05-042 and modified in D.20-05-051: those facilities and infrastructure that are essential to the public safety and that require additional assistance and advance planning to ensure resiliency during de energization events. Namely:
	• Emergency Services Sector
	  ○ Police stations
	  ○ Fire stations
	  ○ Emergency operations centers
	  ○ Public safety answering points
	• Government Facilities Sector
	  ○ Schools
	  ○ Jails and prisons
	• Healthcare and Public Health Sector
	  ○ Public health departments

	o Medical facilities, including hospitals, skilled nursing facilities, nursing homes, blood banks, health care facilities, dialysis centers, and hospice facilities (excluding doctor offices and other non-essential medical facilities) • Energy Sector o Public and private utility facilities vital to maintaining or restoring normal service, including, but not limited to, interconnected publicly-owned utilities and electric cooperatives • Water and Wastewater Systems Sector o Facilities associated with the provision of drinking water or processing of wastewater, including facilities used to pump, divert, transport, store, treat and deliver water or wastewater • Communications Sector o Communication carrier infrastructure including selective routers, central offices, head ends, cellular switches, remote terminals and cellular sites • Chemical Sector o Facilities associated with the provision of manufacturing, maintaining, or distributing hazardous materials and chemicals (including Category N-Customers as defined in D.01-06-085) • Transportation Sector o Facilities associated with automobile, rail, aviation, major public transportation, and maritime transportation for civilian and military purposes
Customer hours	Total number of customers, multiplied by the average number of hours (*e.g.*, of power outage).
Data cleaning	Calibrating raw data to remove errors (including typographical and numerical mistakes).
Dead fuel moisture content	Moisture content of dead vegetation, which responds solely to current environmental conditions and is critical in determining fire potential.
Detailed inspection	In accordance with G.O. 165, an inspection where individual pieces of equipment and structures are carefully examined, visually and through use of routine diagnostic test, as appropriate, and (if practical and if useful information can be so gathered) opened, and the condition of each rated and recorded.
Enhanced inspection	Inspection whose frequency and thoroughness exceeds the requirements of the detailed inspection, particularly if driven by risk calculations.
Evacuation impact	Number of people evacuated, with the duration for which they are evacuated, from homes and businesses, due to wildfires.
Evacuation zone	Areas designated by CAL FIRE and local fire agency evacuation orders, to include both "voluntary" and "mandatory" in addition to other orders, such as "precautionary" and "immediate threat."
Fuel density	Mass of fuel (vegetation) per area that could combust in a wildfire.
Fuel management	Removing or thinning vegetation to reduce the potential rate of propagation or intensity of wildfires.
Fuel moisture content	Amount of moisture in a given mass of fuel (vegetation), measured as a percentage of its dry weight.
Full-time employee	Any individual in the ongoing and/or direct employ of the utility whose hours and/or term of employment are considered as "full-time" for tax and/or any other purposes.

GLOSSARY OF DEFINED TERMS

G.O. 95 nonconformance	Condition of a utility asset that does not meet standards established by General Order 95.
Greenhouse gas (GHG) emissions	Cal. Health & Safety Code § 38505 identifies seven greenhouse gases that ARB is responsible to monitor and regulate in order to reduce emissions: carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), sulfur hexafluoride (SF6), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and nitrogen trifluoride (NF3).
Grid hardening	Actions (such as equipment upgrades, maintenance, and planning for more resilient infrastructure) taken in response to the risk of undesirable events (such as outages) or undesirable conditions of the electrical system in order to reduce or mitigate those events and conditions, informed by an assessment of the relevant risk drivers or factors.
Grid topology	General design of an electric grid, whether looped or radial, with consequences for reliability and ability to support de-energization (*e.g.*, being able to deliver electricity from an additional source).
High Fire Threat District (HFTD)	Per D.17-01-009, areas of the State designated by the CPUC and CAL FIRE to have elevated wildfire risk, indicating where utilities must take additional action (per G.O. 95, G.O. 165, and G.O. 166) to mitigate wildfire risk.
Highly rural region	In accordance with 38 CFR 17.701, "highly rural" shall be defined as those areas with a population of less than 7 persons per square mile. For the purposes of the WMP, "area" shall be defined as census tracts.
High Wind Warning (HWW)	Level of wind risk from weather conditions, as declared by the National Weather Service. For historical NWS data, refer to the Iowa State University Iowa archive of NWS watch / warnings.[1]
HWW overhead (OH) Circuit Mile Day	Sum of overhead circuit miles of utility grid subject to High Wind Warnings (HWW, as defined by the National Weather Service) each day within a given time period, calculated as the number of overhead circuit miles that were under an HWW multiplied by the number of days those miles were under said HWW. For example, if 100 overhead circuit miles were under an HWW for 1 day, and 10 of those miles were under HWW for an additional day, then the total HWW OH circuit mile days would be 110.
Ignition probability	The relative possibility that an ignition will occur. Probability is 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 certainty there is that the event will occur. (Often informally referred to as likelihood or chance.)
Ignition-related deficiency	Any condition that may result in ignition or has previously resulted in ignition, even if not during the past five years.
Impact/consequence of ignitions	The effect or outcome of a wildfire ignition, affecting objectives, which may be expressed by terms including, but not limited to health, safety, reliability, economic, and/or environmental damage.
Initiative	Measure or activity proposed or in process designed to reduce the consequences and/or probability of wildfire or PSPS.
Inspection protocol	Documented procedures to be followed in order to validate that a piece of equipment is in good condition and expected to operate safely and effectively.
Invasive species	Non-native species whose proliferation increases the risk of wildfires.

[1] https://mesonet.agron.iastate.edu/request/gis/watchwarn.phtml

GLOSSARY OF DEFINED TERMS

Level 1 finding	In accordance with G.O. 95, an immediate safety and/or reliability risk with high probability for significant impact.
Level 2 finding	In accordance with G.O. 95, a variable (non-immediate high to low) safety and/or reliability risk.
Level 3 finding	In accordance with G.O. 95, an acceptable safety and/or reliability risk.
Life expectancy	Anticipated years that a piece of equipment can be expected to meet safety and performance requirements.
Limited English Proficiency (LEP)	Populations with limited English working proficiency based on the International Language Roundtable scale.
Line miles	The number of miles of transmission and/or distribution line. Differs from circuit miles because individual circuits, such as the two circuits of a double-circuit line, are not counted separately in circuit miles but are counted as separate total miles of line.
Live fuel moisture content	Moisture content within living vegetation, which can retain water longer than dead fuel.
Lost energy	Energy that would have been delivered were it not for an outage.
Major roads	Interstate highways, U.S. highways, state and county routes.
Match drop simulation	Wildfire simulation method that takes an arbitrary ignition and forecasts propagation and consequence/impact.
Member of the public	Any individual not employed by the utility.
Multi-attribute value function	Risk calculation methodology introduced during CPUC's S-MAP and RAMP proceedings.
Near miss	Previously used to define an event with probability of ignition. Redefined under "Risk event."
Need for PSPS	When utility's criteria for utilizing PSPS are met.
Noncompliant clearance	Rights-of-way whose vegetation is not maintained in accordance with the requirements of G.O. 95.
Outages of the type that could ignite a wildfire	Outages that, in the judgment of the utility, could have ignited a wildfire.
Outcome metrics	Measurements of the performance of the utility and its service territory in terms of both leading and lagging indicators of wildfire, PSPS, and other consequences of wildfire risk, including the potential unintended consequences of wildfire mitigation work, such as acreage burned by utility-ignited wildfire.
Overcapacity	When the energy transmitted by utility equipment exceeds that of its nameplate capacity.
Patrol inspection	In accordance with G.O. 165, a simple visual inspection of applicable utility equipment and structures that is designed to identify obvious structural problems and hazards. Patrol inspections may be carried out in the course of other company business.
Percentile conditions	Top X% of a particular set (*e.g.*, wind speed), based on a historical data set with sufficient detail. For example, "Top 95 percentile wind speeds in the last five years" would refer to the 5% of average daily wind speeds recorded by each weather station. If 1,000 weather stations recorded average daily wind speeds over 10 days, then the 95th percentile wind speed would be the top 5% of weather station-days. In this example, there will be 10 days each with 1,000 weather station reports and a total of 10,000 weather station-days, so 50 observations will be in the top 5%. The lowest wind speed in this top 5% would be the "95th percentile wind speed."
Planned outage	Electric outage announced ahead of time by the utility.

GLOSSARY OF DEFINED TERMS

Preventive maintenance (PM)	The practice of maintaining equipment on a regular schedule, based on risk, elapsed time, run-time meter readings, or number of operations. The intent of PM is to "prevent" maintenance problems or failures before they take place by following routine and comprehensive maintenance procedures. The goal is to achieve fewer, shorter, and more predictable outages.
Priority essential services	Critical first responders, public safety partners, critical facilities and infrastructure, operators of telecommunications infrastructure, and water utilities/agencies.
Program targets	Quantifiable measurements of activity identified in WMPs and subsequent updates used to show progress towards reaching the objectives, such as number of trees trimmed or miles of power lines hardened.
Progress metrics	Measurements that track how much utility wildfire mitigation activity has changed the conditions of utility wildfire risk exposure or utility ability to manage wildfire risk exposure, in terms of leading indicators of ignition probability and wildfire consequences.
Property	Private and public property, buildings and structures, infrastructure, and other items of value that were destroyed by wildfire, including both third-party property and utility assets.
PSPS event	Defined as the time period from the first public safety partner notified of a planned public safety de-energization to the final customer re-energized.
PSPS risk	The potential for the occurrence of a PSPS event expressed in terms of a combination of various outcomes of the event and their associated probabilities.
PSPS weather	Weather that exceeds a utility's risk threshold for initiating a PSPS.
Red Flag Warning (RFW)	Level of wildfire risk from weather conditions, as declared by the National Weather Service (NWS). For historical NWS data, refer to the Iowa State University Iowa archive of NWS watch / warnings.[2]
RFW OH Circuit Mile Day	Sum of overhead circuit miles of utility grid subject to Red Flag Warning each day within a given time period, calculated as the number of overhead circuit miles that were under an RFW multiplied by the number of days those miles were under said RFW. For example, if 100 overhead circuit miles were under an RFW for one day, and 10 of those miles were under RFW for an additional day, then the total RFW OH circuit mile days would be 110.
Risk event	An event with probability of ignition, including wires down, contacts with objects, line slap, events with evidence of heat generation, and other events that cause sparking or have the potential to cause ignition. The following events all qualify as risk events: • Ignitions • Outages not caused by vegetation • Vegetation-caused outages • Wire-down events • Faults • Other risk events with potential to cause ignitions
Risk event simulation	Simulation of what the consequence would have been if an ignition had occurred.
Risk-spend efficiency (RSE)	An estimate of the cost-effectiveness of initiatives, calculated by dividing the mitigation risk reduction benefit by the mitigation cost estimate based on the full set of risk reduction benefits estimated from the incurred costs. For ongoing initiatives, the RSE can be calculated by determining the "marginal benefit" of additional spending in the ongoing

[2] https://mesonet.agron.iastate.edu/request/gis/watchwarn.phtml

	initiative. For example, the RSE of an ongoing initiative could be calculated by dividing the mitigation risk reduction benefit from a 5% increase in spend by the cost associated with a 5% increase in spend.
Rule	Section of Cal. Pub. Util. Code requiring a particular activity or establishing a particular threshold.
Run-to-failure	A maintenance approach that replaces equipment only when it fails.
Rural region	In accordance with G.O. 165, "rural" shall be defined as those areas with a population of fewer than 1,000 persons per square mile as determined by the United States Bureau of the Census. For the purposes of the WMP, “area” shall be defined as census tracts.
Safety Hazard	A condition that poses a significant threat to human life or property.
Simulated wildfire	Propagation and impact/consequence of a wildfire ignited at a particular point (“match drop”), as simulated by fire spread software.
Span	The space between adjacent supporting poles or structures on a circuit consisting of electric lines and equipment. "Span level" refers to asset-scale granularity.
System Average Interruption Duration Index (SAIDI)	System-wide total number of minutes per year of sustained outage per customer served.
Third-party contact	Contact between a piece of electrical equipment and another object, whether natural (tree branch) or human (vehicle).
Time to expected failure	Time remaining on the life expectancy of a piece of equipment.
Top 30% of proprietary fire potential index	Top 30% of fire potential index (FPI) or equivalent scale (*e.g.*, “Extreme” on SCE’s FPI; “extreme,” 15 or greater on SDG&E’s FPI; and 4 or above on PG&E’s FPI).
Trees with strike potential / hazard trees	Trees that could either "fall in” to a power line, or have branches detach and “fly in” to contact a power line in high-wind conditions.
Unplanned outage	Electric outage that occurs with no advance notice from the utility (*e.g.*, blackout).
Urban region	In accordance with G.O. 165, "urban" shall be defined as those areas with a population of more than 1,000 persons per square mile as determined by the United States Bureau of the Census.
Utility-ignited wildfire	Wildfires ignited by utility infrastructure or employees, including all wildfires determined by AHJ investigation to originate from ignition caused by utility infrastructure. For the purposes of the WMP, “area” shall be defined as census tracts.
Vegetation management	Pruning and removal of trees, branches, and other vegetation that poses the risk of contact with electric equipment.
Vegetation risk index	Risk index indicating the probability of vegetation-related outages along a particular circuit, based on the vegetation species, density, height, and growth rate.
Weather normalization	Adjusting metrics based on relative weather risk factors or indices
Wildfire impact/ consequence	The effect or outcome of a wildfire affecting objectives, which may be expressed, by terms including, but not limited to health, safety, reliability, economic, and/or environmental damage.
Wildfire risk	The potential for the occurrence of a wildfire event expressed in terms of ignition probability, wildfire impact/consequence.
Wildfire-only WMP programs	Activities, practices, and strategies that are only necessitated by wildfire risk, unrelated to or beyond that required by minimum reliability and/or safety requirements. Such programs are not indicated or in common use in areas where wildfire risk is minimal (*e.g.*, territory with no vegetation or fuel) or under conditions where wildfires are unlikely to ignite or

	spread (*e.g.*, when rain is falling).
Wildland urban interface (WUI)	A geographical area identified by the state as a "Fire Hazard Severity Zone" or other areas designated by the enforcing agency to be a significant risk from wildfires, established pursuant to Title 24, Part 2, Chapter 7A.
Wire down	Instance where an electric transmission or distribution conductor is broken and falls from its intended position to rest on the ground or a foreign object.

PERSONS RESPONSIBLE FOR EXECUTING THE WMP

1. PERSONS RESPONSIBLE FOR EXECUTING THE WMP

***Instructions**: Provide an accounting of the responsibilities of the responsible person(s) executing the plan, including:*

1. *Executive level with overall responsibility*
2. *Program owners specific to each component of the plan*

The title, credentials and components of responsible persons are released publicly, but other contact information is provided in a redacted file attached to the WMP submission.

Executive-level owner with overall responsibility

- *Name and title:* Chris Alario, President, California
- *Email:* [redacted]
- *Phone number:* [redacted]

Program owners specific to each section of the plan

Note: A program owner may own multiple sections and multiple components across sections, but each section has a program owner accountable.

Section 1: Persons responsible for executing the plan

Program owner:

- Name and title: Eliot Jones, Senior Manager, Wildfire Prevention
- Email: [redacted]
- Phone number: [redacted]
- Component: Wildfire Prevention

- Name and title: Travis Johnson, Vice President, Operations
- Email: [redacted]
- Phone number: [redacted]
- Component: Operations

- Name and title: Blaine Ladd, Director, Operations
- Email: [redacted]
- Phone number: [redacted]
- Component: Operations

Section 2: Adherence to statutory requirements

Program owner:

- Name and title: Dan Marsh, Manager, Rates and Regulatory Affairs
- Email: [redacted]
- Phone number: [redacted]
- Component: Entire Section

Section 3: Actuals and planned spending

PERSONS RESPONSIBLE FOR EXECUTING THE WMP

Program owner:

- Name and title: Rick Dalton, Senior Director, Engineering
- Email: [redacted]
- Phone number: [redacted]
- Component: Capital spending

- Name and title: Eliot Jones, Senior Manager, Wildfire Prevention
- Email: [redacted]
- Phone number: [redacted]
- Component: Operations and Maintenance spending

Section 4: Lessons learned and risk trends

Program owner:

- Name and title: Eliot Jones, Senior Manager, Wildfire Prevention
- Email: [redacted]
- Phone number: [redacted]
- Component: Lessons learned

- Name and title: Greg Campbell, Senior Analyst, Rates and Regulatory Affairs
- Email: [redacted]
- Phone number: [redacted]
- Component: Risk trends

Section 5: Inputs to the plan and directional vision

Program owner:

- Name and title: Eliot Jones, Senior Manager, Wildfire Prevention
- Email: [redacted]
- Phone number: [redacted]
- Component: Wildfire Prevention

- Name and title: Travis Johnson, Vice President, Operations
- Email: [redacted]
- Phone number: [redacted]
- Component: Operations

- Name and title: Blaine Ladd, Director, Operations
- Email: [redacted]
- Phone number: [redacted]
- Component: Operations

Section 6: Metrics and underlying data

Program owner:

- Name and title: Eliot Jones, Senior Manager, Wildfire Prevention

- Email: [redacted]
- Phone number: [redacted]
- Component: Performance Metrics

- Name and title: Blaine Ladd, Director, Operations
- Email: [redacted]
- Phone number: [redacted]
- Component: Performance Metrics

Section 7: Mitigation initiatives

Program owner:

- Name and title: Eliot Jones, Senior Manager, Wildfire Prevention
- Email: [redacted]
- Phone number: [redacted]
- Component: Overall WMP; Situational Awareness and Forecasting; Data Governance

- Name and title: Blaine Ladd, Director, Operations
- Email: [redacted]
- Phone number: [redacted]
- Component: Situational Awareness; PSPS; Grid Operations; Substation Improvements

- Name and title: Peter Stoltman, Manager, Vegetation Management
- Email: [redacted]
- Phone number: [redacted]
- Component: Vegetation Management

- Name and title: Todd Gee, Manager, Asset Management and Inspections
- Email: [redacted]
- Phone number: [redacted]
- Component: Asset Management and Inspections

- Name and title: Frank Sylvester, Senior Manager, Engineering
- Email: [redacted]
- Phone number: [redacted]
- Component: Grid Design and System Hardening

- Name and title: Lindsay Maruncic, Senior Manager, Renewable Energy Assets
- Email: [redacted]
- Phone number: [redacted]
- Component: Resiliency Program

- Name and title: Leonard Kiolbasa, Emergency Management Manager
- Email: [redacted]
- Phone number: [redacted]
- Component: Emergency Planning and Preparedness

PERSONS RESPONSIBLE FOR EXECUTING THE WMP

- Name and title: Alison Vai, Senior Manager, Marketing and Communications
- Email: [redacted]
- Phone number: [redacted]
- Component: Stakeholder Cooperation and Community Engagement

- Name and title: Greg Campbell, Senior Analyst, Rates and Regulatory Affairs
- Email: [redacted]
- Phone number: [redacted]
- Component: Risk Assessment and Mapping, Resource Allocation Methodology

- Name and title: Peter Oakland, Data Analyst
- Email: [redacted]
- Phone number: [redacted]
- Component: Data Governance

Section 8: Public Safety Power Shutoff

Program owner:

- Name and title: Eliot Jones, Senior Manager, Wildfire Prevention
- Email: [redacted]
- Phone number: [redacted]
- Component: Wildfire Prevention

- Name and title: Travis Johnson, Vice President, Operations
- Email: [redacted]
- Phone number: [redacted]
- Component: Operations

- Name and title: Blaine Ladd, Director, Operations
- Email: [redacted]
- Phone number: [redacted]
- Component: Operations

- Name and title: Leonard Kiolbasa, Emergency Management Manager
- Email: [redacted]
- Phone number: [redacted]
- Component: Emergency Planning and Preparedness

Section 9: Appendix

Program owner:

- Name and title: Dan Marsh, Manager, Rates and Regulatory Affairs
- Email: [redacted]
- Phone number: [redacted]
- Component: Entire Section

PERSONS RESPONSIBLE FOR EXECUTING THE WMP

1.1. Verification

Complete the following verification for the WMP submission:

(See Rule 1.11)

(Where Applicant is a Corporation)

I am an officer of the applicant corporation herein, and am authorized to make this verification on its behalf. The statements in the foregoing document are true of my own knowledge, except as to matters which are therein stated on information or belief, and as to those matters I believe them to be true.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on March 5, 2021 at Hermosa Beach, California.
(Date) (Name of city)

Chris Alario
President, California

2. ADHERENCE TO STATUTORY REQUIREMENTS

***Instructions**: Section 2 comprises a "check list" of the CPUC Code Sec. 8386 (c) requirements and subparts. Each utility shall both affirm that the WMP addresses each requirement AND cite the Section or Page Number where it is more fully described (whether in Executive Summary or other section of the WMP). Mark the following table with the location of each requirement. If requirement is located in multiple areas, mention all WMP sections and pages, separated by semi-colon (e.g., Section 5, pg. 30-32; Section 7, pg. 43).*

Table 2-1: Check List of CPUC Requirements

Requirement	Description	WMP Section/Page
1	An accounting of the responsibilities of persons responsible for executing the plan	Chapter 1, pp.10-13
2	The objectives of the plan	Chapter 5, pp.48-53
3	A description of the preventive strategies and programs to be adopted by the electrical corporation to minimize the risk of its electrical lines and equipment causing catastrophic wildfires, including consideration of dynamic climate change risks	Chapter 7, pp.79-141
4	A description of the metrics the electrical corporation plans to use to evaluate the plan's performance and the assumptions that underlie the use of those metrics	Chapter 5, pp.54-56; Chapter 6, pp.64-67; Attachment A
5	A discussion of how the application of previously identified metrics to previous plan performances has informed the plan	Chapter 4, pp.20-25
6	Protocols for disabling reclosers and deenergizing portions of the electrical distribution system that consider the associated impacts on public safety. As part of these protocols, each electrical corporation shall include protocols related to mitigating the public safety impacts of disabling reclosers and deenergizing portions of the electrical distribution system that consider the impacts on all of the aspects listed in Cal. Pub. Util. Code § 8386(c)	Chapter 7, pp.128-134; Chapter 8, pp.142-152
7	Appropriate and feasible procedures for notifying a customer who may be impacted by the deenergizing of electrical lines, including procedures for those customers receiving a medical baseline allowance as described in paragraph (6). The procedures shall direct notification to all public safety offices, critical first responders, health care facilities, and operators of telecommunications infrastructure with premises within the footprint of potential deenergization for a given event	Chapter 7, pp.134-141 Chapter 8, pp.151-152
8	Plans for vegetation management	Chapter 7, pp.104-120

ADHERENCE TO STATUTORY REQUIREMENTS

Requirement	Description	WMP Section/Page
9	Plans for inspections of the electrical corporation's electrical infrastructure	Chapter 7, pp.97-104
10	Protocols for the deenergization of the electrical corporation's transmission infrastructure, for instances when the deenergization may impact customers who, or entities that, are dependent upon the infrastructure	Chapter 7, pp.128-134; Chapter 8, pp.142-152
11	A list that identifies, describes, and prioritizes all wildfire risks, and drivers for those risks, throughout the electrical corporation's service territory, including all relevant wildfire risk and risk mitigation information that is part of the Safety Model Assessment Proceeding and the Risk Assessment Mitigation Phase filings	Chapter 4, pp.27-31
12	A description of how the plan accounts for the wildfire risk identified in the electrical corporation's Risk Assessment Mitigation Phase filing	-
13	A description of the actions the electrical corporation will take to ensure its system will achieve the highest level of safety, reliability, and resiliency, and to ensure that its system is prepared for a major event, including hardening and modernizing its infrastructure with improved engineering, system design, standards, equipment, and facilities, such as undergrounding, insulation of distribution wires, and pole replacement	Chapter 7, pp.81-97
14	A description of where and how the electrical corporation considered undergrounding electrical distribution lines within those areas of its service territory identified to have the highest wildfire risk in a commission fire threat map	Chapter 7, pp.96-97
15	A showing that the electrical corporation has an adequately sized and trained workforce to promptly restore service after a major event, taking into account employees of other utilities pursuant to mutual aid agreements and employees of entities that have entered into contracts with the electrical corporation	Chapter 7, pp.128-130
16	Identification of any geographic area in the electrical corporation's service territory that is a higher wildfire threat than is currently identified in a commission fire threat map, and where the commission should consider expanding the high fire threat district based on new information or changes in the environment	Chapter 4, pp.27-28, 43
17	A methodology for identifying and presenting enterprise wide safety risk and wildfire-related risk that is consistent with the methodology used by other electrical corporations unless the commission determines otherwise	Chapter 4, pp.25-38

Requirement	Description	WMP Section/Page
18	A description of how the plan is consistent with the electrical corporation's disaster and emergency preparedness plan prepared pursuant to Section 768.6, including plans to restore service and community outreach	Chapter 7, pp.128-141
19	A statement of how the electrical corporation will restore service after a wildfire	Chapter 7, pp.122-124, 128-130, 134
20	Protocols for compliance with requirements adopted by the Commission regarding activities to support customers during and after a wildfire, outage reporting, support for low-income customers, billing adjustments, deposit waivers, extended payment plans, suspension of disconnection and nonpayment fees, repair processing and timing, access to electrical corporation representatives, and emergency communications	Chapter 7, pp.132-140; Chapter 8, pp.151-152
21	A description of the processes and procedures the electrical corporation will use to do the following: (A) Monitor and audit the implementation of the plan. (B) Identify any deficiencies in the plan or the plan's implementation and correct those deficiencies. (C) Monitor and audit the effectiveness of electrical line and equipment inspections, including inspections performed by contractors, carried out under the plan and other applicable statutes and commission rules.	(A) Chapter 7, pp.77-78 (B) Chapter 4, pp.40-47 (C) Chapter 7, p.78

3. ACTUAL AND PLANNED SPENDING FOR MITIGATION PLAN

3.1. Summary of WMP initiative expenditures

***Instructions**: In the Table 3-1, summarize the projected costs (in thousands) per year over the three-year WMP cycle, including actual expenditures for years passed. In Table 3-2 break out projected costs per category of mitigations, over the three-year WMP cycle. The financials represented in the summary tables below equal the aggregate spending listed in the mitigations financial tables reported quarterly. Nothing in this document shall be construed as a statement that costs listed are approved or deemed reasonable if the WMP is approved, denied, or otherwise acted upon.*

Table 3-1: Summary of WMP Expenditures - Total

	Spend (in thousands $)
2020 WMP Planned	$30,699
2020 Actual	$33,331
Difference	$(2,632)
2021 Planned	$52,007
2022 Planned	$50,210
2020-2022 Planned	$135,548

Table 3-2: Summary of WMP Expenditures by Category, Spend in thousands $

WMP Category	2020 WMP Planned	2020 Actual	Difference	2021 Planned	2022 Planned	2020-2022 Planned (with 2020 Actual)
Risk and Mapping	$-	$67	$67	$10	$10	$87
Situational Awareness	$450	$445	$(5)	$295	$240	$980
Grid Design and System Hardening	$13,241	$15,325	$2,084	$32,905	$31,863	$80,092
Asset Management and Inspections	$7,259	$3,842	$(3,416)	$2,977	$1,062	$7,881
Vegetation Management	$8,770	$12,685	$3,915	$13,580	$13,785	$40,050
Grid Operations	$-	$371	$371	$548	$950	$1,869
Data Governance	$665	$1	$(664)	$368	$301	$670
Resource Allocation	$-	$-	$-	$124	$255	$379
Emergency Planning	$240	$502	$262	$900	$1,304	$2,706
Stakeholder Cooperation and Community Engagement	$75	$92	$17	$251	$390	$734
Total	$30,699	$33,331	$2,632	$51,957	$50,160	$135,548

3.2. Summary of ratepayer impact

***Instructions**: Report the projected cost increase to ratepayers due to utility-ignited wildfires and wildfire mitigation activities engaged in each of the years below. Account for all expenditures incurred in that year due to utility-ignited wildfires / mitigation activities and provide methodology behind calculation below Table 3-3.*

Table 3-3: WMP Electricity Cost Increases to Ratepayers

	Annual performance - Actual					
Outcome Metric Name	2016	2017	2018	2019	2020	Unit(s)
Increase in electric costs to ratepayer due to utility-ignited wildfires (total)	$-	$-	$-	$-	$-	Dollar value of average monthly rate increase attributable to utility-ignited wildfires per year (*e.g.*, $3/month on average across customers for utility-ignited wildfires occurring in 20XX)
Increase in electric costs to ratepayer due to wildfire mitigation activities (total)	$-	$-	$-	$-	$-	Dollar value of average monthly rate increase attributable to WMPs per year

Methodology for electricity costs increase calculation:

Liberty interprets the category of "increase in electric costs to ratepayer due to wildfire mitigation activities" to include wildfire mitigation costs that have been reviewed by the Commission and included in rates. The increases do not include wildfire mitigation activity costs that are either still under review, that will be reviewed by the Commission for later cost recovery, or are otherwise not currently included in rates.

4. LESSONS LEARNED AND RISK TRENDS

4.1. Lessons Learned: how tracking metrics on the 2020 plan has informed the 2021 plan

***Instructions**: Describe how the utility's plan has evolved since the 2020 WMP submission. Outline any major themes and lessons learned from the 2020 plan and subsequent implementation of the initiatives. In particular, focus on how utility performance against the metrics used has informed the utility's 2021 WMP Update.*

Liberty's Wildfire Mitigation Plan ("WMP") is an actionable plan that is being fully implemented and integrated into Liberty's daily operations and will be an effective source to track risk reduction and improve efficiency through innovative system technologies. Liberty looks forward to working with the Wildfire Safety Division ("WSD") to improve reporting capabilities and developing a partnership for improving its WMP and PSPS strategies and reporting of company-specific performance metrics.[3] Because of the WSD's detailed requirements and strict compliance guidelines, Liberty has entirely re-engineered business processes and its general outlook on implementing and planning mitigation projects and efforts. In one year, Liberty has evolved from manually tracking and reporting on historic inspections using paper records to support its G.O. 165 work to completely automating current inspection records using mobile applications. In addition, Liberty has established a well-defined accounting structure to separately track WMP-related costs at the initiative level for purposes of measuring implementation and progress on mitigation efforts apart from standard operations. Liberty is also in the process of re-engineering and upgrading its GIS interface and reporting capabilities to comply with WSD's schema dictionary and mapping of assets and transmittal of data to WSD. The Commission should note that the required investment and level of commitment of a small utility to meet these reporting and data requirements has been significant.[4]

In developing its 2020 WMP, Liberty complied with the rigorous requirements outlined in the Commission's guidelines provided to all California electric utilities on December 16, 2019. In these guidelines, the Commission outlined a well-structured and very detailed WMP report that required completion of various data tables, reporting attachments, and a maturity survey.[5] In the WMP, Liberty described and developed a comprehensive WMP for over 30 initiatives that included financial forecast and units of measuring progress and future implementation and tracking performance.

Table 4-1: Major Themes and Lessons Learned from 2020 WMP and Implementation of Plan

WMP Category	Progress on implementation	Major themes and lessons learned in 2020	How performance has informed 2021 WMP
Risk Assessment & Mapping	In 2020, Liberty contracted with Reax Engineering ("Reax") to conduct a comprehensive fire spread and consequence model. Reax began its fire mapping analysis in	The study resulted in a fire risk mapping tool to be utilized as the baseline for Liberty's wildfire risk assessment. Reax identified and designated wildfire risk areas in	The WMP initiative leads will assess current wildfire mitigation efforts and will modify and refine plans to include the Reax wildfire study results, if deemed

[3] Each utility is at different phases of wildfire risk modeling and capabilities of providing data at the level WSD requires and are all held to the same standard for compliance. Liberty respectfully requests that the smaller utilities work with the WSD to develop broader quarterly reporting guidelines than those of the larger IOUs.

[4] In order to comply with the WMP quarterly reporting and annual WMP updates, Liberty has hired more support staff, including accountants, data and GIS analysts, engineers, and regulatory staff, and plans to hire additional staff to further improve risk modeling and data governance efforts.

[5] In addition to developing the WMP, Liberty provided five years of required performance metrics on risk drivers and inspection results that Liberty had to obtain from paper files and old supporting documents for reports. Beyond the data challenges, Liberty also worked to update its GIS system to identify current assets and conform to its requirements for a new data dictionary, WUI and rural/urban interfaces, mapping initiatives, and enhanced schema requirements.

WMP Category	Progress on implementation	Major themes and lessons learned in 2020	How performance has informed 2021 WMP
	May 2020 and met weekly with Liberty's WMP team to discuss underlying modeling assumptions and overall evaluation of the wildfire designated areas. The study was completed in September 2020 and was followed up with a final report and fire risk map by year-end 2020.	regionalized "polygons" that were mapped with an overlay of Liberty's overhead distribution lines. The designated high Reax wildfire areas are used by operations and engineering for planning of enhanced wildfire mitigation work.	necessary. In addition to planning what work to be performed to reduce wildfire risk, the Reax mapping will also serve to prioritize efforts within each major category given resource constraints and effectiveness of mitigating work efforts.
Situational Awareness	Liberty Installed 19 weather stations equipped with fuel moisture sensors in and across High Fire Threat Districts. Prioritization was given to installations based on Reax risk mapping designated high wildfire areas. Liberty installed SCADA controls to four additional reclosers, enhancing visibility of the system. Liberty is finalizing the implementation of the ALERTWildfire camera network partnership. Liberty developed and implemented its Fire Potential Index ("FPI") assessment tool in late 2020.	Planning and incorporating an effective situational awareness plan is a challenge. Ongoing operational planning that fully utilizes all the real-time weather data, fault detection anomalies, and predictive wildfire assessment tools are in the early phases of full integration of work processes. The collection of data needs to be analyzed, and business processes are currently in the development phase for full integration of an interactive system of data collection, analysis, and work planning.	Continuous monitoring tools, such as FPI, and installation of fault detection equipment has allowed Liberty staff to develop initial work processes and PSPS plans to monitor and adjust operations based on adverse conditions.
Grid Design and System Hardening	In 2020, Liberty conducted a system-wide inventory of all overhead assets that included enhanced G.O. 165 inspections. From this survey, Liberty now has a third-party assessment of the entire overhead system that can be used to develop programs to proactively replace its aging infrastructure. This information, although in its early development, will be used to measure future wildfire risk reductions.	With the full System Survey being completed in 2020, many programs are still in their infancy. Liberty continues to focus on oil circuit breaker replacements rather than a maintenance program at this time. Covered conductor installations are still too new to have a maintenance program. Pole replacements and maintenance items identified during the System Survey are underway and progressing well. Mitigation of PSPS impacts are being developed and implemented, including resiliency corridors and microgrids. Rule 20 undergrounding projects continue to progress, but permitting has been a challenge.	Resiliency corridors and programs look to be a good solution to mitigate both wildfire risk and PSPS impacts. Liberty will continue to explore these projects in the form of microgrids, covered conductor, and resiliency corridors where feasible. Repairs and pole replacements as a result of the System Survey will be aggressively pursued in 2021. Some of this work may extend into 2022. Expulsion fuse replacements will continue in 2021. Liberty is exploring additional technologies, such as non-expulsion arresters, to make more poles in its territory fully CAL FIRE-exempt.

LESSONS LEARNED AND RISK TRENDS

WMP Category	Progress on implementation	Major themes and lessons learned in 2020	How performance has informed 2021 WMP
Asset Management and Inspections	In 2020, Liberty utilized a contractor to perform a system-wide survey of overhead system assets to collect a complete list of equipment attached to a pole and perform detailed visual inspections. Data, including pictures and GPS coordinates, was collected via hand-held devices to be utilized for improving accuracy of the GIS. Liberty purchased licenses for the Fulcrum mobile application to transition from paper-based to electronic inspection records. The implementation was completed in April 2020.	The System Survey data has generated a significant number of G.O. 95-related repairs that Liberty is working to complete. The survey also revealed that not all field changes had been tracked in an accurate or timely manner and that improvements to those processes need to be made so the system maintains a high level of accuracy. Liberty understands that ground-based inspections have limitations, which is why it is considering other technologies, such as infrared inspections, to enhance inspection practices.	The System Survey data has helped identify assets in need of immediate remediation, repair, or replacements in 2021. While the data is still being processed, Liberty anticipates that the survey will vastly improve the accuracy of Liberty's GIS system. More accurate data will help improve future inspections and reduce the risk that assets in the field are missed due to mapping errors. The data from the survey will also improve operational awareness by allowing field crews and managers to see assets digitally before being dispatched to the location. Once the data processing is completed, Liberty expects this data set to be one of the key drivers for the Risk-Based Decision-Making ("RBDM") program currently under development.
Vegetation Management and Inspections	Liberty's vegetation management program made tremendous progress toward achieving program targets in 2020. In addition to maintaining growth in its existing initiatives, Liberty piloted and implemented new vegetation management and inspection initiatives to continue to enhance its contribution to wildfire mitigation efforts. Key achievements include: implementing the first Forest Resilience Corridors project in cooperation with the USFS on parts of the Lake Tahoe Basin Management Unit and Tahoe National Forest, performing supplemental vegetation risk inspection and mitigation of all overhead lines in Liberty's Tier 3 High Fire Threat District, beginning the implementation of fuel management projects and biomass	Liberty's facilities transverse many public lands managed by various local, state, and federal agencies. Acquiring permit for projects within these areas can be very complex with multiple agencies and departments needing to review and approve vegetation management work. This process may result in delayed project start times. Liberty has ambitious goals for its overall vegetation management program, which may lead to competing priorities and challenges when completing initiatives.	Liberty is working with local land managers to streamline the permitting process with the hope of avoiding future project delays. To accommodate increased workload related to overall program goals and to facilitate continued progress toward its vegetation management and inspection initiatives, Liberty is increasing its staffing through a combination of employees, contractors, and consultants.

WMP Category	Progress on implementation	Major themes and lessons learned in 2020	How performance has informed 2021 WMP
	removal, and piloting the use of LiDAR to perform vegetation inspections along approximately half of overhead electric lines.		
Grid Operations and Operating Protocols	In 2020, Liberty developed and implemented PSPS operations and communications protocols. These protocols, in combination with the development of the FPI and PSPS forecasting tools have helped to inform day-to-day operational decision-making.	Liberty's newly developed FPI has been incorporated into its Fire Prevention Plan, which details work procedures that must be followed based on fire risk conditions. The plan is utilized daily during fire season to inform operational decisions. Developing PSPS protocols, holding table top exercises, and training for PSPS events helped Liberty prepare for potential future PSPS events.	Liberty continually looks to improve FPI and PSPS forecast accuracy and will incorporate additional model forecast data into the existing tools where possible.
Data Governance	The System Survey asset inventory provides the basis of a fully functioning asset management system that can be used for prioritizing future work based on Reax mapping and level findings. Design and testing of cloud-based forms for data collection was implemented for this purpose in addition to the establishment of the wildfire risk SharePoint dedicated location and utilization of other visual mapping applications.	Utilization of digitally distributed field collection forms in 2020 allowed Liberty to collect, store and analyze more System Survey results than in the previous five years combined. This moved Liberty closer to total digital systems adoption for surveys and is providing a means of responding to infractions with increased speed, volume, and improved accuracy. During this process, Liberty recognized that training initiatives, increased integration of data sources, and workflow advancement would assist Liberty to further leverage data governance upgrades and adoption of new technologies. Furthermore, the ability to maximize high quality business information based on key performance measures at Liberty promotes continual process improvement, change management, and more technology-based awareness/skills programs.	The implementation of a dedicated reporting server in parallel with upgrades to GIS and incident management systems are expected to be in production by end of 2021/early 2022. These projects will provide a framework to integrate multiple data streams more efficiently and produce sophisticated reports in a fraction of the previous time required. Liberty intends to leverage its centralized data repository framework to create a series of business information dashboards and web/cloud-based performance metric display pages. In the coming years, Liberty will also leverage the new data repository framework and reporting capabilities to document wildfire-related data and algorithms (Section 7.3.7.3) and enhance analysis of near miss data (Section 7.3.7.4).
Resource Allocation Methodology	Liberty has not developed its first generation wildfire risk model in the same framework as the larger IOUs. While Liberty certainly faces	A major theme/lesson that Liberty learned is that developing the risk based decision-making ("RBDM") framework requires constant focus,	Liberty recognizes the importance and benefits of meeting and eventually exceeding the standard set by the CPUC with respect to

WMP Category	Progress on implementation	Major themes and lessons learned in 2020	How performance has informed 2021 WMP
	limitations in terms of data and resources, the company has spent the past year forming a team of analysts and a consultant to establish risk modeling capabilities. The wildfire risk model finished its development only shortly before the 2021 WMP filing. However, Liberty was able to incorporate its risk mapping information into its G.O.95 inspection targets as well as use information from that initiative to inform decisions at a high-level.	and the amount of detail and quality checks on data to construct accurate models requires much attention. The Liberty RBDM modeling team has laid the foundation for quantitative analysis to be used in forward-looking capital and O&M decision-making.	RBDM. The company has already seen its positive value by scheduling its G.O.95 targeted pole remediation plan by incorporating its detailed wildfire risk analysis alongside its intrusive inspection results. Looking ahead to 2021, Liberty plans to increase its modeling capabilities by hiring up to two additional positions to help with the quantitative aspects of managing the RBDM program.
Emergency Planning and Preparedness	Liberty filled the key positions of Emergency Manager and Fire Protection Specialist in early 2020. The Emergency Manager oversees all emergency response-related activities and public safety partnership engagements. The Fire Protection Specialist oversees fire prevention initiatives, serving as the company liaison for first responders, and public safety partners, and coordinating training for all employees and contractors. Liberty developed comprehensive operations and communications PSPS playbooks that detail operational and communications protocols to be undertaken in each of the five stages of response to extreme wildfire threat conditions, including de-energization and re-energization. Liberty hosted 29 meetings with public safety partners to provide details on Liberty's wildfire mitigation, PSPS preparedness, and community outreach efforts. Liberty held nine regional PSPS workshops and three PSPS tabletop exercises. Liberty hosted seven regional virtual town halls to provide a localized update on wildfire safety work	Wildfires have become a year-round threat in California. Throughout the year, Liberty executes comprehensive wildfire safety and PSPS preparedness outreach, using lessons learned and feedback received from other IOUs, customers, the Commission, and other stakeholders. Liberty also conducts community outreach to educate public safety partners, customers, and the general public on aspects of its wildfire mitigation practices, such as vegetation management and system hardening, and the role they play in helping to reduce wildfire risks in their communities. Please see Section 7.3.10 for more details. Existing personnel work procedures in conditions of elevated fire risk needed improvement. Improvements were made, and training was conducted in the office and field.	Liberty has focused its efforts on evaluating and expanding its current PSPS protocols. In January 2021, Liberty's fire and weather scientific consultant, Reax, formulated an enhanced version of its fire weather forecasting tool to include an additional parameter known as Burning Index, or BI. Burning Index adds an increased layer of information regarding fire potential to Liberty's already robust predictive formula. Use of this new formula, with increased information from newly installed additional weather stations, will enable further granularity in the area of alternative responses to initiating a PSPS, such as managing recloser technology, de-energizing specific circuits, and/or increasing patrols in specific geographic areas. During the 2021 fire season, Liberty will utilize both its current predictive formula and the enhanced model in order to assess improved data.

WMP Category	Progress on implementation	Major themes and lessons learned in 2020	How performance has informed 2021 WMP
	happening in respective communities. Liberty conducted training and updated personnel work procedures in conditions of elevated fire risk for field personnel.		
Stakeholder Cooperation and Community Engagement	In 2020, Liberty expanded its public education and outreach efforts associated with its wildfire mitigation plan. Safety and resiliency communications were part of Liberty's territory-wide public education campaign. These communications focused on personal preparedness and community resiliency. Additionally, Liberty: • Hosted 29 meetings with public safety partners to share information related to Liberty's wildfire mitigation efforts, PSPS preparedness, and community outreach; • Held nine regional PSPS workshops and three PSPS tabletop exercises; • Hosted seven regional virtual town halls to provide a localized update on wildfire safety work happening in respective communities; • Placed 112 posts on Liberty's social media channels; • Sent three bill inserts and direct mailers to customers; and • Conducted three customer e-mail outreach campaigns.	In 2020, Liberty prioritized outreach to its most vulnerable customers. This included outreach to Medical Baseline ("MBL") customers, such as efforts to update contact records for wildfire event communications. Liberty's wildfire mitigation communications and public education initiative consists of direct and indirect engagement through community outreach materials and engagement campaigns. Materials produced over the course of the year are tailored to match Liberty's respective audience and phase. Additionally, communications and outreach efforts will be enhanced and adjusted to reflect feedback received and emerging best practices	Liberty will continue to ground its stakeholder cooperation and community engagement initiatives in customer and stakeholder feedback received throughout each year on an annual basis. As new information, best practices, and lessons learned are available, Liberty will refine its stakeholder outreach and community engagement approach as it has done since introducing its first Wildfire Mitigation Plan. For example, Liberty's Fall 2020 survey found customers most recall wildfire and PSPS messages via email, TV, radio and social media. As a result, Liberty will continue communications via these channels in 2021.

4.2. Understanding major trends impacting ignition probability and wildfire consequence

***Instructions**: Describe how the how the utility assesses wildfire risk in terms of ignition probability and estimated wildfire consequence, including use of Multi-Attribute Risk Score (MARS) and Multi-Attribute Value Function (MAVF) as in the Safety Model and Assessment Proceeding (S-MAP)3 and Risk Assessment Mitigation Phase (RAMP), highlighting changes since the 2020 WMP report. Include description of how the utility distinguishes between these risks and the risks to safety and reliability. List and describe each "known local condition" that the utility monitors per G.O. 95, Rule 31.1, including how the condition is monitored and evaluated. In addition:*

LESSONS LEARNED AND RISK TRENDS

Liberty has modeled its risk-based decision-making ("RBDM") methodology on both the larger IOUs' structure and the Commission's guidance during the RAMP and S-MAP proceedings. Although Liberty has yet to file its General Rate Case ("GRC") with its RBDM methodology and results, it has made great strides since filing its 2020 WMP. In 2020, Liberty formed its risk assessment team to meet the near-term strategic goals and guidelines developed by the Commission in the 2020 WMP. Liberty continues to incorporate the methods in the IOU's RBDM framework, while also addressing each requirement in the CPUC's Voluntary Agreement in the RBDM Decision (D.19-04-020). Liberty began with no RBDM framework in place for 2020 and progressed to a functional first-generation RBDM model that incorporates CPUC/IOU guidance into its framework.

Liberty utilizes the Multi-Attribute Risk Score ("MARS") and Multi-Attribute Value Function ("MAVF") methodology in its wildfire risk modeling. Each of these methods properly converts natural units of risk reduced to standardized risk units reduced, allowing a direct comparison of controls and/or mitigations. Liberty has chosen to model the larger IOUs' RBDM frameworks, as these frameworks put Liberty in a better position to take advantage of the improvements the CPUC and the larger IOUs make in evaluating and benchmarking risk-spend efficiency ("RSE"). Liberty recognizes the importance of RSEs of wildfire mitigations to reduce wildfire risk in its service territory.

Liberty assesses wildfire risk through various levels of analysis. First, it analyzes its simulated burn, match-drop simulations conducted by Reax Engineering, its wildfire science consultant, which takes into account factors such as the six-hour burn area, structures destroyed, commercial value of buildings destroyed, sensitive habitats disrupted, commercial timber destroyed, fire suppression costs, and anticipated population affected by serious injuries or death. These factors are reviewed independently of the company's asset performance or risk, and a multitude of risk-profiles are created in the service territory based on both the factors mentioned above and the location of Liberty's primary overhead lines. Liberty then factors in its historical asset performance and inspection data in order to merge this information with the wildfire consequence modeling and simulations completed by Reax. Lastly, Liberty creates its various risk tranches in its service territory based on the merged information of the simulated wildfire consequence modeling, asset performance (from the Responder incident reporting system and G.O. 95 inspections), and its vegetation management reports in order to form a holistic profile of wildfire risk by region.

Recent risk analysis performed by Liberty includes utilizing a machine learning approach to model its wildfire risk. Initial data inputs include detailed historic outage records dating back to 2015 pulled from the company's outage management system (OMS). Since the OMS was fully integrated in 2017, data integrity and quality can only be reasonably analyzed for 2017-2020. In 2020, Liberty's OMS was upgraded and now incorporates an operations focus on reporting quality and training of its dispatch crew and outage tracking. The upgraded outage system now tracks data points required by the Commission, such as event ignition type, number of splices, splice type, geolocation, wire-down, bare wire, and whether equipment was energized. This data granularity will take time to mature but serves as a new baseline for tracking outage details over previous outage data collection.

Machine learning neural network methods are preferable over regression modeling because the ultimate goal is to predict ignitions based on input characteristics instead of explaining the variance of ignitions based on a set of input characteristics. This new type of risk evaluation can serve to observe which ignition types influence the change in the level of ignition events using a time-series multi-variate regression model. The exercise of forecasting ignitions using a neural network machine learning approach is still new to Liberty, but initial analysis shows reasonable results.

Wildfire risk is reviewed separately from public safety, employee/contractor safety, or distribution asset performance in Liberty's RBDM framework. Although Liberty has not yet filed its GRC with its RBDM framework included, Liberty has produced wildfire risk models to calculate RSEs modeled in the same fashion as in the RAMP/S-MAP proceedings. The public safety, employee/contractor safety, and distribution asset performance risks will be separated into three distinguishable risk groups, exclusive of how Liberty models wildfire risk. It should be noted however, that the

consequence modeling of the wildfire risk bow-tie analysis includes analysis of serious injuries, deaths, and customer minutes of interruption – similar to how the large IOUs have modeled the bow-ties in their RBDM frameworks.

Liberty designs, constructs, and maintains facilities in accordance with G.O. 95, as well as in accordance with known local conditions that require a higher standard than specified in G.O. 95 to enable the furnishing of safe, proper, and adequate service. Specifically, because Liberty's service territory is over 3,000 feet above sea level, Liberty adheres to Grade A - Heavy Loading District construction, per G.O. 95, Rule 43.1.

A. *Describe how the utility monitors and accounts for the contribution of weather to ignition probability and estimated wildfire consequence in its decision-making, including describing any utility-generated Fire Potential Index or other measure (including input variables, equations, the scale or rating system, an explanation of how uncertainties are accounted for, an explanation of how this index is used to inform operational decisions, and an explanation of how trends in index ratings impact medium-term decisions such as maintenance and longer-term decisions such as capital investments, etc.).*

Please refer to Section 4.5.1.4, which explains how Liberty monitors and adjust work conditions based on weather.

B. *Describe how the utility monitors and accounts for the contribution of fuel conditions to ignition probability and estimated wildfire consequence in its decision-making, including describing any proprietary fuel condition index (or other measures tracked), the outputs of said index or other measures, and the methodology used for projecting future fuel conditions. Include discussion of measurements and units for live fuel moisture content, dead fuel moisture content, density of each fuel type, and any other variables tracked. Describe the measures and thresholds the utility uses to determine extreme fuel conditions, including what fuel moisture measurements and threshold values the utility considers "extreme" and its strategy for how fuel conditions inform operational decision-making.*

Seasonal variations in fuel moisture conditions are tracked through a combination of analytical methods and field-based fuel moisture sampling. For the former, observed and forecasted Energy Release Component ("ERC") percentiles from the USFS Wildland Fire Assessment System ("WFAS") are used to monitor intermediate to long-term fuel dryness. The data is generated from Remote Automated Weather Station ("RAWS") observations and the National Weather Service ("NWS") National Digital Forecast Database ("NDFD"). WFAS data is supplemented with in-situ fuel moisture sampling. In 2020, weekly or bi-weekly fuel moisture sampling was conducted at seven separate locations in and around the Greater Lake Tahoe Area. In 2021, weekly fuel moisture sampling will be conducted, and sampling locations will be expanded to additional sites in the Southern (Topaz/Walker) and Northern (Portola/Sierra Brooks) parts of Liberty's service territory. Fuel moisture sampling is targeted at values that are most difficult to accurately calculate from weather observations, including 1,000-hour dead fuel moisture, live woody fuel moisture, and foliar moisture content. These readings serve as a check on the automated WFAS ERC percentiles and inform fire behavior calculations that are conducted when adverse weather conditions are forecast to occur.

4.2.1. Service territory fire-threat evaluation and ignition risk trends

***Instructions**: Discuss fire-threat evaluation of the service territory to determine whether an expanded High Fire Threat District (HFTD) is warranted (i.e., beyond existing Tier 2 and Tier 3 areas). Include a discussion of any fire threat assessment of its service territory performed by the electrical corporation, highlighting any changes since the prior WMP report. In the event that the electrical corporation's assessment determines the fire threat rating for any part of its service territory is insufficient (i.e., the actual fire threat is greater than what is indicated in the CPUC Fire Threat Map and High Fire Threat District designations), the corporation shall identify those areas for consideration of HFTD modification, based on the new*

information or environmental changes. To the extent this identification relies upon a meteorological or climatological study, a thorough explanation and copy of the study shall be included.

Liberty commissioned Reax to increase the precision and accuracy of assessing wildfire risk in Liberty's service territory. As part of Reax's analysis of wildfire conditions risk (separate from the asset performance and state of vegetation proximate to Liberty assets) in different locations within Liberty's service territory, Reax employed its fire propagation models and observed the consequences of the spread. The fire risk quantification methodology converts environmental, statistical, and scientific data into an easily understood graphical format that identifies regions of elevated fire risk from utility infrastructure. Reax's analysis showed two major findings in Liberty's service territory. The first finding was that the current HFTD Tier 3 zone in the southeast part of the South Lake Tahoe region, aligned very close with the Reax fire risk region (called "polygons" in the analysis) – denoted with a "Very High" fire risk rating. The second finding was that, within the regions currently labeled as HFTD Tier 2 in the service territory, Reax was able to identify four different risk profiles: Low, Moderate, High, and Very High. Notably, the Fallen Leaf region in the southwestern part of the South Lake Tahoe region was a region Reax identified as Very High fire risk but is scored as HFTD Tier 2.

Liberty is open to working with WSD on developing new fire risk zones that incorporate the analysis performed by Reax. Presently, approximately 92% of the service territory lies within HFTD Tiers 2 and 3.

List and describe any macro trends impacting ignition probability and estimated wildfire consequence within utility service territory, highlighting any changes since the 2020 WMP report:

1. *Change in ignition probability and estimated wildfire consequence due to climate change*
2. *Change in ignition probability and estimated wildfire consequence due to relevant invasive species, such as bark beetles*
3. *Change in ignition probability and estimated wildfire consequence due to other drivers of change in fuel density and moisture*
4. *Population changes (including Access and Functional Needs population) that could be impacted by utility ignition*
5. *Population changes in HFTD that could be impacted by utility ignition*
6. *Population changes in WUI that could be impacted by utility ignition*
7. *Utility infrastructure location in HFTD vs non-HFTD*
8. *Utility infrastructure location in urban vs rural vs highly rural areas*

Please see Table 4-2 below.

Table 4-2: Macro Trends Impacting Ignition Probability and/or Wildfire Consequence

Rank	Macro trends impacting utility ignited ignition probability and estimated wildfire consequence by year 10	Comments
1	Change in ignition probability and estimated wildfire consequence due to climate change	Reduction in live and dead fuel moisture values relative to the historical baseline correlate with increased fire severity. Tree mortality induced by climate change may increase ignitions associated with trees contacting powerlines. Hotter summers with drought conditions and more extremes in the winter may also contribute to change in ignition probability.

Rank	Macro trends impacting utility ignited ignition probability and estimated wildfire consequence by year 10	Comments
5	Change in ignition probability and estimated wildfire consequence due to relevant invasive species, such as bark beetles	Tree mortality induced by disturbances, such as bark beetles, may increase ignitions associated with trees contacting power lines. The relationship between tree mortality and fire behavior is not clear and remains an active research area. Vegetation, such as cheatgrass, has taken over native grasslands and is highly flammable.
2	Change in ignition probability and estimated wildfire consequence due to other drivers of change in fuel density and moisture	Over 100 years of fire suppression and exclusion have contributed to higher fuel loading, which results in a shift from frequent, low intensity fires that benefit the landscape to periodic, intense fires that have negative effects.
7	Population changes (including Access and Functional Needs population) that could be impacted by utility ignition	This macro trend was interpreted to refer to aging population and individuals with limited mobility and/or cognitive impairments and how they could be impacted by utility-caused ignitions. Because urban populations are relatively scarce, this macro trend is not viewed as a major driver of fire consequence in Liberty's service territory.
8	Population changes in HFTD that could be impacted by utility ignition	Future demographic trends are unknown, and a macro trend is not considered a major driver of fire consequence in Liberty's service territory.
6	Population changes in WUI that could be impacted by utility ignition	Structures in Wildland Urban Interface or Intermix are more vulnerable to fire losses than those in urbanized areas. As more structures are built in WUI/Intermix areas, fire losses from all causes, not just utility ignitions, may increase.
3	Utility infrastructure location in HFTD vs. non-HFTD	As additional utility infrastructure is added to HFTD areas to serve new development, ignition probability may increase due to the presence of utilities in areas that previously had no utility infrastructure. This increase in ignition probability could potentially be partially offset by improved real-time monitoring of circuits and fire prevention measures, including de-energization under appropriate circumstances.

Rank	Macro trends impacting utility ignited ignition probability and estimated wildfire consequence by year 10	Comments
4	Utility infrastructure location in urban vs. rural vs. highly rural areas	As more structures are built and connected to the grid in rural and highly rural areas, increased presence of utilities in areas that previously contained no utilities may increase ignition probability. This increase in ignition probability could potentially be partially offset by improved real-time monitoring of circuits and other fire prevention measures, including de-energization under appropriate circumstances.

4.3. Change in ignition probability drivers

***Instructions**: Based on the implementation of the above wildfire mitigation initiatives, explain how the utility sees its ignition probability drivers evolving over the 3-year term of the WMP, highlighting any changes since the 2020 WMP report. Focus on ignition probability and estimated wildfire consequence reduction by ignition probability driver, detailed risk driver, and include a description of how the utility expects to see incidents evolve over the same period, both in total number (of occurrence of a given incident type, whether resulting in an ignition or not) and in likelihood of causing an ignition by type. Outline methodology for determining ignition probability from events, including data used to determine likelihood of ignition probability, such as past ignition events, number of risk events, and description of events (including vegetation and equipment condition).*

Two factors to consider when evaluating trends in ignition probability drivers from Liberty's data are the increased focus on accuracy and detail recorded in Liberty's outage management reporting tool Responder and the ramping up of wildfire mitigation activities that Liberty plans to implement in 2021 and beyond. Compared to many of the other California utilities, Liberty has the shortest history of outage data, only going back reliably to 2015. Additionally, many of Liberty's WMP strategies prior to 2020 were compliance-driven and routine and generally did not exceed regulatory requirements.

Given those factors, Liberty can determine trends in its data from 2015-2020, and looking ahead to 2021 and beyond. One risk driver that shows an increasing trend is vegetation-related outages. Liberty averaged approximately 26 vegetation-related outages per year from 2015-2018. Factoring in future vegetation management activity and the recent trend, it is reasonable to forecast about 20 incidents a year for 2021-2022. Additionally, in 2020 Liberty began investigating and recording vegetation related outages. Over time, this new dataset will provide more opportunity to target and remediate vegetation related outages more specifically. Liberty's comprehensive vegetation management program will eventually lead to an overall reduction of vegetation related outages and increased reliability, but furthermore the outage investigation data will provide better information regarding outages that occur during fire season, which provides opportunity to specifically target vegetation risk related to wildfire. In 2020, Liberty performed vegetation management on over 11,000 trees.

Another driver with recent increases in reported issues was animal-related contact. Liberty averaged about approximately seven animal-related outages per year during 2015-2018, recorded 22 animal-related outages in 2019, and recorded 21 animal-related outages in 2020. Because the company plans to increase its covered conductor program to protect against this ignition-inducing driver, it is reasonable to forecast about 15 incidents a year for 2021-2022.

Fuse damage or failure is not straightforward to forecast. The difficulty arises because many incidents for which the cause is not known, or dispatcher notes may not be complete enough to determine an exact cause, the default issue logged is a "fuse failure." Factoring in the upgraded features in its Responder outage reporting program, and an increased focus of capturing exact causes of outages, Liberty projects a slight decrease in the annual number looking ahead. Additionally, Liberty continues to replace conventional fuses with non-expulsive type fuses, which eliminates the ignition risk even when the fuse fails.

Transformer-related outages increased during the 2015-2018 timeframe. After averaging approximately nine incidents during 2015-2018, Liberty recorded 23 incidents in 2019 and 34 incidents in 2020.

Through its covered conductor program, incorporation of LiDAR, and increased attention to vegetation management, Liberty expects incidents related to vegetation-related outages and animal-related outages to decrease or remain flat. As mentioned above, fuse failures are difficult to track, and Liberty also plans to replace its older fuses with new non-expulsion fuses. Liberty will continue to monitor the trend of increased transformer-related outages.

4.4. Research proposals and findings

***Instructions**: Report all utility-sponsored research proposals, findings from ongoing studies and findings from studies completed in 2020 relevant to wildfire and PSPS mitigation.*

4.4.1. Research proposals

***Instructions**: Report proposals for future utility-sponsored studies relevant to wildfire and PSPS mitigation. Organize proposals under the following structure:*

1. *Purpose of research – brief summary of context and goals of research*
2. *Relevant terms - Definitions of relevant terms (e.g., defining "enhanced vegetation management" for research on enhanced vegetation management)*
3. *Data elements - Details of data elements used for analysis, including scope and granularity of data in time and location (i.e., date range, reporting frequency and spatial granularity for each data element, see example table below)*
4. *Methodology - Methodology for analysis, including list of analyses to perform; section shall include statistical models, equations, etc. behind analyses*
5. *Timeline - Project timeline and reporting frequency to WSD*

Distribution Fault Anticipation (DFA) - In its 2020 WMP, Liberty discussed plans to participate in a collaborative research project with Texas A&M to evaluate an emerging technology, Distribution Fault Anticipation ("DFA").

1. Purpose of research – DFA is a technology developed by Texas A&M to analyze high-fidelity current waveforms with algorithms to anticipate the type and location of common electrical distribution failures. DFA hardware installed in Liberty's service territory aims to increase the accuracy of the technology by providing additional data to the algorithms that are used to identify distribution asset failures. The deployment of DFA technology will help to anticipate potential distribution failures and reduce ignition potential in the service territory.
2. Relevant terms – N/A
3. Data elements – N/A
4. Methodology – N/A
5. Timeline – DFA hardware will installed by the end of 2021 and will be evaluated throughout 2022.

High Impedance Fault Detection ("HIFD")

1. Purpose of research – Liberty is planning to collaborate with the University of Nevada, Reno to investigate the ability of HIFD to mitigate ignition potential during high impedance faults. The research will determine the ability of the HIFD capable relays to detect high impedance faults and determine if the faults would have been detected using traditional overcurrent methods. The research also hopes to conclude if HIFD can clear faults fast enough to reduce ignition potential.
2. Relevant terms – N/A
3. Data elements – N/A
4. Methodology – N/A
5. Timeline – After delays in the project timeline, HIFD is set to be deployed in 2021.

4.4.2. Research findings

***Instructions**: Report findings from ongoing and completed studies relevant to wildfire and PSPS mitigation. Organize findings reports under the following structure:*

1. *Purpose of research - Brief summary of context and goals of research*
2. *Relevant terms - Definitions of relevant terms (e.g., defining "enhanced vegetation management" for research on enhanced vegetation management)*
3. *Data elements - Details of data elements used for analysis, including scope and granularity of data in time and location (i.e., date range, reporting frequency and spatial granularity for each data element, see example table above)*
4. *Methodology - Methodology for analysis, including list of analyses to perform; section shall include statistical models, equations, etc. behind analyses*
5. *Timeline - Project timeline and reporting frequency to WSD. Include any changes to timeline since last update*
6. *Results and discussion – Findings and discussion based on findings, highlighting new results and changes to conclusions since last update*
7. *Follow-up planned – Follow up research or action planned as a result of the research*

Liberty does not have research findings to present at this time as the technologies have not yet been deployed. Liberty will provide research findings in future WMP updates.

4.5. Model and metric calculation methodologies

4.5.1. Additional models for ignition risk probability, wildfire and PSPS risk

***Instructions**: Report details on methodology used to calculate or model ignition probability, potential impact of ignitions and / or PSPS, including list of all input used in impact simulation; data selection and treatment methodologies; assumptions, including Subject Matter Expert (SME) input; equation(s), functions, or other algorithms used to obtain output; output type(s), e.g., wind speed model; and comments.*

For each model, organize details under the following headings:

1. *Purpose of model - Brief summary of context and goals of model*
2. *Relevant terms - Definitions of relevant terms (e.g., defining "enhanced vegetation management" for a model on vegetation-related ignitions)*

3. *Data elements - Details of data elements used for analysis, including scope and granularity of data in time and location (i.e., date range, reporting frequency and spatial granularity for each data element, see example table above)*
4. *Methodology - Methodology and assumptions for analysis, including Subject Matter Expert (SME) input; equation(s), functions, statistical models, or other algorithms used to obtain output*
5. *Timeline – Model initiation and development progress over time. If updated in last WMP, provide update to changes since prior report.*
6. *Application and results – Explain where the model has been applied, how it has informed decisions, and any metrics or information on model accuracy and effectiveness collected in the prior year.*

4.5.1.1. Model: Probability of Ignition ("POI") Inputs

1. Purpose of model – Observe and quantify the POI at the asset level, which is subsequently fed into risk-modeling inputs.

2. Relevant terms – POI = probability of ignition event. Risk = Ignition probability x consequence of utility started wildfire.

3. Data elements – Historic logged ignitions from Responder outage management system.
    a. Data source – Responder Outage Management System.
    b. Collection Period – 2015-2020
    c. Collection Frequency – Per ignition event/outage
    d. Granularity – Circuit and structure level

4. Methodology – Liberty will observe its historic ignitions and the drivers for these ignitions. Liberty will also trace the location, HFTD, Reax wildfire threat polygon area, time, cause, and equipment for which the ignition took place. Liberty plans to improve its sophistication looking ahead if technologies become available but, for the upcoming period, will utilize the data from Responder in its risk models.

5. Timeline – Reax completed the analysis and fires spread modeling efforts for Liberty in Q3 2020.

6. Application and results – Liberty is now able to observe its consequence of wildfire risk, utilizing the probability of ignition, driver-type, location, and Reax-defined polygoned areas. The models are identifiable at the circuit and polygon level to refine its targeted mitigations and existing controls.

4.5.1.2. Model: Consequence Modeling from Wildfire Risk Model

1. Purpose of model – Utilizing Reax match drop simulation methods to model fire consequence at various parts of the utility's service territory.

2. Relevant terms – Risk = Ignition probability x consequence of utility started wildfire.

3. Data elements – Temperature, fuel moisture, wind speed/direction, vegetation density/type, precipitation, cloud cover.
    a. Data source – North American Regional Reanalysis ("NARR"); Weather Research and Forecasting ("WRF"); Modified Fosberg Fire Weather Index ("MFFWI")
    b. Collection Period – NAPR from 1979-2018, WRF from 1979-2019, MFFWI from 2000-2019
    c. Collection Frequency – NAPR: every three hours; WRF: one hour; MFFWI: three hours

   d. Granularity – NAPR: 32 km x 32 hm resolution; WRF: humidity 1.2 km, temperature 1.2 km, moisture 1.2 km, wind speed/direction 1.2 km; MFFWI: wind – 10 m, temperature – 2 m, humidity – 2 m

4. Methodology –
   a. NARR: The NARR dataset is maintained by the National Centers for Environmental Prediction, the National Weather Service, and the National Oceanic and Atmospheric Administration. It is a gridded meteorological dataset that provides a "snapshot" of the atmosphere every 3 hours at approximately 32 km resolution. Being a reanalysis, NARR is a hybrid of weather modeling and meteorological observations (surface observations of temperature, relative humidity, wind speed/direction, and precipitation, weather balloon observations of wind speed/direction and atmospheric, sea surface temperatures from buoys, satellite imagery for cloud cover and precipitable water, etc.). Ingested data include not only surface (meaning near ground level) quantities but also upper atmosphere quantities as well. The NARR dataset is available from 1979, when modern satellites first became available to current day, with a lag of a few weeks.
   b. WRF: The WRF model is then used to generate wind and weather fields only for those days identified as being significant from a fire weather perspective. Although NARR's 32 km resolution is too coarse to be useful for fire spread modeling purposes, it can be used to identify historical fire weather days to be recreated at higher resolution using WRF. With historical weather dates now identified, a 41-year (1979-2019) fire weather climatology was developed using the WRF model to recreate historical days of fire weather significance across the analysis area.
   c. MFFWI: The first step in identifying historical fire weather days is selection of a single criterion that can be used to identify the most severe fire weather conditions in the NARR dataset. While there are many possibilities, a modification to the Fosberg Fire Weather Index (FFWI) was selected because it combines temperature, relative humidity, and wind speed into a single index.

5. Timeline – Reax Engineering completed the analysis and fire spread modeling efforts for Liberty in Q3 2020.

6. Application and results – Liberty is able to incorporate the results of Reax's analysis into its consequence modeling for utility wildfire risk. Consequences that will utilize the outputs from Reax's models will include safety, financial, and environmental consequences. All potential factors were considered in assigning an overall wildfire risk rating to the various polygons in Liberty's service territory.

4.5.1.3. Model: PSPS Risk Model (In Development)

1. Purpose of Model – Liberty is currently assessing its methods to evaluate PSPS. The company is considering PSPS risk and modeling it as a future control/mitigation while considering the economic cost burdens to ratepayers.

2. Relevant terms – MARS/MAVF: Multi-Attribute Risk Score & Multi-Attribute Value Function.

3. Data elements – Liberty plans to utilize all available information relevant to its risk modeling methodology. Currently, Liberty has very little historical data and no developed model to account for PSPS. Following CPUC guidance, Liberty plans to model PSPS events in its upcoming GRC.
   a. Data source – N/A
   b. Collection Period – N/A
   c. Collection Frequency – N/A
   d. Granularity – PSPS risks will eventually be able to be modeled by HFTD, Reax polygon, and circuit level

4. Methodology – Liberty continues to evaluate how it will approach PSPS. Liberty has attended numerous RAMP/S-MAP conferences and absorbed much of the discussion around modeling PSPS from both the IOU standpoint and the Commission's standpoint. One approach that Liberty is considering is keeping the PSPS a control/mitigation but factoring in the large economic cost to its customer base from the power shutoffs. This approach would compare the significant cost to any benefit the shutoffs would provide to prevent wildfire risk. Furthermore, the analysis of economic cost of power will certainly include residential customers and not just commercial customers.

5. Timeline – PSPS risk models will be available in approximately Q2 2021. Liberty looks forward to the guidance and specific direction related to PSPS risk and mitigation.

6. Application and results – N/A

4.5.1.4. Model: Fire Potential Index (FPI)

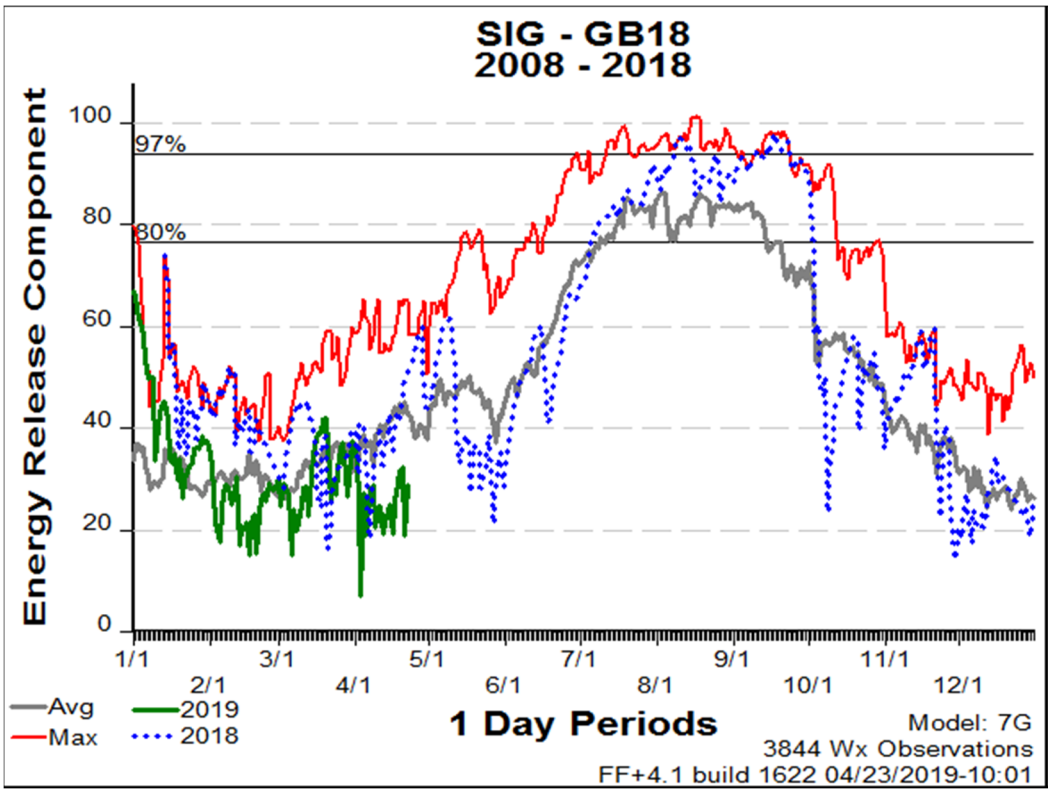
1. Purpose of model – The FPI is intended to communicate daily localized wildfire potential using easily understood classifications (low, medium, high, very high, and extreme) to forecast out the next week.

2. Relevant terms - Burning Index ("BI") = An estimate of the potential difficulty of fire containment as it relates to the flame length at the head of the fire; Energy Release Component ("ERC") = The computed total heat release per unit area (Btu/ft2) within the flaming front at the head of a moving fire; National Fire Danger Rating System ("NFDRS") = the United States' fire danger rating system intended to quantify fire threat and relative severity of burning conditions.

3. Data elements – As described in the methodology section below, Liberty's FPI is calculated from two NFDRS indices. The first index, ERC, quantifies intermediate to long-term dryness. The second index, BI, quantifies its proportion to flame length of a head fire and is directly related to fire suppression effectiveness and difficulty of fire containment.

   ERC is calculated from Remote Automated Weather Station ("RAWS") observations as part of the NFDRS. A given ERC value is 4% of the energy per unit area, in units of Btu/ft2, that would be released during a fire. Therefore, multiplying an ERC value by 25 gives the number of Btu per square foot that would be released in the flaming front of a fire. ERC depends on live and dead fuel loading by size class (as characterized by an NFDRS fuel model), as well as fuel moisture content of live and dead fuels. In addition to dependence on fuel loading assigned to each fuel model, ERC varies due to changes in moisture content of both live and dead fuels, which are, in turn, dependent on prior precipitation, relative humidity, and temperature. Figure 4-1 below shows a representative yearly variation in ERC in the Western U.S. Because ERC depends on fuel loading/fuel model at each RAWS, absolute ERC values are usually converted to percentiles to facilitate comparison of seasonal ERC trends between RAWS stations with different fuel models.

Figure 4-1: Representative Yearly Variation in ERC in the Western US



BI is conventionally interpreted as head fire flame length, in feet, multiplied by 10. For example, a BI of 80 corresponds to a head fire flame length of approximately eight feet. BI is more sensitive to short-term fluctuations in environmental conditions, particularly wind, than ERC.

For fire danger rating purposes, ERC and BI are often normalized against historical weather conditions so they can be reported as percentiles, which may provide a better indication of fire danger than absolute values. For the purposes of calculating Liberty's FPI, ERC and BI percentile forecasts are obtained from the U.S. Forest Service ("USFS") Wildland Fire Assessment System ("WFAS") (https://wfas.net).

4. Methodology – A 2019 USFS study demonstrated that a simple fire danger index that combines ERC and BI percentiles is strongly correlated with historical fire occurrence and ultimate fire size. Analysis of historical fire records (Figure 4-2) has shown that 13% of new fires and 33% of eventual burned area occurred when fires were ignited when ERC and BI were both above 90th percentile. Similarly, 28% of new fire reports and 57% of eventual acres burned occurred when both indices were above 80th percentile. Leveraging these findings, Liberty's FPI is calculated by converting ERC and BI percentiles obtained from the USFS WFAS into FPI adjectives using Table 4-3.

Figure 4-2: New fire reports (a) and eventual acres burned (b) as a function of ERC and BI percentiles. Color scales indicate the amount of fire activity observed in each joint bin and the percentages indicate the proportion of fire activity observed in each joint bin

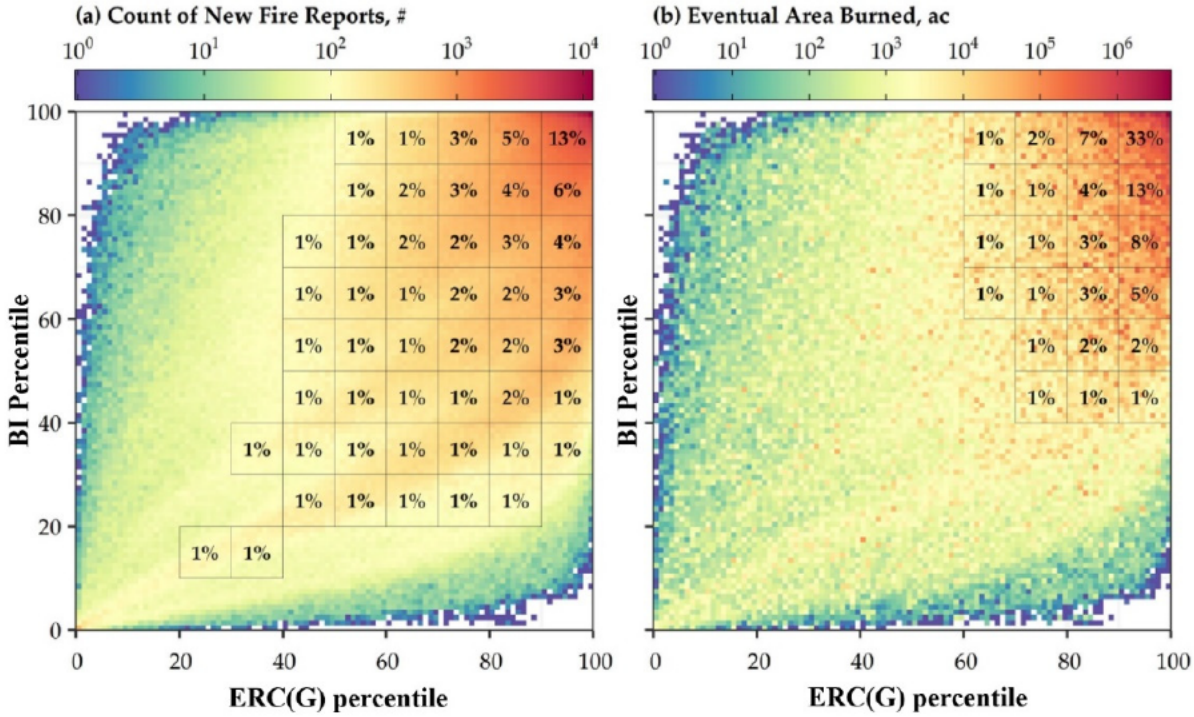


Table 4-3: Liberty FPI Ratings and a Function of ERC and BI Percentiles

BI Percentile						
	97-100					Extreme
	90-97				Very High	
	80-90			High		
	60-80		Moderate			
	0-60	Low				
		0-60	60-80	80-90	90-97	97-100
		ERC Percentile				

5. Timeline – Liberty introduced the FPI to support operations at the start of 2020 fire season. Assessment of the model, enhancements to the automated analytics and monitoring system, and other verification efforts are ongoing.

6. Application and results – FPI is used to inform reactive and proactive operational practices through standard operating procedures. Use of the FPI is expected to enable Liberty to reduce the probability of its facilities and operations leading to an ignition, especially during times of elevated wildfire risk.

4.5.2. Calculation of key metrics

***Instructions**: Report details on the calculation of the metrics below. For each metric, a standard definition is provided with statute cited where relevant. The utility must follow the definition provided and detail the procedure they used to calculate the metric values aligned with these definitions. Utilities must cite all data sources used in calculating the metrics below.*

1. *Red Flag Warning overhead circuit mile days - Detail the steps to calculate the annual number of red flag warning (RFW) overhead (OH) circuit mile days. Calculated as the number of circuit miles that were under an RFW multiplied by the number of days those miles were under said RFW. Refer to Red Flag Warnings as issued by the National Weather Service (NWS). For historical NWS data, refer to the Iowa State University Iowa archive of NWS watch / warnings. Detail the steps used to determine if an overhead circuit mile was under a Red Flag Warning, providing an example of how the RFW OH circuit mile days were calculated for a Red Flag Warning that occurred within utility territory over the last five years.*
2. *High Wind Warning overhead circuit mile days – Detail the steps used to calculate the annual number of High Wind Warning (HWW) overhead circuit mile days. Calculated as the number of overhead circuit miles that were under an HWW multiplied by the number of days those miles were under said HWW. Refer to High Wind Warnings as issued by the National Weather Service (NWS). For historical NWS data, refer to the Iowa State University Iowa archive of NWS watch / warnings. Detail the steps used to determine if an overhead circuit mile was under a High Wind Warning, providing an example of how the OH HWW circuit mile days were calculated for a High Wind Warning that occurred within utility territory over the last five years.*
3. *Access and Functional Needs population – Detail the steps to calculate the annual number of customers that are considered part of the Access and Functional Needs (AFN) population. Defined in Government Code § 8593.3 and D.19-05-042 as individuals who have developmental or intellectual disabilities, physical disabilities, chronic conditions, injuries, limited English proficiency or who are non-English speaking, older adults, children, people living in institutionalized settings, or those who are low income, homeless, or transportation disadvantaged, including, but not limited to, those who are dependent on public transit or those who are pregnant.*
4. *Wildlife Urban Interface – Detail the steps to calculate the annual number of circuit miles and customers in Wildlife Urban Interface (WUI) territory. WUI is defined as the area where houses exist at more than 1 housing unit per 40 acres and (1) wildland vegetation covers more than 50% of the land area (intermix WUI) or (2) wildland vegetation covers less than 50% of the land area, but a large area (over 1,235 acres) covered with more than 75% wildland vegetation is within 1.5 mi (interface WUI) (Radeloff et al, 2005).7*
5. *Urban, rural and highly rural – Detail the steps for calculating the number of customers and circuit miles in utility territory that are in highly rural, rural, and urban regions for each year. Use the following definitions for classifying an area highly rural/rural/urban (also referenced in glossary):*
    a. *Highly rural – In accordance with 38 CFR 17.701, "highly rural" shall be defined as those areas with a population of less than 7 persons per square mile as determined by the United States Bureau of the Census. For the purposes of the WMP, "area" shall be defined as census tracts.*

b. *Rural – In accordance with G.O. 165, "rural" shall be defined as those areas with a population of less than 1,000 persons per square mile as determined by the United States Bureau of the Census. For the purposes of the WMP, "area" shall be defined as census tracts.*
c. *Urban – In accordance with G.O. 165, "urban" shall be defined as those areas with a population of more than 1,000 persons per square mile as determined by the United States Bureau of the Census. For the purposes of the WMP, "area" shall be defined as census tracts.*
d. *Population density numbers are calculated using the American Community Survey (ACS) 1-year estimates on population density by census tract for each corresponding year (2016 ACS 1-year estimate for 2016 metrics, 2017 ACS 1-year estimate for 2017 metrics, etc.). For years with no ACS 1-year estimate available, use the 1-year estimate immediately before the missing year (use 2019 estimate if 2020 estimate is not yet published, etc.)*

1. Red Flag Warning overhead circuit mile days – First, the NWS watch/warning shapefiles are downloaded from Iowa State's archive for the past five years. The archive is then filtered to separate Red Flag Warning events. Next, the RFW shapefile is clipped to Liberty's service territory, and the duration of the RFW is calculated using the difference between the start and end times. The resultant shapefile overlaid on Liberty's GIS allows for the calculation of RFW circuit mile days.

2. High Wind Warning overhead circuit mile days – The process for calculating High Wind Warning overhead circuit mile days is identical to the above except the Iowa State NWS archive is filtered for High Wind Warnings.

3. Access and Functional Needs (AFN) population – Liberty tracks the following categories within Liberty's databases to be AFN: customers enrolled in the California Alternate Rates for Energy (CARE) Program and the Medical Baseline ("MBL") Program. As of February 3, 2021, there are 3,793 CARE customers and 259 MBL customers in the Liberty service territory.

4. Wildland Urban Interface – WUI polygons for the State of California were downloaded from the following website: http://silvis.forest.wisc.edu/data/wui-change/. For the calculation, the field "Wuiflag10" was used. According to the website, WUI polygon consists of interface or urban (wuiflag10=2) and intermix or rural (wuiflag10=1). The annual number of circuit miles and customers in the WUI polygons was calculated using spatial analysis. The mileage and customer count was recalculated in newly created output and reported. The sources of the data were Liberty distribution/transmission lines and meter location data layer.

5. Urban, rural and highlight rural – To populate circuit miles and number of customers in urban, rural, and highly rural areas, Liberty used U.S. Census Bureau, 2015-2019 American Community Survey 5-Year Estimates. Population density was calculated per each census tract, which was then used to determine if the tract falls under urban (>1,000 people), rural (seven-999 people), or highly rural (fewer than seven people). Geospatial overlay of Liberty's circuits and meters within urban, rural, and highly rural areas was performed, and then Liberty calculated the total number of meters and circuit miles within each category.

4.6. Progress reporting on past deficiencies

***Instructions**: Report progress on all deficiencies provided in the 2020 WMP relevant to the utility. This includes deficiencies in Resolution WSD-002.*

Table 4-4: List of Liberty Deficiencies and Summary of Response, 2020

Deficiency Number	Deficiency Title	Utility Response (brief summary)	Referenced Documents	WSD Action
Guidance-3, Class A	Lack of Risk Modeling to inform Decision-Making	Liberty has established an interim risk modeling approach designed to inform management of various risk factors (tree risk, asset risk, wildfire risk, and performance risk) used to profile risk by circuit and target areas of concern. This modeling approach uses quantitative metrics (asset condition, tracking ignition drivers, and tree hazards) that will also be utilized in the RBDM model.	WSD Evaluation of Liberty's Remedial Action plan	WSD's findings for Liberty's Condition Guidance-3 response was insufficient. WSD lists 11 action statements for Liberty to complete in its 2021 WMP submission.
Guidance-1, Class B	Lack of risk spend efficiency (RSE) information	Liberty is building its wildfire risk model with the support of its wildfire engineering consultant. Currently, Liberty estimates that its model is approximately 75% complete. The wildfire risk model will resemble those of the larger IOUs, utilizing methods such as MARS/MAVF and RSE.	WSD Evaluation of Liberty's First Quarterly Report	Action LIB-1: In its 2021 WMP Update, Liberty shall use its completed wildfire risk model to inform and provide: 1) the calculated reduction in ignition risk for each initiative in its 2021 WMP Update, and 2) the calculated reduction in wildfire consequence risk for each initiative in its 2021 WMP Update.
Guidance-4, Class B	Lack of discussion on PSPS impacts	Most WMP initiatives generally support Liberty's vision for mitigating PSPS events and customer impacts resulting from PSPS events. Liberty's PSPS thresholds are currently fixed and do not change based on initiative progress. Liberty anticipates that, as these initiatives progress, more data can be used to evaluate wildfire risk reduction impacts. Liberty may find a different way to combine existing fire and weather based threshold modeling with initiative risk reduction.	WSD Evaluation of Liberty's First Quarterly Report	Action LIB-2: In its 2021 WMP Update, Liberty shall detail how each initiative in its WMP: 1) affects its threshold values for initiating PSPS events, 2) is expected to reduce the frequency of PSPS events, 3) is expected to reduce the scope of PSPS events, 4) is expected to reduce the duration of PSPS events, and 5) supports its directional vision for necessity of PSPS.
Guidance-6, Class B	Failure to disaggregate WMP initiatives from standard operations	Liberty provided a table that lists each WMP initiative, classifies the initiative as standard operations or augmented operations, and provides the account tracking number for the initiative.	WSD Evaluation of Liberty's First Quarterly Report	Action LIB-3: In its 2021 WMP Update, Liberty shall provide an updated table that shows the account tracking number for each of its WMP initiatives. Where an account is not yet created or otherwise unavailable for a WMP initiative, Liberty shall explain the delay and describe how it tracked the 2020 costs of those initiatives.

Deficiency Number	Deficiency Title	Utility Response (brief summary)	Referenced Documents	WSD Action
Guidance-9, Class B	Insufficient discussion of pilot programs	While none of the pilot programs are mature enough to have performance metrics, Liberty will use a similar method in tracking performance as proposed for covered conductor. Liberty uses an interactive visualization tool to display detailed historic outage information from 2015-2020 at the macro system level, as well as by circuit or major risk driver level. Liberty plans to layer on the base forced outage data on top of all completed and planned pilot program locations expected over the next few years, to allow the company to track performance of the pilot programs at the individual line segment level. After the installation of pilot programs, individual circuit performance can be measured by outage frequency and outage type and will be analyzed and assessed for planning future mitigation efforts.	WSD Evaluation of Liberty's First Quarterly Report	Action LIB-4: In its 2021 WMP Update, Liberty shall provide quantitative risk reduction estimates for its pilot programs, under the assumption that the technology would be adopted and fully implemented.
Guidance-11, Class B	Lack of detail on plans to address personnel shortages	In its First Quarterly Report filed in September 2020, Liberty described its direct and indirect recruiting strategies, training programs, and metrics to track applicants and new recruits.	WSD Evaluation of Liberty's First Quarterly Report	Action LIB-5: In its 2021 WMP Update, Liberty shall provide a listing of required training programs for personnel classifications executing: 1) vegetation inspections and trimming/removal, and 2) asset inspections and replacements. The listing shall include the hours of training required under each program and a description of the scope of each program. See Section 5.4. Action LIB-6: In its 2021 WMP Update, Liberty shall provide a complete listing of the metrics it uses to track the effectiveness of its recruiting programs. Action LIB-7: In its 2021 WMP Update, Liberty shall: 1) describe the data that is captured as "applicant source information," and 2) provide the percentage of recruits that were working for another

Deficiency Number	Deficiency Title	Utility Response (brief summary)	Referenced Documents	WSD Action
				California utility immediately prior to being hired.
LIB-1, Class B	Liberty did not describe methods for tracking effectiveness of its covered conductor initiative	Liberty is pursuing a targeted approach for its future covered conductor projects that involves the following steps: identify at-risk wildfire areas, gather and organize risk-related data by circuit and analyze data, develop a plan for each circuit, track performance of covered conductor program by circuit or segment using visualization applications. Liberty's project scope and design for all covered conductor projects includes replacing and installing new overhead assets, in addition to new crossarms, lightning arrestors, fuses, and other hardware. The vegetation management group also inspects the proposed line installation route for all capital jobs to evaluate need for additional tree work.	WSD Evaluation of Liberty's First Quarterly Report	Action LIB-8: In its 2021 WMP Update, Liberty shall describe the structural impact on overhead facilities and the ancillary consequences on other assets (i.e., necessity to replace poles, crossarms, etc.) of its targeted covered conductor deployment.
LIB-2, Class B	Liberty reports inspection frequencies that raise concerns about effectiveness	Liberty contracted a third-party assessment of its vegetation management program that concluded that a three-year cycle would be "optimal" for its routine vegetation management program. Liberty also states that, if adverse vegetation conditions are encountered during other inspection activities (*e.g.*, asset inspections), those conditions are reported to the vegetation management department. With consideration to the concern regarding Liberty's inspection frequencies, the vegetation management department plans to conduct annual LiDAR inspections to detect clearance to conductor proximity in order to address clearance regulations on an annual basis. This additional LiDAR initiative is meant to address vegetation encroachments prior to a vegetation encroachment infraction.	WSD Evaluation of Liberty's First Quarterly Report	Action LIB-9: In its 2021 WMP Update, Liberty shall provide a justification with supporting data of its three-year vegetation inspection cycle outside of Tier 3 HFTD areas. Action LIB-10: In its 2021 WMP Update, Liberty shall detail: 1) whether it tracks the number of problematic vegetation conditions (*e.g.*, violation of G.O. 95 clearance requirements, dead, dying, diseased, or rotten trees, etc.) found for each inspection program, and 2) the number of PRC violations found during inspections broken out by inspection type.

<u>Class A</u>

Action Liberty-1:

- Reax developed a fire consequence model to map Liberty's service territory into 33 sections or polygons that displayed similar wildfire risk profiles. Each polygon was assigned a Reax wildfire risk rating of low, moderate, high, or very high wildfire risk.

- The Reax model simulated the fire spread impact of hundreds of thousands of ignitions along Liberty's overhead lines using historical weather data, layering terrain and topography maps, fire suppression factors, and population/structure density data to analyze and group areas of concern.
- Mapped polygons were discussed and evaluated with Liberty's wildfire risk team and the report and maps were completed in October 2020.
- Further fire consequence modeling assumptions are still ongoing with Reax and were completed by March 1, 2021.
- Liberty utilized Reax maps to compare and present to management the differences between current HFTD ratings with Reax ratings. The Reax wildfire consequence fire model assigned a very high fire risk polygon that completely covered the current HFTD 3 area in South Lake Tahoe. In addition to identifying more areas of concern in South Lake Tahoe, the Reax mapping also identified areas in North Lake Tahoe as high wildfire risk and thus expanded Liberty's area of concern. Management is still processing the effects of this new analysis on current operations and is dedicated to incorporating the expanded regions of increased wildfire risk from the Reax study into work practices. The planned initiatives include and reference the Reax study when applied.
- Liberty utilized PowerBI to import various data sets including the results of the System Survey and tree inspection and work identified layered with the Reax maps to assess asset risk of failure and tree risk on an interim basis. This analysis visually displays for management areas of highest risk of probability of ignition using asset condition factors and tree risk of falling on power lines until remediation work is complete.
- Liberty has finished its first generation wildfire risk model as of February 2021.

Action Liberty-2: The following initiatives will have RBDM RSEs in place but have not informed decision-making since their completion in February 2021:

- Covered conductor
- Undergrounding
- Targeted G.O.95 intrusive inspection and remediation (replace/repair schedules)
- Enhanced vegetation management
- Microgrid
- Fuse Expulsion Replacement Program
- Distribution fault anticipation technology

Other initiatives that were evaluated but did not use or have RBDM RSEs include:

- Quality assurance/quality control and tree inventory database efforts were considered more foundational to risk reduction and hard to quantify reductions in ignitions.
- Asset management and inspection will use RBDM for only the enhanced inspections and remediation work initiative.
- Automatic reclosers and weather stations are currently under evaluation but were not modeled. They were evaluated using subject matter expert judgment about the system and budgeting constraints because many of the decisions were made prior to the RBDM wildfire risk model completion.

Action Liberty-3: Liberty currently uses various data factors in its wildfire risk analysis and not merely "historical incidents and associated characteristics," as previously stated in Liberty's Remedial Compliance Plan ("RCP"). As explained in Action Liberty-1, the analysis and use of the Reax consequence modeling efforts and System Survey results and tree work compilation of data is in its early stage of development to formalize an effective reporting tool that operations, engineering, planning, risk, budgets can all be used to target areas to prioritize work in the future. See Table C-4 in Attachment C for all circuit analysis performed to assess tree risk, asset risk, performance risk, and overall circuit risk of wildfire.

Action Liberty-4: Liberty's outage history, tracked in its outage management system, Responder, forms the basis of tracking all forced outages on its distribution system. Within the tracking of these incidents, a cause, location, time, feeder, and other incident characteristics are present in the archived reports for analysis. By observing these reported incidents in the archived historical outages, Liberty is able to develop a database of number of incidents by type, location, feeder, customer minutes interrupted ("CMI"), asset, and other identifiers. These elements form the basis of targeting which type of issues contribute to the probability of an ignition event, or constitute the population of wildfire risk-drivers for utility wildfire risk. By incorporating the data into the Liberty wildfire risk models, the company is able to score its controls/mitigations to reduce wildfire risk, displayed in the RSE values. RSEs will form one of the foundations for utility capital and O&M decision-making looking ahead, as Liberty's wildfire models were completed in February 2021.

In addition to the Responder data, Liberty has used vegetation management inspection data and intrusive pole/asset inspection data, layered over the analysis conducted by Reax, to formulate a "vegetation risk" and "asset risk" profile for each circuit. This is the first time that the company has undertaken this analysis and incorporated it in conjunction with its subject matter expertise. Liberty made sure at each step during the compilation of data, that the circuit scoring and results from inspections and fire propagation models were reasonable and connected with the experience of planning, engineering, and operations on the system.

Action Liberty-5: Incidents that fall outside of the reported outages arena are incidents that are absorbed in the company's G.O.95 inspections, as well as vegetation management inspections. These are not reported as outages, but they are indicative of risk and areas where Liberty could achieve risk reduction. For example, finding many fire condition code issues or trees that are dead and dying in an area for which fire spread and suppression costs are high would increase the risk of an ignition event, independent of asset risk. These features are combined with the forced outages reported in Responder to formulate a more holistic assessment of risk in a particular region/circuit within the Liberty service territory.

Action Liberty-6: See Section 4.6 in Liberty's 2021 WMP.

Action Liberty-7: Liberty discussed data sharing capabilities and modeling strategies with two utilities: Bear Valley Electric Service, Inc. ("BVES") and Southern California Edison Company ("SCE"). From these discussions, Liberty and the other two utilities discussed how to best use data points from their respective utilities to improve data modeling capabilities in the other utilities' models.

Much of the peer utility data Liberty evaluated from SCE was made available through RAMP/S-MAP and GRC filings. Relevant peer data points may prove useful to include in Liberty wildfire risk models. For example, while Liberty has not experienced a large enough sample size of ignitions escaping containment, data from other utilities is available to estimate this probability. Furthermore, reliable data from Liberty's outage management system only dates back to 2015, while other California utilities have decades' worth of data points. Liberty also observed effectiveness scores from San Diego Gas & Electric Company ("SDG&E") and SCE wildfire risk models used in determining control and mitigation effectiveness and used the results to help inform Liberty's own scoring. These effectiveness scores form a basis for the level of risk reduction applied to each of the wildfire risk-drivers targeted from each control/mitigation.

SCE held multiple calls with Liberty to discuss what has and has not worked for SCE, as well as SCE's progression in modeling wildfire risk in terms of data and technologies used. SCE discussed its augmentation of using Reax's research in its service territory with Technosylva technologies. While Liberty's resources may not yet be ready to take advantage of Technosylva's advancements, it was useful to understand the benefits SCE outlined in its 2021 WMP filing. BVES and Liberty are in earlier stages of wildfire risk modeling, and, as their modeling capabilities grow, it is reasonable to assume data sharing and modeling methodology sharing will increase between these utilities.

Action Liberty-8: Liberty researched issues, such as the effectiveness of covered conductors on outage prevention, through external resources to gather data points that could help score effectiveness of its controls/mitigations. Liberty is also working with Texas A&M on its DFA technology to pilot its effectiveness in fault anticipation, with a projected implementation date around Q4 2021. External research was not heavily used beyond referencing covered conductor fault prevention research, which seemed to agree with Liberty's expectations and the results from the other IOUs' effectiveness scoring for the mitigation. Liberty remains hopeful, as some of these newer wildfire prevention technologies are used, more data and research can be incorporated into its later generation wildfire risk models.

Action Liberty-9: See Response to Action Liberty-7.

Action Liberty-10: Technologies not currently employed with a description of what it is and how it will be used is as follows:

- LiDAR – Airborne LiDAR systems (light detection and ranging) have the capacity to accurately measure three-dimensional vegetation structure and have been widely used in wildlife habitat mapping and species distribution modeling. Data received from the LiDAR systems became available at the beginning of 2021 and has yet to be incorporated into Liberty's first generation wildfire risk models. Liberty anticipates incorporating LiDAR data into its second generation wildfire risk models, with a projection of Q2 2021 incorporation.
- DFA – Distribution Fault Anticipation has the ability to detect precursors to failures, thereby giving utilities tools to achieve greater awareness about the health of their systems and to take preemptive action to avoid outages. This data was not available to Liberty as of February 2021, and the pilot data may not be incorporated until Q1 2022 at the earliest.
- AMI – Advanced Meter Infrastructure data will provide Liberty with granular system demand data for all customer classes, which is a big improvement over Liberty's current ability to only track system demands for larger and medium commercial customers (customers with interval demand meters). AMI data will offer Liberty more precise data measurements when evaluating segmented effects of lost service and aid in predicting future consequences with voluminous real-time data and can help restore service to customers in the event of a PSPS. AMI data is projected to be available by late 2022.
- SAP (Customer First Initiative) – Liberty plans to use the Customer First implementation of SAP to integrate with its updated ESRI GIS system to improve Liberty's asset management capabilities. Currently, Liberty has a "bare bones" asset management framework that tracks outage type and number, vegetation issues, inspection issues, line miles, number of assets in high risk areas, and SAIDI/SAIFI/CAIDI statistics by circuit. The rollout of the SAP & ESRI GIS upgrade is planned for 2023 and should be usable as an asset management system thereafter.

Action Liberty-11: Liberty plans to vet the accuracy of its wildfire RBDM models through quality assurance/quality control practices, such as adding resources to the RBDM team at the utility. Liberty plans to add up to two full-time positions to assist with data-related issues, such as database organization, data quality, strength of RBDM model predictive power, and integration of new data resources into existing models. Much of the models' construction has taken place over the past year, so the quality assurance/quality control of data inputs and outputs used in the analysis will be equally as important in order to improve upon the first generation of wildfire risk models built. With a deeper roster of full-time resources dedicated to the RBDM program, the company will strengthen its quality assurance/quality control practices and accuracy.

<u>Class B</u>

Action LIB-1: See Chapter 4.

Action LIB-2: Most WMP initiatives generally support Liberty's vision for mitigating PSPS events and customer impacts resulting from PSPS events. Liberty's PSPS thresholds are currently fixed and do not change based on initiative progress. Liberty anticipates that, as these initiatives progress, more data can be used to evaluate wildfire risk reduction impacts. Liberty may find a different way to combine existing fire and weather based threshold modeling with initiative risk reduction. See Chapter 8 for more information on PSPS protocols.

Action LIB-3: See Attachment A, Table 12.

Action LIB-4: Liberty calculated RSE's related to four of its pilot programs, Distribution Fault Anticipation (DFA), Light Detection and Ranging ("LiDAR") within the Vegetation Management initiative category, the Sagehen Microgrid project within the Grid Topology improvements initiative, and the Covered Wire program. Refer to Attachment C: WMP Risk Spend Efficiency Calculations, and Table 12 in Attachment A for the RSE values associated with these programs. Also refer to the following sections for further discussion associated with Liberty pilot projects:

1) Distribution Fault Anticipation ("DFA") – See Action Liberty-10, Section 4.4, and Section 7.3.7.2.
2) High Impedance Fault Detection ("HIFD") – See Section 4.4 and Section 7.3.7.2.
3) Rapid Earth Fault Current Limiter ("REFCL") – See Section 7.1.
4) Light Detection and Ranging ("LiDAR") – See Action Liberty-10, Table 5-1, Section 7.1, and Section 7.3.5.7.
5) Sagehen Microgrid – See Section 5.2 and Section 7.1.
6) Electronic Dropout Reclosers (Tripsavers) – See Section 7.1.
7) Covered Wire – See Section 7.3.3.3.

Action LIB-5: See Section 5.4 for workforce requirements for vegetation management and asset inspections and replacements initiatives.

Action LIB-6: Liberty uses the time-to-fill metric. The goal is to fill the positions in 45-50 days, which is industry standard. Liberty also uses current attrition rates, which is the number of people who leave within their first year of employment. Liberty's soft target is 90% retention.

For 2019, the average time-to-fill for the 19 positions filled by Liberty was 142 days. For 2020, the average time-to-fill for the 21 positions filled by Liberty was 34 days. The efficiency gains are related to hiring a dedicated talent acquisition manager. Liberty also added steps to the process to focus on hiring top talent and have a formal and standard talent acquisition process. With every job posting, Liberty also utilizes outside resources from the two largest job boards: Indeed and LinkedIn. This allows Liberty's positions to reach a larger audience. Liberty recently ended the process of requiring every candidate to live in the local area upon hire. Offering relocation assistance when needed has allowed Liberty to hire people from other states who are willing to move to the area. This change alone accounted for four hires in 2020, which was approximately 20% of total hires.

Action LIB-7: Liberty tracks applicant source information through its applicant tracking system. This system tracks where the majority of candidates are finding open positions. This allows Liberty to know where the majority of its candidate pool comes from and to focus resources accordingly. Liberty also tracks applicants who applied for other jobs to match the skill sets of other open positions.

For 2020, of the 21 positions filled by Liberty, three (14.2%) were hired directly from another utility.

Action LIB-8: Liberty is pursuing a targeted approach for its future covered conductor projects that involves the following steps: identify at-risk wildfire areas, gather and organize risk-related data by circuit and analyze data, develop a plan for each circuit, and track performance of covered conductor program by circuit or segment using visualization applications.

Liberty's project scope and design for all covered conductor projects includes replacing and installing new overhead assets, in addition to new crossarms, lightning arrestors, fuses, and other hardware. The vegetation management group also inspects the proposed line installation route for capital jobs to evaluate the need for additional tree work. See Section 7.3.3.3 for more information on the Covered Conductor Initiative.

Action LIB-9: See Section 7.3.5 for information regarding Vegetation Management initiatives.

Action LIB-10: See Section 7.3.5 for information regarding Vegetation Management initiatives.

5. INPUTS TO THE PLAN AND DIRECTIONAL VISION FOR WMP

5.1. Goal of Wildfire Mitigation Plan

***Instructions**: The goal of the Wildfire Mitigation Plan is shared across WSD and all utilities: Documented reductions in the number of ignitions caused by utility actions or equipment and minimization of the societal consequences (with specific consideration to the impact on Access and Functional Needs populations and marginalized communities) of both wildfires and the mitigations employed to reduce them, including PSPS.*

In the following sub-sections report utility-specific objectives and program targets towards the WMP goal. No utility response required for Section 5.1.

5.2. The objectives of the plan

***Instructions**: Objectives are unique to each utility and reflect the 1, 3, and 10-Year projections of progress towards the WMP goal. Objectives are determined by the portfolio of mitigation strategies proposed in the WMP. The objectives of the plan shall, at a minimum, be consistent with the requirements of California Public Utilities Code §8386(a) – Each electrical corporation shall construct, maintain, and operate its electrical lines and equipment in a manner that will minimize the risk of catastrophic wildfire posed by those electrical lines and equipment.*

Describe utility WMP objectives, categorized by each of the following timeframes, highlighting changes since the prior WMP report:

1. *Before the next Annual WMP Update*
2. *Within the next 3 years*
3. *Within the next 10 years – long-term planning beyond the 3-year cycle*

In accordance with Cal. Pub. Util. Code § 8386(a), Liberty constructs, maintains, and operates its electric system in a manner that minimizes the risk of catastrophic wildfire posed by its electric power lines and equipment. Liberty's overarching WMP goal is to prevent and mitigate the risk of wildfires caused by utility equipment. Liberty's 2021 WMP Update continues to focus on reducing wildfire risk. Each year, Liberty identifies ways to enhance its wildfire prevention and mitigation efforts through enhancing or expanding existing programs and developing and implementing new programs.

Over the next 10 years, Liberty plans to make significant strides in reducing wildfire risk in its service territory, including aggressive long-term plans for mitigating PSPS impacts on customers. Liberty plans to develop proactive asset replacement programs as part of its grid hardening efforts for addressing its aging infrastructure that will help reduce the probability of asset failures in service. In the future, the plan will include a targeted approach for asset (and vegetation) inspections and replacements, at the segment level, based on risk-informed data collected through LiDAR technology, situational awareness tools and assessments, and Reax fire mapping. By targeting asset repairs (tree work) and replacements, the overall objective is to, in the near term, allow management to assess asset and tree risk at a localized level in order to make informed business decisions to most effectively mitigation wildfire risk. Grid hardening efforts also include replacing overhead lines with covered conductor to protect high fire risk areas during volatile weather events and building resiliency corridors. Liberty's overall resiliency program is still in its conceptual phase, but initial plans include installation of microgrids in targeted high fire risk areas. The combination of covered conductor installations, resiliency corridors, and microgrids will greatly reduce impacts and frequency of PSPS events and service interruptions.

INPUTS TO THE PLAN AND DIRECTIONAL VISION FOR WMP

A description of Liberty's WMP objectives for each of the specified timeframes is provided below.

1. Before the next Annual WMP Update: high level discussion of WMP objectives
2. Within the next three years: high level discussion of WMP objectives
3. Within the next 10 years – long-term planning beyond the three-year cycle: high level discussion of WMP objectives

Table 5-1: Liberty's Objectives for Wildfire Risk Mitigation

WMP Objectives	2021 Goals	Plans through 2023	Objectives for 2023-2030
Continue grid hardening efforts and expand to include new proactive asset replacement programs and enhanced substation improvements	Liberty plans to expand its covered conductor program to build resiliency in selected locations in south Lake Tahoe. Liberty plans to repair and replace assets identified in the System Survey to strengthen its overall system performance. Substations will continue to replace old oil circuit breakers ("OCB") with new vacuum or gas breakers.	Liberty plans to develop proactive asset replacement programs for high risk assets. Evaluation of other substation rebuilds where oil equipment and wood structures exist and continue OCB replacements. Explore substation enhancements to include capability to house future battery energy storage system ("BESS"), if deemed necessary.	Liberty plans to remediate all level findings with pole integrity issues within five years. Fully rebuild or refurbish all substations in Liberty territory. Have substation maintenance program in place.
Build customer-focused resiliency corridors to aid in mitigating PSPS impacts	Forest resiliency corridors are underway and focus on tree removal and fuel reduction activities to improve forest resiliency and reduce the risk of wildfire. Conduct study to develop a comprehensive resiliency program that includes a cost-benefit analysis and demonstrates wildfire and PSPS risk reductions. File application supporting the proposed plan, including	Implement and build resiliency corridors with covered conductors, and microgrids. The number of miles of covered conductor for future years will be a function of number of micro grids deployed. Develop communication plan to educate and inform customers of new program offerings and battery storage options and fees.	If economically feasible and successfully implemented in 2022 and 2023, Liberty plans to expand this program to other sites that would benefit.

WMP Objectives	2021 Goals	Plans through 2023	Objectives for 2023-2030
	microgrid selected sites later this year.		
Utilize FPI tools and other situational risk models to better plan for emergency PSPS events, alleviate customer impacts, and reduce ignition risk due to extreme weather and fuel conditions	Fully integrate situational awareness tools and applications into system operations and monitoring of conditions. Data from weather stations, regional camera networks, and FPI assessments to alert operations of heightened fire risk can all be utilized and communicated to field operations and system control operators to adjust work conditions.	Evaluate and compare results of new Burning Index added to Liberty's FPI assessment in 2021 that will enable further granularity in the area of alternative responses to initiating a PSPS, such as managing recloser technology, de-energizing specific circuits and/or increasing patrols in specific geographic areas. Continue efforts to research new sectionalizing devices and innovations in pre-fault indicators to improve PSPS mitigating efforts in the future.	Continue efforts to research new sectionalizing devices and innovations in pre-fault indicators to improve PSPS mitigation efforts in the future.
Improve system controls on lines by installing line reclosers to allow for flexibility of operations during high fire risk days and PSPS switching	The installation of fault detection devices, automatic reclosers, SCADA, and sectionalizing equipment will improve overall system operations, flexibility, and customer interruptions.	Continue automating distribution operations to reduce customer downtimes, improve tracking risk drivers based on fault detection monitoring and analysis,	Explore new innovations with grid operations and fault detections prior to wire down event or customer outage. Research new technologies and collaborate with other utilities.
Utilize LiDAR technology and reporting capabilities to enhance both vegetation and asset inspections to target future remediation work	Establish contract for annual LiDAR inspections. Complete 100% of LiDAR inspections. Develop process for generating work based on LiDAR inspections. Enhance communications to improve management of community impacts. Improve vegetation risk models for prioritizing activities.	Integrate LiDAR data analysis and reporting with wildfire risk models to target future inspections and proactively plan for tree work based on risk-informed decision making. Data integration and transformation into effective MIS and DSS tools and reports to manage and track asset inspections and	Fully integrate a wildfire risk based asset and vegetation management inspection program.

WMP Objectives	2021 Goals	Plans through 2023	Objectives for 2023-2030
		repairs by location using GIS.	
Enhancements in Vegetation Management work to reduce wildfire risk	Expand program for fuel management and slash reduction. Establish contract for quality assurance/quality control program and implement	Identify and implement opportunities for increasing removal of biomass and reduction of fuel load throughout service territory. Update vegetation management inventory and work management system.	Continue to adopt new technologies and processes for a comprehensive vegetation management program that provides appropriate wildfire risk mitigation based on best practices and principals of integrated vegetation management.

Substation Rebuild Program

Liberty identified in its 2020 WMP plans to decommission or rebuild three substations (Brockway, Stateline, and Squaw Valley) that included fire hardening and implementation of new technology. Old, aging wooden bus structures and oil-filled equipment would be replaced with steel bus, gas, or vacuum breakers, and FR3 oil-filled transformers and voltage regulators. In 2020, Liberty decommissioned Brockway substation and rebuilt King's Beach substation with new circuit breakers. Plans are underway to rebuild the Stateline, Squaw Valley, Tahoe City, and Portola substations during this WMP cycle.

Resiliency Program

Liberty's near-term WMP objective includes a focus on building customer-centered resiliency services that complement grid hardening and vegetation management efforts and, once aligned, will help improve system resiliency during and after disasters. In January 2021, Liberty partnered with a consulting firm to begin developing a structured resiliency program.

Liberty's portfolio of customer resiliency programs will (1) establish a set of prioritized resiliency corridors where focused customer engagement and outreach is centralized and will provide resiliency services (back-up power) within designated "community cores" and (2) provide specifically targeted resiliency services to both medical baseline customers and critical customers.[6] Liberty plans to file a detailed program portfolio application that expands on these concepts later this year.

The goal of the resiliency program is to integrate an adaptive system to avoid energy disruptions and to provide customers with reliable and backup power during wildfire, PSPS, and winter storm events. Liberty's upcoming application will propose cost-effective customer resiliency offerings to prioritized resiliency corridors, medical baseline customers, and other critical customers within Liberty's service territory.

Key milestones 2022-2031:

- Conduct cost-benefit analysis of each resiliency program type and work solution plan for each site location
- Integrate customer resiliency programs by 2022 in key PSPS zones and high fire risk areas

[6] See Attachment B: Customer Resiliency Program Design Concept.

- Assess performance data and adjust resiliency program scope
- Explore other societal and environmental benefits of energy storage beyond customer-focused resiliency
- Investigate opportunities for program expansion throughout the territory

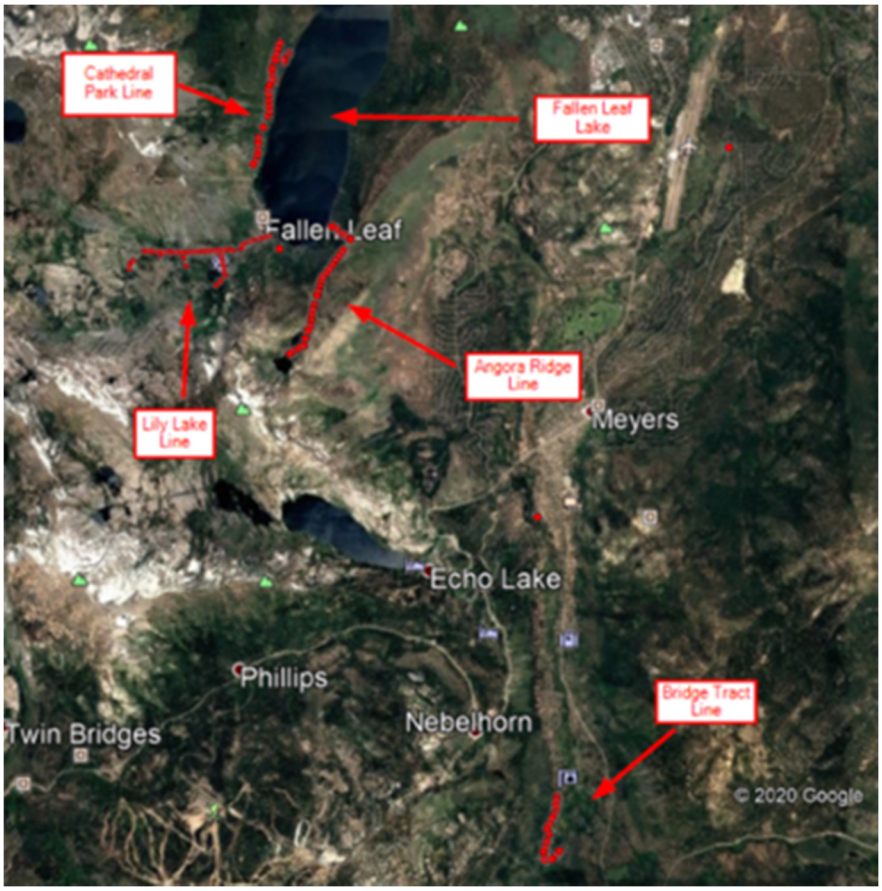
Microgrid Feasibility

Liberty commissioned an advanced island-able microgrid at Sagehen Field Station, a Liberty customer, in November 2020. This microgrid system is capable of powering the field station in the event Liberty de-energizes its service line for wildfire season (June-December). The system consists of 20 kW of solar PV, 68.4 kWh of battery storage, a 14 kW bi-direction inverter, site controller, and a 35 kW prime-power propane generator, all prefabricated inside of a climate-controlled 20-foot shipping container. The system also includes an advanced remote monitoring and control system, which allows for both autonomous operation, as well as complete remote control and diagnostic capabilities. The Sagehen Microgrid has saved customers over $2 million by replacing a high fire risk distribution line with a containerized solar plus battery storage microgrid instead of having to replace four miles of distribution line serving a single customer.

Due to the success of the Sagehen Microgrid, Liberty is conducting a review of planned covered conductor projects located in densely forested, remote areas and serving a small customer load, to determine if microgrids are a better solution. Liberty is conducting an economic and logistical feasibility study to review, if selected, covered conductor projects that could be better served by a microgrid, providing year-round power to the communities. All projects will contemplate decommissioning the distribution line, removing the wildfire risk and reducing operating and maintenance costs in the future.

The covered conductor projects currently under review include:

- Angora Lake
- Lily Lake
- Bridge Tract
- Cathedral



Liberty plans to complete the feasibility study in 2021 and determine whether to proceed with the microgrids. If the study shows that the microgrids are feasible, Liberty will include the projects in an upcoming application addressing system resiliency.

SAP (Customer First)

Liberty plans to use the Customer First implementation of SAP to integrate with its updated ESRI GIS system to improve Liberty's asset management capabilities. Currently, Liberty has a "bare bones" asset management framework that tracks outage type and number, vegetation issues, inspection issues, line miles, number of assets in high risk areas, and SAIDI/SAIFI/CAIDI statistics by circuit. The rollout of SAP and ESRI GIS upgrade is planned for 2023 and should be usable as an asset management system thereafter. The Enterprise Asset Management ("EAM") and Asset Manager SAP applications will be valuable in helping Liberty mitigate the risk of wildfire ignitions. EAM will provide more integrated processes for managing equipment conditions and predicting equipment failures by helping to predict equipment failures before they occur, allowing Liberty to proactively replace aging equipment before it fails in service. EAM and Asset Manager will also improve wildfire mitigation documentation and reporting for both internal and external stakeholders.

Advanced Meter Infrastructure ("AMI")

AMI's project scope includes installing advanced two-way metering technology and infrastructure throughout Liberty's service territory. AMI data will provide Liberty with granular system demand data for all customer classes, which is a great improvement over Liberty's current ability to only track system demands for larger and medium commercial customers (customers with interval demand meters). AMI data will offer Liberty more precise data measurements when

evaluating segmented effects of lost service and aid in predicting future consequences with voluminous real-time data and can help restore customers in the event of a PSPS. AMI data is projected to be available in 2023. AMI will enhance public safety with Outage Management System ("OMS") integration and remote switching capabilities, which can be used during PSPS events.

5.3. Plan program targets

***Instructions**: Program targets are quantifiable measurements of activity identified in WMPs and subsequent updates used to show progress towards reaching the objectives, such as number of trees trimmed or miles of power lines hardened.*

List and describe all program targets the electrical corporation uses to track utility WMP implementation and utility performance over the last five years. For all program targets, list the 2019 and 2020 performance, a numeric target value that is the projected target for end of year 2021 and 2022, units on the metrics reported, the assumptions that underlie the use of those metrics, update frequency, and how the performance reported could be validated by third parties outside the utility, such as analysts or academic researchers. Identified metrics must be of enough detail and scope to effectively inform the performance (i.e., reduction in ignition probability or wildfire consequence) of each targeted preventive strategy and program.

Table 5-2: List and Description of Program Targets

Program Target[7]	2019 Performance	2020 Performance	Projected Target by end of 2021	Projected Target by end of 2022	Units	Underlying Assumptions	Third-Party Validation
Recloser installation with high-speed clearing functionality and SCADA	6	4	3	3	Number of reclosers installed or upgraded vacuum reclosers with SCADA controls with "fire season" settings.	Remote monitoring of system assets promotes faster outage response. Supervisory controls will provide the settings necessary to reduce electrical ignition, while also helping to mitigate power outages.	Purchase orders and receipts for relay and recloser equipment.
Expulsion Fuse Replacement	250	853	1,500	1,500	Number of fuses installed	Energy and spark potential at faulted locations is mitigated by non-expulsion fuses.	Quote for material, purchase order, fuse installation tracking, and field verification of installation.
Installation of covered conductor in HFTD Tier 2 areas	2.7	6.82	10.1	11.7	Miles of covered conductor installed	Mitigate contact of ignition source by covering the wire.	Quote for material, purchase order, job designs.

[7] All Program Targets are updated quarterly, except for the LIDAR Program Target, which is updated annually.

INPUTS TO THE PLAN AND DIRECTIONAL VISION FOR WMP

Program Target[7]	2019 Performance	2020 Performance	Projected Target by end of 2021	Projected Target by end of 2022	Units	Underlying Assumptions	Third-Party Validation
Weather Station installations	10	19	10	1	Weather stations installed	Improved situational awareness results in improved PSPS decision making.	Quote for material, purchase order, field verification of installation.
Perform Vegetation Management	9,371	11,604	11,500	11,500	Number of trees pruned and removed	Pruning and removing trees along overhead lines results in decrease in tree-related outages, and potential ignitions.	Work orders, work tracking spreadsheets, verification of identification and pruned or removed trees.
Perform On-Ground Routine Inspections and Equipment Asset Inspections.	1/5 of system	23,000 poles (and entire overhead system)	825	6,023	Number of assets inspected (including overhead and underground inspections)	Completed inspections result in detection of non-compliant items and decrease in potential ignition events.	G.O.165 inspection records
Pole replacement projects	N/A	62	400	350	Number of poles replaced	Replace poles identified from the System Survey based on level findings and G.O.95 remediation guidelines, *e.g.* poles with level 1 and 2 findings that had pole integrity condition codes (pole replace, pole rot, pole cracks)	G.O.165 inspection records
Substation Design Hardening	N/A	1	2	1	Number of oil circuit breakers (OCBs) replaced	Hardened design of substation leads to less equipment failure and decrease in potential ignitions.	Design drawings for Brockway removal and replacement of OCBs. Field verification of replaced breakers.
Tree Mortality Removal Project	1,539 trees	2,038 trees	Patrol overhead lines to identify and mitigate	Patrol overhead lines to identify and mitigate	Number of Dead/Dying Trees removed	Removal of dying trees in or adjacent to right of way decreases potential ignitions.	Work orders, work tracking records, invoices.

Program Target[7]	2019 Performance	2020 Performance	Projected Target by end of 2021	Projected Target by end of 2022	Units	Underlying Assumptions	Third-Party Validation
			dead/dying trees that pose a risk to facilities	dead/dying trees that pose a risk to facilities			
Forest Resiliency Corridor Development	N/A	14 miles	13 miles	13 miles	Number of line miles treated	Expanded vegetation management and fuel reduction in the forest reduces ignition source and minimizes fire propagation.	Work orders.
LiDAR	N/A	320 miles	712 miles	712 miles	Miles of line inspected	Increased efficiency of inspections to identify locations where tree pruning is necessary to maintain clearances results in decreased potential ignitions from trees growing into facilities.	Vendor invoices and LiDAR inspection records.
Fuel Management	N/A	376.4 tons	2,100 tons	2,100 tons	Tons of biomass removed	Reducing fuel load will decrease likelihood of an ignition. In the event of an ignition, removal of biomass will decrease fire intensity and rate of spread while increasing effectiveness of suppression activities.	Vendor invoices and load receipts.

5.4. Planning for workforce and other limited resources

***Instructions**: Report on worker qualifications and training practices regarding wildfire and PSPS mitigation for workers in the following target roles:*

1. *Vegetation inspections*
2. *Vegetation management projects*
3. *Asset inspections*
4. *Grid hardening*
5. *Risk event inspection*

For each of the target roles listed above:

1. *List all worker titles relevant to target role (target roles listed above)*

2. *For each worker title, list and explain minimum qualifications with an emphasis on qualifications relevant to wildfire and PSPS mitigation. Note if the job requirements include the following:*
    a. *Going beyond a basic knowledge of General Order 95 requirements to perform relevant types of inspections or activities in the target role*
    b. *Being a "Qualified Electrical Worker" (QEW) and define what certifications, qualifications, experience, etc. is required to be a QEW for the target role for the utility.*
    c. *Include special certification requirements such as being an International Society of Arboriculture (ISA) Certified Arborist with specialty certification as a Utility Specialist*
3. *Report percentage of Full Time Employees (FTEs) in target role with specific job title*
4. *Provide a summarized report detailing the overall percentage of FTEs with qualifications listed in (2) for each of the target roles.*
5. *Report plans to improve qualifications of workers relevant to wildfire and PSPS mitigation. Utilities will explain how they are developing more robust outreach and onboarding training programs for new electric workers to identify hazards that could ignite wildfires.*

5.4.1. Target role: Vegetation inspections

1. Worker titles in target role
2. Minimum qualifications
3. FTE percentages by title in target role
4. Percent of FTEs by high-interest qualifications
5. Plans to improve worker qualifications

Table 5-3: Target role - Vegetation Inspections

1. Worker Titles in Target Role	2. Minimum Qualifications	3. FTE % by title in Target Role	4. % of FTEs by high-interest qualifications
System Arborist (Liberty)	• ISA Arborist Certification or California Registered Professional Foresters License ("RPF") • Four years' experience in Utility Operations with responsibilities in line clearance vegetation management	20%	100%
Supervisor, Utility Forester (Contractor)	• ISA Arborist Certification • Three to five years utility arboriculture experience	10%	100%
Utility Forester (Contractor)	• Minimum of one year experience in utility arboriculture or related field. Associates degree or greater in urban forestry, forestry, botany, ecology, biology, conservation, environmental science, horticulture or comparable area may substitute for work experience to fulfill the minimum qualifications for this position at the discretion of Liberty's Vegetation Program Manager.	30%	N/A

Utility Forester I (Contractor)	• ISA Arborist Certification or RPF • One year's utility arboriculture experience	N/A	N/A
Utility Forester II (Contractor)	• ISA Arborist Certification or RPF • ISA Utility Specialist Certification • Three years utility arboriculture experience	35%	100%
Utility Forester III (Contractor)	• ISA Arborist Certification or RPF • ISA Utility Specialist Certification • Five to nine years utility arboriculture experience	5%	100%
Utility Forester IV (Contractor)	• ISA Arborist Certification or RPF • ISA Utility Specialist Certification • 10+ years utility arboriculture experience	N/A	N/A

Minimum Qualifications: Minimum qualifications for worker titles listed in Table 5-3 establish personnel that are proficient in providing vegetation inspections, among other duties, to provide regulatory compliance on Liberty's system. Personnel performing vegetation inspections on Liberty's system must demonstrate the required level of competence, gained through technical training, work experience, and professional credentials, set in place by minimum qualifications for each worker title. Liberty's pre-inspection contractors employ their own training programs to provide Liberty with a qualified workforce for its system. The specific skills, training and certificates exhibited by these workers include understanding of regulatory requirements, program policies and procedures, tree identification, knowledge of specific species characteristics and susceptibilities , hazard tree assessments, understanding various types of vegetation threats to electrical equipment, electrical knowledge, fire safety procedures, industry standards and best management practices, and industry safety standards.

Plans to Improve Worker Qualifications: Liberty's internal vegetation management personnel provide monitoring, oversight and evaluation of vegetation inspections to confirm alignment with inspection protocols and to identify opportunities for improvement. Liberty conducts periodic benchmarking with vegetation inspection workers to review tree assessment practices, procedures, scopes of work and inspection requirements to continually align and improve worker qualifications. Liberty conducts monthly status meetings with all vegetation inspection personnel to provide project, program and organizational updates, as well as, continuing education opportunities towards professional credentials. Liberty continually seeks opportunities to improve worker qualifications for vegetation inspections through regular program review and a collaborative approach with its contractor providing vegetation inspection services.

5.4.2. Target role: Vegetation management projects

1. Worker titles in target role
2. Minimum qualifications
3. FTE percentages by title in target role
4. Percent of FTEs by high-interest qualifications
5. Plans to improve worker qualifications

Table 5-4: Target role - Vegetation Management Projects

1. Worker Titles in Target Role	2. Minimum Qualifications	3. FTE % by title in Target Role	4. % of FTEs by high-interest qualifications
General Foreperson (Contractor)	• Two years experience as Foreperson • Two years prior experience as Journeyman Tree Trimmer	9%	N/A
Foreperson (Contractor)	• One year experience as Journeyman Tree Trimmer	18%	N/A
Journeyman Tree Trimmer (Contractor)	• 18 months of related training and on the job experience • Successful completion of Company Line Clearance Tree Trimmer Certification Program	9%	N/A
Trimmer Trainee (Contractor)	• Successful completion of Grounds Operation Specialist Test	18%	N/A
Bucket Operator (Contractor)	• Prior experience as professional Tree Trimmer or Climber • Meets Journeyman Tree Trimmer requirements	See Foreperson, Journeyman Tree Trimmer, and Trimmer Trainee	N/A
Groundperson (Contractor)	N/A	46% (can be a specific ground crew or made up of members of tree crew)	N/A

Minimum Qualifications: Minimum qualifications for worker titles listed in Table 5.4 certify that personnel are proficient in providing the work required for vegetation management projects along Liberty's system. Personnel performing tree work for vegetation management projects must demonstrate the required level of competence, gained through technical training and work experience, set in place by minimum qualifications for each worker title. Liberty's line-clearance tree contractors employ their own training programs and establish minimum qualifications to provide a qualified workforce for Liberty's system. The specific skills, training and certificates exhibited by these workers include understanding of regulatory requirements, program policies and procedures, tree identification, knowledge of specific species characteristics and susceptibilities, hazard tree assessments, understanding various types of vegetation threats to electrical equipment, electrical knowledge, fire safety procedures, industry standards and best management practices, and industry safety standards.

Plans to Improve Worker Qualifications: Liberty's internal vegetation management personnel provide monitoring, oversight and evaluation of vegetation management projects to confirm project goals and objectives are met and to identify opportunities for improvement. Regular project tailboards, field meetings and work verification is conducted with General Forepersons and crew members to communicate goals, progress, and opportunities. Liberty continually strives for long term program efficiency and sustainability through vegetation project management and collaboration with its line-clearance tree contractors performing project work on the system.

5.4.3. Target role: Asset inspections

1. Worker titles in target role
2. Minimum qualifications
3. FTE percentages by title in target role
4. Percent of FTEs by high-interest qualifications
5. Plans to improve worker qualifications

Table 5-5: Target role – Asset Inspections

1. Worker Titles in Target Role	2. Minimum Qualifications	3. FTE % by title in Target Role	4. % of FTEs by high-interest qualifications
Inspector	• Journeyman lineman; • Minimum one year journeyman lineman experience; • Class A Driver's License; • General knowledge of GO 95 and company's construction standards.	83.3%	N/A
Inspector Foreman	• Journeyman lineman; • Minimum two years journeyman lineman experience; • CDL required; • Expert knowledge of G.O. 95 and company's construction standards.	16.7%	N/A

5.4.4. Target role: Grid hardening

1. Worker titles in target role
2. Minimum qualifications
3. FTE percentages by title in target role
4. Percent of FTEs by high-interest qualifications
5. Plans to improve worker qualifications

Table 5-6: Target role – Grid Hardening

1. Worker Titles in Target Role	2. Minimum Qualifications	3. FTE % by title in Target Role	4. % of FTEs by high-interest qualifications
Engineer IV	Must possess a Bachelor's of Science in Electrical Engineering or an equivalent Engineering Degree from an accredited four-year college or university. Must hold PE Certification.	6.5%	N/A
Capital Administrator	Associates or Bachelor's degree in Construction Administration, Accounting or a related field or a minimum of three years of technical experience with a utility or other related field. Working knowledge of accounting, project management and construction management practices.	3.2%	N/A
Project Manager	Associate's or Bachelor's degree in Project Management, Construction Administration, Engineering in a related field or a PMP certification and a minimum of five years of technical experience with a utility or other related field. Must have a demonstrated working knowledge of project management and construction management practices.	6.5%	N/A
Lineman	Journeyman lineman. Class C Driver's license	38.7%	N/A
Lineman Working Foreman	Journeyman lineman. Minimum two years experience as Journeyman Lineman. Class C Driver's license	12.9%	N/A
Inspector	Journeyman lineman.	16.1%	N/A

1. Worker Titles in Target Role	2. Minimum Qualifications	3. FTE % by title in Target Role	4. % of FTEs by high-interest qualifications
	Minimum one year journeyman lineman experience. Class A Driver's License. General knowledge of G.O. 95 and company's construction standards.		
Inspector Foreman	Journeyman lineman. Minimum two years journeyman lineman experience. Class A Driver's License. Expert knowledge of G.O. 95 and company's construction standards.	3.2%	N/A
Substation Electrician	Must have successfully completed the Electrician Apprentice training program or equivalent. Must be qualified to perform switching.	3.2%	N/A
Substation Electrician Working Foreman	Journeyman Electrician. Minimum two years' experience as journeyman electrician. Must be qualified to perform switching.	3.2%	N/A
Job Facilitator	Journeyman lineman. Minimum two years' experience as journeyman lineman. Class C Driver's License.	6.5%	N/A

Plans to Improve Worker Qualifications: By adding qualified professionals Liberty will be able to train and raise the skill set of the existing work force. Training plans are in progress for all engineering team members for 2021 and beyond.

5.4.5. Target role: Risk event inspections

1. Worker titles in target role
2. Minimum qualifications

3. FTE percentages by title in target role
4. Percent of FTEs by high-interest qualifications
5. Plans to improve worker qualifications

Table 5-7: Target role – Risk Event Inspections

1. Worker Titles in Target Role	2. Minimum Qualifications	3. FTE % by title in Target Role	4. % of FTEs by high-interest qualifications
Troubleshooter	Journeyman lineman. Minimum one year experience as journeyman lineman	100%	N/A

6. PERFORMANCE METRICS AND UNDERLYING DATA

***Instructions**: Section to be populated from Quarterly Reports. Tables to be populated are listed below for reference.*

NOTE: Report updates to projected metrics that are now actuals (e.g., projected 2020 spend will be replaced with actual unless otherwise noted). If an actual is substantially different from the projected (>10% difference), highlight the corresponding metric in light green.

6.1. Recent performance on progress metrics, last 5 years

***Instructions for Table 1**: In the attached spreadsheet document, Liberty reports on performance on the following metrics within the utility's service territory over the past five years as needed to correct previously-reported data. Where the utility does not collect its own data on a given metric, the utility shall work with the relevant state agencies to collect the relevant information for its service territory, and clearly identify the owner and dataset used to provide the response in the "Comments" column.*

Table 1: Recent Performance on Progress Metrics, last 5 years is provided in Attachment A.

6.2. Recent performance on outcome metrics, annual and normalized for weather, last 5 years

***Instructions for Table 2**: In the attached spreadsheet document, report performance on the following metrics within the utility's service territory over the past five years as needed to correct previously-reported data. Where the utility does not collect its own data on a given metric, the utility shall work with the relevant state agencies to collect the relevant information for its service territory, and clearly identify the owner and dataset used to provide the response in "Comments" column.*

Provide a list of all types of findings and number of findings per type, in total and in number of findings per circuit mile.

Table 2: Recent Performance on Outcome Metrics, last 5 years is provided in Attachment A.[8]

6.3. Description of additional metrics

***Instructions for Table 3:** In addition to the metrics specified above, list and describe all other metrics the utility uses to evaluate wildfire mitigation performance, the utility's performance on those metrics over the last five years, the units reported, the assumptions that underlie the use of those metrics, and how the performance reported could be validated by third parties outside the utility, such as analysts or academic researchers. Identified metrics must be of enough detail and scope to effectively inform the performance (i.e., reduction in ignition probability or wildfire consequence) of each preventive strategy and program.*

Table 3: List and Description of Additional Metrics, last 5 years is provided in Attachment A.

6.4. Detailed information supporting outcome metrics

***Instructions for Table 4:** In the attached spreadsheet document, report numbers of fatalities attributed to any utility wildfire mitigation initiatives, as listed in the utility's previous or current WMP filings or otherwise, according to the type of activity in column one, and by the victim's relationship to the utility (i.e., full-time employee, contractor, of member of*

[8] The data for 2020 does not include the Mountain View Fire, which occurred in Liberty's service territory on November 17, 2020, and the cause of which remains under investigation and has yet to be determined by CAL FIRE.

the general public), for each of the last five years as needed to correct previously-reported data. For fatalities caused by initiatives beyond these categories, add rows to specify accordingly. The relationship to the utility statuses of full-time employee, contractor, and member of public are mutually exclusive, such that no individual can be counted in more than one category, nor can any individual fatality be attributed to more than one initiative.

Table 4: Fatalities Due to Utility Wildfire Mitigation Initiatives, last 5 years is provided in Attachment A.

Instructions for Table 5*: the attached spreadsheet document, report numbers of OSHA-reportable injuries attributed to any utility wildfire mitigation initiatives, as listed in the utility's previous or current WMP filings or otherwise, according to the type of activity in column one, and by the victim's relationship to the utility (i.e., full-time employee, contractor, of member of the general public), for each of the last five years as needed to correct previously-reported data. For members of the public, all injuries that meet OSHA-reportable standards of severity (i.e., injury or illness resulting in loss of consciousness or requiring medical treatment beyond first aid) shall be included, even if those incidents are not reported to OSHA due to the identity of the victims.*

For OSHA-reportable injuries caused by initiatives beyond these categories, add rows to specify accordingly. The victim identities listed are mutually exclusive, such that no individual victim can be counted as more than one identity, nor can any individual OSHA-reportable injury be attributed to more than one activity.

Table 5: OSHA-Reportable Injuries Due to Utility Wildfire Mitigation Initiatives, last 5 years is provided in Attachment A.

6.5. Mapping recent, modelled, and baseline conditions

Instructions: Underlying data for recent conditions (over the last five years) of the utility service territory in a downloadable shapefile GIS format, following the schema provided in the spatial reporting schema attachment. All data is reported quarterly, this is a placeholder for quarterly spatial data.

Please refer to Liberty's Quarterly Data Report submitted concurrently.

6.6. Recent weather patterns, last 5 years

Instructions for Table 6*: In the attached spreadsheet document, report weather measurements based upon the duration and scope of NWS Red Flag Warnings, High wind warnings and upon proprietary Fire Potential Index (or other similar fire risk potential measure if used) for each year. Calculate and report 5-year historical average as needed to correct previously-reported data.*

Table 6: Weather Patterns, last 5 years is provided in Attachment A.

6.7. Recent and projected drivers of ignition probability

Instructions for Table 7*: In the attached spreadsheet document, report recent drivers of ignition probability according to whether or not risk events of that type are tracked, the number of incidents per year (e.g., all instances of animal contact regardless of whether they caused an outage, an ignition, or neither), the rate at which those incidents (e.g., object contact, equipment failure, etc.) cause an ignition in the column, and the number of ignitions that those incidents caused by category, for each of last five years as needed to correct previously-reported data.*

Calculate and include 5-year historical averages. This requirement applies to all utilities, not only those required to submit annual ignition data. Any utility that does not have complete 2020 ignition data compiled by the WMP deadline shall indicate in the 2020 columns that said information is incomplete.

Table 7.1: Key Recent and Projected Drivers of Ignition Probability, last five years and projections is provided in Attachment A.

Table 7.2: Key Recent and Projected Drivers of Ignition Probability by HFTD, last five years and projections is provided in Attachment A.

6.8. Baseline state of equipment and wildfire and PSPS event risk reduction plans

6.8.1. Current baseline state of service territory and utility equipment

Instructions for Table 8*: In the attached spreadsheet document, provide summary data for the current baseline state of HFTD and non-HFTD service territory in terms of circuit miles; overhead transmission lines, overhead distribution lines, substations, weather stations, and critical facilities located within the territory; and customers by type, located in urban versus rural versus highly rural areas and including the subset within the Wildland-Urban Interface (WUI) as needed to correct previously- reported data.*

The totals of the cells for each category of information (e.g., "circuit miles (including WUI and non-WUI)") would be equal to the overall service territory total (e.g., total circuit miles). For example, the total of number of customers in urban, rural, and highly rural areas of HFTD plus those in urban, rural, and highly rural areas of non-HFTD would equal the total number of customers of the entire service territory.

Table 8: State of Service Territory and Utility Equipment is provided in Attachment A.

6.8.2. Additions, removal, and upgrade of utility equipment by end of 3-year plan term

Instructions for Table 9*: In the attached spreadsheet document, input summary information of plans and actuals for additions or removals of utility equipment as needed to correct previously-reported data. Report net additions using positive numbers and net removals and undergrounding using negative numbers for circuit miles and numbers of substations. Report changes planned or actualized for that year – for example, if 10 net overhead circuit miles were added in 2020, then report "10" for 2020. If 20 net overhead circuit miles are planned for addition by 2022, with 15 being added by 2021 and 5 more added by 2022, then report "15" for 2022 and "5" for 2021. Do not report cumulative change across years. In this case, do not report "20" for 2022, but instead the number planned to be added for just that year, which is "5".*

Table 9: Location of Actual and Planned Utility Equipment Additions or Removal Year Over Year is provided in Attachment A.

Instructions for Table 10*: Referring to the program targets discussed above, report plans and actuals for hardening upgrades in detail in the attached spreadsheet document. Report in terms of number of circuit miles or stations to be upgraded for each year, assuming complete implementation of wildfire mitigation activities, for HFTD and non- HFTD service territory for circuit miles of overhead transmission lines, circuit miles of overhead distribution lines, circuit miles of overhead transmission lines located in Wildland-Urban Interface (WUI), circuit miles of overhead distribution lines in WUI, number of substations, number of substations in WUI, number of weather stations and number of weather stations in WUI as needed to correct previously-reported data.*

PERFORMANCE METRICS AND UNDERLYING DATA

If updating previously-reported data, separately include a list of the hardening initiatives included in the calculations for the table.

Table 10: Location of Actual and Planned Utility Infrastructure Upgrades Year Over Year is provided in Attachment A.

7. MITIGATION INITIATIVES

7.1. Wildfire mitigation strategy

***Instructions**: Describe organization-wide wildfire mitigation strategy and goals for each of the following time periods, highlighting changes since the prior WMP report:*

1. *By June 1 of current year*
2. *By Sept 1 of current year*
3. *Before the next Annual WMP Update*
4. *Within the next 3 years*
5. *Within the next 10 years*

Table 7-1: Wildfire Mitigation Strategy and Goals

Initiative Category	By June 1 of current year	By September 1 of current year	Before the next Annual WMP Update	Within the next 3 years	Within the next 10 years	Monitoring and Auditing Plan
Risk Assessment & Mapping	Liberty will evaluate whether any data updates are necessary to revise wildfire model inputs.	Liberty plans to update data into its wildfire models and GIS risk maps. This update will include data obtained through Reax's propagation models, as well as internal data points from risk-drivers and inspections.	Liberty will continue to explore technologies and anticipates new capabilities for wildfire risk modeling and use of more affordable real-time monitoring solutions.	Liberty plans to continue working with Reax to refine fire spread modeling consequence in its wildfire risk modeling process. This includes integrating updated data into the analysis used for Liberty's wildfire risk models. Liberty also plans to focus internally on its own RBDM capabilities, by adding additional resources to aid in leveraging technical skills and quality assurance/quality control validation.	Liberty anticipates greater technological advancement, as well as the maturity, quality, and robustness of the company's datasets to give more accurate predictive capabilities in its wildfire risk models.	Liberty plans to evaluate whether any data updates between Q2 and Q3 2021 would revise wildfire model inputs.
Situational Awareness & Forecasting	Finalize partnership with AlertWildfire. Identify potential enhancement to fire weather forecasting tools.	Install additional 10 weather stations and incorporate into weather monitoring network. Deployment of DFA technology underway.	Identify and evaluate potential new situational awareness additions and incorporate into 2022 WMP.	Evaluate effectiveness of DFA program and determine if necessary to add to more circuits. Add weather stations if any gaps	Situational awareness and forecasting technology will undoubtedly advance over the next decade. Liberty will look to utilize new	

Initiative Category	By June 1 of current year	By September 1 of current year	Before the next Annual WMP Update	Within the next 3 years	Within the next 10 years	Monitoring and Auditing Plan
			Complete all 2021 DFA deployments.	in weather network are identified. Incorporate AlertWildfire cameras into predictive wildfire risk modeling work	technologies that will increase situational awareness and forecasting capabilities.	
Grid Design & System Hardening	Complete 50% pole replacement for tier 2 System Survey results. Award contracts for five planned covered conductor jobs (Lily Lake, Cathedral Park, Angora Ridge, Bridge Tract and 7300 Phase 6). Replace one OCB at Tahoe City substation.	Complete 80% pole replacement for tier 2 System Survey results. Commence with construction for Topaz Phase 6 and Brockway 4202 Resilience Project Have 40% design completed for all 2022 covered conductor jobs. (Fallen Leaf Lake A and B, 640 A, Meyers Celio A and B, Cathedral Park B) Replace second OCB at Tahoe City substation. Portola substation rebuild design at 30%. Squaw Valley sub breaker replacements design at 90%.	Review design standards with G.O. 95 and see if improvements can be made for resiliency. 100% design completed for all 2022 covered conductor jobs. OCB replacements (5) at Tahoe City and Squaw Valley substations complete. Portola design at 100% ready for construction in 2021.	Establish asset replacement programs for equipment guards, conductor covers, and open jumpers. Utilize risk matrix to identify additional covered conductor projects. Stateline and Squaw Valley substation rebuild projects to remove old oil equipment and wood structures completed.	Identify areas for battery and/or microgrid. Tahoe City/625 Line rebuild completed. Additional substation rebuild projects completed as prioritized by their wildfire mitigation effectiveness.	Establish a project management office as industry best practice for monitoring and control of executing WMP initiatives. Utilize micro-grid feasibility studies to determine if covered conductor alternative technologies are available. Substation projects completed on time and within budget.
Asset Management and Inspections	Complete 25% of scheduled asset inspections. Liberty will continue to develop and improve the processes around digital based inspections that	Complete 25%-75% of scheduled asset inspections. Begin development of RFP scope and parameters for infrared and quality assurance pilot programs.	Finish the remaining 25% of scheduled asset inspections scheduled for 2021. Finalize RFPs for infrared asset inspections and quality assurance	Maintain compliance with asset inspections regulations by performing scheduled inspections. Transition to new enterprise-wide GIS mobile application	Continue to be compliant with asset inspection regulations and look to technological innovations (LiDAR) that will enhance or improve existing inspection practices.	Develop inspection auditing program through RFP process in 2021 to be implemented in 2022.

Initiative Category	By June 1 of current year	By September 1 of current year	Before the next Annual WMP Update	Within the next 3 years	Within the next 10 years	Monitoring and Auditing Plan
	were introduced in 2020 to support inspection activities.		pilot programs to put out to bid.	for asset inspections. Establish a robust quality assurance/quality control program for asset inspections. Once developed, implement RBDM when scheduling asset inspections in high-risk areas. The utility plans to integrate its GIS and SAP data into an asset management system within the next three years.	Continue utilization and improvement of risk modeling to assist with planning of inspection activities. Liberty will continue to explore any technological upgrades over its planned asset management structure post-2024.	
Vegetation Management & Inspections	Establish contract for annual LiDAR inspections. Expand program for fuel management and slash reduction. Establish contract for quality assurance/quality control program.	Complete LiDAR inspection of 100% of lines. Implement quality assurance/quality control program.	Completion of 2021 planned vegetation initiatives outlined in Table 12 in Attachment A. Develop process for generating work based on LiDAR inspections. Enhance communications to improve management of community impacts. Improve vegetation management risk models for prioritizing activities.	Identify and implement opportunities for increasing removal of biomass and reduction of fuel load throughout service territory. Updated vegetation management inventory and work management system.	Continue to adopt new technology and processes for a comprehensive vegetation management program that provides appropriate wildfire risk mitigation based on best practices and principals of integrated vegetation management.	Quarterly reporting of vegetation management initiatives.

MITIGATION INITIATIVES

Initiative Category	By June 1 of current year	By September 1 of current year	Before the next Annual WMP Update	Within the next 3 years	Within the next 10 years	Monitoring and Auditing Plan
Grid Operations & Operating Protocols	Three additional recloser locations determined. All substation breakers and line reclosers in one-shot fire mode. Refresher training on Fire Prevention Plan (FPP), personnel work procedures, and emergency fire suppression tools and actions in conditions of elevated fire risk for crews before fire season. Review PSPS playbook for upcoming fire season. SOW developed for recloser Distribution Automation ("DA") scheme implementation	One of three reclosers installed (replacement recloser), other two have planned jobs. Incorporate any modifications to FPP and Corporate Emergency Management Plan (CEMP) for annual G.O.166 filing. Start modifications to PSPS playbook for annual G.O.166 filing. RFP for DA implementation done, and vendor selected with schedule for implementation in place. Discuss crew-accompanying ignition prevention resources and stationed on-call ignition prevention resources, look at cost and staffing requirements going forward.	Three additional recloser installed and in service. Additional three locations selected for 2022. DA implementation underway for 2022 in service. Continued improvement to FPP, CEMP, and PSPS playbook. Feasibility of ignition prevention resources in 2022 determined.	Continue to install and/or upgrade reclosers at the rate of three per year. DA implemented across the Tahoe Basin, exploring taking it outside the basin to other Liberty territories. Continued improvement to FPP, CEMP, and PSPS playbook. Feasibility of ignition prevention resources in 2022 determined and possibly in place if feasible.	Continue to install and/or upgrade reclosers at the rate of three per year. DA fully implemented across Liberty's entire territory where feasible. Continued improvement to FPP, CEMP, and PSPS playbook. If feasible, ignition prevention resources fully implemented in FPP.	Three reclosers per year goal. DA program vendor selected in 2021, implementing in 2022, 50% by 2024, fully implemented by 2031. Third-party and CPUC verification annually of an effective FPP, CEMP, and PSPS playbook.
Data Governance	Additional integration of data tools such as SQL Server Reporting services ("SSRS"), Power BI and SQL scripting resources facilitating the standardization.	Standardization of weekly, monthly, quarterly, annual reports.	50% or greater automation of standard reports and live dashboard tracking of initiatives providing measured increases in efficiency and	75% or greater automation of standard reports with live, streamlined dashboard systems.	90% or greater automation of standard reports with live, streamlined dashboard systems.	As part of standard reporting, Liberty's data governance can be periodically surveyed with goals set for each time period.

Initiative Category	By June 1 of current year	By September 1 of current year	Before the next Annual WMP Update	Within the next 3 years	Within the next 10 years	Monitoring and Auditing Plan
	of reporting and analysis.		reductions in risk factors.			Inventory of data sets, reports, documentation and presentation to a data governance committee can provide transparent review and advancement.
Resource Allocation Methodology	Liberty plans to hire additional resources for the RBDM initiative. Improve ability to build, revise, and validate its wildfire risk models.	The next generation of Liberty's wildfire risk models will be updated. This includes further quality assurance/quality control validation, data refresh to fire propagation models, and internal data updates on Liberty data.	Liberty is committed to increasing its focus on integrating risk and quantitative analysis into its capital and O&M budgeting process.	Liberty is dedicated to evaluating enterprise-wide risk at the corporate level and enhancing communication and continual development and refinement of its utility wildfire risk.	Liberty is expected to update the Commission each WMP filing on the status of its resource allocation methodology.	Liberty's RDBM framework will be presented and fully developed in its GRC proceeding. This will include testimony, models, analysis, and workpaper support of its RBDM.
Emergency Planning and Preparedness	Conduct Incident Command ("IC") Training for all identified IC members and hold a Virtual PSPS Table Top exercise. Conduct virtual Town Halls in seven communities in the Liberty's service area.	Meet with Community Advisory Boards in four service areas: Sierra/ Plumas Counties, Placer County, El Dorado County, and Alpine/Mono Counties.	Continued Deployment of Community Resource Centers ("CRCs").	Continued maintenance of emergency response plans. Continued engagement with local stakeholders to prepare for and respond to fire-related events.	Increased granularity and customization of response plans. Enhanced documentation and use of lessons learned to update plans.	Formalized review of procedures, benchmarking and stakeholder engagement. Formalized process of learning from peer utilities inside and outside California. Addition of IC training to training database.

MITIGATION INITIATIVES

Initiative Category	By June 1 of current year	By September 1 of current year	Before the next Annual WMP Update	Within the next 3 years	Within the next 10 years	Monitoring and Auditing Plan
Stakeholder Cooperation and Community Engagement	Schedule and finalize virtual town halls and PSPS workshops. Promotion of PSPS, wildfire and readiness messaging through CBO partnerships, social media, email and digital channels. Continued identification of AFN and medical baseline customers. Expand opportunities to extend and amplify messaging through CBO's and other support groups.	Complete virtual town halls and PSPS workshops, gather feedback. Enhance communication channels and utilize programs and services to identify AFN customers.	Survey customers, CBOs, community partners and stakeholders to understand the needs of customers. Strengthen and expand AFN CBO partnerships. Identify emerging channels and technologies to better communicate with customers, community and stakeholders.	Establish stakeholder/CBO networks and partnerships to better understand customer, community and stakeholder-specific needs and develop tailored solutions. Implement planned communication channels and technologies with customers, community and stakeholders.	Effective stakeholder communication through tailored approaches for outreach, engagement and information exchange with customers, communities and stakeholders based on various groups' unique needs. Identify new emerging channels and technologies to better communicate with customers, community and stakeholders.	Set outreach benchmarks each year based on data from previous year. Review AFN list and CBO partnerships semiannually and update accordingly. Distribute semiannual surveys to customers, CBOs, community partners and stakeholders to understand the needs of the customer and update the WMP accordingly.

Instructions: *The description of utility wildfire mitigation strategy shall:*

A. *Discuss the utility's approach to determining how to manage wildfire risk (in terms of ignition probability and estimated wildfire consequence) as distinct from managing risks to safety and/or reliability. Describe how this determination is made both for (1) the types of activities needed and (2) the extent of those activities needed to mitigate these two different groups of risks. Describe to what degree the activities needed to manage wildfire risk may be incremental to those needed to address safety and/or reliability risks.*

See Section 4.2 for summary of how Liberty differentiates wildfire risk from safety and reliability risk. The determination for a particular mitigation is made by examining the bow-tie structure for each risk category. Utility wildfire risk is a separately modeled risk from employee/contractor and public safety (safety risk bow-ties), as well as distribution asset failure risk (reliability risk bow-tie). For the 2021 WMP filing, control and mitigation activities are limited to what reduces drivers of utility-caused wildfires, both in probability and consequence terms. Activities that are designed to reduce the probability of asset failures and injuries/fatalities of the public and employees/contractors have separate bow-ties. Additionally, the consequence of a utility-caused wildfire event have both reliability and safety consequences on the right

side of the wildfire risk bow-tie. Each of these consequences is modeled in the same fashion as the RAMP/S-MAP guidance from the Commission. The extent to which a wildfire risk mitigation reduces the probability or severity of the consequences (safety and reliability consequences included) addresses wildfire risk, safety, and reliability because they are bound together.

Instructions:

B. *Include a summary of what major investments and implementation of wildfire mitigation initiatives achieved over the past year, any lessons learned, any changed circumstances for the 2020 WMP term (i.e., 2020-2022), and any corresponding adjustment in priorities for the upcoming plan term. Organize summaries of initiatives by the wildfire mitigation categories listed in Section 7.3.*

Liberty's WMP is an aggressive mitigation plan that includes major investment in vegetation management, asset management, and grid hardening programs.

Asset Management and Inspections – As Liberty began developing the 2020 WMP, it recognized that the asset data inherited from the previous utility owner was missing key details needed to support the Wildfire Mitigation Program fully. This data issue andthe lack of an electronic inspection program comprise the two key initiatives needed in 2020 to improve decision-making for future asset management initiatives as well as other programs that utilize the same datasets.

In 2020, the System Survey initiative, which consisted of an asset survey and detailed inspection of all overhead distribution and transmission equipment, was completed for Liberty's service territory. In the survey, over 23,000 overhead assets were inspected, and an equipment database was created to store asset information. This information will be imported into the GIS, where data utilization can be maximized across working groups to improve design efficiencies, enable targeting of aging or failing facilities for replacement, and reduce overall costs.

Because it encompassed Liberty's entire service territory, the System Survey generated a larger-than-normal number of asset compliance issues that are currently being addressed. Approximately 400 poles have been identified as needing replacement, which is expected to be a major initiative in 2021. Additionally, another $2.3 million dollars has been invested in a repair program to address the other G.O. 95 findings identified in the survey, with remediation currently under way.

In parallel to the System Survey initiative, Liberty purchased licenses for a mobile data collection application (Fulcrum) to develop an asset database for electronic inspections. All asset inspection forms were digitized, field crews were trained, and, after a small pilot program, the project was fully operational by April 2020.

Grid Design and System Hardening – Grid design and system hardening efforts continue to include major investments in resiliency efforts to strengthen the system with installation of covered conductor and the replacement of over 400 poles in 2021. These two WMP initiatives account for 64% of the overall capital spending for grid hardening.

Liberty plans to use the System Survey as a baseline assessment of the overhead system that will be used to develop programs to proactively replace its aging infrastructure. This information, although in its early development, will also be used to measure future wildfire risk reductions.

Liberty continues to focus on oil circuit breaker replacements rather than a maintenance program at this time. Pole replacements and maintenance work identified during the System Survey are underway and progressing well. Mitigation of PSPS impacts are being developed and implemented, including resiliency corridors and microgrids. Rule 20 undergrounding projects continue to progress, but permitting has been a challenge.

Resiliency corridors and programs are potential solutions to mitigate both wildfire risk and PSPS impacts. Liberty will continue to explore these projects in the form of microgrids, covered conductor, and resiliency corridors where feasible. Repairs and pole replacements as a result of the System Survey will be aggressively pursued in 2021. Some of this work may extend into 2022. The expulsion fuse replacement program will continue in 2021. Liberty is exploring additional technologies, such as non-expulsion arresters, to make more poles in its territory CAL FIRE-exempt.

Vegetation Management – To accomplish its vegetation management and inspection program targets, Liberty has invested in staff, technology, and several vegetation management initiatives. Total operating expenses dedicated to vegetation management initiatives more than doubled from 2018 to 2019. Furthermore, the adoption of Senate Bill 247 in October 2019 caused a drastic increase in costs for qualified line clearance contractors, which elevated projected costs for 2020. For additional details on actual and projected spending, please refer to Table 12 in Attachment A. A lack of internal resources due to extraordinary program growth was a challenge Liberty recognized early in 2020. In order to provide short-term relief, Liberty hired additional consultants and contract resources to assist with managing the increased volume of work in the vegetation management department. To provide a more sustainable, long-term solution, Liberty created an additional system arborist position in its vegetation management department dedicated to wildfire mitigation initiatives. Liberty will continue to utilize external resources as needed to maintain continued progress toward vegetation management program targets.

The Wildfire Safety Division expressed concern in Liberty's 2020 WMP over the implementation of a three-year inspection cycle for vegetation inspections. In order to address this concern, Liberty explored alternative options for an annual inspection cycle while maintaining its comprehensive, detailed inspection program. In October 2020, Liberty piloted the use of LiDAR to perform inspections of vegetation conditions relative to overhead electric lines. The success of this pilot program led to the commitment of a substantial investment into an annual LiDAR program for measuring vegetation clearance distances system wide. The annual system-wide LiDAR inspections will commence in 2021 and will specifically target vegetation clearance compliance.

When it filed its 2020 WMP, Liberty did not have the mechanisms in place to differentiate between vegetation activities performed to mitigate vegetation for strike potential as opposed to maintaining line clearance. In order to provide more granularity, Liberty has established a methodology for tracking vegetation management activities separately with each inspection program having an associated maintenance program. LiDAR inspections will allow Liberty to track vegetation management activities specific to achieving clearances around electric lines and equipment as described in Section 7.3.5.20. The removal of trees with strike potential are now associated with the identification and removal of dead and dying trees described in Section 7.3.5.11. The cost of performing this work was previously recorded with the remediation of at-risk species, which is now exclusively associated with trees identified for work under Liberty's detailed inspection program discussed in Section 7.3.5.2.

Liberty invested in the growth of its existing vegetation management activities, and is committed to new initiatives that enhance its wildfire mitigation efforts. The establishment of a program focused on quality assurance and quality control ("QA/QC") of inspections, as described in Section 7.3.5.13, will provide insight into the effectiveness of vegetation management and inspection programs. The information collected by the QA/QC program will allow Liberty to determine how effective activities are at meeting program objectives and to identify areas for improvement. In August 2020, Liberty began developing a program dedicated to fuel management and reduction of "slash" from vegetation management activities, which is described in Section 7.3.5.5. The establishment of this program will reduce the accumulation of fuel load with the ultimate goal of a net decrease in fuel load throughout Liberty's service territory.

Emergency Planning and Preparedness, Resource Allocation, Data Governance, Risk Mapping - While Liberty certainly faces limitations in terms of data and resources, Liberty has spent the past year forming a team of analysts and a consultant to establish risk modeling capabilities. Liberty completed its wildfire risk model shortly before the 2021 WMP filing. Liberty

was able to incorporate its risk mapping information into its G.O. 95 inspection targets and use information from that initiative to inform decisions at a high level.

Developing the RBDM framework requires constant focus, and the amount of detail and quality checks on data to construct accurate models requires much attention. The Liberty RBDM modeling team has laid the foundation for quantitative analysis to be used in forward-looking capital and O&M decision-making.

Liberty recognizes the importance and benefits of meeting and eventually exceeding RBDM standards established by the CPUC. Liberty has already seen positive value by scheduling its G.O. 95 targeted pole remediation plan by incorporating its detailed wildfire risk analysis alongside its intrusive inspection results. For 2021, Liberty has determined additional needs to increase its modeling capabilities and plans to hire up to two additional positions to help with the quantitative aspects of managing the RBDM program.

To implement its 2020 WMP, Liberty established a formal WMP work team consisting of a Wildfire Prevention Manager, Fire Protection Specialist, Emergency Planning Manager, Accountant, and Data Analyst. With the expansion of WMP-related programs this year, Liberty plans to hire additional staff to execute and track performance of initiatives presented in its 2021 WMP update. Support labor that cannot be easily identified as attributed to a specific WMP initiative is presented in Table 12 in the Emergency Planning and Preparedness category.

Stakeholder Cooperation and Community Engagement – Liberty understands aggressive and proactive communication is essential to help mitigate the risk of wildfires and adverse impacts of PSPS events for its customers and community partners. Liberty remains committed to partnering with customers, elected officials, community-based organizations ("CBOs"), first responders, and other public safety and community partners, understanding each partner plays a unique role in helping achieve wildfire prevention and mitigation in Liberty's service territory. Liberty provides an essential service, and it takes its role within the communities it serves very seriously.

Liberty will continue to strive to provide all stakeholders proactive and transparent awareness and information, educating the public on wildfire preparedness and PSPS events. It is Liberty's goal to provide those it serves with the necessary resources to navigate the adverse impacts of an emergency, wildfire or PSPS event. Through educational campaigns and strategic partnerships, Liberty has implemented a robust, external communication strategy, which is considered a living document and updated to reflect lessons learned and new best practices. Liberty also leverages its partnerships with CBOs and stakeholders to amplify and disseminate emergency preparedness information. In order to meet these goals, Liberty plans to hire two new positions related to PSPS and wildfire mitigation community outreach.

C. *List and describe all challenges associated with limited resources and how these challenges are expected to evolve over the next 3 years.*

Limited qualified resources: One of the many challenges of operating a utility in the Lake Tahoe area is a lack of qualified staff in the region. Lake Tahoe is a resort community with many residences serving as second homes. Affordable housing is in limited supply for potential employees. More affordable housing is located over an hour away, and access to Liberty's service territory is sometimes challenging via mountain roads that are periodically shut down due to winter weather. All these challenges make it more difficult for Liberty to be a competitive employer for positions, such as degreed/licensed engineers and project managers. Liberty is in the process of hiring a capital project delivery manager to strategically help plan and execute capital projects. Furthermore, Liberty is also in the process of hiring an additional electrical engineer in the distribution engineering group to increase its workforce and talent skill sets.

Liberty plans to add up to two full-time resources in order to bolster modeling capability and accuracy of utility overall risk modeling, specifically wildfire risk modeling. To date, Liberty has leveraged the technical risk management proficiency of

a senior analyst in its Rates & Regulatory department and formed a team of consultants and other analysts with guidance from Liberty's corporate Energy Risk Management team.

D. *Outline how the utility expects new technologies and innovations to impact the utility's strategy and implementation approach over the next 3 years, including the utility's program for integrating new technologies into the utility's grid. Include utility research listed above in Section 4.4.*

LiDAR: Liberty strives for continuous improvement through the use of technologies and other tools with the potential to enhance the quality and efficiency of its vegetation management inspections. In 2020, Liberty piloted LiDAR inspections of vegetation around electric lines and equipment of approximately half of its service territory, including all line miles in the Extreme (Tier 3) High Fire Threat District. The pilot project proved to be successful in detecting vegetation to conductor clearance issues, and Liberty will expand the use of LiDAR, beginning in 2021, to include annual inspections of 100% of its overhead electric lines and equipment.

Tripsavers: Liberty continues to use S&C Tripsavers as a non-expulsion alternative to traditional fuses on feeder laterals. Tripsavers reduce ignition potential due to fuse operations and allow for greater flexibility in coordination of protective devices, leading to shorter customer interruptions. Some Tripsavers are set to be deployed with SCADA, which can be a cost-efficient alternative to recloser installations. Costs of S&C Tripsavers are captured under the expulsion fuse replacement program.

Sagehen microgrid: Liberty was successful in constructing and commissioning an innovative microgrid solution to a remote mountain research station. This project has saved customers over $2 million by replacing a high fire-risk distribution line with a containerized solar plus battery storage microgrid. The project is a wildfire mitigation solution that would avoid costly replacement of four miles of distribution line serving a single customer in Central Sierra Nevada, north of Truckee, California. The microgrid will allow Liberty to completely de-energize the line in the summer, maintaining reliable service to the customer.

DFA: Distribution Fault Anticipation is a collaborative project between Texas A&M and Liberty. The technology is an incipient fault detection technology that detects small anomalies in the AC power waveform due to events such as arcing hardware or tree branches in the line that are non-permanent faults. Per the CPUC's suggestion, Liberty selected DFA as a possible technology during development of the 2021 WMP. Other IOUs are piloting the incipient fault technologies, which appear to help find and stop ignitions before they happen.

HIFD: High Impedance Fault Detection is a collaborative research project between the University of Nevada, Reno ("UNR") and Liberty. This technology is well suited to detect faults that are high impedance in nature. It is believed that this technology will work particularly well in the Lake Tahoe Basin in light of the poor grounding conditions in the area. Liberty selected HIFD for its ability to clear high impedance faults. With the poor grounding in much of Liberty's territory, this technology seems well suited to clear faults rapidly before ignitions. Traditional protection measures have not performed well with these types of faults on poorly grounded networks.

Ground Fault Neutralization ("GFN"): GFN is an established technology by Swedish Neutral. Widely used in Europe and Australia, this technology drives line-to-ground fault current to near zero, decreasing risk of ignition significantly. Swedish Neutral claims that this technology works well on a three-wire system, such as Liberty's 14.4kV three-wire system. Liberty is considering GFN for its ability to drive line-to-ground fault current to near zero. If it performs as advertised, GFN will greatly limit the available energy required to ignite vegetation.

7.2. Wildfire Mitigation Plan implementation

***Instructions**: Describe the processes and procedures the electrical corporation will use to do all the following:*

A. Monitor and audit the implementation of the plan. Include what is being audited, who conducts the audits, what type of data is being collected, and how the data undergoes quality assurance and quality control.
B. Identify any deficiencies in the plan or the plan's implementation and correct those deficiencies.
C. Monitor and audit the effectiveness of inspections, including inspections performed by contractors, carried out under the plan and other applicable statutes and commission rules.
D. Ensure that across audits, initiatives, monitoring, and identifying deficiencies, the utility will report in a format that matches across WMPs, Quarterly Reports, Quarterly Advice Letters,8 and annual compliance assessment.

A. The company closely monitors the implementation of all WMP activities. Refer to Table 7-1 for monitoring and auditing plans associated with WMP initiative categories.

B. Liberty continually looks for opportunities to enhance and refine its wildfire mitigation plan. Liberty addresses the WSD-identified deficiencies with its 2020 WMP in Section 4.6 above. One area that Liberty understands does not currently meet the WSD expectations is its quarterly GIS data submission. Since the issuance of the Draft WSD GIS Data Reporting Requirements on August 21, 2020, Liberty has re-engineered and upgraded its GIS interface and reporting capabilities to comply with WSD's schema dictionary and mapping of assets. The required investment and level of commitment to meet these reporting and data requirements has been significant and are part of a company-wide enterprise GIS system upgrade. Liberty expects the GIS system upgrade to be complete in August 2021 and hopes to provide all requested GIS files in accordance with the WSD requirements by that time or soon thereafter.

C. Refer to Table 7-1. Liberty has or is planning QA/QC programs to monitor and audit the effectiveness of its inspection programs. For vegetation management, Liberty maintains and implements a robust scheduling process in order to meet compliance inspection requirements. Most of the maintenance work for vegetation management (pre-inspection, pruning, and tree removals) is performed by contractors and not by Liberty employees. On an annual basis, over 10,000 trees are identified for work, and there is a need to track work performed and associated business processes and to standardize a formal QA/QC program for Liberty. Since the last WMP, Liberty has consulted with regional industry experts to develop such a QA/QC program that includes statistical sampling of vegetation management inspections by annual circuit miles and a formal post-work verification process control. For the asset inspection programs, Liberty plans to develop an inspection auditing program through an RFP process in 2021 to be implemented in 2022. Additionally, operation managers will be spot auditing new construction.

   In 2020, the WSD Compliance Branch began auditing Liberty's electric distribution asset work and vegetation management program.

D. In 2020, Liberty made significant efforts to respond to the growing WSD quarterly reporting requirements. Liberty recognizes the need for a single standardized system for streamlined and consistent reporting across the WMP, quarterly reports, quarterly advice letters, annual compliance assessment, and all other WMP-related requests. Liberty plans to develop a standardized system in 2021 and will seek to develop automation processes over the next few years.

7.3. Detailed wildfire mitigation programs

***Instructions**: In this section, Liberty describes how the specific programs and initiatives plan to execute the strategy set out in Section 5 and Section 7.1. The specific programs and initiatives are divided into 10 categories, with each providing a space for a narrative description of the utility's initiatives and a summary table for numeric input in the subsequent tables in this section. The initiatives are organized by the following categories provided in this section:*

1. *Risk assessment and mapping*
2. *Situational awareness and forecasting*
3. *Grid design and system hardening*
4. *Asset management and inspections*
5. *Vegetation management and inspections*
6. *Grid operations and protocols*
7. *Data governance*
8. *Resource allocation methodology*
9. *Emergency planning and preparedness*
10. *Stakeholder cooperation and community engagement*

7.3.1. Financial data on mitigation initiatives, by category

***Instructions**: In the following section (7.3.2) is a list of potential wildfire and PSPS mitigation activities which fit under the 10 categories listed above. While it is not necessary to have initiatives within all activities, all mitigation initiatives will fit into one or more of the activities listed below. Financial information—including actual / projected spend, spend per line-miles treated, and risk-spend-efficiency for activity by HFTD tier (all regions, non-HFTD, HFTD tier 2, HFTD tier 3) for all HFTD tiers which the activity has been or plans to be applied—is reported in the attached file quarterly. Report any updates to the financial data in the spreadsheet attached in Table 12.*

Please see Table 12: Mitigation Initiative Financials in Attachment A[9].

7.3.2. Detailed information on mitigation initiatives by category and activity

***Instructions**: Report detailed information for each initiative activity in which spending was above $0 over the course of the current WMP cycle (2020-2022). For each activity, organize details under the following headings:*

1. ***Risk to be mitigated** / problem to be addressed*
2. ***Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives*
3. ***Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (e.g., veg clearance is done for trees tagged as "high-risk")*
4. ***Progress on initiative** (amount spent, regions covered) and plans for next year*
5. ***Future improvements to initiative***

***List of initiative activities by category** – Detailed definitions for each mitigation activity are provided in the appendix.*

[9] Incremental labor costs for support staff not easily attributable to a specific WMP initiative are included in the Emergency Planning and Preparedness category under the Adequate and trained workforce for service restoration WMP line item on Table 12.

7.3.1 Risk assessment and mapping

7.3.1.1 A summarized risk map showing the overall ignition probability and estimated wildfire consequence along electric lines and equipment

1. **Risk to be mitigated** / problem to be addressed

All wildfire risk-drivers.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

The establishment of Liberty's risk mapping and wildfire risk models will allow the company to incorporate objective, quantitative analysis into its decision-making. This analysis will be a natural complement to judgments and experience of Liberty's subject matter experts with actual utility performance.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

The risk map will cover Liberty's entire service territory.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

In 2020, Liberty advanced from no risk model or mapping capabilities to a first-generation wildfire risk model and fire risk mapping tools. Costs associated with this initiative are captured in Table 12 of Attachment A.

5. **Future improvements to initiative**

Liberty plans to establish a formal risk management team at the utility level and plans to build on its wildfire risk models as more data and more resources are dedicated to the initiative.

7.3.1.2 Climate-driven risk map and modeling based on various relevant weather scenarios

Please refer to Section 7.3.1.1.

7.3.1.3 Ignition probability mapping showing the probability of ignition along the electric lines and equipment

Please refer to Section 7.3.1.1.

7.3.1.4 Initiative mapping and estimation of wildfire and PSPS risk-reduction impact

Please refer to Section 7.3.1.1.

7.3.1.5 Match drop simulations showing the potential wildfire consequence of ignitions that occur along the electric lines and equipment

Please refer to Section 7.3.1.1.

7.3.1.6 Weather-driven risk map and modeling based on various relevant weather scenarios

Please refer to Section 7.3.1.1.

7.3.2 Situational awareness and forecasting

7.3.2.1 Advanced weather monitoring and weather stations

1. **Risk to be mitigated** / problem to be addressed

Liberty's advanced weather monitoring program improves situational awareness by providing weather information to operations and allows for the safe operation of the electric grid during extreme weather events. Continuation of this program reduces the likelihood of avoidable customer outages and probability of ignitions risk with continuous weather monitoring. Enhanced real-time weather monitoring data provides an important tool to help Liberty plan for operating activities during such extreme events.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

This initiative is necessary to provide the weather data required to accurately predict wildfire risk in the service territory. An alternative to installing Liberty-owned weather stations is to use the data provided by existing weather stations in or near Liberty's service territory, but these weather stations do not provide the frequency or quantity of data required for Liberty's PSPS and Fire Potential Index ("FPI") programs.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

The expansion of this program will focus on areas where risk mapping initiatives have determined high or very high fire risk, or where more granular weather data can provide for better sectionalizing options during a PSPS event.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

In 2020, 19 out of 20 targeted weather stations were installed, bringing the total number of weather stations to 29. Fuel moisture sensors were also added to weather stations installed in 2020 and retrofitted to several of the locations installed in 2019. Fuel moisture sensors can help to validate fuel moisture conditions, which is crucial to accurately predict wildfire risk in local areas. The data from these weather stations provides much needed support for Liberty's PSPS and FPI tools.

5. **Future improvements to initiative**

Liberty aims to have 40 total stations installed by the end of 2021, a reduction of 10 as compared to the 2020 program target. This reduction is due to achieving an adequate granularity of data provided by the 40 planned stations. Weather stations in future years will be added on a case-by-case basis, as necessary, to support more granular sectionalizing of circuits during PSPS events.

7.3.2.2 Continuous monitoring sensors

Liberty employs various types of continuous monitoring sensors on its system, both at the distribution and sub-transmission level. Substation relays provide remote system monitoring of SCADA data back to Liberty's System Control Center in New Hampshire. In addition, most of Liberty's line reclosers now have SCADA remote capabilities.

Because SCADA relaying is expensive, Liberty has explored other system control and monitoring tools. Fault indicators, such as GridAdvisors smart sensors, have been deployed on lines and have shown to be an effective tool for identifying fault and outage locations. Liberty has also deployed Aclara Line Sensors for additional continuous monitoring in more remote locations, provided cellular communications are available. Aclara technology is very similar to the GridAdvisors line sensors, but it has added value by recording line disturbances and allowing for post-event analysis.

More recently, Liberty has deployed S&C's Tripsavers, which replace some expulsion fuses in locations where reclosing is beneficial. These devices also have the added benefit of a one-shot (fire mode) setting that can be deployed during fire season.

One other form of system monitoring is through the AlertWildfire camera network which allows for real-time monitoring of the service territory and potential for early detection of ignitions

1. **Risk to be mitigated** / problem to be addressed

The primary benefit of continuous monitoring sensors is system reliability. The ability to quickly determine fault and outage locations allows dispatchers to quickly deploy resources to evaluate and resolve system issues. Another benefit of continuous monitoring systems is providing a faster response to an ignition event. Aclara sensors record continuous line disturbances, which can be analyzed and repaired before an issue leads to an ignition. Tripsavers are a good tool during high fire threat days with their one-shot (fire mode) capability. AlertWildfire cameras provide opportunity for early detection of ignitions and provide opportunity to view areas where a fault may have occurred

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

It has long been a utility standard to employ continuous monitoring at substations using substation relay technology, as it has both line reclosers and the relay technology. More recently, SCADA monitoring capabilities have been added to Liberty's line reclosers to provide better visibility and control on distribution lines. This technology also allows system controls to quickly change to fire mode (one-shot) settings without the need for physical interaction at the recloser site.

GridAdvisors sensors have been deployed for many years on Liberty's system. These sensors provide locations of outages and faults. Aclara sensors are a more robust line sensor solution with the capability to provide email notifications and remote ability to analyze system disturbances, much like today's incipient fault detection solutions. This added capability makes Aclara sensors the line sensor of choice. Tripsavers are a good solution to replace expulsion fuses in locations where reclosing is beneficial and where fire mode (one-shot) settings can be deployed.

The AlertWildfire Camera network has grown significantly throughout California and other western states in large part due to partnerships with electric utilities. Over the last few years, these cameras have proven their value and have become an integral part of fire detection and monitoring during fire season in California. With more cameras, improving technology, and more partnerships, the capabilities of the AlertWildfire network will continue to improve on an already successful platform.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

Prioritization of any new continuous monitoring sensors will be considered first in Liberty's Tier 3 area, followed by Tier 2 areas considered high risk.

Liberty has selected eight cameras to partner with AlertWildfire. The locations of the cameras were selected to optimize the most coverage within Liberty's service territory and the HFTD. An additional benefit to partnering with AlertWildfire, is the ability to access all cameras within Liberty's service territory beyond the eight cameras adopted by Liberty.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

Aclara sensors were deployed on four additional feeders in 2020. Three of these feeders are in HFTD Tier 3 areas. Costs incurred for deployment of line sensors is minimal since the hardware was purchased under a previous program

Tripsavers were deployed on one feeder in 2020. Costs are tracked as part of the expulsion fuse replacement program.

AlertWildfire – In 2020, Liberty planned to enter into partnership with AlertWildfire, but the agreement was not completed prior to year-end. Liberty is in the process of finalizing the AlertWildfire partnership and plans to adopt eight cameras prior to 2021 fire season.

5. **Future improvements to initiative**

Liberty will continue to deploy this technology, especially targeting removal of expulsion fuses with Tripsavers and other non-expulsion fuses, until all expulsion fuses have been removed from Liberty's system. Liberty plans to work with University of Nevada, Reno to explore new use cases for AlertWildfire cameras as more technology becomes available and integrated into the network.

7.3.2.3 Fault indicators for detecting faults on electric lines and equipment

It has long been utility practice to install fault indicators in strategic locations to help with fault location on both the overhead and underground systems. Liberty's troublemen also install additional indicators while troubleshooting in order to help find fault locations.

1. **Risk to be mitigated** / problem to be addressed

The primary benefit of fault indicators is more rapid service restoration during an outage.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

It has long been a utility standard to employ fault indicators to assist in fault location during outage troubleshooting.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

There is no region prioritization for this initiative at this time. It is a well-established program.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

Fault indicators are installed on an as-needed basis by troublemen and/or as recommended by troublemen.

5. **Future improvements to initiative**

Continue current process.

7.3.2.4 Forecast of a fire risk index, fire potential index, or similar

1. **Risk to be mitigated** / problem to be addressed

Liberty's FPI is a comprehensive assessment tool designed to heighten awareness of daily forecast fire conditions to aid in operational decision making. FPI converts environmental, statistical, and scientific data into an easily understood forecast of short-term fire threat for Liberty's service territory. FPI forecasts up to seven days of fire threat potential. More details regarding FPI can be found in Section 4.5.1.4.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

Liberty uses FPI for fire threat awareness and operational decision making. The FPI provides a seven-day fire risk condition forecast for 11 geographic zones within the service territory. FPI condition forecasts include five risk conditions (Low, Moderate, High, Very High, and Extreme) that are used as a means to determine operating procedures, by zone, depending on the forecast fire risk. FPI condition forecasts are communicated to field staff on a daily basis to inform operational decisions when work restrictions are in place due to fire risk. Prior to the development of FPI, Liberty did not have any specialized fire risk prediction tools, which meant less overall awareness of day-to-day fire risk.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

There are 11 FPI zones, covering Liberty's entire service territory, with individual fire risk forecasts for each zone. This forecasting granularity provides a better understanding of the overall fire risk throughout the service area and allows for better decision-making in scheduling work by zone.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

<u>FPI Methodology Development</u>: In 2020, FPI was developed for Liberty's service territory based on SDG&E and Pacific Gas & Electric Company ("PG&E") methodologies. Factors considered include climatological, geographical, and fuel source conifer and timber understory fuels in Liberty's service territory. FPI calculations include fuel moisture (both dead and live), "green-up" factor, ambient temperature, relative humidity, Fosberg Fire Weather Index, and Burning Index, among other factors. This work led to the establishment of the number of FPI classes as well as the fuel and weather criteria that delineate FPI classes.

<u>Identification of FPI zones/polygons</u>: Eleven FPI zones have been developed to capture homogeneous fuels, weather, and topography within each zone. The number of zones and their extent encompass all of Liberty's service territory.

<u>Establishment of FPI thresholds for each FPI zone based on historical weather analyses</u>: Historical data was analyzed to

establish appropriate FPI thresholds specific to the areas identified above. FPI values for determining allowable work and operations based on fire risk were delineated based on weather station observations and the state of fuels, including seasonal variations in fuel moisture and short-term fire weather conditions (temperature, wind speed, relative humidity/vapor pressure deficit, etc.).

Extend proactive de-energization monitoring and operational support tool to include FPI calculation: Liberty has developed a web-based monitoring and operational support tool that displays FPI values by zones, in addition to PSPS weather analytics and forecasting.

5. **Future improvements to initiative**

With FPI brought online, Liberty continues to monitor forecast accuracy and reliability. Through the monitoring process, Liberty and Reax Engineering look to identify inconsistencies between forecast and monitored conditions in order to make improvements in forecast accuracy.

7.3.2.5 Personnel monitoring areas of electric lines and equipment in elevated fire risk conditions

1. **Risk to be mitigated** / problem to be addressed

In areas with forecast elevated fire weather conditions, Liberty will activate proactive patrols along power lines. Operations personnel are deployed to observe conditions along the electrical system (vegetation issues, equipment condition, wire sag and sway, and any potential system damage related to the weather event) that may pose a threat to public safety. This added situational awareness provides the ability to identify imminent safety risks in order to resolve them immediately.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

Liberty engages in this initiative because it provides a beneficial supplement to other situational awareness activities. Liberty monitors real-time conditions through its weather station network and fire weather tools and can deploy field resources to evaluate and resolve issues to mitigate fire risk during elevated fire weather conditions.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

Liberty monitors forecast and real-time weather conditions by utilizing weather station data and fire weather prediction tools. FPI and PSPS zones, which receive individualized forecasts, help to determine the specific circuits that are predicted to experience elevated fire risk conditions. This knowledge allows for patrol resources to be more accurately and efficiently deployed.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

In the last two years, Liberty has worked with Reax Engineering to develop the FPI and PSPS forecasting tools. These forecasting tools have been foundational in developing the methodology for the deployment of resources during elevated fire risk events. Please see Section 4.5.1.4 for more details on FPI and Chapter 8 for PSPS protocols. Costs associated with this initiative are captured under section 7.3.6.3 of the Grid Operations and Protocols category.

5. **Future improvements to initiative**

Liberty will continue to evaluate its proactive patrol methodology by incorporating lessons learned from field personnel and weather forecasting analysis. As weather monitoring and fire forecasting tools evolve, Liberty hopes to improve its ability to deploy resources as efficiently and accurately as possible.

7.3.2.6 Weather forecasting and estimating impacts on electric lines and equipment

Please refer to section 7.3.2.4.

7.3.3 Grid design and system hardening

Most of the current asset management work and inspection cycles are compliance-driven. Liberty primarily maintains and replaces its system assets using work identified from G.O. 165 (overhead lines) and G.O. 174 (substation) inspections. Under G.O. 165, overhead distribution assets are inspected on a detailed level every five years, and any issues identified are remediated using G.O. 95 compliance timelines. Asset repairs and replacements identified during intrusive pole inspections and G.O 165 inspections are remediated under the timelines outlined in G.O. 95, and work is performed using Liberty's construction standards and pole loading calculations.

Other asset replacements or improvements Liberty performs are (1) customer requests for rebuilds as a result of the need for load upgrades or to fix connection issues, (2) customer (county) requests for Rule 20-A undergrounding projects, (3) reactive repairs or replacements from asset failures in service from weather events or contact from objects and are not proactively replaced based on asset age or condition, (4) major overhead line replacements for Topaz and the 7300 lines, in addition to the new 625/650 transmission line upgrade, and (5) battery storage solutions (Sagehen pilot).

In 2020, Liberty conducted a system-wide survey of all overhead assets that included enhanced G.O. 165 inspections. From this survey, Liberty now has available an assessment of the entire overhead system that can be used to develop programs to proactively replace its aging infrastructure. This information, although in its early development, will also be used to measure future wildfire risk reductions.

7.3.3.1 Capacitor maintenance and replacement program

Liberty does not have an applicable program at this time. Capacitors are inspected during G.O. 165 inspections.

7.3.3.2 Circuit breaker maintenance and installation to de-energize lines upon detecting a fault

1. **Risk to be mitigated** / problem to be addressed

Installing new circuit breakers mitigates the risk of energy release component during fault conditions by decreasing the fault clearing times and energy release component during a system fault. Breakers are being updated and installed as part of Liberty's overall WMP objective to rebuild its aging substations, allowing for increased fault clearing times, greatly improving switching speeds, and reducing energy release component.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

Brockway Substation, an aging and failing substation located in a residential area, was decommissioned and is being replaced by installing new circuit breakers at Kings Beach Substation. Liberty's focus has been to replace oil circuit breakers

("OCB") rather than trying to maintain them. Recently, Liberty has removed OCBs from Meyers (2019), and Kings Beach (2020) substations.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

Liberty is evaluating other regions and selecting substation circuit breaker replacements based on risk assessment and current equipment capability.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

The new circuit breakers at Kings Beach Substation were put into operation in 2020. Circuit breaker replacements are also planned for the Tahoe City and Squaw Valley Substations in 2021. The Stateline and Squaw Valley substation rebuild projects, scheduled in 2023 and 2024, will also replace OCBs with new circuit breakers.

5. **Future improvements to initiative**

Future improvements for this initiative include adding personnel to support capital project delivery and engineering leadership.

7.3.3.3 Covered conductor installation

1. **Risk to be mitigated** / problem to be addressed

Installing covered conductor mitigates the risk of faults due to line impact, animals, and line-to-line faults.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

Liberty's service territory is located in the High Sierras of California and is prone to wildfire risk. Additionally, the Lake Tahoe area sees a massive influx of visitors during peak tourism season, which happens to coincide with peak fire season. Liberty has selected covered conductor as a system hardening initiative to reduce the risk of wildfire in an area with limited resources (roads, infrastructure, emergency response, and ingress/egress) to handle the capacity of tourists. Liberty has selected to perform work in this initiative with its pilot ACS and Tree wire covered conductor program in areas based on climate, reliability, and asset conditions.

Covered conductor is effective at mitigating several types of ignition drivers such as contact from object and wire-to-wire contract, as well as reducing other equipment failures.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

A vast majority of Liberty's service territory is in HFTD 2 and 3. In the initial phases (2020 and 2021) of the covered conductor program, areas of the service territory were selected based on local knowledge of the wildland/urban interface, locations of high fire threat districts, and the age and condition of the current infrastructure. Areas were also chosen based on their accessibility and egress options during an emergency. Initiatives in 2020 and 2021 are focused mainly on the

southwest shores of Lake Tahoe and Fallen Leaf Lake in South Lake Tahoe. These areas already needed line upgrades and are in high-traffic areas with limited options for egress, especially in peak tourism season.

Since the deployment of the risk-based assessment, covered conductor projects selected for 2022 and beyond were chosen based on the areas providing the greatest risk reduction gained by implementing covered conductor projects.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

In 2020, the following initiatives were completed:

Table 7-3: 2020 Covered Conductor Projects

Project Name	Design Type	Total Spend	Number of Poles	Mileage	Tree Removals/Trims
7300 Phase 3a	ACS Bundled Conductor	$1,148,652	12	0.5	28 removals; 14 trims
7300 Phase 3b	ACS Bundled Conductor	$449,039	13	0.45	
7300 Phase 4	ACS Bundled Conductor	$925,915	21	0.75	18 removals; 35 trims
7300 Phase 5	ACS Bundled Conductor	$760,653	20	0.7	11 removals; 27 trims
Vikingsholm	ACS Bundled Conductor	$1,725,130	26	1.25	44.25 removals; 93 trims (.25 units refer to brush)
Topaz Phase 2	Tree Wire	$591,752	13	0.47	0
Topaz Phase 4	Tree Wire	$1,155,132	41	1.8	24 removals; 3 trims
Topaz Phase 5	Tree Wire	$729,838	39	0.9	
Total		**$7,486,111**	**185**	**6.82**	**125.25 removals; 172 trims**

In 2021, the following initiatives are proposed:

Table 7-4: 2021 Covered Conductor Projects

Project Name	Design Type	Total Budgeted	Number of Poles	Mileage
Topaz Phase 6	Tree Wire	$1,461,400	37	1.5
Lily Lake	ACS Bundled Conductor	$3,106,258	50	2
Angora Ridge	ACS Bundled Conductor	$1,967,400	46	1.7
Cathedral Park A	ACS Bundled Conductor	$1,613,938	37	1.5
Bridge Tract	ACS Bundled Conductor	$1,084,167	24	0.9
Hobart WMP	Tree Wire	TBD	70	2.5

Table 7-5: 2022 Covered Conductor Projects

Project Name	Design Type	Total Budgeted	Number of Poles	Mileage
Fallen Leaf A	Tree Wire	$1,009,900	24	0.6
Fallen Leaf B	ACS Bundled Conductor	$1,719,940	51	1.5
Cathedral B	Tree Wire		43	2.25
Meyers Celio A	Tree wire	$1,769,300	36	1.6
Meyers Celio B	Tree Wire	$1,262,300	23	0.75
640 A- Covered transmission and underbuild	Covered transmission	TBD	TBD	3
640 B- Covered transmission	Covered transmission	TBD	TBD	3

5. **Future improvements to initiative**

To supplement the covered conductor initiative, Liberty is currently conducting microgrid feasibility studies throughout its service territory. Microgrids may allow for removal and/or power shutoffs of lines without impacting customer reliability, which would further reduce fire risk and reduce impacts from PSPS events. Microgrids could possibly supplement projects as early as 2022. Angora Ridge (currently planned to receive covered conductor) has been determined as a project that is highly feasible for microgrid placement.

Additionally, Liberty is determining the best placement for tree wire and ACS bundled covered conductor. Due to maintenance and access issues, ACS bundled covered conductor will be utilized in areas that can be accessed by a bucket truck. Tree wire will be utilized in difficult access areas to reduce the length of outages.

7.3.3.4 Covered conductor maintenance

Liberty does not have an applicable program at this time. Lines are patrolled and inspected as part of G.O. 165 inspections.

7.3.3.5 Crossarm maintenance, repair, and replacement

Liberty does not have an applicable program at this time. Lines are patrolled and inspected as part of G.O. 165 inspections.

7.3.3.6 Distribution pole replacement and reinforcement, including with composite poles

In 2021, Liberty plans to replace approximately 400 poles in HFTD 2 areas that were identified as needing replacement during Liberty's System Survey. In 2020, Liberty replaced poles identified as needing replacement in HFTD 3 areas.

During the system-wide survey in 2020, inspections were performed on all of Liberty's 22,400 poles. Inspectors identified poles requiring replacement based on G.O. 95 conditions Levels 1, 2 or 3. Every pole requiring replacement was assigned a due date based on the condition of the pole and its location. Priority 1 poles in HFTD 3 areas were replaced immediately. Level 2 poles in HFTD 3 areas and Level 1 poles in HFTD 2 areas were also replaced within six months of inspection. Level 2 poles in HFTD 2 areas (approximately 400 poles) will be replaced in 2021. Liberty will perform data analysis on these 400 poles to remove poles that are planned to be replaced in other WMP initiatives, such as the covered conductor initiative. Liberty is currently developing a program to replace approximately 1,700 poles classified as Level 3 poles. Liberty plans to replace approximately 350 poles a year for five years to complete this initiative.

1. **Risk to be mitigated** / problem to be addressed

Pole replacements and reinforcements minimize the risk of system fault due to structural pole failure.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

This initiative was selected based on the results of the 2020 System Survey. Approximately 3% of poles on Liberty's system will be replaced. Poles will be designed to meet G.O. 95 heavy loading requirements.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (e.g., veg clearance is done for trees tagged as "high-risk")

Liberty prioritized pole replacements based on their location. Poles requiring replacement in HFTD 3 areas have been replaced and Liberty is now focusing on replacing poles in HFTD 2 areas.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

In 2020, 62 poles were replaced at a cost of $2.2 million for Level 1 and 2 priority poles in HFTD 3 and HFTD 2 areas.

5. **Future improvements to initiative**

Future plans include replacement of poles identified as needing replacement from the 2020 System Survey. Lessons learned are needed for improved programmatic planning and construction management to address resource and material

needs to meet compliance deadlines. Liberty is reviewing standards for future updates to construction and design standards to consider fire damage reduction and improved survivability.

7.3.3.7 Expulsion fuse replacement

1. **Risk to be mitigated** / problem to be addressed

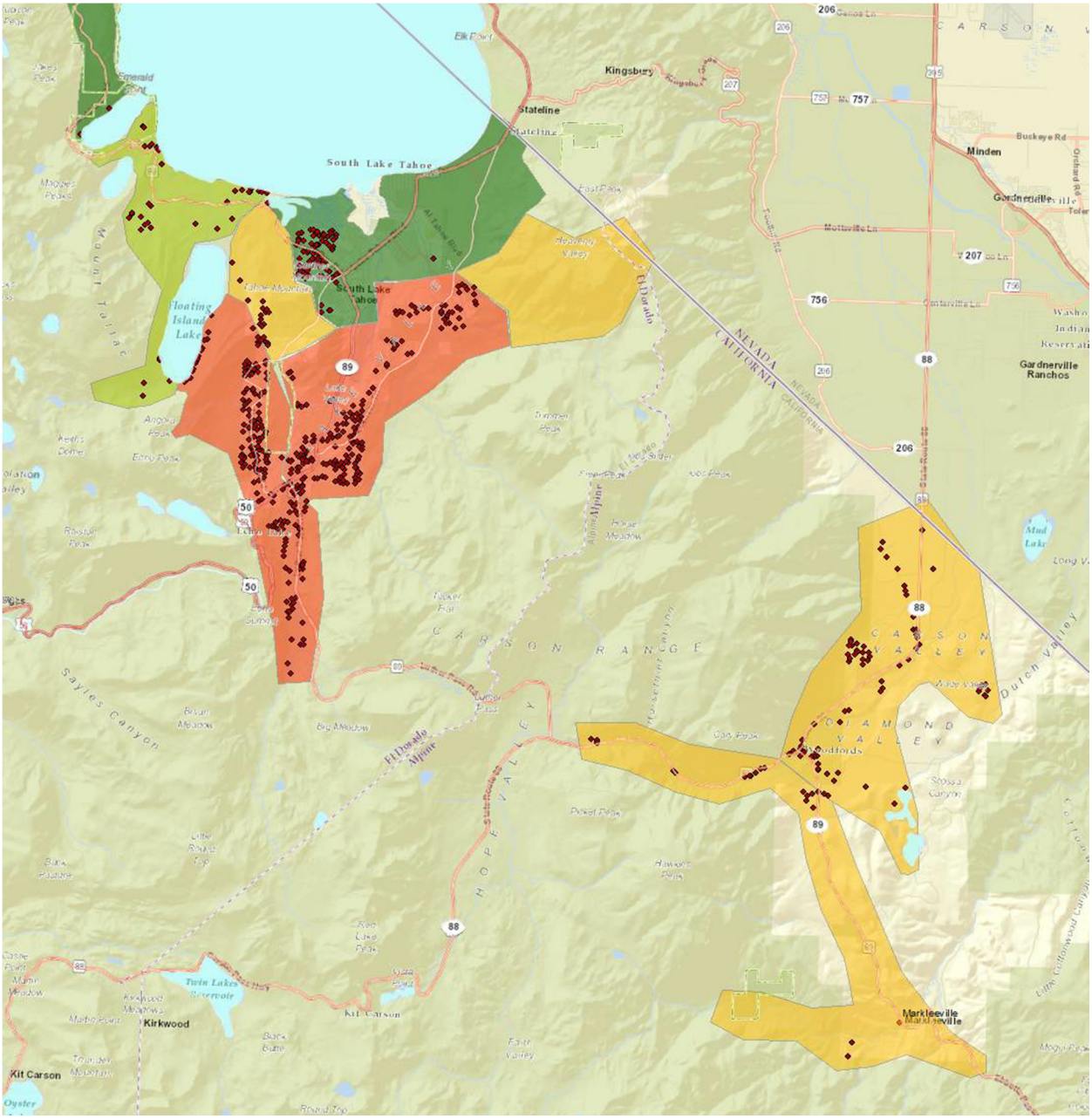
The goal of the expulsion fuse replacement program is to mitigate ignition potential of traditional expulsion fuses by replacing them with non-expulsion alternatives. When a fault occurs on the distribution system, the fault is often isolated by an expulsion fuse, which, upon operation, discharges gas and particles that could ignite nearby vegetation. By replacing traditional fuses with non-expulsion fuses, the ignition potential is significantly reduced.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

The expulsion fuse replacement initiative installs CAL FIRE-approved non-expulsion fuse hardware, which has shown reduced ignition potential compared to traditional fusing alternatives. Since Liberty began replacing expulsion fuses in 2019, there have been no ignitions resulting from non-expulsion fuses. Although the dataset is small, initial results indicate that non-expulsion fuses are effective at mitigating ignition potential due to fuse operations.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

The expulsion fuse replacement program was prioritized utilizing Reax fire risk maps, prioritizing areas identified with high or very high wildfire risk. A map of fuse replacement locations is shown below, along with risk areas.



Risk Rating

- Low
- Moderate
- High
- Very High

Fuse Replacement Locations

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

In 2020, improvements in data tracking were leveraged to more efficiently track progress on the expulsion fuse initiative. Liberty replaced 853 fuses, primarily in high and very high wildfire threat areas as prioritized by risk mapping. Liberty has replaced approximately 1,100 fuses since the program's inception in 2019.

5. **Future improvements to initiative**

Liberty plans to replace 1,500 fuses per year until all of the approximately 9,000 fuses in Liberty's HFTD Tier 2 and Tier 3 areas are replaced.

7.3.3.8 Grid topology improvements to mitigate or reduce PSPS events

Refer to Section 5.2 for a description of future resiliency corridors.

7.3.3.9 Installation of system automation equipment

Liberty's current system automation equipment uses traditional substation and line recloser relaying, which provides the ability to automatically reclose lines during non-high fire threat days. The equipment also has the benefit of remote control and the ability to quickly change settings remotely, such as putting a device into one-shot (fire mode) during high fire threat days. For wildfire mitigation, the use of line reclosers places protective relaying closer to end-of-line faults, allowing devices to quickly clear faults that substation relaying may not pick up.

Liberty is currently developing a Distribution Automation ("DA") strategy that will likely include a single DA controller at a substation that controls multiple devices, both in the substation and on the line. For the past few years, Liberty has focused on installing line reclosers that have communication for SCADA control and the intelligent controllers to handle a DA scheme.

1. **Risk to be mitigated** / problem to be addressed

The primary risk mitigated is de-energizing during end-of-line faults that substation relays may not pick up or take long to clear. Having reclosers on the line in series allows for better clearing times for faults downstream of the line reclosers, thus better mitigating fire risk.

System automation also provides a reliability benefit with its ability to quickly switch to isolate faults and restore load. This is also known as FLISR (Fault Location, Isolation, and Service Restoration). It will be a valuable resource for service restoration after any PSPS event as well. Installing automation equipment can reduce outage durations and the number of customers impacted.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

Liberty's initiative includes a recloser upgrade program to replace assets to improve system operability, control, and reporting capabilities. Line recloser installation is an effective wildfire mitigation measure. By placing line reclosers with high speed relaying devices out on distribution lines, line faults with lower fault current can be more rapidly detected and cleared. Adding DA will enable faults to be rapidly cleared and isolated for better fault location information and rapid system restoration, restoring power to customers in areas where re-energizing line is still safe. The relays also provide valuable information on the type of fault and fault current levels.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

Liberty has selected regions by asset condition on mainline feeders to minimize customer outages. Liberty has made progress on implementation of new reclosers and aging recloser replacements in Tier 3 and Tier 2 areas within the Lake

Tahoe basin. Liberty is expanding its recloser installations and replacements into its more remote Tier 2 areas going forward. All of Liberty's substations currently have new technology relaying and with control and data acquisition (SCADA).

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

Four line reclosers were installed in 2020, with plans to install three additional line reclosers in 2021. Liberty plans to continue performing a minimum of three recloser replacements or new installations per year going forward.

5. **Future improvements to initiative**

Liberty plans to continue installing new line reclosers to better sectionalize and have relaying devices closer to end-of-line to help detect low current faults. Liberty is planning to install three additional line reclosers in 2021.

Beyond that, Liberty is planning on a DA pilot program starting in 2021 and continuing into 2022. Liberty plans to house a DA controller at one of its substations and control multiple communication enabled reclosers and substation breakers. This allows for FLISR technology to be implemented on our system.

7.3.3.10 Maintenance, repair, and replacement of connectors, including hotline clamps

Liberty does not have an applicable program at this time.

7.3.3.11 Mitigation of impact on customers and other residents affected during PSPS event

Refer to Section 5.2 for a description of Liberty's resiliency program.

7.3.3.12 Other corrective action

<u>Green Jacket Insulators</u>

1. **Risk to be mitigated** / problem to be addressed

The goal of the Green Jacket project is to protect and insulate substation equipment from debris and animal contact. If an animal makes contact with substation equipment that is not insulated, there is the potential for a hazardous arc to form, which could lead to a significant outages. Protecting this equipment with Green Jacket insulation will reduce the risk of ignition by animal/debris contact and increase system reliability.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

The Green Jacket project plans to install insulation hardware on exposed transformer/switchgear bushings, switches, lighting arrestors, phase transformers, and other exposed equipment. Over the past several years, animal contact outages have been a regular occurrence throughout the calendar year. In 2020, however, Liberty saw a significant increase in squirrel- and bird-related outages. Construction of the new Kings Beach substation prompted Green Jacket insulators to be installed there and at other substations.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

Green Jacket insulation installation was prioritized by substation and the history of animal/debris contact outages. All substations planned for Green Jacket insulations are within Liberty's HFTD.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

Liberty has been in contact with the Green Jacket team and has sent pictures and structural drawings of substations to receive a quote for insulators. In 2021, Liberty employees will meet with a measuring crew to obtain high-accuracy dimensions of the equipment planned to be insulated. Once delivery of the insulators is accepted, certain parts of substations will need to be de-energized to install the insulators.

5. **Future improvements to initiative**

In future years, Liberty plans to improve and rebuild substations, like Portola, and insulate them at a later date. This plan is being followed to avoid insulation of equipment that will ultimately be replaced in the near future.

Other near-term improvements include creating a formal wildfire asset replacement program for selected equipment to help reduce fire risk in the future. Potential replacement programs include:

1. CAL FIRE exempt hardware
2. Tree attachment removals
3. Open wire secondary/grey wire replacement with tree wire TPX or QPX secondary/service wire
4. Equipment and conductor guards

This work is currently performed on a case-by-case basis and future improvements include establishing proper accounting and project management strategies to individually quantify, execute and track work for these programs. Liberty also plans to develop a work process plan that includes assigning a project manager, engineer, and capital administrator to each program. The System Survey provided an inventory of poles with the identifiers above. Because of resource constraints this year and getting all the poles remediated within G.O. 95 timelines, the plan is to create these programs later this year with updates included in next year's WMP.

7.3.3.13 Pole loading infrastructure hardening and replacement program based on pole loading assessment program

1. **Risk to be mitigated** / problem to be addressed

Pole loading assessments mitigate the risk of structural pole failure, pole overturn, and or guying and cable strength/tension failure. Any new or existing poles that are installed or modified are designed to G.O. 95 heavy standards using the Osmos O-calc pole loading program.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

Liberty has not implemented this initiative. Any new or existing poles that are installed or modified are designed to G.O. 95 heavy standards using the Osmos O-calc pole loading program.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

Pole calculations are performed for all new poles and pole replacements within Liberty's service territory.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

Liberty will continue to perform pole calculations as mandated by G.O. 95 standards.

5. **Future improvements to initiative**

There are no planned improvements to this initiative. There is potential for Liberty to review pole loading design standards in HFTD 2 and 3 areas in conjunction with its risk based model to determine if design safety factors above G.O. 95 standards should be implemented.

7.3.3.14 Transformers maintenance and replacement

Liberty does not have an applicable program at this time. Transformers are inspected as part of G.O. 165 inspections.

7.3.3.15 Transmission tower maintenance and replacement

Liberty does not have an applicable program at this time. Transmission towers and structures are inspected as part of G.O. 165 inspections.

7.3.3.16 Undergrounding of electric lines and/or equipment

Liberty does not have a formal proactive undergrounding program as part of its WMP. The undergrounding projects currently underway are customer-initiated Rule 20A conversions of overhead systems based on county-allocated funds.

Tahoe Vista: The Tahoe Vista Rule 20 project replaces overhead distribution lines with underground electric facilities in the underground district Area 10 (Beach to National) and Area 11 (National to Estates) in Placer County. The project location is a 1.25 mile length of State Route 28 impacting approximately 90 private property parcels on the north shore of Lake Tahoe.

1. **Risk to be mitigated** / problem to be addressed

Undergrounding electric lines will reduce wildfire risk. Rule 20A projects are nominated by the city or county and are paid for by the electric utility ratepayers. Because ratepayers contribute the bulk of the costs of Rule 20A programs through utility rates, the projects must be in the public interest. Removing overhead distribution reduces the risk of wildfire due to overhead lines in severe weather conditions and improves public safety and reduces potential outages.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

There was no WMP risk analysis performed for these projects. Placer and El Dorado Counties created the underground districts years ago as a beautification project, before WMPs were in place, to utilize the Rule 20 funds allocated to them.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

No region prioritization was performed. See response above.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

In October 2020, Southwest Gas Corporation ("SWG") proposed installing gas and electric lines in separate trenches (located on opposite sides of Highway 28) in a stakeholder meeting with Caltrans. Recent clarity into the application of Caltrans standards allowed this proposal to be considered, where it had not been considered historically. Follow-up meetings with Caltrans have provided discussion indicating it is reasonable to move forward with this trench alignment design.

Historically, there have been challenges securing a Caltrans permit to construct the project. The original project effort started in 2013 (Area 10 design) and 2017 (Area 11 design). At that time, Caltrans required Liberty to seek a permit jointly with SWG to incorporate the Rule 20 trench into a larger trench with SWG's gas main replacement project in the same location. Coordination and permitting efforts stalled and construction did not move forward. Significant portions of the prior design effort will be utilized for the current design work.

5. **Future improvements to initiative**

None at this time.

7.3.3.17 Updates to grid topology to minimize risk of ignition in HFTDs

Refer to Section 5.4 for a description of Liberty's resiliency program.

7.3.4 Asset management and inspections

The following section outlines Liberty's asset inspection programs, which focus not only on maintaining compliance with G.O. 165 but also improving the safety and reliability of the electrical system through careful examination of assets in the field. As detailed below, Liberty has made substantial investments to its asset management and inspection programs which have established a solid foundation to build upon.

Liberty also recognizes the need for continuous investment and improvements to these programs which are essential to reducing the risk of asset failure. As such, Liberty is planning to establish a QA/QC program utilizing independent contractors in addition to piloting the use of infrared technology to improve asset inspections.

7.3.4.1 Detailed inspections of distribution electric lines and equipment

1. **Risk to be mitigated** / problem to be addressed

Detailed inspections of distribution and transmission lines and equipment performed in accordance with G.O. 165 guidelines mitigate the risk of equipment failure by identifying aging and deteriorating equipment in the field. When a Qualified Electrical Worker identifies an issue in the field that needs remediation or repair, work orders are generated to address them. As equipment failure can lead to electrical system faults and has the potential to cause ignition events, Liberty's detailed inspection programs play a vital role in reducing risk.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

This program is mandated by the CPUC, and this initiative is required for compliance with G.O. 165. As Liberty further

develops its risk program, the findings from these inspections will be a key driver in the push towards risk-based decision-making for prioritization of asset inspections, repairs, and replacements.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

Liberty inspects approximately 20% of the system annually, which results in the entire system being inspected every five years before starting the cycle again. As this program has a set schedule to maintain compliance, there is no risk analysis performed for regional prioritization at this time until the risk program is further developed.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

In 2020, a system-wide survey and detailed inspection of all overhead distribution and transmission equipment was completed for Liberty's service territory. The volume of repairs generated from that work is such that there will be a reduced number of detailed inspections performed in 2021. Because resources are limited, the near-term focus is on completing repairs within the CPUC timelines set forth in G.O. 95. The full level of detailed inspections will resume as scheduled in 2022, encompassing approximately 25% of the overall system.

5. **Future improvements to initiative**

In 2020, Liberty made the transition from paper-based inspection records to electronic inspection records utilizing a mobile application. In addition, a new enterprise-wide GIS is expected to be placed into service in 2022, which will greatly enhance the accuracy of inspections, reports and overall record keeping capabilities of the inspection programs.

7.3.4.2 Detailed inspections of transmission electric lines and equipment

Liberty does not have a separate program for detailed transmission inspections. There are approximately 75 miles of 60kV lines and 19 miles of 120kV lines that are included in the distribution detailed inspection program. Please refer to Section 7.3.4.1 for initiative details.

7.3.4.3 Improvement of inspections

1. **Risk to be mitigated** / problem to be addressed

In the first half of 2020, Liberty conducted inspections through paper maps and paper forms with no ties to any type of computerized work management system. The enterprise GIS solution, set to go live in 2022, will include a mobile data collection application, but the risk of using paper-based inspection records is considered so high, that Liberty prioritized finding an interim solution.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

To improve inspection data collection methods and eliminate the need for paper forms, Liberty purchased licenses for Fulcrum, a cloud-based mobile application to bridge the gap until Liberty's enterprise GIS is implemented in 2022. Recognizing that paper records also make statistical analysis of inspections, repairs, and equipment failure trends extremely difficult, Liberty prioritized moving to an electronic inspection program in 2020.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

Inspection processes and the technology used are the same throughout Liberty's service territory. As the risk modeling evolves, Liberty anticipates that the data analysis generated will be a key driver in prioritization of asset inspections.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

Liberty purchased and implemented the Fulcrum mobile application for all field operations in the second half of 2020 and no longer performs inspections with paper records.

A system-wide survey was conducted in 2020 that utilized contractors and Liberty personnel to inspect the entire service territory and provided data on conditions of all overhead distribution and transmission assets, in addition to the collection of GIS coordinates. This data is essential for Liberty's new asset management database, planning remediation projects, and risk metrics.

5. **Future improvements to initiative**

As electronic inspection records are still relatively new, Liberty continuously evaluates and improves the process with useful forms, creating a back-end database. Applications, dashboards and reports are being developed to provide leadership key data needed to make informed decisions about the condition of assets in the field and prioritization of improvements to mitigate fire risk. In 2022, the data from Fulcrum and processes created will be migrated to the enterprise GIS as the permanent system of record.

7.3.4.4 Infrared inspections of distribution electric lines and equipment

1. **Risk to be mitigated** / problem to be addressed

Detailed visual and patrol inspections will identify most issues that lead to asset failure. However, Liberty recognizes those inspections may not be adequate to prevent all instances of asset failure, and infrared inspections may be able to identify issues that are not easily detectable with traditional inspection methods.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

Liberty is planning a pilot program in 2022 to assess the viability of integrating infrared technology into the distribution and transmission inspection cycles.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

Liberty plans to conduct an infrared pilot program within the Tier 3 HFTD zone of its service territory to evaluate the effectiveness of the technology.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

Liberty will develop an Infrared Inspection RFP in 2021 to find a qualified contractor to perform the infrared pilot inspection in 2022.

5. **Future improvements to initiative**

Should the infrared inspection produce meaningful, actionable results, Liberty will incorporate the technology into the inspection program for distribution and transmission assets.

7.3.4.5 Infrared inspections of transmission electric lines and equipment

Liberty does not have a separate program for transmission inspections. There are approximately 75 miles of 60kV lines and 19 miles of 120kV lines that are included as part of the distribution inspection program. Please refer to Section 7.3.4.4 for initiative details.

7.3.4.6 Intrusive pole inspections

1. **Risk to be mitigated** / problem to be addressed

Intrusive pole inspections are a G.O. 165 mandated program for the testing and treatment of wood poles that begin to deteriorate and degrade over time. Poles that are thoroughly inspected and/or proactively treated to extend the service life of the asset and significantly reduces safety risk to the system and public. In addition to extending the life of existing poles, the program also helps to identify those assets that need to be replaced before they fail.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

The intrusive pole inspection program tests the integrity of wood poles both visually and through internal examination of the poles to identify damage, decay, and approximate shell thickness. A report is generated identifying poles that pass inspection as well as those that need to be replaced or need remediation, such as pole stubbing or treatment application.

This program can reduce replacement costs, extend the life of poles and increase the safety and reliability of the overall system. Although Liberty does not currently use risk analysis for this program, the data collected from intrusive pole inspections is essential to creating those calculations and will be used in evaluating the overall effectiveness of the program in future years.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

Intrusive pole inspections are currently performed throughout Liberty's service territory on an annual basis on a 10-year cycle, which exceeds G.O. 165 timelines.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

In 2020, Liberty performed intrusive inspections on approximately 3,000 poles and forecasts performing approximately 3,600 intrusive inspections in 2021.

5. **Future improvements to initiative**

While no improvements to the intrusive pole inspection program are currently under consideration, Liberty will look to

integrate risk-based decision making in upcoming years to enhance this initiative.

7.3.4.7 LiDAR inspections of distribution electric lines and equipment

In light of the recent System Survey and vegetation management program LiDAR projects in 2020 and 2021, Liberty does not plan to utilize LiDAR for asset inspections of distribution or transmission facilities but will consider it again in the future on a per-project basis should the need for that type of data arise.

7.3.4.8 LiDAR inspections of transmission electric lines and equipment

In light of the recent System Survey and vegetation management program LiDAR projects in 2020 and 2021, Liberty does not plan to utilize LiDAR for asset inspections of distribution or transmission facilities but will consider it again in the future on a per-project basis should the need for that type of data arise.

7.3.4.9 Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations

Liberty does not currently have additional types of discretionary inspections planned for electrical distribution lines and equipment.

7.3.4.10 Other discretionary inspection of transmission electric lines and equipment, beyond inspections mandated by rules and regulations

Liberty does not currently have additional types of discretionary inspections planned for electrical transmission lines and equipment.

7.3.4.11 Patrol inspections of distribution electric lines and equipment

1. **Risk to be mitigated** / problem to be addressed

Liberty performs annual patrol inspections in urban areas and patrol inspections every two years in rural areas. A qualified electrical worker patrols the electric system looking for issues with overhead structures or obvious hazards that impact the safety and reliability of the system. Please refer to section 7.3.6.3 for enhanced patrols on heightened wildfire risk days.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

This program is mandated by the CPUC and this initiative is needed for compliance with G.O. 165. As Liberty further develops its risk program, the findings from these inspections will be a key driver in the push toward risk-based assessments that can help guide decision making in asset replacement and prioritization of asset inspections.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

Patrols are performed throughout Liberty's service territory in accordance with the schedules outlined in G.O. 165.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

Liberty conducted a detailed inspection of its entire electric system in 2020, which meant patrols were considered completed during the course of this work. Liberty will complete all patrols in 2021 and 2022 in accordance with the schedules outlined in G.O. 165.

5. **Future improvements to initiative**

Due to the alpine terrain and other factors such as limited vehicle access, Liberty plans to utilize helicopters to make patrol inspections of remote lines more efficient and cost-effective.

7.3.4.12 Patrol inspections of transmission electric lines and equipment

Liberty does not have a separate program for transmission inspections. There are approximately 75 miles of 60kV lines and 19 miles of 120kV lines that are included as part of the distribution inspection program. Please refer to Section 7.3.4.11 for initiative details.

7.3.4.13 Pole loading assessment program to determine safety factor

1. **Risk to be mitigated** / problem to be addressed

Pole loading assessment mitigates the risk of structural pole failure.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

Any new or existing poles that are installed or modified are currently designed to G.O. 95 heavy standards using the Osmos O-calc pole loading program.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

Pole calculations are performed for all new poles and pole replacements within the service territory.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

Liberty will continue to perform pole calculations as mandated by the CPUC and G.O. 95 standards.

5. **Future improvements to initiative**

Please refer to section 7.3.3.13.

7.3.4.14 Quality assurance / quality control of inspections

1. **Risk to be mitigated** / problem to be addressed

Liberty does not currently have a QA/QC program for inspections. With the increased reliance on contractors, due

primarily to WMP activities that did not exist until recently, the company recognizes that there is a need to establish a robust QA/QC program to improve compliance with company and Commission standards.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

A QA/QC program should reduce the potential for non-compliance by confirming that inspections are performed correctly and that projects are built to design specifications. The data generated by this program should serve as a critical tool in identifying issues with electric asset inspections, which will lead to improvements in inspection processes at Liberty.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

Once established, the QA/QC program will encompass the entire service territory with a focus on those assets in Tier 2 and Tier 3 of the HFTD and other critical facilities identified by the risk ranking program currently under development.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

Liberty will develop a QA/QC RFP in 2021 to find a qualified, independent contractor to help establish standards and perform inspections on company assets beginning in 2022.

5. **Future improvements to initiative**

After the program has been established, Liberty will look to incorporate any available risk-based data to further refine the QA/QC processes and prioritization of asset inspections.

7.3.4.15 Substation inspections

Liberty conducts its substation inspections in accordance with its current G.O. 174 Substation Inspection Plan. Most substations that are accessible year-round are inspected on a quarterly basis. Substations that are not accessible for normal daily operations are inspected on an annual basis.

1. **Risk to be mitigated** / problem to be addressed

Substation inspections can identify several issues before they become serious problems. The primary risk to be mitigated from substation inspection is catastrophic failure of equipment leading to ignition of nearby vegetation.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

This initiative is a requirement by the CPUC for Liberty to have a Substation Inspection Plan document and for Liberty to follow its plan.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

There is no region prioritization for this initiative. It is an established program with 13 substations to inspect.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

Substation inspections are on track per the plan.

5. **Future improvements to initiative**

None. Liberty will continue to follow its current process G.O. 174 substation inspection plan.

7.3.5 Vegetation management and inspections

7.3.5.1 Additional efforts to manage community and environmental impacts

Vegetation management ("VM") projects are critical to protect the environment by reducing the probability of ignition as a result of vegetation contact on electrical equipment. Liberty is committed to carrying out vegetation management in an environmentally responsible manner, while supporting the principles of ecologically sustainable development. Liberty's VM plan includes resource protection measures that are designed to comply with regulations adopted by state, federal, and local government agencies. Implementing best practices for water quality, terrestrial wildlife, sensitive and rare plants, non-native invasive plant management, and hazardous spill control help to address environmental concerns that may arise from vegetation management activities.

In addition to environmental concerns, Liberty is developing comprehensive communication plans to educate and inform its communities of current and planned VM activities and is dedicated to partnering with community leaders and local businesses to mitigate any potential negative impacts. It is normal VM procedure for contract pre-inspectors and line-clearance tree contractors to leave door hangers for pruning notifications. Notice of Intent Letters and Tree Work Notification Forms are mailed to customers where tree removals are required (but contact was not made with the customer in the field or over the phone) and is also standard procedure. Liberty piloted a pre-notification letter for the 7300 Phase 6 WMP re-conductor project, Tahoe City 7300 routine vegetation maintenance, and the Highlands HOA Fuels-Management Project prior to inspections taking place in early 2021.

1. **Risk to be mitigated** / problem to be addressed

VM activities have the potential to negatively impact the environment and communities in which they are implemented. Liberty requires that all such activities are performed in accordance with its documented resource protection measures to mitigate potential negative environmental impacts. Liberty works with customers, property owners, and surrounding land managers to implement vegetation management projects while minimizing negative impacts and promoting benefits to the community.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

The success of Liberty's VM program is dependent on its ability to effectively implement projects in a manner that manages both community and environmental impacts. Liberty maintains working relationships with local, state, and federal resource protection agencies to identify appropriate measures to eliminate or minimize negative impacts to natural and cultural resources. In order to achieve successful project implementation, Liberty engages with its customers and community partners to provide communications about planned vegetation management projects.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

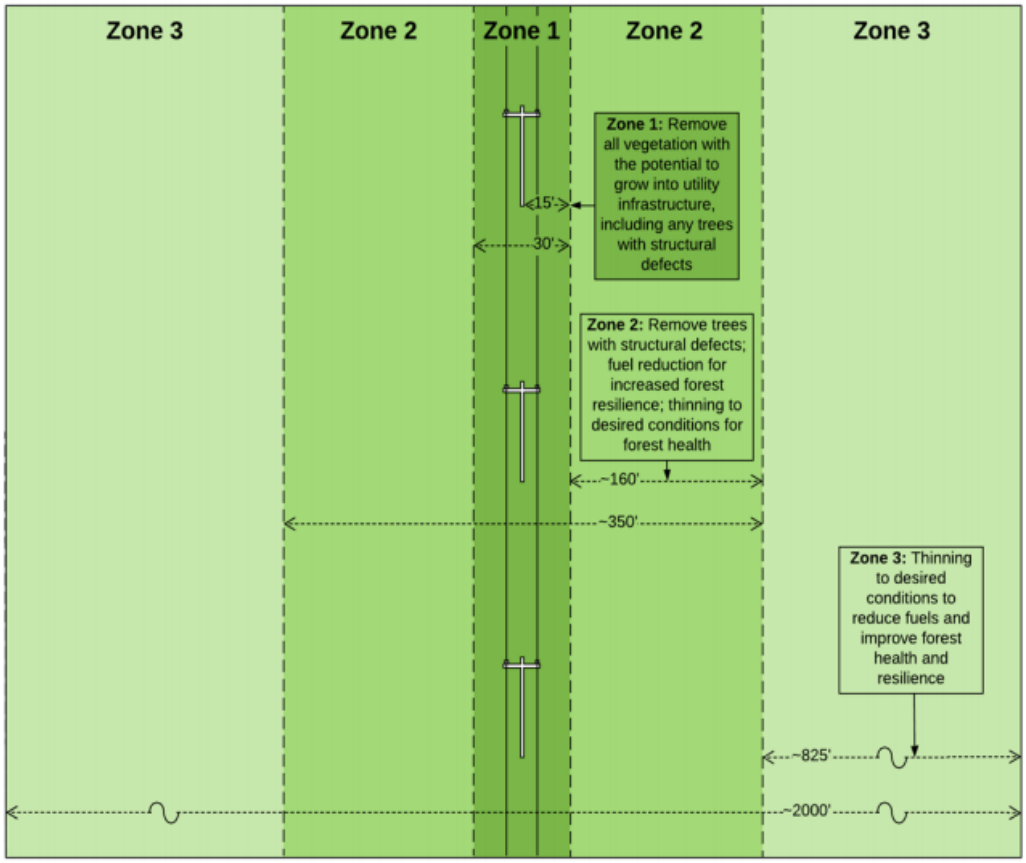
Communication and resource protection initiatives occur throughout Liberty's service territory. The prioritization of these efforts are determined by the portfolio of upcoming capital and vegetation-related projects and are planned at the region level. Liberty coordinates with surrounding land managers to complete environmental and cultural surveys of project areas prior to implementation. Some efforts to manage community and environmental impacts are prioritized as a result of collaboration with other agencies, land managers, and property owners to increase efficiency of available resources. Additional prioritization may be given to projects focused on forest resiliency and fuels reduction surrounding critical community infrastructure.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

In 2020, Liberty initiated Forest Resilience Corridors projects on portions of its transmission system. These projects are multi-jurisdictional efforts focused on tree removal and fuel reduction activities to improve forest resiliency and reduce the risk of wildfire in the Wildland Urban Interface. Liberty's role emphasizes the removal of vegetation with the potential to disrupt the flow of electric service or contribute to wildfire risk by growing into or striking utility assets in the event of tree failure due to structural defects or environmental conditions. Since the filing of its 2020 Wildfire Mitigation Plan, Liberty has worked with federal, state, and private land owners to implement Forest Resilience Corridor Projects on portions of its transmission system. This was implemented on the 625 60kV (Kings Beach-Tahoe City) transmission line. This effort has resulted in the removal of hazardous trees and other vegetation along approximately 18 miles of transmission right of way. California Public Resources Code Section 4293 and G.O. 95 Rule 35 HFTD Tier 2 & 3 requirements apply to Liberty's 60kV and 120kV transmission systems. Forest Resiliency Corridors go above and beyond maintaining compliance obligations through treatments described below (Zones 1, 2 and 3).

Forest Resilience Corridors projects prescribe the following treatment zones for areas surrounding utility rights-of-way:

- Zone 1 (up to 15' each side of power line, ~200 acres): vegetation, including shrubs ≥ 18" high, with potential to grow into utility infrastructure will be removed, along with defect trees.
- Zone 2 (up to 175' each side of power line, ~2,200 acres): trees with structural defects with the potential to strike utility infrastructure will be removed; fuels will be reduced to improve forest resilience to fire, insect, disease, and drought; and, thinning to desired conditions will improve forest health and resilience. The target average stand density is 60 BAF (basal area factor) with a range of 40-80 BAF. For trees less than 10" in diameter in the understory, a minimum of 10 tree per acre will be retained.
- Zone 3 (up to ~1000' each side of power line, ~5,200 acres): reducing fuel loads and thinning the forest to desired conditions will improve forest health and resilience to disturbance. The target average stand density is 100 BAF, with a range of 80-120 BAF. For trees less than 10" in diameter in the understory, a minimum of 10 trees per acre will be retained. Liberty will not perform work in Zone 3.



5. **Future improvements to initiative**

Liberty will continue to seek opportunities for collaboration with community partners regarding VM activities that continue to manage environmental and community impacts. Liberty's external communications team has been working closely with the VM Department to reach customers and the community about its VM efforts and will continue to seek opportunities to enhance communications, notification and education to its external stakeholders.

7.3.5.2 Detailed inspections of vegetation around distribution electric lines and equipment

Liberty performs detailed inspections of vegetation along entire circuits in which individual trees are examined and the condition of each is rated and recorded. These inspections are used to prescribe pruning and removal of vegetation as a safeguard against grow-ins or fall-ins and to conform to applicable laws and regulations.

Liberty performs routine vegetation maintenance through detailed inspections of entire circuits to prescribe pruning and removal of vegetation as a safeguard against grow-ins or fall-ins and to conform to required laws and regulations. Liberty intends to perform such inspections and work once every three years per circuit. In prescribing pruning or removal, the following factors are considered: (1) the potential for vegetation to grow and/or encroach within the minimum allowed distances to the facilities within the cycle, and (2) the potential for vegetation to structurally fail into the facilities within the cycle. Additional site conditions and factors are considered in prescribing tree work such as length of span, line sag, planned inspections, location of vegetation within the span, species type, species characteristics, vegetation growth rate, arboricultural practices, environmental characteristics of the site, local climate, and elevation.

Liberty manages tree work inventories and workloads through the Vegetation Management System ("VMS") database. The VMS tracks circuit inspections, notification and tree work progress, provides work orders, notification letters and report generating functions, retains historical inspection and tree work data, and also has a variety of query options to specify select tree inventories as needed (*i.e.*, routine circuit work on federal lands for a specific inspection year or a random sample for quality control or assurance audits). Trees are inventoried if that specific tree is requiring remediation for the current inspection; therefore, a new tree is only added to the inventory in VMS if it is being listed for tree work. Every tree inventoried on the system is assigned its own tree identification number. If a tree that has been worked in the past requires work again, that specific tree record is updated to create a new work order and inspection record for the current inspection taking place, but the unique tree identification number for that tree does not change. The past work orders and inspection records for that tree are retained. During the inspection process, trees not requiring work are not inventoried and/or updated. Photographs, tree work authorization forms, and other documents associated with specific trees can be linked to the tree records through local network drives. Each individual tree is also assigned a status to track notifications, project progress, and tree work completion. Upon receipt of a signed and completed work requests, an individual tree records status is changed to a completed status.

1. **Risk to be mitigated** / problem to be addressed

Liberty has developed a Hazard Tree Management Plan (VM-02) to identify, document, and mitigate trees that are located within the utility strike zone and are expected to pose a risk to electric facilities based on the tree's observed structural condition and site considerations.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

Liberty's detailed vegetation inspections are designed to avoid conflicts between vegetation and electrical assets and to maintain compliance with applicable rules and regulations. During the inspection process, tree and site conditions are assessed to determine tree risk and if work is required to mitigate the identified risk. Inspections to identify hazard trees are conducted during detailed inspections for compliance and reliability.

Detailed inspections are performed by completing a Level 2: Basic Assessment of individual trees per ANSI A300 (Part 9) Tree Risk Assessment and Liberty's Hazard Tree Management Plan. This is a detailed ground-based visual assessment of an individual tree and its surrounding site. A Level 2 assessment may include walking completely around the tree—looking at the site, buttress roots, trunk, and branches. Many trees that pose a potential risk to electric facilities are located on

private property and beyond the edge of the utility easement of right-of-way, which may restrict access. Severe terrain or other obstacles may also prevent access. As such, there may be a limited opportunity or ingress to do a 360-degree assessment of every individual tree.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

Several factors are taken into consideration when planning and prioritizing detailed inspections of vegetation around distribution electric lines and equipment. These factors include vegetation density, maintenance history, regional fire risk rating based on CPUC fire threat areas and REAX fire risk ratings, customer tree inspection requests, observations from field employees and contractors, and vegetation-caused outages. Emergency pruning or removal is performed when a tree poses an imminent threat to the electrical facilities.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

Liberty's detailed vegetation inspections are performed primarily by a contract workforce of pre-inspectors who are trained to take into consideration the potential likelihood of a grow-in or tree failure, or parts thereof, occurrences that can adversely affect Liberty infrastructure, and the severity of the potential consequences. In its 2020 Wildfire Mitigation Plan, Liberty planned to perform detailed inspections of vegetation along a total of 230 miles of its electric lines and equipment. Liberty was successful in completing its plan by performing detailed inspections of vegetation along approximately 233 miles of its electrical lines and equipment.

5. **Future improvements to initiative**

Liberty's detailed inspections of vegetation along its electrical lines and equipment is a comprehensive patrol of vegetation within and adjacent to the utility right of way. This approach has been successful in mitigating risk posed by hazard trees and improving system resilience and reliability. Liberty will continue to perform these comprehensive, detailed inspections to continue to mitigate the risk posed by hazard trees. Liberty will be augmenting its detailed inspections with an annual compliance inspection of 100% of its territory described in Section 7.3.5.7 and 7.3.5.8 (LiDAR inspections of vegetation around distribution and transmission electric lines and equipment).

7.3.5.3 Detailed inspections of vegetation around transmission electric lines and equipment

Liberty's detailed inspections of vegetation around transmission electric lines and equipment does not differ from that for distribution electric lines and equipment. Please refer to Section 7.3.5.2.

7.3.5.4 Emergency response vegetation management due to red flag warning or other urgent conditions

Although there are no costs specifically associated with this activity, the inspections and vegetation management work performed in Sections 7.3.2.2, 7.3.2.3, 7.3.2.5, 7.3.2.7, 7.3.2.8, 7.3.2.11, 7.3.2.12, 7.3.2.15, and 7.3.2.16 prepare for these types of events.

7.3.5.5 Fuel management and reduction of "slash" from vegetation management activities

Liberty recognizes the need for additional fuel reduction and wood management throughout its service territory. Vegetation left behind from clearing activities, if left untreated, becomes an increasingly dry fuel source adjacent to power lines and an infestation risk to remaining trees by forest insects.

1. **Risk to be mitigated** / problem to be addressed

Cutting down hazardous trees and clearing limbs away from power lines meets compliance and reduces ignition risk by eliminating strike and grow-in potential, but it does not address the fuel load that results from these activities. In the event of a fire, dead, dry fuel left behind by vegetation management activities will contribute to the intensity and rate of spread of the fire. There is also a risk of the fuel becoming ignited by power lines during wire-down, blown fuse, and other equipment failure events. Added benefits of reducing fuel load near powerlines is the protection of the powerlines from wildfire and increased effectiveness of suppression activities, regardless of the ignitions cause.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

Liberty's typical practice for fuel management and reduction of slash has been based on historic industry practices. Only slash measuring less than 4" diameter is treated as follows:

- Residential Areas Accessible by Roads – Slash will be chipped. Chips may be hauled off site to a different location or may be broadcasted back onto the site.
- Rural or Forested Areas not Accessible by Roads – Slash will be lopped and scattered in a non-continuous manner outside of the utility right-of-way; or slash will be lopped and scattered as to ensure that the vertical height is not more than 18" above the ground.

Wood greater than 4" diameter has not regularly been removed from the work location, though Liberty has begun to offer the hauling of this wood that may have otherwise been left onsite. Liberty recognizes the need for increased fuel management activities and is developing a new methodology for fuels treatment that aligns more closely with joint goals of agency partners and the local community to treat vegetation management fuel in a manner that reduces both fire ignition risk and the potential for increased fire intensity.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

Selection of fuel management and reduction of slash projects are based on multiple factors, such as fire risk ratings, proximity of overhead conductors to the Wildland Urban Interface, landowner cooperation, ability to carry out activities in alignment with environmental and cultural resource protection measures, and other relevant factors that may affect the success of such projects.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

Since the filing of its 2020 Wildfire Mitigation Plan, Liberty completed several projects focused on fuel management and reduction of slash. These projects can be categorized as community fuel reduction projects, large landowner and agency partnerships, substation defensible space, and wood hauling efforts. The table below demonstrates progress towards this initiative in 2020 based on various metrics.

Community fuel reduction projects target communities where recent vegetation management activities were completed. Enhanced vegetation management practices are conducted to remove additional trees under and adjacent to lines that would be future grow-in issues, clearing brush from around all utility poles, and removal of all debris left behind including slash from brush that was previously lopped and scattered and wood that was created after felling trees. Liberty completed three community fuel reduction projects in 2020 in the towns of Truckee and South Lake Tahoe, CA.

Liberty looks to partner with local, state, and federal agencies and other larger land owners throughout its service area to collaborate on projects that will reduce fuel loads. In 2020, Liberty coordinated with California Tahoe Conservancy ("CTC") to develop a strategy for treating wood and debris on parcels owned by CTC after the initial completion of vegetation management projects. This work is supports CTC's Land Management Program which focuses on managing forest health and reduction of wildfire risk. In Q4 of 2020, after developing the scope of work for this program, Liberty completed fuel reduction projects on 33 CTC parcels.

In an effort to manage wildfire risk posed by vegetation surrounding its substations, Liberty identified two of its substations that would benefit from fuel management and reduction of slash projects. For these projects vegetation adjacent to the substation was inspected to identify and remove obvious hazard trees that may impact substation facilities. Upon completion of the hazard tree removal. Small diameter trees, dead and decadent brush and branches, and slash from previous vegetation management activities surrounding the substation was removed to maintain defensible space around electrical facilities. Liberty completed these projects at its Squaw Valley and Meyers substations.

Historically, Liberty did not remove wood greater than 4" diameter from vegetation management project sites. This wood removal would typically be left for individual property owners to manage. Liberty recognizes that this can create additional burden on its customers, as well as contribute to fuel load near electrical lines and equipment. In order to better manage the fuel load, Liberty has begun to offer the hauling of this wood that may have otherwise been left onsite. The wood currently being hauled is often where there are large diameter tree removals being performed, and leaving the wood onsite would be overly burdensome for the customer. Liberty is in the process of developing a more extensive approach to removing wood from project areas that will benefit the community and reduce wildfire risk.

	Line Miles Treated	Acres Treated	Trees Removed	Landowner Participation	Tons of Biomass Removed
2020 Actual	3.4	8.5	404	55	376.4
2021 Projected					2,100

	Line Miles Treated	Acres Treated	Trees Removed	Landowner Participation	Tons of Biomass Removed
2022 Projected					2,100

5. **Future improvements to initiative**

Liberty's local, state, and federal agency partners (CAL FIRE, Tahoe Regional Planning Agency, California Tahoe Conservancy, Tahoe Fire and Fuels Team, U.S. Forest Service, and local fire agencies) have been highly supportive partners and have increased their emphasis on the need to reduce forest fuel load that results from power line vegetation management. Liberty intends to work closely with these partners to develop best practices for an effective fuels management program that reduces both fire ignition risk and fire spread potential, while benefitting the local community and the environment.

7.3.5.6 Improvement of inspections

Liberty is taking measures to improve its vegetation inspections through the use of technology, inspector training, and post work verification processes.

1. **Risk to be mitigated** / problem to be addressed

Improvement of inspections provides added certainty that vegetation requiring pruning or removal is identified with adequate time to mitigate the risk posed by the vegetation conditions being assessed.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

After a careful examination of its vegetation management and inspections program by Liberty and a third party consultant to evaluate its effectiveness, Liberty determined that enhancements to its current strategy were appropriate to adequately mitigate the overall vegetation risk to its service territory.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

Improvements to inspections will be implemented throughout the Liberty system.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

In 2020, Liberty contracted with a third-party vegetation management consultant to provide a comprehensive assessment of the vegetation management program. Liberty has worked closely with the consultant to analyze all aspects of its vegetation management and inspection programs. During this process, Liberty has identified opportunities to improve inspections of vegetation conditions around all overhead electrical lines and equipment. These improvements include the implementation of LiDAR inspections (described in Section 7.3.2.7) on approximately half of the system in 2020 with plans to expand LiDAR inspections to an annual inspection of 100% of the system beginning in 2021. Other improvements include enhanced documentation of inspection protocols through the drafting of a Hazard Tree Mitigation Plan (described in Section 7.3.2.2) and Vegetation Threat Procedure (described in Section 7.3.2.15). Liberty has also developed a Post Work Verification Procedure (described in Section 7.3.2.13) to implement a formal process for evaluating inspections and identifying opportunities for continued improvement to inspections.

5. **Future improvements to initiative**

The development of its LiDAR inspection program and its expansion to an annual inspection of 100% of the system will be a significant addition to Liberty's vegetation inspection methods. In addition to the use of this data for identifying vegetation conditions needing remediation, it will be able to be used in the future to evaluate performance of inspections and vegetation management projects by identifying areas that were not identified or remediated according to Liberty's documented processes and procedures. By having documented inspection protocols recently updated, Liberty will use those documents to provide additional training to inspectors based on the most current program goals and objectives. Once Liberty has its Quality Assurance / Quality Control Program fully implemented, it will provide additional information for the evaluation of inspectors and identification of areas of improvements to vegetation inspections.

7.3.5.7 LiDAR inspections of vegetation around distribution electric lines and equipment

Liberty strives for continuous improvement through the use of technologies and other tools with the potential to enhance the quality and efficiency of its vegetation management inspections. In 2020, Liberty piloted a LiDAR inspection of vegetation around electric lines and equipment for approximately half of its service territory, including all line miles in the Extreme (Tier 3) High Fire Threat District. The pilot project is proving to be successful in detecting vegetation-to-conductor clearance issues, and Liberty plans to expand the use of LiDAR in 2021 and beyond to an annual inspection of 100% of its overhead electric lines and equipment.

1. **Risk to be mitigated** / problem to be addressed

The ability of LiDAR to provide measurements of the distance between vegetation and overhead conductors with a high degree of accuracy makes it a useful tool in detecting locations where tree pruning or removal may be necessary to maintain compliance with G.O. 95 Rule 35 and Public Resources Code Section 4293. The data provided by LiDAR inspections of vegetation around electric lines and equipment provides a detailed analysis of the vegetation conditions at the time data is acquired. This allows for quicker inspection of large areas than can be accomplished with ground based patrol via foot or vehicle and can provide for expedited vegetation management to achieve clearances around electric lines and equipment described in Section 7.3.2.20.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

Liberty plans to transition to annual compliance inspections of 100% of its service territory to assess the vegetation conditions around electric lines and equipment with regard to regulated vegetation to conductor clearance distances. LiDAR is the preferred method of performing these inspections due to the speed at which large areas can be inspected as well as its high degree of accuracy when measuring vegetation to conductor distances. The data acquired by LiDAR inspections will be used to inform vegetation management activities performed to maintain compliance at all times.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

Liberty is planning to perform annual LiDAR inspections of vegetation around 100% of its electrical lines beginning in 2021.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

In 2020, Liberty contracted with a LiDAR vendor to perform an inspection of vegetation around approximately 330 miles

of electrical lines. This accounts for close to half of the primary overhead line miles maintained by Liberty. Liberty is in the process of utilizing the data acquired to generate work necessary within the next 18 months to achieve and maintain adequate clearances around the electrical lines that were surveyed.

5. **Future improvements to initiative**

Beginning in 2021, Liberty plans to expand the use of LiDAR to 100% of overhead primary lines on an annual basis. This approach will provide an inspection frequency that is effective at identifying locations where vegetation management activities are necessary for maintaining clearances around electric lines and equipment (LIB-2). Liberty is considering additional uses of LiDAR inspections for informing other aspects of its vegetation management program, such as the identification of all trees capable of striking its facilities.

7.3.5.8 LiDAR inspections of vegetation around transmission electric lines and equipment

Liberty's LiDAR inspections of vegetation around transmission electric lines and equipment does not differ from that for distribution electric lines and equipment. See Section 7.3.5.7.

7.3.5.9 Other discretionary inspection of vegetation around distribution electric lines and equipment, beyond inspections mandated by rules and regulations

Although there are no costs specifically associated with this activity, the work performed in Section 7.3.2.2, 7.3.2.7, and 7.3.2.11 helps to carry out inspections of distribution facilities effectively.

7.3.5.10 Other discretionary inspection of vegetation around transmission electric lines and equipment, beyond inspections mandated by rules and regulations

Although there are no costs specifically associated with this activity, the work performed in Section 7.3.2.3, 7.3.2.8, and 7.3.2.12 helps to carry out inspections of distribution facilities effectively.

7.3.5.11 Patrol inspections of vegetation around distribution electric lines and equipment

Liberty performs inspections of vegetation along utility rights-of-way to identify obvious hazards. These inspections are focused on the removal of dead and dying trees within and adjacent to the right-of-way.

1. **Risk to be mitigated** / problem to be addressed

Patrol inspections of vegetation around electric lines and equipment is performed to identify dead and dying trees with the potential to strike electric facilities. During patrol inspections, trees are also evaluated for compliance to regulated clearance distances from vegetation to conductors per G.O. 95 Rule 35 and Public Resources Code Section 4293.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

Due to the nature of increasing tree mortality within its service territory, Liberty has identified the need to inspect for dead and dying trees throughout its entire system by performing an inspection of the vegetation around lines and equipment to identify dead and dying trees under a Catastrophic Event Memorandum Account ("CEMA").

Patrol inspections are typically performed by completing a Level 1: Limited Visual Assessment per ANSI A300 (Part 9) Tree Risk Assessment and Liberty's Hazard Tree Management Plan. This is accomplished by conducting an assessment from one side of the tree (side nearest the electric facilities) and can be ground-based, vehicle-based, or aerial-based, as appropriate for the site conditions, type of infrastructure, and tree population being considered. A Level 1 assessment focuses on identifying obvious tree defects that are observable from the side of the tree nearest the electric facilities. If a condition of concern is identified during the Level 1 assessment, recommendations are developed regarding possible mitigation. If the Level 1 assessment cannot sufficiently determine the severity of the condition, a Level 2 assessment is conducted.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

Several factors are taken into consideration when planning and prioritizing patrol inspections of vegetation around distribution electric lines and equipment. These factors include vegetation density, maintenance history, regional fire risk rating based on CPUC fire threat areas and REAX fire risk ratings, customer tree inspection requests, observations from field employees and contractors, and vegetation caused outages. Emergency pruning or removal is performed when a tree poses an imminent threat to the electrical facilities.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

Liberty's patrol inspections are performed primarily by a contract workforce of pre-inspectors trained to identify obvious hazards to Liberty infrastructure. In its 2020 WMP, Liberty planned to perform patrol inspections of vegetation around electric lines and equipment along a total of 150 miles of electrical lines and equipment. Liberty exceeded its plan by completing patrol inspections along approximately 345 miles of electrical lines and equipment.

5. **Future improvements to initiative**

Liberty's patrol inspections have been successful in mitigating risk posed by dead and dying trees. Liberty will continue to perform these inspections to maintain reliability and safe operation of its electrical assets.

7.3.5.12 Patrol inspections of vegetation around transmission electric lines and equipment

Liberty's patrol inspections of vegetation around transmission electric lines and equipment does not differ from that for distribution electric lines and equipment. Please refer to Section 7.3.5.11.

7.3.5.13 Quality assurance / quality control of inspections

Currently, Liberty's vegetation management program maintains and implements a robust scheduling process in order to meet mandated compliance inspection requirements. Most of the current maintenance work for VM (pre-inspection, pruning, and tree removals) is performed by contractors and not by Liberty employees. On an annual basis, over 10,000 trees are identified for work and there is a need to track work performed and associated business processes and to standardize a formal QA/QC program for Liberty. Since the last WMP, Liberty has consulted with regional industry experts to develop such a QA/QC program that includes statistical sampling of VM inspections by annual circuit miles and a formal post work verification process control.

1. **Risk to be mitigated** / problem to be addressed

The quality and effectiveness of its vegetation inspections and vegetation management work performed by its contractors

is Liberty's utmost priority to help mitigate the risk of wildfires in its service territory. Unlike other electric utilities in California, Liberty's mountainous terrain and heavily forested service territory presents its own challenges, especially with the amount of vegetation management work performed annually. By establishing a formal QA/QC program for VM inspections and work, this initiative serves to track the effectiveness of its contractor work performance. The risk associated with not implementing such a program exposes Liberty to the possibilities of trees being missed during inspections (*i.e.*, pruning needed for regulatory clearance, hazards), inadequate clearance during pruning work, and improper pruning techniques by tree crews.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

Liberty has drafted a Post Work Verification Procedure (VM-04), which is applicable to both vegetation inspections and vegetation management work that is conducted on local, federal, and state agency land. This procedure contains both QA and QC components. The purpose of the procedure is to define the program oversight requirements used to provide reasonable assurance that Liberty is meeting the applicable requirements related to vegetation management. The oversight contained in the procedure is intended to provide several levels of defense-in-depth strategy in order to provide reasonable assurance that inspection and maintenance work is being effectively performed.

The procedure includes personnel qualification requirements, sampling methodology, sample size by priority, process assessment (QA), results evaluation (QC), acceptable quality level (AQL) and conformance level (CL), description of post work verification (*i.e.*, desktop review, field review), and types of QC inspections (*i.e.*, pre-inspections, tree pruning and removal, hazard trees, pole brushing, reporting accuracy, inventory reconciliation). With the transition to an annual inspection cycle for the entire service area, Liberty has established appropriate sample sizes to achieve a 99% CL with a 10% confidence interval.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

QA/QC Inspections will be performed in higher percentages in Tier 3 and Tier 2 HFTD with a smaller percentage being performed in non-HFTD areas. Tier 3 and Tier 2 HFTDs account for approximately 92 percent of Liberty's service territory.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

The Post Work Verification Procedure has been developed and the development of the specification for contracting this work is in its final stages. Current plan is to implement the post work procedure Q1 of 2021 for all inspections and tree work performed in 2020. Beyond this, the plan is review inspections/tree work on a quarterly basis, so Q2 will review Q1 inspections/work. The results of the QA/QC initiative will be evaluated and adjusted as needed throughout 2021. Any material changes made to the program will be clearly articulated to WSD and documented in Liberty's 2021 quarterly reports.

5. **Future improvements to initiative**

There are none contemplated at this time. It is premature to assess future improvements for a new initiative.

7.3.5.14 Recruiting and training of vegetation management personnel

The foundation for any utility vegetation management program must be based on an intimate knowledge of the work necessary to remain in compliance with regulations. Liberty's vegetation management program has matured over the years by implementing many process improvements and staffing the program with professionals from the vegetation management industry.

1. **Risk to be mitigated** / problem to be addressed

The quality and success of a vegetation management program relies heavily on properly trained Liberty staff who direct and oversee contracted work to remain in compliance with all regulations. The contractors that perform inspections and tree clearing work are required to provide properly trained personnel in order to complete the assigned work in accordance with Liberty's specifications.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

Safety, compliance, and service reliability are the stated goals for the vegetation management program. In order to achieve these goals Liberty must employ properly trained personnel and contractors. Additionally, it is imperative that all internal personnel and contractors are trained on, and able to execute, Liberty's wildfire mitigation plan. The response to Section 5.4 provides a comprehensive overview of the minimum requirements for both internal personnel and the contracted workforce.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

Vegetation management contractors are responsible for conducting training of their personnel. Liberty's contract specifications, for both inspections and tree clearing work, describe minimum requirements for contract personnel. Liberty carefully reviews contract personnel qualifications to remain in compliance with the stated requirements. This process is applied consistently throughout the Liberty service territory.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

Liberty's program is effective at mitigating risk by ensuring adequately trained internal personnel and contractors manage and provide vegetation management services. Liberty will continue the use of its current processes and make adjustments, as necessary.

5. **Future improvements to initiative**

In order to help expand the available vegetation management professionals, Liberty supports the development of utility vegetation management training such as that offered by the University of Wisconsin, Stevens Point. This is a two-year UVM Professional Development Certificate Program aimed at increasing the personnel available to staff utility VM programs and perform vegetation management inspection work. If possible, Liberty will take advantage of those graduates in the future.

7.3.5.15 Remediation of at-risk species

Liberty has developed a Hazard Tree Management Plan (VM-03) for the purpose of identifying, documenting, and mitigating trees that are located within the Utility Strike Zone and are expected to pose a risk to electric facilities based on the tree's observed structural condition and site considerations. The plan includes an overview of tree risk associated with electric lines and equipment, inspection types, risk assessment levels, work priority levels, and mitigation actions.

1. **Risk to be mitigated** / problem to be addressed

Tree and limb failures are common place throughout the Liberty service territory. In order to reduce the risk of those failures contacting electric facilities, a process has been developed to identify, document and mitigate at-risk vegetation.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

As part of its Vegetation Management Program, Liberty manages thousands of trees within and along easements. Given the magnitude, Liberty cannot continuously assess every tree for possible defects. Even under the best circumstances and with the highest standard of care, tree failure cannot be predicted with 100% accuracy. Although Liberty is unable to reasonably foresee all tree failures all the time, by exercising good professional judgment and using a systematic approach, such as the one described in the Hazard Tree Management Plan, it is possible to significantly reduce the risk of tree failures that can damage electric facilities.

It is not possible to accurately identify or predict all trees that will fail, particularly during force majeure events.[10] These events could include unforeseeable weather events or failures related to conditions that cannot be observed such as those related to root systems or the inner structure of the tree.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

Liberty has drafted a Vegetation Threat Procedure (VM-05) to identify methods of prioritization for vegetation threats discovered along electric lines and equipment through the implementation of its vegetation inspection programs. The Vegetation Threat Procedure prioritizes vegetation threats to be mitigated based on observed vegetation and surrounding environmental conditions. Although there is no region prioritization, Liberty may perform separate pre-fire season hazard tree inspections in designated Public Resource Code areas, Extreme (Tier 3) and Very High (Tier 2) fire areas as needed.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

Liberty was successful in achieving its goal toward this initiative in 2020, which covers all regions within its service area. Please refer to Table 12 in Attachment A for details regarding amount spent and plans for next year.

[10] Circumstances that are beyond a utility's control, including natural disasters such as earthquakes, fires, tornados, hurricanes, landslides, wind shear, fresh gale, major storms, ice storms, and floods; human or animal activity such as logging, animal severing tree, vehicle contact with tree, or installation, removal, or digging of vegetation.

5. **Future improvements to initiative**

There are none contemplated at this time.

7.3.5.16 Removal and remediation of trees with strike potential to electric lines and equipment

Mitigation of trees with the potential to strike electric lines and equipment are addressed in Section 7.3.5.15.

7.3.5.17 Substation inspections

Although there are no costs specifically associated with this activity, the inspections performed in Sections 7.3.2.2, 7.3.2.3, 7.3.2.11, and 7.3.2.12 help to see that required vegetation work surrounding substations is adequately documented and scheduled.

7.3.5.18 Substation vegetation management

Although there are no costs specifically associated with this activity, vegetation within the substation footprint is cleared on an as-needed basis using herbicide, pre-emergent and hand treatments. Work that is needed is identified as described in Activity 7.3.2.17.

7.3.5.19 Vegetation inventory system

Liberty manages tree work inventories and workloads through the Vegetation Management System ("VMS") database. The VMS tracks circuit inspections, notification and tree work progress, provides work orders, notification letters and report generating functions, retains historical inspection and tree work data, and also has a variety of query options to specify select tree inventories as needed (*i.e.*, routine circuit work on Federal lands for a specific inspection year or a random sample for quality control or assurance audits).

1. **Risk to be mitigated** / problem to be addressed

There is an inherent challenge to assign vegetation management work, track work progress, audit completed work, and re-assign work that is needed in the future. In order to meet this challenge, Liberty has implemented the Vegetation Management System throughout its footprint.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

Trees are inventoried if a specific tree requires remediation for the current inspection; therefore, a new tree is only added to the inventory in VMS if it is being listed for tree work. Every tree inventoried on the system is assigned its own tree ID number. If a tree that has been worked in the past requires work again, that specific tree record is updated to create a new work order and inspection record for the current inspection taking place, but the unique tree ID number for that tree does not change. Past work orders and inspection records for that tree are retained. During the inspection process, trees not requiring work are not inventoried and/or updated. Photographs, tree work authorization forms, and other documents associated with specific trees can be linked to the tree records through local network drives. Each individual tree is also assigned a status drop-down in order to track notifications, project progress, and tree work completion. Upon receipt of a signed and completed work requests, an individual tree records status is changed to a completed status.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

The Vegetation Management System has been implemented throughout the Liberty system.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

This initiative has been fully implemented.

5. **Future improvements to initiative**

Liberty's vegetation management group plans to continue discussing improvements in tracking overall circuit work. Liberty plans to continue discussions to implement dashboard screens to better track overall circuit progress and status. Liberty will continue to make improvements to the vegetation inventory system as needed to improve process efficiencies and meet reporting requirements.

7.3.5.20 Vegetation management to achieve clearances around electric lines and equipment

Liberty's Vegetation Management program is designed to comply with all regulation including the clearance set forth in G.O. 95, Table 1. This is accomplished by performing comprehensive inspections as described in 7.3.2.2, 7.3.2.3, 7.3.2.7, 7.3.2.8, 7.3.2.11, and 7.3.2.12.

1. **Risk to be mitigated** / problem to be addressed

Vegetation is a living organism and must be inspected/monitored on a regular basis to comply with stated regulations. In order to accomplish this, Liberty conducts annual inspections of its facilities in order to identify needed vegetation management work. Work performed as a result of these inspections meets the clearance recommendations set forth in Appendix E of G.O. 95, Rule 35 (14.4kV and 60kV – 12' to 15'; 120kV – 30').

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

As part of its Vegetation Management Program, Liberty manages thousands of trees within and along easements. Liberty continually monitors these trees using various inspections methods to comply with the clearance requirements set forth in G.O. 95, Table 1.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

Liberty implements this inspection and clearing strategy through its system.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

This initiative has been fully implemented.

5. **Future improvements to initiative**

Although there are currently no specific improvements needed or identified, Liberty continually evaluates its processes to meet the highest level of compliance with all mandated regulations.

7.3.6 Grid operations and protocols

7.3.6.1 Automatic recloser operations

Liberty's current system automation equipment uses traditional substation and line recloser relaying. One benefit is the ability to automatically reclose during non-high fire threat days, to clear temporary faults, and quickly restore power. The current system has the benefit of remote control and the ability to quickly change settings remotely, such as putting a device into one-shot (fire mode) during high fire threat days. For wildfire mitigation, the use of line reclosers places protective relaying closer to end-of-line faults, allowing the device to quickly clear faults that substation relaying may not pick up.

1. **Risk to be mitigated** / problem to be addressed

Primarily, the risk mitigated is wildfire, by de-energizing during end-of-line faults that substation relays may not pick up or take long to clear the fault. Having reclosers on the line in series allows for better clearing times for faults downstream of the line reclosers, thus better mitigating fire risk. As many as three devices in series have been employed on some of Liberty's longer distribution lines. Additionally, line reclosers can be used as smart switches to more rapidly isolated the faulted area and rapidly restore customers not in the faulted area where it is still safe to restore power.

System automation is also a benefit to reliability with the ability to quickly switch to isolate faults and restore load as much as possible. This is also known as FLISR (Fault Location, Isolation, and Service Restoration). It will be a valuable resource for more rapid service restoration after any PSPS event as well.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

Line recloser installation is an effective wildfire and PSPS mitigation measure. By placing line reclosers with high speed relaying devices out on distribution lines, line faults with lower fault current can be more rapidly detected and cleared. Adding DA will enable faults to be rapidly cleared and isolated for better fault location information and rapid system restoration, restoring power to customers in areas where re-energizing line is still safe. The relays also provide valuable information on the type of fault and fault current levels.

The ability to remote control these devices will enable more rapid service restoration after any PSPS de-energization event.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

Liberty has made progress on implementation of new reclosers and aging recloser replacements in Tier 3 and Tier 2 areas within the Lake Tahoe basin. Liberty is expanding its recloser installations and replacements into its more remote Tier 2 areas going forward. All of Liberty's substations currently have new technology relaying and with control and data acquisition (SCADA).

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

Four additional line reclosers were installed in 2020, with plans for an additional three in 2021. Liberty plans to continue to replace or install at least three line reclosers per year going forward.

5. **Future improvements to initiative**

Liberty plans to continue installing new line reclosers to better sectionalize and have relaying devices closer to end-of-line to help detect low current faults. Liberty is planning to install three additional line reclosers in 2021 and to replace or install at least three line reclosers per year going forward.

Beyond that, Liberty is planning on a DA pilot program starting in 2021 and continuing into 2022. Liberty plans to house a DA controller at one of its substations and control multiple communication enabled reclosers and substation breakers. This allows for FLISR technology to be implemented on our system. It has the added benefit of more rapid restoration after a PSPS event.

7.3.6.2 Crew-accompanying ignition prevention and suppression resources and services

Please refer to section 7.3.6.3

7.3.6.3 Personnel work procedures and training in conditions of elevated fire risk

1. **Risk to be mitigated** / problem to be addressed

Liberty has designated the type of work activities that may be performed in its service territory under certain FPI Operating Conditions (*e.g.*, low condition, moderate condition, high condition, very high condition, and Extreme or Red Flag Warning condition). As conditions increase in severity, activities that present an increased risk of ignition have additional mitigation requirements. Where risk cannot be mitigated, work activity will cease. Personnel work procedures and proper training help mitigate the risk of an ignition while performing at-risk activities that are necessary to maintain and operate the Liberty electric system.

The following summarizes the work activity guidelines for each of Liberty's Operating Conditions:

Low Fire Risk: As determined by the Wildfire Prevention Department, Low or "Normal" Fire Risk is defined as periods where the potential for wildfires and associated ignition risks are low but may sometimes still exist within Tier 2 or 3 of the HFTD. Some O&M activities may have stipulations and additional fire mitigation activities may be required. The Low Fire Risk status is the default operational state and the FPI is indicated as "Blue."

Moderate Fire Risk: As determined by the Wildfire Prevention Department, Moderate Fire Risk is defined as periods where the potential for wildfires and associated ignition risks are not elevated but still exist within Tier 2 or 3 of the HFTD. Some O&M activities may have stipulations and additional fire mitigation activities may be required. The FPI is indicated as "Green."

High Fire Risk: As determined by the Wildfire Prevention Department, High Fire Risk is defined as periods of increasing risk of wildfires and associated ignition risks within Tier 2 or 3 of the HFTD. Many O&M activities have stipulations and additional fire mitigation activities are sometimes required. The High Fire Risk status is indicated as "Yellow."

Very High Fire Risk: As determined by the Wildfire Prevention Department, Very High Fire Risk is defined as periods of increasing risk of wildfires and associated ignition risks within Tier 2 or 3 of the HFTD. Many O&M activities have

stipulations and additional fire mitigation activities are required. The Very High Fire Risk status is indicated as "Orange."

Extreme Fire Risk: As determined by the Wildfire Prevention Department, Extreme Fire Risk is defined as periods of significant risk of wildfires and the associated ignition risks within Tier 2 or 3 of the HFTD. All O&M activities have stipulations, and significant fire mitigation activities are required. Most overhead work activities will cease, except where not performing the work would create a greater risk than doing so. In those cases where at-risk work needs to be performed, a Liberty Fire Safety Monitor or Leader is assigned, and additional mitigation steps are implemented. The Extreme Fire Risk status is indicated as "Red."

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

The safety of Liberty's customers, personnel, and cooperating agencies are all considered during the development and subsequent refinements of Liberty's personnel work procedures and training. Wildfire presents a large risk to all these groups and these procedures help to greatly reduce the chance that Liberty's activities cause ignitions and that Liberty personnel are prepared in the event of a wildfire in an area in which they are working.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

Liberty's Fire Prevention Plan requires that all employees, contractors, and consultants that conduct activities in the wildland areas of the service territory receive this training on an annual basis. The training includes definitions of at-risk work, wildland areas, FPI, and a matrix that can be used to determine the minimum fire prevention requirements for at risk activities. Information is also provided related to working on, or adjacent to wildland fires, reporting wildland fires, and guidance for taking fire suppression action.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

Liberty has refined and updated its FPI Operating Conditions since 2020 and plans to continue to conduct training on fire prevention and emergency actions at any ignition found. Liberty will continue refining procedures designed to prevent ignitions from Liberty equipment or activities throughout our service area.

5. **Future improvements to initiative**

Liberty's Wildfire Prevention Division continues to explore other opportunities to improve FPI Operating Conditions and safety training processes to train personnel to be prepared to work in elevated fire risk conditions. Procedures and training are reviewed annually, and feedback from attendees, other IOUs/agencies, and from public safety partners is incorporated into future training.

7.3.6.4 Protocols for PSPS re-energization

As outlined in Liberty's Corporate Emergency Management Plan ("CEMP") pursuant to G.O. 166, Liberty has developed a PSPS plan that supplements and enhances protocols for preparedness and service restoration in the event of a disaster or emergency. Liberty reviews the plan annually to bolster its preparedness plan to not only meet compliance standards for service restoration but to also reduce impacts of PSPS events on its customers.

1. **Risk to be mitigated** / problem to be addressed

Primarily, the risk is long interruption of service to a variety of customer types, including medical baseline customers.[11] Service restoration is unique for each emergency event and restoration prioritization is influenced by several factors including safety, accessibility, availability of repair parts, availability of personnel, etc. This element of the plan identifies general restoration prioritization guidelines but allows for the Incident Commander, or designee, to alter priorities according to the circumstances of the emergency and in coordination with essential load customers and government agencies.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

Pursuant to G.O. 166 requirements, Liberty has developed a PSPS plan to supplement and enhance protocols for service restoration in the event of a PSPS.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

Restoration Guidelines include:

i. Restore radial transmission and substations;
ii. Restore distribution circuits with essential customers such as health care facilities, utilities, public safety, governmental facilities, and Green Cross customers;
iii. Restore circuits with the greatest number of customers;
iv. Restore primary taps, followed by secondary lines;
v. Restore individual services which are accessible and serviceable;
vi. Restore essential customers.

Below is the priority list of essential customers. Priority assumes circuits, equipment, and services are accessible and repairable.

i. Health Care Hospitals
    a. Primary Care Hospitals
ii. Utility Services/Districts
    a. Public Utility Districts
    b. Telecommunications
    c. Water/Water Treatment
    d. Pipeline
iii. Public safety agencies
    a. Public Safety Dispatch Centers
    b. Law enforcement facilities/holding facilities
    c. Fire operations facilities
    d. Transportation equipment and facilities
iv. Government facilities
v. Green Cross customers

[11] Liberty is in the concept phase of evaluating a comprehensive resiliency program that will address the specific needs of medical baseline customers. See section 5.4.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

Liberty has developed its PSPS plan and will review the plan annually and will make improvements if deemed necessary. Also, Liberty held a "mock" PSPS drill in 2020 and plans to exercise its PSPS plan annually.

5. **Future improvements to initiative**

Liberty reviews the plan annually to bolster its preparedness plan to meet compliance standards for service restoration.

7.3.6.5 PSPS events and mitigation of PSPS impacts

Please refer to section 7.3.6.4 and section 8.

7.3.6.6 Stationed and on-call ignition prevention and suppression resources and services

Please refer to section 7.3.6.4.

7.3.7 Data governance

7.3.7.1 Centralized repository for data

Liberty continues to advance its usage of a centralized data storage and integrate relational data systems. While there is currently no centralized wildfire risk data repository, there are established databases maintained individually in silos that includes an outage incident reporting system (Responder), geographic information systems ("GIS"), Vegetation Management System database ("VMS"), and an initial asset database from the system-wide survey. Other risk-based decision making data sources, such as environmental impacts, work planning and tracking using Reax fire map overlays, system hardening efforts, and overall systems analysis will improve with integration of data from all systems. Currently, there is one dedicated resource for all regulatory and operational data needs and Liberty is working with corporate Information Technology to alleviate bottlenecks and implementation lag times for data system efforts.

As Liberty moves forward with new methods of integration, analysis and reporting, Liberty's risk-based decision making process will continue to add efficiency and sophistication. The platform supporting storage, processing and utilization of all Liberty proprietary and outside sourced data is expected to mature and standardize within the next two to three years. Liberty has established data sources providing a wealth of information that once summarized and integrated can be used for planning work efforts that fully leverage risk based decision making. By compiling selected data from these data sources in a centralized location in real-time, information can be utilized by different groups, such as vegetation management, and coordinate regional inspections and repair work based on previously evaluated high risk areas. Liberty can also increasingly utilize this data framework for system hardening, battery storage and microgrid projects.

1. **Risk to be mitigated** / problem to be addressed

The efficiency and accuracy of data processing related to work performed is intended to provide safe and reliable business information to reduce the costs associated with field errors, delays, infrastructure vulnerabilities and miscommunication. Multiple copies of spreadsheets, out of date information and miscommunication can introduce risks when guiding decisions. The centralization of data creates an empowered workforce that can act quicker in the right places to provide safer, more reliable services.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

Relational and transactional data is a constantly changing process that challenges users to achieve accuracy and timeliness. The centralization of data sources requires appropriate systems and skillsets that can provide data integrity and security while providing appropriate access and tools to perform analysis. Liberty will advance this process of data sophistication to achieve a robust framework of integrated business intelligence and move towards dashboard capabilities for driving risk based decision making. Liberty strives to empower its workforce with the most efficient methodologies it can provide to mitigate risk, lower costs and provide reliability in service.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

Continued centralization and sophistication of data systems will improve systems over the entire service territory with emphasis on Tier 3 and identified high fire risk areas.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

In 2020, the System Survey inventoried and created a record of poles by number that also included photos, updated GIS coordinates, hardware on poles, type of wire connected, whether there was a tree attachment, and included an initial assessment using G.O. 165 condition codes and priority findings. The System Survey was capitalized in December 2020 and provides the basis of a fully functioning asset management system to be used for prioritizing work based on Reax mapping and level findings. Design and testing of cloud-based forms for data collection was implemented for this purpose in addition to the establishment of the wildfire risk SharePoint dedicated location and utilization of other visual applications. The implementation of a dedicated reporting server in parallel with upgrades to GIS and incident management systems are expected to be in production by end of 2021/early 2022. These projects will provide a framework to integrate multiple data streams more efficiently and produce sophisticated reports in a fraction of the previous time required.

5. **Future improvements to initiative**

Liberty intends to leverage its centralized data repository framework to create a series of business information dashboards and cloud-based performance metric display pages. In the coming years, Liberty will leverage the new data repository framework and reporting capabilities to document and develop WMP initiatives for wildfire-related data and algorithms (see Section 7.3.7.3) and enhance analysis of near-miss data (see Section 7.3.7.4).

7.3.7.2 Collaborative research on utility ignition and/or wildfire

Liberty has embarked on two collaborative research projects: a Distribution Fault Anticipation ("DFA") project with Texas A&M, and a High Impendence Fault Detection ("HIFD") project with the University of Nevada, Reno. Liberty is also considering a Ground Fault Neutralization ("GFN") pilot program of Swedish Neutral's Ground Fault Neutralizer.

DFA is a collaborative project between Liberty and Texas A&M. The technology is an incipient fault detection technology that detects small anomalies in the AC power waveform due to things such as arcing hardware or tree branches in the line that are non-permanent faults.

HIFD is a collaborative research project between Liberty and the University of Nevada, Reno. This technology is well suited to detect faults that are high impedance in nature. This technology will work particularly well in the Lake Tahoe Basin due to poor grounding conditions in the area.

GFN is an established technology by Swedish Neutral. Widely used in Europe and Australia, the technology drives line-to-ground fault current to near zero, decreasing risk of ignition significantly. Swedish Neutral claims that this technology works well on a three-wire system such as Liberty's 14.4kV three-wire system.

1. **Risk to be mitigated** / problem to be addressed

The primary risk to be mitigated is wildfire ignitions due to intermittent issues and high impedance faults. DFA can detect small faults prior to a full failure of hardware or a permanent fault due to vegetation, which will allow crews to be dispatched to patrol line and find these issues prior to a catastrophic failure or ignition event. HIFD can better detect and clear a high impedance fault, such as a wire down on high impedance soil with very low fault current. GFN reduces fire risk by driving line-to-ground fault current to near zero and alleviating the energy needed for a spark. All three technologies were selected for their wildfire risk mitigation potential.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

Per the CPUC's suggestion, Liberty selected DFA as a possible technology during development of the 2021 WMP. The incipient fault technologies are being piloted by other IOUs and appear to help find and stop ignitions before they happen.

HIFD was selected for its ability to clear high impedance faults. With the poor grounding in much of Liberty's territory, the technology seems well suited to clear faults rapidly before ignitions. Traditional protection measures have not performed well with these types of faults on poorly grounded networks.

GFN is being considered for its ability to drive line-to-ground fault current to near zero. Should it perform as advertised, it will greatly limit the available energy required to ignite vegetation.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

Region prioritization will be focused primarily in the Tier 3 region, moving out to Tier 2 if the technology is proven to reduce wildfire ignition risk.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

DFA hardware has been purchased and received and is expected to be installed on 10 distribution feeders by the end of 2022. HIFD is set to be deployed in 2021. For GFN, Liberty is in the beginning stages of trying to launch a GFN pilot program at Meyers (Tier 3) Substation, with a goal for a 2022 in-service date.

5. **Future improvements to initiative**

Liberty is always looking for alternate technologies for wildfire mitigation and considering alternate HIFD offerings due to current vendor delays. These technologies all have the possibility of being expanded in future years should they be found to significantly limit risk of wildfire ignitions.

7.3.7.3 Documentation and disclosure of wildfire-related data and algorithms

Refer to Section 7.3.7.1.

7.3.7.4 Tracking and analysis of risk event data

Refer to Section 7.3.7.1.

7.3.8 Resource allocation methodology

7.3.8.1 Allocation methodology development and application

Please refer to Section 7.3.7.1.

7.3.8.2 Risk reduction scenario development and analysis

Please refer to Section 7.3.7.1.

7.3.8.3 Risk spend efficiency analysis – not to include PSPS

Please refer to Section 7.3.7.1.

7.3.9 Emergency planning and preparedness

The emergency preparedness and response plans described in the WMP comply with Cal. Pub. Util. Code §§ 768.6, 8386. Specifically, the WMP complies with the following mandates:

- Sharing elements of vested interest of the WMP and emergency response plan with relevant cities and counties to provide input and feedback.
- Direction to routinely update and improve the WMP.
- Accounting of responsibilities of persons responsible for executing the WMP.
- Appropriate and feasible procedures for notifying customers that may be impacted.
- Plans to prepare for and restore service, including workforce mobilization.
- Plans for community outreach and public awareness before, during, and after a wildfire.
- Emergency communications that include plans to provide messages in English, Spanish, German, French, and Chinese (Mandarin and Cantonese). Languages prevalent in Liberty's service area are English and Spanish, based on United States Census data.
- Protocols for compliance with Commission reporting guidelines.

7.3.9.1 Adequate and trained workforce for service restoration

Liberty employs a staff of qualified journeymen linemen in order to handle day-to-day activities as well as respond to emergencies. Liberty has addressed limitations in resource sufficiency through mutual aid agreements. Mutual assistance entities include NV Energy, Western Region Mutual Assistance Agreement ("WRMAA"), and the California Utilities Emergency Association ("CUEA"). Liberty is also in the process of adding additional qualified journeyman linemen to its workforce to better handle both day-to-day and emergency work.

MITIGATION INITIATIVES

1. **Risk to be mitigated** / problem to be addressed

Primarily, the risk is long interruption of service to a variety of customer types, including medical baseline customers. Service restoration is unique to each emergency and restoration prioritization is influenced by several factors including safety, accessibility, availability of repair parts, and availability of personnel.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

Having an adequate and trained workforce is part of Liberty's normal operating procedures. Liberty utilizes contract crews for some work and will utilize contractors for emergencies when necessary. If needed, Liberty can add additional entities in major emergencies through its mutual assistance agreements.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

Restoration Guidelines include:

i. Restore radial transmission and substations;
ii. Restore distribution circuits with essential customers such as health care facilities, utilities, public safety governmental facilities, and Green Cross customers;
iii. Restore circuits with the greatest number of customers;
iv. Restore primary taps, followed by secondary lines;
v. Restore individual services which are accessible and serviceable;
vi. Restore essential customers.

Below is the priority list of essential customers. Priority assumes circuits, equipment, and services are accessible and repairable.

i. Health Care Hospitals
    a. Primary Care Hospitals
ii. Utility Services/Districts
    a. Public Utility Districts
    b. Telecommunications
    c. Water/Water Treatment
    d. Pipeline
iii. Public safety agencies
    a. Public Safety Dispatch Centers
    b. Law enforcement facilities/holding facilities
    c. Fire operations facilities
    d. Transportation equipment and facilities
iv. Government facilities
v. Green Cross customers

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

Liberty has this plan in place.

5. **Future improvements to initiative**

Liberty is in the process of adding additional crew members to improve emergency restoration and normal day-to-day work.

7.3.9.2 Community outreach, public awareness, and communications efforts

1. **Risk to be mitigated** / problem to be addressed

Wildfires are a year-round threat in California. As a result, Liberty executes a robust, year-round communications and outreach effort to increase community resiliency to wildfires and educate customers and the public about PSPS and how to prepare for potential de-energization events. The goal of this effort is the increase awareness and community resiliency to wildfires and PSPS.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

Liberty conducts PSPS and wildfire-specific communications in three phases: before, during, and following an emergency event. Efforts before focus on immediate actions customers and the public can employ to remain safe, resilient and updated during the emergency. During the event, Liberty focuses on providing real-time awareness and updates about the event and how to remain safe. Following the event, Liberty focuses on transparency, from educating customers and the public on the impact of the event to soliciting customer feedback to improve communication efforts for any future event.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

Public education and communication efforts target Liberty's service territory with a particular focus on the areas that are most at risk of PSPS or wildfire (High Fire Threat District). Liberty also focuses on areas with an elevated percentage of at-risk customers, such as MBL and AFN customers.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

Liberty's wildfire mitigation communications and public education initiative consists of direct and indirect engagement through community outreach materials and engagement campaigns. Materials produced over the course of the year are tailored to match Liberty's respective audience and phase. Additionally, communications and outreach efforts will be enhanced and adjusted to reflect feedback received and emerging best practices.

- **Prior to a potential event**: In 2020, Liberty expanded its public education and outreach efforts associated with its wildfire mitigation plan. Safety and resiliency communications were part of a territory-wide public education campaign. These communications focused on personal preparedness and community resiliency. Also, in light of COVID-19 considerations, special emphasis was placed on digital outreach to engage customers on important emergency, wildfire, and PSPS information.

    - Online Town Halls: As mentioned above, the COVID-19 pandemic altered how Liberty communicated with customers and the general public. Community-based virtual town halls were held to provide information

about Liberty's local wildfire mitigation efforts, PSPS, and how to prepare and remain resilient through the events. Virtual town halls were advertised on Liberty's social media platforms and promoted via email communications. Liberty anticipates the continued need for virtual events; therefore, planning for future events will focus on garnering more participation in these community events.

- Community Newsletter Outreach**:** Liberty continually looks for new ways to reach its customers. In 2020, Liberty initiated a new public education campaign through community-based newsletters and magazines. The purpose of the campaign was to promote personal preparedness during an emergency, wildfire, or PSPS. Liberty also provided PSPS messaging, including educational material on the factors that determine a PSPS and how Liberty would communicate to customers and community partners during a de-energization event.

  Digital Communications: Digital communications became a critical communications pathway with customers and the general public, as the COVID-19 pandemic prevented in-person events and meetings. Liberty increased PSPS-related posts on social media by 500 percent in 2020, as compared to 2019. Liberty anticipates the continued need for digital communications in 2021 and beyond. Liberty also bolstered its digital communications, producing a three-part video series educating customers and the general public on how to prepare before, during, and after a PSPS event. These videos were disseminated via email and across Facebook, Twitter, YouTube, and the Liberty website.

- CBO Outreach: Liberty engaged regional CBOs to help disseminate critical preparedness information. CBOs were provided with a digital toolkit, which included information about assistance programs, the MBL program, etc.

• **During an event**: Liberty will execute standard communication protocols such as, but not limited to, customer notifications, media updates and situational awareness postings across social media channels. In addition, Liberty will activate a series of additional tactics to inform customers and the public about the latest developments during emergency, wildfire, and PSPS events.

As part of its expanded outreach, Liberty will coordinate roadside changeable message signs with Caltrans throughout affected communities to keep impacted residents informed. These signs will be critically important to educate tourists in Liberty's service territory.

During an event, Liberty will assign dedicated liaisons who are responsible for conveying real-time updates and outreach material to our public safety partners, elected officials, critical facilities and CBOs. Liberty will also employ standard communication channels to promote emergency service resources including, but not limited to social media channels, broadcast and print media, and the Liberty website.

Liberty will disseminate detailed information on the emergency, wildfire, or PSPS event, including a list and maps of impacted communities, critical facilities, and estimated number of impacted customers (including a breakdown of registered MBL and identified AFN customers) and share it with local public safety partners and elected officials.

To expand its digital outreach, Liberty will distribute public service announcements ("PSAs") to read live on the airwaves and coordinate with CalOES to distribute wireless emergency alerts to impacted regions. The templates allow for the addition of real-time awareness details and provide referral to Liberty's social media platforms for additional safety information and updates.

- **Following an event**: Communicating with customers and the public early and often is essential to the region's wildfire preparedness. Liberty engages in discussions and solicits feedback from its communities and stakeholders regarding proactive safety preparations, mitigation measures and community support strategies to reduce infrastructure-related ignitions and mitigate impacts of a wildfire or PSPS.

  In 2020, Liberty reached out to customers through formal surveys to establish a baseline awareness of wildfire mitigation and PSPS-related messaging and communications at the beginning of wildfire season. At the end of the 2020 wildfire season, customers were again surveyed to measure the effectiveness of public education efforts and communications. Liberty will use the gathered feedback to evaluate, refine and improve customer and public education efforts for 2021 and follow a similar process in the coming years.

5. **Future improvements to initiative**

In 2021, Liberty will be investing in improvements that enhance both wildfire safety and PSPS communications. As previously noted, these efforts include the expansion of the MBL and AFN campaign to better communicate with at-risk populations. The public education campaign will start sooner in the year and will work to expand the reach of communications within the service territory.

Liberty will also continue to build partnerships with CBOs. Many of these organizations target at-risk communities and can help refine communications and further identify AFN populations within the territory.

Additionally, the Liberty is considering and evaluating additional efforts such as a robust media buy to significantly expand 2021 wildfire safety and PSPS outreach communications.

7.3.9.3 Customer support in emergencies

1. **Risk to be mitigated** / problem to be addressed

Emergencies and wildfires can leave customers looking for support in many areas. Liberty provides assistance to those who are directly impacted. Customers eligible for the wildfire customer protections described below are those directly impacted by the wildfires and identified as such by Liberty or who have self-reported as being impacted. Directly impacted customers would include those without electric service or those needing to re-locate (either temporarily or permanently) due to wildfire damage.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

Liberty provides emergency residential and non-residential customer protections for wildfire victims, as ordered by the CPUC. Examples of protections include billing adjustments, deposit waivers, extended payment plans, suspension of disconnection and nonpayment fees, and specific support for low income and MBL customers.

The descriptions below reflect Liberty's customer protection measures during and after a wildfire or PSPS event:

- Outage reporting: Throughout the lifecycle of an adverse weather event, it is important that the customer is adequately informed and prepared at all times. Liberty utilizes a multi-channel approach for real-time situational awareness.

After extreme weather conditions are forecasted and the National Weather Service issues a Red Flag Warning, Liberty begins to coordinate with local government agencies, community-based organizations, and public safety partners approximately 72 hours prior to the event. Communications are then initiated with customers via Everbridge, broadcast media and social media channels. These communications drive traffic to Liberty's social media and/or dedicated PSPS landing page for more information and real-time situation updates. As the event progresses, these notifications become more specific and targeted to customers as the situation warrants. Along with outage updates the channels listed above provide information related to wildfire safety, emergency preparedness, PSPS, and Community Resource Centers.

- Support for low income and MBL customers: Low-income/CARE and MBL customers will be offered special payment arrangements resulting from fire-related outages, as necessary.

- Billing adjustments: Liberty will suspend billing until power is restored to impacted customers.

- Deposit waivers: Liberty will waive deposit requirements for customers who are seeking to re-establish service at either the same location or a new location.

- Extended payment plans: Special consideration will be granted for payment extension when customers experience tremendous loss (*i.e.* property loss).

- Suspension of disconnection and nonpayment fees: For customers impacted by wildfires, Liberty will suspend disconnection for non-payment and associated fees, waive the deposit and late fee requirements for affected customers who pay their utility bills late, and not report late payments by customers who are eligible for these protections to credit reporting agencies or to other such services.

- Repair processing and timing: Timing for repair procedures will be determined on the severity of the wildfire. As feasible, Liberty will accelerate the repair process.

- Access to utility representatives: If Liberty's offices are not impacted by the wildfire event, operations will resume and customer service representatives will be available to provide support. If offices are impacted, nearby offices and corporate communications will be available to customers.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

These customer protections are available to customers throughout Liberty's service territory. Liberty will provide descriptions of the customer protections offered to affected customers on a special landing page on its website and promote the page with social media campaigns. In addition, Liberty will make every effort possible to contact impacted customers to bring awareness regarding these protections.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

In 2020, Liberty focused on outreach to its most vulnerable customers. This included outreach to MBL customers, including efforts to update contact records for wildfire event communications.

5. **Future improvements to initiative**

Liberty will evaluate new partnerships, programs and service offerings both directly provided by Liberty, as well as provided through community partnerships.

7.3.9.4 Disaster and emergency preparedness plan

In accordance with G.O. 166, Liberty has a CEMP that outlines the policies and procedures for disaster and emergency events. The CEMP has undergone an internal review for improvement, and the Emergency Manager is responsible for oversight or the plan. In addition to annual reviews, Liberty continually looks for opportunities to improve the plan and to collaborate with local agencies, communities, and other stakeholders to maintain protocols and satisfy requirements.

7.3.9.5 Preparedness and planning for service restoration

As outlined in the CEMP pursuant to G.O. 166, Liberty has developed a PSPS plan that supplements and enhances protocols for preparedness and service restoration in the event of a disaster or emergency. Liberty reviews the plan annually to bolster its preparedness plan to meet compliance standards for service restoration. Please refer to Section 7.3.6.4 for more initiative details.

7.3.9.6 Protocols in place to learn from wildfire events

Any major wildfire event caused by Liberty would be considered an emergency situation, and activation of the CEMP would be in place. Post-incident lessons learned meetings and documentation would be generated and circulated, and resulting emergency preparedness improvements would be shared in training sessions with key personnel in the company.

7.3.10 Stakeholder cooperation and community engagement

Liberty understands communication is essential to help mitigate the risk of wildfires and adverse impacts of PSPS events for our customers and community partners. Liberty remains committed to partnering with utility customers, elected officials, community-based organizations ("CBOs"), first responders, and all other public safety and community partners, understanding each partner plays a unique role in achieving wildfire prevention and mitigation in our service territory. Liberty provides an essential service, and it takes its role very seriously. This is especially true during times of potential PSPS events, when communities depend on complete, accurate, and timely information to protect their health and safety.

Liberty will continue to strive to educate stakeholders about wildfire preparedness, including PSPS events. It is Liberty's goal to enable those it serves with the necessary resources to navigate the adverse impacts of an emergency, wildfire, or PSPS event. Through educational campaigns and strategic partnerships, Liberty has implemented a robust, external communication strategy, which reflects lessons learned and evolving best practices. Liberty also leverages its partnerships with CBOs and stakeholders to amplify and disseminate emergency preparedness information.

Liberty remains committed to fostering these relationships and collaborating on new ways to better serve its communities in 2021 and beyond. As outlined below, Liberty will continue to leverage its partner network and agency relationships and will continue to strive for transparent education and messaging.

7.3.10.1 Community engagement

1. **Risk to be mitigated** / problem to be addressed

Working together with public safety partners, CBOs and customers is an important part of Liberty's wildfire safety education program. Communities are empowered to understand the critical safety work underway in their area and are more prepared for wildfire season, specifically Public Safety Power Shutoff (PSPS) events. The goals of Liberty's detailed outreach and engagement plan includes the following, among others:

- Identifying and engaging with key stakeholder groups;
- Creating alignment between Liberty, customers, public safety partners, elected officials and the general public;
- Identifying opportunities to collaborate with key local agencies in the design and planning of wildfire mitigation work to leverage efficiencies in project execution or the pursuit of projects that are closely aligned with community priorities; and
- Preparing public safety partners, agencies, and customers for PSPS events, mitigating the risks associated with those events for our most vulnerable customers.

In addition, Liberty designs, translates, distributes and evaluates communications, including AFN and non-English speaking customers, to help facilitate the following:

- Customers and communities are aware of Liberty's wildfire mitigation efforts;
- Customers and communities increase their personal PSPS preparedness; and
- There is balanced communication to customer populations, where the most vulnerable populations have access to information in the format best suited for their needs.

2. **Initiative selection** ("why" engage in activity) – include reference to a risk informed analysis on empirical (or projected) impact of initiative in comparison to alternatives

Liberty develops an outreach and engagement plan for the various stakeholders within our service territory. Key stakeholders include public safety partners, including federal, state, local and tribal agencies; critical facilities, such as water agencies, communications providers and hospitals; and, customers, including MBL and AFN customers.

Throughout the year, Liberty engages with these stakeholders regarding the company's critical wildfire mitigation efforts. Liberty's main outreach and engagement objectives for 2021 include:

- Adapting to shifting needs and priorities in emergency preparedness and wildfire mitigation, including a mindfulness of other key local priorities such as responding to the ongoing coronavirus (COVID-19) crisis;
- Hosting regionalized discussions with public safety partners to enhance knowledge of regional driving factors for PSPS events and other potential emergency events in their areas;
- Strengthening partnerships between public safety partners and Liberty representatives, establishing point-of-contacts that can address their needs both during an emergency event and throughout the year;
- Customizing outreach approach and cadence based upon the community's wildfire risk, with a key focus on providing more heavily impacted communities with information and resources; and
- Approaching public safety partners and customers with humility and transparency while providing timely and accurate information that supports emergency preparedness and localized wildfire mitigation efforts;

To further explain Liberty's community engagement approach, this section has been organized into the following categories:

Strategy and Actions Taken to Identify and Contact Key Community Stakeholders

Liberty aims to collaborate with stakeholders to inform them of wildfire safety work in their area and address unique, local issues in real-time. Liberty recognizes its public safety partners and community organizations evolve to meet changing emergency conditions as Liberty does. That is why Liberty works to keep contact lists updated throughout the year, identifying and maintaining relationships within federal, state, local, and tribal agencies on a quarterly basis. These relationships enable Liberty representatives to include public safety partners and other stakeholder groups in future outreach engagements and in-emergency notifications.

Liberty collaborates with stakeholder representatives throughout its service territory, from local to federal levels. Liberty also has representatives who coordinate regularly with critical facilities and large businesses and are responsible for identifying and maintaining these contacts. Liberty representatives work to build trust with their respective stakeholder groups and are empowered to share information and seek feedback on future wildfire mitigation work.

Beyond existing relationships, Liberty continues to establish partnerships with CBO and AFN entities that may assist Liberty in our outreach and engagement efforts to at-risk populations. These entities can also assist with identifying customer groups that require additional, specialized outreach. Liberty also follows best practice guidelines and seeks input from the other California IOUs and through its advisory committees to identify additional stakeholders.

For further information on how Liberty identifies and maintains agency and critical facility contact information for PSPS and emergency event notifications, see Chapter 8.

Increase Public Awareness and Support of Utility Wildfire Mitigation Activity

Wildfires are now a year-round threat in California. Throughout the year, Liberty executes comprehensive wildfire safety and PSPS preparedness outreach, using lessons learned and feedback received from other IOUs, customers, and stakeholders. Further, Liberty conducts community outreach to educate public safety partners, customers, and the general public on aspects of our wildfire mitigation practices, such as vegetation management and system hardening, and the role they play in helping to reduce wildfire risks in their communities.

In light of the COVID-19 pandemic, Liberty will adhere to public health guidelines when executing its outreach plan, including making all communications available in a digital form. In years past, Liberty collaborated with public safety partners, critical facilities, and other stakeholders on outreach, including designing in-person meetings and community town halls. The COVID-19 pandemic prevented most in-person engagement efforts for 2020 and will continue to restrict in-person engagements in 2021. Liberty will continue to follow prevailing public health guidance when planning 2021 engagements and will also consider the preferences of public safety partners, customers, communities, and internal staff.

- **Public Safety Partner and Critical Facilities Outreach**: Liberty works closely with public safety partners and critical facilities to inform them of Liberty's wildfire safety work in their area. Liberty encourages public safety partners and critical facilities to provide feedback and play an active role in providing additional outreach support to increase awareness and support of utility wildfire mitigation activities.
    - Listening Sessions: Liberty meets with public safety partners in its service territory to share regional plans for wildfire mitigation, system resiliency and address steps being taken to incorporate the feedback

received during the previous wildfire season. The purpose of the listening sessions is to provide public safety partners with an opportunity to have detailed conversations regarding wildfire mitigation work planned in their community and PSPS improvements. Feedback from the sessions has helped to shape local planning for PSPS events, including critical facility locations, community resource center (CRC) locations, and local contacts for emergency response.

- PSPS Tabletop Exercises: Liberty invites public safety partners to PSPS tabletop exercises, testing Liberty's ability to effectively communicate with our partners during PSPS events. Tabletop exercises help clarify roles and responsibilities during a PSPS event and provide an opportunity to identify possible areas of improvement. These PSPS tabletop exercise and workshops are a continued best practice in 2021. In 2020, Liberty hosted three tabletop exercises.

- Additional PSPS Workshops: Liberty hosts additional PSPS workshops for public safety partners, as needed. Liberty prioritizes topics that are most valuable to the jurisdictions, including localized drivers of PSPS, wildfire mitigation activities in their communities, and other topics of interest. Liberty aims to co-host public-facing events with public safety partners to address questions and concerns from the community related to PSPS and wildfires and partner on additional external outreach and engagement opportunities.

- In 2020, Liberty conducted meetings with nearly 10 stakeholder groups. Liberty will continue these meetings throughout 2021. Throughout 2021, Liberty will continue to engage with public safety partners and critical facilities to support wildfire, PSPS and emergency preparedness planning, including topics such as business continuity, backup power options, safety, among others.

• **Customer and Community Outreach**: Liberty engages with customers and communities regarding wildfire safety and PSPS preparedness year-round to increase public awareness and support of Liberty wildfire mitigation activities. Liberty prioritizes engagement with those most likely to be impacted by PSPS, which includes customers within Tier 2 and Tier 3 High Fire Threat District (HFTD) areas. It also includes additional touch points for MBL customers, those with limited English proficiency and the AFN community. Liberty will leverage multiple channels, such as virtual town halls, e-mails, bill inserts, postcards, radio, digital advertisements, print media, informational videos, social media, website, and possibly face-to-face meetings. Liberty will continue direct-to-customer outreach campaigns that are focused on, but are not limited to, personal PSPS preparedness, gathering updated contact information and sharing PSPS and emergency safety tips.

- Communications for AFN Populations and Limited English Proficiency Populations: Liberty translates "critical information," which includes resources focused on emergency preparedness, wildfire safety, and PSPS preparedness in the format best fitting customers' needs. Additionally, Liberty continues to establish partnerships with CBOs to provide additional outreach support. Please see Section 8.4 for details on Liberty's communications for AFN populations and limited English proficiency populations.

- Virtual Town Halls and other Community Events: Liberty hosts virtual town halls dedicated to providing information about Liberty's local wildfire mitigation efforts, PSPS and how to prepare and remain resilient through the events (anticipated by June 2021). These events are designed for anyone who is interested in learning more about Liberty's wildfire mitigation efforts and allow community members to ask questions and share feedback. Liberty plans to continue to host and/or participate in community events focused on customers with disabilities, seniors, and low-income customers, including participation in meetings hosted by CBOs. In 2021, the format and timing of community events will depend on COVID-19 safety

protocols. Liberty anticipates that most community events will occur virtually in 2021. When it becomes safe for customers, communities, and employees to gather, Liberty plans to resume in-person events, based on state and local health guidance.

- Direct-to-Customer Outreach: To help customers prepare for emergencies and potential PSPS events, Liberty plans to conduct a multi-channel outreach and awareness campaign throughout 2021, including e-mails, homeowner's association ("HOA") newsletters, postcards, and more. Topics include, but are not limited to, calls to update customer contact information, directions to enroll in the MBL program, and PSPS awareness and preparedness messaging.

- Digital Engagement: Liberty's website is a key resource for information about wildfire mitigation activities, PSPS readiness initiatives, and PSPS event information. Liberty's website allows customers to have access to information before, during, and after a wildfire and/or PSPS event as well as a variety of topics associated with wildfire including wildfire safety, emergency preparedness, and PSPS planning and preparedness.

- Informational Videos: Liberty uses informational videos to inform customers about wildfire mitigation and PSPS preparedness. For example, in 2020, Liberty developed a three-part series of short videos detailing how customers can prepare before, during, and after a PSPS event. Additional video topics include PSPS decision-making and MBL information. Liberty plans to develop additional short-form videos about other wildfire safety topics.

- Social Media: Liberty regularly provides customer preparedness resources through its social media channels, including Twitter and Facebook. Liberty continues to work with public safety partners and CBOs to assist with communications and share its social media posts before and during PSPS events. Liberty plans to leverage its social media platform throughout 2021.

- Purchased Media/Advertising Campaign: This will include PSPS and WFM information in print, digital, radio, and television platforms.

• **Strategy and Actions Taken to Design, Translate, Distribute, and Evaluate Effectiveness of Related Communications**: As noted above, Liberty engages with public safety partners and critical facilities in multiple formats that foster open and transparent communication and encourage key stakeholders to provide candid feedback. When feasible, feedback is implemented into operational and/or engagement plans. Below is a list of evaluation mechanisms that Liberty employs to assess effectiveness of public safety partner and critical facility outreach and identify improvements as needed:

- After-engagement internal evaluations: After each type of engagement (*e.g.*, listening sessions and tabletop exercises), Liberty evaluates feedback from stakeholders and determines where improvements can be made before the next engagement opportunity.

- Feedback from local Liberty representatives: Local Liberty representatives seek feedback on communication effectiveness from public safety partners, community stakeholders and customers throughout the year, both in formal engagements and during informal conversations. Liberty evaluates the feedback and determines where improvements can be made before the next engagement opportunity.

- The section above (Strategies and Actions Taken to Identify and Contact Key Community Stakeholders) also notes the various ways Liberty engages with customers. To measure effectiveness, Liberty collects feedback from customers on outreach and identifies barriers and areas for improvement. The feedback is collected both prior to and after wildfire and/or PSPS events. Below is a list of evaluation mechanisms that Liberty employs to assess effectiveness of customer outreach and identify improvements as needed:

    - Opinion Surveys: Before and after the start of wildfire season, Liberty conducts semi-annual surveys with customers (in both English and non-English languages) to capture awareness and recall, understanding of, and satisfaction with Liberty's customer communications and to measure statistically significant changes over time.

    - Customer Feedback: Liberty regularly reviews customer sentiments received directly by the Customer Care Department, email, and social media outlets.

    - Web Traffic: Liberty measures traffic to relevant pages on its website, such as wildfire alerts, updates to contact information, wildfire, and PSPS safety pages. Website traffic is currently measured by assessing number of unique visitors, visits, and page views.

    - Click-through-rates of advertisements: Click-through-rate of advertisements is an industry-accepted standard that measures the number of people visiting a webpage who access a hyperlink to an advertisement (*e.g.*, wildfire safety). Advertisement click-through-rates measure the immediate response to an advertisement but not necessarily the overall response. Customers may see the advertisement, absorb the messaging, and choose to act later.

    - Conversion rates / actions taken by customers as a result: Conversion rates of customers are the measurable actions taken by customers based on the outreach (*e.g.*, updating contact information, attending a virtual town hall, enrolling in MBL Program).

    - As required by CPUC Decision 20-03-004, Liberty filed its independent survey results that assess the effectiveness of 2020 community outreach on December 23, 2020. Liberty will continue to apply best practices and leverage lessons learned from its 2020 customer outreach experience.

• **Strategies and Actions Taken to Address Concerns and Serve Needs of AFN Populations and Non-English-Speaking Customers**: Liberty is committed to providing additional services to AFN and medically sensitive customers by partnering with organizations that assist and provide services to these populations. Liberty will continue to encourage awareness and enrollment of the MBL Program. Please see Section 8.4, which provides more details on Liberty's AFN population support strategy before and during PSPS events, including programs that serve these customers, preparedness outreach, and events that serve AFN populations. This is also detailed in Liberty's 2021 PSPS AFN Plan, filed at the CPUC on February 5, 2021.

- MBL Program Outreach: Liberty will continue to conduct outreach to eligible customers to drive participation in the program, collect contact information in preparation for PSPS events, and share other relevant programs and service information to streamline communications, as appropriate. This support includes:
    - Providing support to CBOs for outreach to MBL and AFN customers;
    - Increasing engagement with the healthcare industry to encourage more program enrollments;
    - Providing master meter tenant education with both owners and tenants;

- Adding self-identified vulnerable, vulnerable senior, and disabled customers to our MBL outreach efforts; and
- Providing a new customer welcome packet that includes additional information about the MBL Program.

- Income-Qualified Customers and Disadvantaged Communities: Liberty will engage stakeholders who represent, support and advocate for our income-qualified customers and disadvantaged communities to provide relevant updates and encourage participation in support programs such as California Alternate Rates for Energy, Energy Savings Assistance and MBL. Liberty will continue to seek other ways and opportunities to engage disadvantaged and underserved communities' stakeholders and customers.

3. **Region prioritization** ("where" to engage activity) – include reference to a risk informed analysis in allocation of initiative (*e.g.*, veg clearance is done for trees tagged as "high-risk")

Public education and communication efforts target Liberty's entire service territory with a particular focus on the areas that are most at risk of PSPS or wildfire (High Fire Threat District). Liberty also focuses on areas with an elevated percentage of at-risk customers (MBL and AFN customers). Accordingly, in 2021, certain regions may receive more frequent and more customized engagements according to their needs based upon their past experiences with PSPS and/or wildfires.

4. **Progress on initiative** (amount spent, regions covered) and plans for next year

Below are some of Liberty's key 2020 engagement and outreach highlights:

- Hosted over 29 meetings with public safety partners to share information related to Liberty's wildfire mitigation efforts, PSPS preparedness and community outreach;
- Held nine regional PSPS workshops and three PSPS tabletop exercises;
- Hosted seven regional virtual town halls with over 54 attendees to provide a localized update on wildfire safety work happening in respective communities and answer customer questions;
- Placed over 112 posts on Liberty's social media channels;
- Sent three bill inserts and direct mailers to customers; and
- Conducted three customer e-mail outreach campaigns.

In 2021, Liberty plans to continue awareness campaigns that it established and implemented in 2020, with a focus on improved customer, community, and utility readiness, and resiliency in the face of growing wildfire threat. COVID-19 considerations and other unforeseen factors may have an impact on Liberty's outreach approach for 2021.

5. **Future improvements to initiative**

As referenced in the responses above, Liberty will continue to ground stakeholder cooperation and community engagement initiatives in customer and stakeholder feedback received annually. As new information, best practices, and lessons learned are available, Liberty will refine its stakeholder outreach and community engagement approach.

7.3.10.2 Cooperation and best practice sharing with agencies outside CA

Liberty continues to cooperate and share best practices with agencies outside California. Because of Liberty's proximity to Nevada, there are several collaborative efforts between NV Energy and Liberty. For example, Liberty and NV Energy share weather data and fuel sampling resources in order to reduce costs of these respective programs to customers. Further, NV Energy and Liberty hold recurring meetings to share updates to system hardening programs and to discuss local staffing and resources and other wildfire mitigation-related activities. Liberty is a member of the Western Energy Institute's (WEI) Western Region Mutual Assistance Group (WRMAG), which is a collaboration of western utilities that provide mutual assistance for emergency relief. Liberty is also a member of the Edison Electric Institute (EEI) and participates in EEI's wildfire mitigation working group to explore new wildfire mitigation technologies and share best practices.

7.3.10.3 Cooperation with suppression agencies

Refer to Sections 7.3.9.2 and 7.3.10.1.

7.3.10.4 Forest service and fuel reduction cooperation and joint roadmap

Refer to Sections 7.3.5.1 and 7.3.5.5.

8. PUBLIC SAFETY POWER SHUTOFF (PSPS), INCLUDING DIRECTIONAL VISION FOR PSPS

8.1. Directional vision for necessity of PSPS

***Instructions**: Describe any lessons learned from PSPS since the utility's last WMP submission and expectations for how the utility's PSPS program will evolve over the coming 1, 3, and 10 years. Be specific by including a description of the utility's protocols and thresholds for PSPS implementation. Include a quantitative description of how the circuits and numbers of customers that the utility expects will be impacted by any necessary PSPS events is expected to evolve over time. The description of protocols must be sufficiently detailed and clear to enable a skilled operator to follow the same protocols.*

When calculating anticipated PSPS, consider recent weather extremes, including peak weather conditions over the past 10 years as well as recent weather years and how the utility's current PSPS protocols would be applied to those years.

Liberty has focused extensive efforts on evaluating its current PSPS protocols and expanding on those protocols. Specifically, in January 2021, Liberty's Fire and Weather Scientific consultant, Reax Engineering, formulated an enhanced version of its fire weather forecasting tool to include an additional parameter known as Burning Index, or BI. BI adds an increased layer of information regarding fire potential to our already robust predictive formula. It accounts for predominant fuel type, live and dead fuel moisture, and short-term fluctuations in fire weather conditions. Use of this new formula with increased information from newly installed additional weather stations will enable further granularity in the area of alternative responses to initiating a PSPS, such as managing recloser technology, de-energizing specific circuits and /or increasing patrols in specific geographic areas of concern. During the 2021 fire season, Liberty will utilize both the current predictive formula and the enhanced model in order to assess improved data.

Additionally, Liberty has developed best practices to establish safeguards for customers, and the public, during PSPS events. In addition, Liberty efforts to provide mobile generation, enhanced communication devices, charging stations, battery storage for medical baseline customers, and other necessary customer facilities for PSPS events are ongoing.

Liberty's strategies to improve public safety during high wildfire risk conditions include:

1. Providing all field response employees with safety training aligned with their respective roles.
2. Managing all electrical switching and reporting with appropriate controlling parties to enhance employee and public safety.
3. Providing regular public information, typically in the form of media messages or alerts, regarding unsafe or hazardous areas or conditions.
4. Utilizing the Emergency Alert System ("EAS") through local or county Emergency Management or Public Safety offices in the event of an area emergency that is life or property threatening. Liberty will advise the emergency management agencies when such alert is necessary.
5. Partnering with public safety agencies, as necessary, for traffic control and perimeter safety until qualified personnel arrive to clear the hazard situation.

***Instructions for Table 8-1**: Rank order the characteristic of PSPS events (in terms of numbers of customers affected, frequency, scope, and duration) anticipated to change the most and have the greatest impact on reliability (be it to increase or decrease) over the next ten years. Rank in order from 1 to 9, where 1 means greatest anticipated change or impact and 9 means minimal change or impact on ignition probability and estimated wildfire consequence. To the right of the ranked magnitude of impact, indicate whether the impact is to significantly increase reliability, moderately increase reliability, have limited or no impact, moderately decrease reliability, or significantly decrease reliability. For each, include comments describing expected change and expected impact, using quantitative estimates wherever possible.*

It is important to note when evaluating Table 8-1 that Liberty, in its history, has had only one PSPS event. Since that event, Liberty has taken many steps to establish its PSPS program through the development of protocols, procedures, and the establishment of PSPS thresholds detailed throughout Chapter 8. The PSPS work over the last two years, in combination with an anticipated increase in fire weather events (*i.e.* RFW, longer fire season, high winds, etc.), may lead to more frequent use of PSPS in the next 10 years. Table 8-1 was completed by evaluating how Liberty's WMP initiatives are anticipated to affect a given PSPS characteristic, rather than whether a PSPS characteristic will increase/decrease in the next 10 years when compared to historic use of PSPS.

Table 8-1: Anticipated characteristics of PSPS use over next 10 years

Rank order 1-9	PSPS characteristic	Significantly increase; increase; no change; decrease; significantly decrease	Comments
1	Number of customers affected by PSPS events (total)	Decrease	In time, grid hardening efforts such as covered conductor, microgrids, and the addition of sectionalizing devices will help to reduce the number of customers affected by PSPS.
2	Number of customers affected by PSPS events (normalized by fire weather, *e.g.*, Red Flag Warning line mile days)	Decrease	Same as above
3	Frequency of PSPS events in number of instances where utility operating protocol requires de-energization of a circuit or portion thereof to reduce ignition probability (total)	Decrease	Weather is the primary factor that drives PSPS frequency. In time, grid hardening efforts, such as covered wire and microgrids, will eventually lead to higher thresholds for de-energization, which would potentially reduce the frequency of PSPS events.
4	Frequency of PSPS events in number of instances where utility operating protocol requires de-energization of a circuit or portion thereof to reduce ignition probability (normalized by fire weather, *e.g.*, Red Flag Warning line mile days)	Decrease	Same as above
5	Scope of PSPS events in circuit-events, measured in number of events multiplied by number of circuits targeted for de-energization (total)	Decrease	The work that results in reducing impact to customers and the frequency of events will also reduce the scope of PSPS events.
6	Scope of PSPS events in circuit-events, measured in number of events multiplied by number of	Decrease	Same as above

	circuits targeted for de-energization (normalized by fire weather, *e.g.*, Red Flag Warning line mile days)		
7	Duration of PSPS events in customer hours (total)	Decrease	Weather events determine the length of time circuits need to be de-energized. If scope and number of customers are being reduced over time, then re-energization time should decrease which is a factor in the duration of PSPS events.
8	Duration of PSPS events in customer hours (normalized by fire weather, *e.g.*, Red Flag Warning line mile days)	Decrease	Same as above
9	Other		

8.2. Protocols on Public Safety Power Shut-off

***Instructions**: Describe protocols on Public Safety Power Shut-off (PSPS or de-energization), highlighting changes since the previous WMP report:*

1. *Strategy to minimize public safety risk during high wildfire risk conditions and details of the considerations, including but not limited to list and description of community assistance locations and services provided during a de-energization event.*
2. *Outline of tactical and strategic decision-making protocol for initiating a PSPS/de-energization (e.g., decision tree).*
3. *Strategy to provide for safe and effective re-energization of any area that was de-energized due to PSPS protocol.*
4. *Company standards relative to customer communications, including consideration for the need to notify priority essential services – critical first responders, public safety partners, critical facilities and infrastructure, operators of telecommunications infrastructure, and water utilities/agencies. This section, or an appendix to this section, shall include a complete listing of which entities the electrical corporation considers to be priority essential services. This section shall also include a description of strategy and protocols to ensure timely notifications to customers, including access and functional needs populations, in the languages prevalent within the utility's service territory.*
5. *Protocols for mitigating the public safety impacts of these protocols, including impacts on first responders, health care facilities, operators of telecommunications infrastructure, and water utilities/agencies.*

1. <u>Strategy to minimize public safety risk during high wildfire risk conditions</u> — In coordination with the communities that it serves, Liberty has established a network of Community Resource Centers ("CRCs") to assist communities in real time during extreme weather events. Planning factors for meeting the safety needs for access and functional needs and vulnerable populations have included local demographic data, as well as the company database of medical baseline customers. The establishment of CRCs was informed by

presentations and discussions in seven Town Hall Meetings held in each of seven communities in Liberty's service territory. Plan creation included consultation with regional local government, advisory boards, public safety partners, representatives of people/communities with access and functional needs, tribal representatives, senior citizen groups, business owners, community resource organizations, and public health and healthcare providers.

a. Locations: If Liberty anticipates that the power will be off for an extended period, Liberty will open CRCs in the affected areas. The CRC locations selected by Liberty were identified through a rigorous process, which included input from fire and meteorological experts, as well as those areas most prone to extreme weather, as indicated by historical data. Identified CRC locations include South Lake Tahoe, CA (2), Kings Beach CA, Walker CA, and Portola CA. Mobile or portable outdoor units are being studied due to COVID-19 concerns with indoor distancing.

b. Accommodations: All CRCs are located in fixed facility locations known to the public. CRCs will have backup power or are located in areas that are contiguous to PSPS zones that would not be shut off in the event of a PSPS. They are ADA-compliant and meet the needs of people with access and functional needs, medical baseline, and other access and functional needs utility customers. FEMA June 2020 Mass Care Emergency Assistance Pandemic Planning Considerations were used to provide for adequate space for estimated occupancy and comply with social distancing and public health protocols.

c. Services provided: Each CRC site meets fire codes and has at least two egress routes. Once activated, CRCs will operate in 14-hour shifts from 8:00 AM to 10:00 PM daily, until power to the affected community has been restored. The CRCs are capable of providing device charging stations, cellular network services, chairs, and restrooms. Volunteer organizations will provide bottled water and snacks to impacted area residents. Pre-identified Liberty subject matter experts ("SMEs") will collaborate with volunteer staff at activated CRCs to communicate real-time PSPS updates directly to impacted community members.

2. Outline of tactical and strategic decision-making protocol for initiating a PSPS/de-energization event - Liberty utilizes weather stations throughout its service territory and collaborates with Reax Engineering, a fire and weather scientific consultant, the National Weather Service ("NWS") in Reno, Nevada, and local fire officials, to monitor local weather conditions and evaluate when a PSPS should be initiated. The initiation of PSPS events are influenced by the following factors:

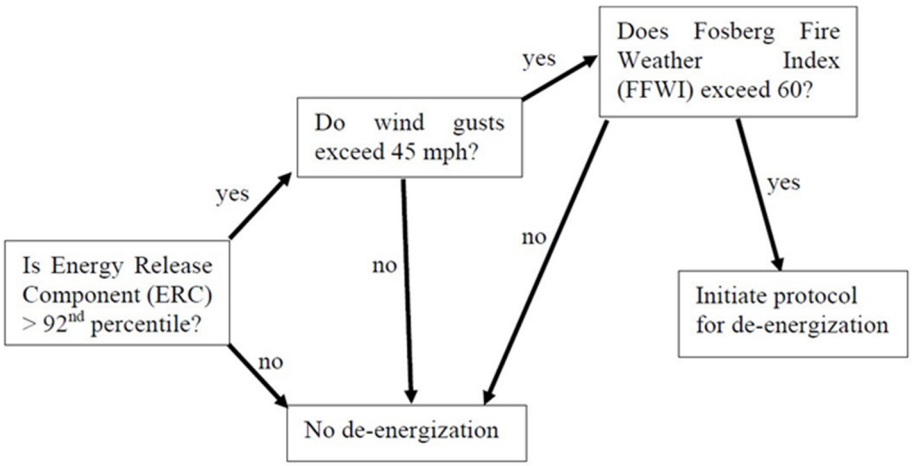
a. Red Flag Warnings: Issued by the NWS to alert of the onset, or possible onset, of critical weather or dry conditions that would lead to increases in utility-associated ignition probability and rapid rates of fire spread.
b. Low humidity levels: Potential fuels are more likely to ignite when relative humidity is low and vapor pressure deficit is high.
c. Forecast sustained winds and gusts: Fires burning under high winds can increase ember production rates and spotting distances. Winds also can transfer embers from lower fire risk areas into high risk areas, igniting spot fires and increasing wildfire potential.
d. Dry fuel conditions: Trees and other vegetation act as fuel for wildfires. Fuels with low moisture levels easily ignite and can spread rapidly.
e. Observed Energy Release Component ("ERC")
f. Observed wind gusts
g. Observed Fosberg Fire Weather Index ("FFWI")

In a case where the NWS forecasts three-second gusts greater than 50 mph, Liberty will check the location of those speeds, and areas where those speeds would peak, for the proximity to service equipment. If the gusts are near service equipment, the equipment is assessed to see if it is scheduled for repair. Liberty then monitors humidity and temperature levels to evaluate fuel conditions and forest susceptibility to fire for those areas. If an area is identified to be at risk of causing a wildfire, Liberty will first attempt to de-energize that line so that load at the end of the line can continue to be served. In the event that load has to be dropped, Liberty will attempt to minimize the lost load and customer disruption.

Liberty employs two de-energization decision trees, one for the Topaz and Muller 1296 r3 PSPS zones, and another for all other zones. In each case, the ERC, observed wind gust, and FFWI criteria are evaluated simultaneously to test whether any exceed the defined threshold:

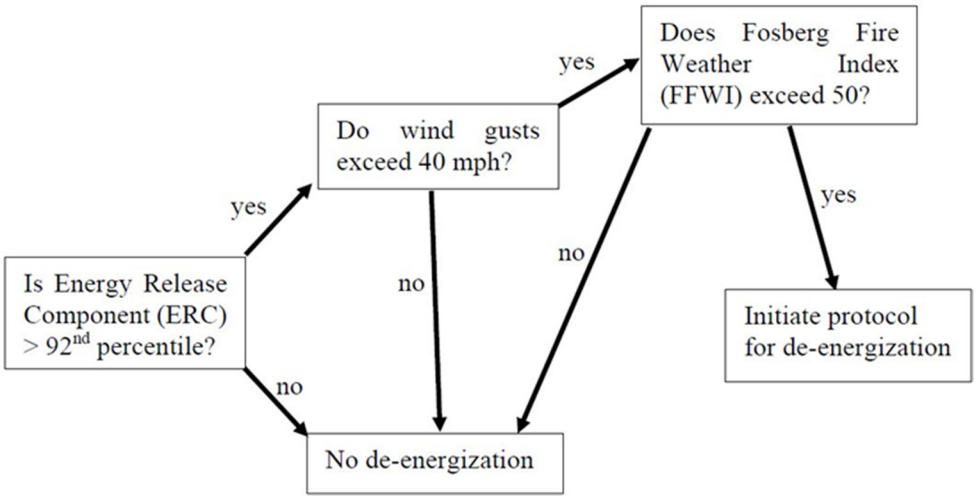
The figure below represents the de-energization decision tree for Topaz and Muller 1296 r3 PSPS zones:

Figure 8-1: De-energization Decision Tree for Topaz and Muller 1296 r3 PSPS Zones



The figure below represents the de-energization decision tree for all other zones.

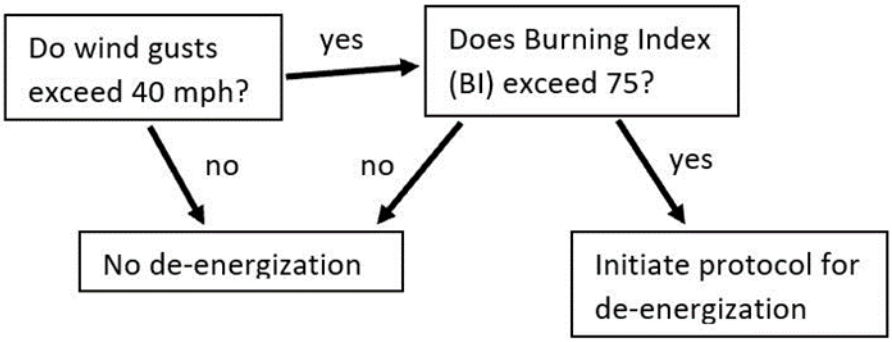
Figure 8-2: De-energization Decision Tree for other PSPS zones.



In January 2021, Liberty's Fire and Weather Scientific consultant, Reax Engineering, formulated an enhanced version of its fire weather forecasting tool to include an additional parameter known as Burning Index, or BI. BI adds an increased layer of information regarding fire potential to its already robust predictive formula. It accounts for predominant fuel type, live and dead fuel moisture, and short-term fluctuations in fire weather conditions. Use of this new formula with increased information from newly installed additional weather stations will enable further granularity in the area of alternative responses to initiating a PSPS, such as managing recloser technology, de-energizing specific circuits and /or increasing patrols in specific geographic areas of concern. During the 2021 fire season, Liberty will utilize both the current predictive formula and the enhanced model in order to assess improved data.

The figure below shows the current BI/gust de-energization formulation that is being evaluated by back testing against historical weather station observations and archived weather forecast data.

Figure 8-3: De-energization Decision Tree that Liberty is Evaluating in 2021.



3. Strategy to provide for safe and effective re-energization of any area that was de-energized due to PSPS protocol – Once Liberty has confirmed that conditions have subsided to the point that an energized grid does not pose a wildfire threat, the utility will begin the process of re-energizing power lines. Once a decision to re-energize has been made, Liberty will:

    a. Patrol affected circuits prior to re-energization.
    b. Inform all media and partners of the successful conclusion of the de-energization event and provide an update when power has been restored.
    c. Inform all customers impacted by the de-energization event that power has been restored via Everbridge (email, voice, and/or text).
    d. Post the time of power restoration(s) on the Liberty website and social media at the conclusion of the de-energization event.
    e. Follow up with media and partners to facilitate effective communication and to determine if additional steps or efforts would be beneficial in the future.
    f. Provide a report to the Director of the Safety and Enforcement Division no later than 10 business days after the conclusion of the PSPS event that includes (i) an explanation of the decision to shut off power; (ii) all factors considered in the decision to shut off power, including wind speed, temperature, humidity, and moisture in the vicinity of the de-energized circuits; (iii) the time, place, and duration of the shut-off event; (iv) the number of affected customers, broken down by residential, medical baseline, commercial/industrial, and other; (v) any wind-related damage to overhead power-line facilities in the areas where power is shut off; (vi) a description of the notice to customers and any other mitigation provided; and (vii) any other matters the utility believes are relevant to the Commission's assessment of the reasonableness of Liberty's decision to shut off power.

4. Company standards relative to customer communications – Liberty will work to provide as much advanced notification as prudent to customers who may be affected by a PSPS event, and Liberty plans to provide even more advanced warning of a PSPS event to public safety partners, local utilities, and critical infrastructure, before a PSPS event is imminent. In order to avoid desensitization of the public, advanced notice to customers will be provided in a shorter timeframe and only when a PSPS event is likely. Under these considerations, Liberty has developed the following notification guidelines:

a. Up to eight days in advance: cities, counties, emergency services (public safety partners), regional utilities, cell tower operators, and critical facilities.
b. Up to 72 hours in advance: medical baseline or medically sensitive patients, and cities, counties, emergency services (public safety partners), regional utilities, cell tower operators, and critical facilities.
c. Up to 48 hours in advance: all affected or potentially affected customers, public safety partners, CPUC, and the media.
d. Up to 24 hours in advance: all affected or potentially affected customers, public safety partners, CPUC and the media.
e. Immediately before de-energization: all affected or potentially affected customers, public safety partners, CPUC and the media.
f. During the PSPS Event: all affected or potentially affected customers, public safety partners, CPUC, and the media.
g. At the conclusion of the PSPS Event: all affected or potentially affected customers, public safety partners, CPUC, and the media.

A list of Priority Entities/Critical Facilities is below:

a. Health Care Facilities
    a. Primary Care Hospitals
b. Utility Services/Districts
    a. Public Utility Districts
    b. Telecommunications
    c. Water/Water Treatment
    d. Pipeline
c. Public safety agencies
    a. Public Safety Dispatch Centers
    b. Law enforcement facilities/holding facilities
    c. Fire operations facilities
    d. Transportation equipment and facilities
d. Government facilities
e. Green Cross/Life Line

Liberty will lead the communication effort and outreach for PSPS events. Liberty will be clear with its public safety partners when the information is intended to be public. When notifications are intended to be public, Liberty will provide clear messaging and request that each partner and media outlet assist in the distribution of the same information and messaging. To this point, Liberty has embarked on a system-wide outreach and awareness campaign to help customers and partners understand and prepare for a PSPS event.

5. Protocols for mitigation the public safety impacts of these protocols - Company standards relative to customer communications – Liberty provides ongoing public electric safety courses and information so the public will be prepared when an emergency event occurs. These programs are provided year-round to all levels of schools, business, service clubs, trade shows, and expositions. Additionally, Liberty routinely provides electric safety training to local and regional law enforcement, fire, county and state transportation, and other emergency response agencies.

During an emergency event, Liberty may utilize stand-by personnel, trained in general electrical safety, to observe and report hazardous conditions and assist in perimeter safety around identified hazards due to

unsafe conditions until qualified electric personnel arrive. Personnel safety is identified as a key element in Liberty's Emergency Response Plan. Electric trade personnel, including groundpersons, helpers, apprentices, journeyman lineman, troublemen, and inspectors are provided the highest level of safety and skills training to perform in both daily and emergency situations. Only trained personnel may perform safety sensitive functions including switching, de-energizing, overhead and underground operations, repairing and assessing damage.

To improve employee and public safety, the design, installation and operation of equipment and automatic protection schemes for transmission and substation equipment must remain in place. Employees follow procedures in accordance with OSHA 1910.269 regulations. Non-trade personnel that are mobilized to assist with emergency repair (metering, meter reading, construction, etc.) are trained in general electric safety before assisting in emergency field response.

Liberty will respond to immediate life safety concerns as its top priority. Once a hazardous situation is reported, immediate response will be provided by line crews, trouble men, inspectors or other trained personnel to assess and mitigate risk. Additionally:

a. All field response employees shall undergo safety training aligned with their respective roles.
b. All electrical switching and reporting shall be managed by the appropriate controlling parties to enhance employee and public safety.
c. Liberty will provide regular public information, typically in the form of media messages or alerts, regarding unsafe or hazardous areas or conditions that the public should be informed about.
d. In the event of an area emergency that is life or property threatening, the EAS shall be enabled through the local or county Emergency Management or Public Safety office. Liberty will advise the emergency management agencies when such alert is essential.
e. Public safety agencies will be utilized, as necessary, for traffic control and perimeter safety until qualified personnel arrive to clear the hazard situation. Agencies will be used, if necessary, to control public disturbances and establish safety controls for the public.
f. Employees will be monitored for appropriate meal breaks, hours worked, and safety compliance; when emergencies are expected to last more than 24 hours. Shifts will be established to cover work, and employees will be given appropriate rest periods.
g. Weather and road conditions will be are monitored for worsening conditions so that workers are not stranded at remote work locations.
h. Work may be curtailed until safe work conditions prevail.

8.3. Projected changes to PSPS impact

***Instructions**: Describe organization-wide plan to reduce scale, scope and frequency of PSPS for each of the following time periods, highlighting changes since the prior WMP report and including key program targets used to track progress over time.*

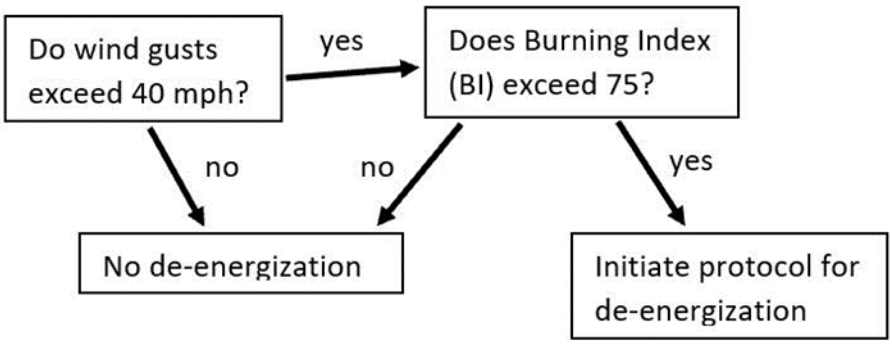
1. *By June 1 of current year*
2. *By September 1 of current year*
3. *By next Annual WMP Update*

Liberty has focused extensive efforts on evaluating its current PSPS protocols and expanding on those protocols. Specifically, in January 2021, Liberty's Fire and Weather Scientific consultant, Reax Engineering, formulated an enhanced version of its fire weather forecasting tool to include an additional parameter known as Burning Index, or BI. BI adds an

increased layer of information regarding fire potential to its already robust predictive formula. It accounts for predominant fuel type, live and dead fuel moisture, and short-term fluctuations in fire weather conditions. Use of this new formula with increased information from newly installed additional weather stations will enable further granularity in the area of alternative responses to initiating a PSPS, such as managing recloser technology, de-energizing specific circuits and /or increasing patrols in specific geographic areas of concern. During the 2021 fire season, Liberty will utilize both the current predictive formula and the enhanced model in order to assess improved data.

The figure below shows the current BI/gust de-energization formulation that is being evaluated by back testing against historical weather station observations and archived weather forecast data.

Figure 8-3: De-energization Decision Tree that Liberty is Evaluating in 2021.



8.4. Engaging vulnerable communities

***Instructions**: Report on the following:*

1. *Describe protocols for PSPS that are intended to mitigate the public safety impacts of PSPS on vulnerable, marginalized and/or at-risk communities. Describe how the utility is identifying these communities.*

Protecting the health and safety of its vulnerable/AFN customers and communities is among Liberty's highest priorities during an emergency, wildfire, or PSPS event. Liberty conducts outreach related to emergency preparedness, provides advanced notification during PSPS events and offers additional services and resources to these customers in advance of and during PSPS events. Throughout 2020, Liberty worked to make potential PSPS events less burdensome for its customers. These accomplishments include, but are not limited to:

- Development of partnerships with CBOs to help support AFN customers with resources before, during and after PSPS events or wildfires.
- Increased MBL program enrollment by 0.4 percent since the start of 2020 – from 258 customers to 259 customers.
- Updating the Liberty website to share more transparent PSPS preparedness, awareness, and status information.

In 2021, Liberty will continue to establish partnerships with CBOs and continue to integrate these groups into PSPS operations. Liberty is working to expand opportunities for customers to self-identify as vulnerable (*e.g.*, self- certified vulnerable, self-identified disabled, alternate format communications) without impinging on any HIPAA and/or CCPA data privacy laws.

2. *List all languages which are "prevalent" in utility's territory. A language is prevalent if it is spoken by 1,000 or more persons in the utility's territory or if it is spoken by 5% or more of the population within a "public safety answering point" in the utility territory9 (D.20-03-004).*

Liberty is committed to providing resources to customers in their primary language. The following languages have been identified as "prevalent" in its service territory: English and Spanish.

3. *List all languages for which public outreach material is available, in written or oral form.*

To complement the public education channels across the service territory, Liberty has developed access to in-language PSPS and wildfire safety preparedness and event information designed to reach disadvantaged communities and non-English proficient audiences in the territory. Liberty provides wildfire safety and PSPS-related communications in the following required languages: English, Spanish, German, French and Chinese (Mandarin and Cantonese).

4. *Detail the community outreach efforts for PSPS and wildfire-related outreach. Include efforts to reach all languages prevalent in utility territory.*

Please see Section 7.3.10, which describes Liberty's PSPS and wildfire-related outreach in detail.

8.5. PSPS-specific metrics

Instructions: *PSPS data reported quarterly. Placeholder tables below to be filled in based on quarterly data.*

Instructions for the PSPS table: *In the attached spreadsheet document, report performance on the following PSPS metrics within the utility's service territory over the past five years as needed to correct previously-reported data. Where the utility does not collect its own data on a given metric, the utility shall work with the relevant state agencies to collect the relevant information for its service territory, and clearly identify the owner and dataset used to provide the response in the "Comments" column.*

Please see Attachment A, Table 11: Recent Use of PSPS and Other PSPS Metrics.

9. APPENDIX

9.1. Definitions of initiative activities by category

Category	Initiative activity	Definition
A. Risk mapping and simulation	A summarized risk map that shows the overall ignition probability and estimated wildfire consequence along the electric lines and equipment	Development and use of tools and processes to develop and update risk map and simulations and to estimate risk reduction potential of initiatives for a given portion of the grid (or more granularly, *e.g.*, circuit, span, or asset). May include verification efforts, independent assessment by experts, and updates.
	Climate-driven risk map and modeling based on various relevant weather scenarios	Development and use of tools and processes to estimate incremental risk of foreseeable climate scenarios, such as drought, across a given portion of the grid (or more granularly, *e.g.*, circuit, span, or asset). May include verification efforts, independent assessment by experts, and updates.
	Ignition probability mapping showing the probability of ignition along the electric lines and equipment	Development and use of tools and processes to assess the risk of ignition across regions of the grid (or more granularly, *e.g.*, circuits, spans, or assets).
	Initiative mapping and estimation of wildfire and PSPS risk-reduction impact	Development of a tool to estimate the risk reduction efficacy (for both wildfire and PSPS risk) and risk-spend efficiency of various initiatives.
	Match drop simulations showing the potential wildfire consequence of ignitions that occur along the electric lines and equipment	Development and use of tools and processes to assess the impact of potential ignition and risk to communities (*e.g.*, in terms of potential fatalities, structures burned, monetary damages, area burned, impact on air quality and greenhouse gas, or GHG, reduction goals, etc.).
B. Situational awareness and forecasting	Advanced weather monitoring and weather stations	Purchase, installation, maintenance, and operation of weather stations. Collection, recording, and analysis of weather data from weather stations and from external sources.
	Continuous monitoring sensors	Installation, maintenance, and monitoring of sensors and sensorized equipment used to monitor the condition of electric lines and equipment.
	Fault indicators for detecting faults on electric lines and equipment	Installation and maintenance of fault indicators.
	Forecast of a fire risk index, fire potential index, or similar	Index that uses a combination of weather parameters (such as wind speed, humidity, and temperature), vegetation and/or fuel conditions, and other factors to judge current fire risk and to create a forecast indicative of fire risk. A sufficiently granular index shall inform operational decision-making.
	Personnel monitoring areas of electric lines and equipment in elevated fire risk conditions	Personnel position within utility service territory to monitor system conditions and weather on site. Field observations shall inform operational decisions.

APPENDIX

Category	Initiative activity	Definition
	Weather forecasting and estimating impacts on electric lines and equipment	Development methodology for forecast of weather conditions relevant to utility operations, forecasting weather conditions and conducting analysis to incorporate into utility decision-making, learning and updates to reduce false positives and false negatives of forecast PSPS conditions.
C. Grid design and system hardening	Capacitor maintenance and replacement program	Remediation, adjustments, or installations of new equipment to improve or replace existing capacitor equipment.
	Circuit breaker maintenance and installation to de-energize lines upon detecting a fault	Remediation, adjustments, or installations of new equipment to improve or replace existing fast switching circuit breaker equipment to improve the ability to protect electrical circuits from damage caused by overload of electricity or short circuit.
	Covered conductor installation	Installation of covered or insulated conductors to replace standard bare or unprotected conductors (defined in accordance with G.O. 95 as supply conductors, including but not limited to lead wires, not enclosed in a grounded metal pole or not covered by: a "suitable protective covering" (in accordance with Rule 22.8), grounded metal conduit, or grounded metal sheath or shield). In accordance with G.O. 95, conductor is defined as a material suitable for: (1) carrying electric current, usually in the form of a wire, cable or bus bar, or (2) transmitting light in the case of fiber optics; insulated conductors as those which are surrounded by an insulating material (in accordance with Rule 21.6), the dielectric strength of which is sufficient to withstand the maximum difference of potential at normal operating voltages of the circuit without breakdown or puncture; and suitable protective covering as a covering of wood or other non-conductive material having the electrical insulating efficiency (12kV/in. dry) and impact strength (20ft.-lbs) of 1.5 inches of redwood or other material meeting the requirements of Rule 22.8-A, 22.8-B, 22.8-C or 22.8-D.
	Covered conductor maintenance	Remediation and adjustments to installed covered or insulated conductors. In accordance with G.O. 95, conductor is defined as a material suitable for: (1) carrying electric current, usually in the form of a wire, cable or bus bar, or (2) transmitting light in the case of fiber optics; insulated conductors as those which are surrounded by an insulating material (in accordance with Rule 21.6), the dielectric strength of which is sufficient to withstand the maximum difference of potential at normal operating voltages of the circuit without breakdown or puncture; and suitable protective covering as a covering of wood or other non-conductive material having the electrical insulating efficiency (12kV/in. dry) and impact strength (20ft.-lbs.) of 1.5 inches of redwood or other material meeting the requirements of Rule 22.8-A, 22.8-B, 22.8-C or 22.8-D.

APPENDIX

Category	Initiative activity	Definition
	Crossarm maintenance, repair, and replacement	Remediation, adjustments, or installations of new equipment to improve or replace existing crossarms, defined as horizontal support attached to poles or structures generally at right angles to the conductor supported in accordance with G.O. 95.
	Distribution pole replacement and reinforcement, including with composite poles	Remediation, adjustments, or installations of new equipment to improve or replace existing distribution poles (*i.e.*, those supporting lines under 65kV), including with equipment such as composite poles manufactured with materials reduce ignition probability by increasing pole lifespan and resilience against failure from object contact and other events.
	Expulsion fuse replacement	Installations of new and CAL FIRE-approved power fuses to replace existing expulsion fuse equipment.
	Grid topology improvements to mitigate or reduce PSPS events	Plan to support and actions taken to mitigate or reduce PSPS events in terms of geographic scope and number of customers affected, such as installation and operation of electrical equipment to sectionalize or island portions of the grid, microgrids, or local generation.
	Installation of system automation equipment	Installation of electric equipment that increases the ability of the utility to automate system operation and monitoring, including equipment that can be adjusted remotely such as automatic reclosers (switching devices designed to detect and interrupt momentary faults that can reclose automatically and detect if a fault remains, remaining open if so).
	Maintenance, repair, and replacement of connectors, including hotline clamps	Remediation, adjustments, or installations of new equipment to improve or replace existing connector equipment, such as hotline clamps.
	Mitigation of impact on customers and other residents affected during PSPS event	Actions taken to improve access to electricity for customers and other residents during PSPS events, such as installation and operation of local generation equipment (at the community, household, or other level).
	Other corrective action	Other maintenance, repair, or replacement of utility equipment and structures so that they function properly and safely, including remediation activities (such as insulator washing) of other electric equipment deficiencies that may increase ignition probability due to potential equipment failure or other drivers.
	Pole loading infrastructure hardening and replacement program based on pole loading assessment program	Actions taken to remediate, adjust, or install replacement equipment for poles that the utility has identified as failing to meet safety factor requirements in accordance with G.O. 95 or additional utility standards in the utility's pole loading assessment program.
	Transformers maintenance and replacement	Remediation, adjustments, or installations of new equipment to improve or replace existing transformer equipment.

APPENDIX

Category	Initiative activity	Definition
	Transmission tower maintenance and replacement	Remediation, adjustments, or installations of new equipment to improve or replace existing transmission towers (*e.g.*, structures such as lattice steel towers or tubular steel poles that support lines at or above 65kV).
	Undergrounding of electric lines and/or equipment	Actions taken to convert overhead electric lines and/or equipment to underground electric lines and/or equipment (*i.e.*, located underground and in accordance with G.O. 128).
	Updates to grid topology to minimize risk of ignition in HFTDs	Changes in the plan, installation, construction, removal, and/or undergrounding to minimize the risk of ignition due to the design, location, or configuration of utility electric equipment in HFTDs.
D. Asset management and inspections	Detailed inspections of distribution electric lines and equipment	In accordance with G.O. 165, careful visual inspections of overhead electric distribution lines and equipment where individual pieces of equipment and structures are carefully examined, visually and through use of routine diagnostic test, as appropriate, and (if practical and if useful information can be so gathered) opened, and the condition of each rated and recorded.
	Detailed inspections of transmission electric lines and equipment	Careful visual inspections of overhead electric transmission lines and equipment where individual pieces of equipment and structures are carefully examined, visually and through use of routine diagnostic test, as appropriate, and (if practical and if useful information can be so gathered) opened, and the condition of each rated and recorded.
	Improvement of inspections	Identifying and addressing deficiencies in inspections protocols and implementation by improving training and the evaluation of inspectors.
	Infrared inspections of distribution electric lines and equipment	Inspections of overhead electric distribution lines, equipment, and right-of-way using infrared (heat-sensing) technology and cameras that can identify "hot spots", or conditions that indicate deterioration or potential equipment failures, of electrical equipment.
	Infrared inspections of transmission electric lines and equipment	Inspections of overhead electric transmission lines, equipment, and right-of-way using infrared (heat-sensing) technology and cameras that can identify "hot spots", or conditions that indicate deterioration or potential equipment failures, of electrical equipment.
	Intrusive pole inspections	In accordance with G.O. 165, intrusive inspections involve movement of soil, taking samples for analysis, and/or using more sophisticated diagnostic tools beyond visual inspections or instrument reading.
	LiDAR inspections of distribution electric lines and equipment	Inspections of overhead electric transmission lines, equipment, and right-of-way using LiDAR (Light Detection and Ranging, a remote sensing method that uses light in the form of a pulsed laser to measure variable distances).

APPENDIX

Category	Initiative activity	Definition
	LiDAR inspections of transmission electric lines and equipment	Inspections of overhead electric distribution lines, equipment, and right-of-way using LiDAR (Light Detection and Ranging, a remote sensing method that uses light in the form of a pulsed laser to measure variable distances).
	Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations	Inspections of overhead electric transmission lines, equipment, and right-of-way that exceed or otherwise go beyond those mandated by rules and regulations, including G.O. 165, in terms of frequency, inspection checklist requirements or detail, analysis of and response to problems identified, or other aspects of inspection or records kept.
	Other discretionary inspection of transmission electric lines and equipment, beyond inspections mandated by rules and regulations	Inspections of overhead electric distribution lines, equipment, and right-of-way that exceed or otherwise go beyond those mandated by rules and regulations, including G.O. 165, in terms of frequency, inspection checklist requirements or detail, analysis of and response to problems identified, or other aspects of inspection or records kept.
	Patrol inspections of distribution electric lines and equipment	In accordance with G.O. 165, simple visual inspections of overhead electric distribution lines and equipment that is designed to identify obvious structural problems and hazards. Patrol inspections may be carried out in the course of other company business.
	Patrol inspections of transmission electric lines and equipment	Simple visual inspections of overhead electric transmission lines and equipment that is designed to identify obvious structural problems and hazards. Patrol inspections may be carried out in the course of other company business.
	Pole loading assessment program to determine safety factor	Calculations to determine whether a pole meets pole loading safety factor requirements of G.O. 95, including planning and information collection needed to support said calculations. Calculations shall consider many factors including the size, location, and type of pole; types of attachments; length of conductors attached; and number and design of supporting guys, per D.15-11-021.
	Quality assurance / quality control of inspections	Establishment and function of audit process to manage and confirm work completed by employees or subcontractors, including packaging QA/QC information for input to decision-making and related integrated workforce management processes.
	Substation inspections	In accordance with G.O. 175, inspection of substations performed by qualified persons and according to the frequency established by the utility, including record-keeping.

APPENDIX

Category	Initiative activity	Definition
E. Vegetation management and inspection	Additional efforts to manage community and environmental impacts	Plan and execution of strategy to mitigate negative impacts from utility vegetation management to local communities and the environment, such as coordination with communities to plan and execute vegetation management work or promotion of fire-resistant planting practices
	Detailed inspections of vegetation around distribution electric lines and equipment	Careful visual inspections of vegetation around the right-of-way, where individual trees are carefully examined, visually, and the condition of each rated and recorded.
	Detailed inspections of vegetation around transmission electric lines and equipment	Careful visual inspections of vegetation around the right-of-way, where individual trees are carefully examined, visually, and the condition of each rated and recorded.
	Emergency response vegetation management due to red flag warning or other urgent conditions	Plan and execution of vegetation management activities, such as trimming or removal, executed based upon and in advance of forecast weather conditions that indicate high fire threat in terms of ignition probability and wildfire consequence.
	Fuel management and reduction of "slash" from vegetation management activities	Plan and execution of fuel management activities that reduce the availability of fuel in proximity to potential sources of ignition, including both reduction or adjustment of live fuel (in terms of species or otherwise) and of dead fuel, including "slash" from vegetation management activities that produce vegetation material such as branch trimmings and felled trees.
	Improvement of inspections	Identifying and addressing deficiencies in inspections protocols and implementation by improving training and the evaluation of inspectors.
	LiDAR inspections of vegetation around distribution electric lines and equipment	Inspections of right-of-way using LiDAR (Light Detection and Ranging, a remote sensing method that uses light in the form of a pulsed laser to measure variable distances).
	LiDAR inspections of vegetation around transmission electric lines and equipment	Inspections of right-of-way using LiDAR (Light Detection and Ranging, a remote sensing method that uses light in the form of a pulsed laser to measure variable distances).
	Other discretionary inspections of vegetation around distribution electric lines and equipment	Inspections of rights-of-way and adjacent vegetation that may be hazardous, which exceeds or otherwise go beyond those mandated by rules and regulations, in terms of frequency, inspection checklist requirements or detail, analysis of and response to problems identified, or other aspects of inspection or records kept.
	Other discretionary inspections of vegetation around transmission electric lines and equipment	Inspections of rights-of-way and adjacent vegetation that may be hazardous, which exceeds or otherwise go beyond those mandated by rules and regulations, in terms of frequency, inspection checklist requirements or detail, analysis of and response to problems identified, or other aspects of inspection or records kept.

APPENDIX

Category	Initiative activity	Definition
	Patrol inspections of vegetation around distribution electric lines and equipment	Visual inspections of vegetation along rights-of-way that is designed to identify obvious hazards. Patrol inspections may be carried out in the course of other company business.
	Patrol inspections of vegetation around transmission electric lines and equipment	Visual inspections of vegetation along rights-of-way that is designed to identify obvious hazards. Patrol inspections may be carried out in the course of other company business.
	Quality assurance / quality control of vegetation inspections	Establishment and function of audit process to manage and confirm work completed by employees or subcontractors, including packaging QA/QC information for input to decision-making and related integrated workforce management processes.
	Recruiting and training of vegetation management personnel	Programs to ensure that the utility is able to identify and hire qualified vegetation management personnel and to ensure that both full-time employees and contractors tasked with vegetation management responsibilities are adequately trained to perform vegetation management work, according to the utility's wildfire mitigation plan, in addition to rules and regulations for safety.
	Remediation of at-risk species	Actions taken to reduce the ignition probability and wildfire consequence attributable to at-risk vegetation species, such as trimming, removal, and replacement.
	Removal and remediation of trees with strike potential to electric lines and equipment	Actions taken to remove or otherwise remediate trees that could potentially strike electrical equipment, if adverse events such as failure at the ground-level of the tree or branch breakout within the canopy of the tree, occur.
	Substation inspection	Inspection of vegetation surrounding substations, performed by qualified persons and according to the frequency established by the utility, including record-keeping.
	Substation vegetation management	Based on location and risk to substation equipment only, actions taken to reduce the ignition probability and wildfire consequence attributable to contact from vegetation to substation equipment.
	Vegetation inventory system	Inputs, operation, and support for centralized inventory of vegetation clearances updated based upon inspection results, including (1) inventory of species, (2) forecasting of growth, (3) forecasting of when growth threatens minimum right-of-way clearances ("grow-in" risk) or creates fall-in/fly-in risk.
	Vegetation management to achieve clearances around electric lines and equipment	Actions taken to ensure that vegetation does not encroach upon the minimum clearances set forth in Table 1 of G.O. 95, measured between line conductors and vegetation, such as trimming adjacent or overhanging tree limbs.
F. Grid operations and protocols	Automatic recloser operations	Designing and executing protocols to deactivate automatic reclosers based on local conditions for ignition probability and wildfire consequence.

APPENDIX

Category	Initiative activity	Definition
	Crew-accompanying ignition prevention and suppression resources and services	Those firefighting staff and equipment (such as fire suppression engines and trailers, firefighting hose, valves, and water) that are deployed with construction crews and other electric workers to provide site-specific fire prevention and ignition mitigation during on-site work
	Personnel work procedures and training in conditions of elevated fire risk	Work activity guidelines that designate what type of work can be performed during operating conditions of different levels of wildfire risk. Training for personnel on these guidelines and the procedures they prescribe, from normal operating procedures to increased mitigation measures to constraints on work performed.
	Protocols for PSPS re-energization	Designing and executing procedures that accelerate the restoration of electric service in areas that were de-energized, while maintaining safety and reliability standards.
	PSPS events and mitigation of PSPS impacts	Designing, executing, and improving upon protocols to conduct PSPS events, including development of advanced methodologies to determine when to use PSPS, and to mitigate the impact of PSPS events on affected customers and local residents.
	Stationed and on-call ignition prevention and suppression resources and services	Firefighting staff and equipment (such as fire suppression engines and trailers, firefighting hose, valves, firefighting foam, chemical extinguishing agent, and water) stationed at utility facilities and/or standing by to respond to calls for fire suppression assistance.
G. Data governance	Centralized repository for data	Designing, maintaining, hosting, and upgrading a platform that supports storage, processing, and utilization of all utility proprietary data and data compiled by the utility from other sources.
	Collaborative research on utility ignition and/or wildfire	Developing and executing research work on utility ignition and/or wildfire topics in collaboration with other non-utility partners, such as academic institutions and research groups, to include data-sharing and funding as applicable.
	Documentation and disclosure of wildfire-related data and algorithms	Design and execution of processes to document and disclose wildfire-related data and algorithms to accord with rules and regulations, including use of scenarios for forecasting and stress testing.
	Tracking and analysis of near miss data	Tools and procedures to monitor, record, and conduct analysis of data on near miss events.
H. Resource allocation methodology	Allocation methodology development and application	Development of prioritization methodology for human and financial resources, including application of said methodology to utility decision-making.
	Risk reduction scenario development and analysis	Development of modeling capabilities for different risk reduction scenarios based on wildfire mitigation initiative implementation; analysis and application to utility decision-making.

APPENDIX

Category	Initiative activity	Definition
	Risk spend efficiency analysis	Tools, procedures, and expertise to support analysis of wildfire mitigation initiative risk-spend efficiency, in terms of MAVF and/ or MARS methodologies.
I. Emergency planning and preparedness	Adequate and trained workforce for service restoration	Actions taken to identify, hire, retain, and train qualified workforce to conduct service restoration in response to emergencies, including short-term contracting strategy and implementation.
	Community outreach, public awareness, and communications efforts	Actions to identify and contact key community stakeholders; increase public awareness of emergency planning and preparedness information; and design, translate, distribute, and evaluate effectiveness of communications taken before, during, and after a wildfire, including Access and Functional Needs populations and Limited English Proficiency populations in particular.
	Customer support in emergencies	Resources dedicated to customer support during emergencies, such as website pages and other digital resources, dedicated phone lines, etc.
	Disaster and emergency preparedness plan	Development of plan to deploy resources according to prioritization methodology for disaster and emergency preparedness of utility and within utility service territory (such as considerations for critical facilities and infrastructure), including strategy for collaboration with Public Safety Partners and communities.
	Preparedness and planning for service restoration	Development of plans to prepare the utility to restore service after emergencies, such as developing employee and staff trainings, and to conduct inspections and remediation necessary to re-energize lines and restore service to customers.
	Protocols in place to learn from wildfire events	Tools and procedures to monitor effectiveness of strategy and actions taken to prepare for emergencies and of strategy and actions taken during and after emergencies, including based on an accounting of the outcomes of wildfire events.
J. Stakeholder cooperation and community engagement	Community engagement	Strategy and actions taken to identify and contact key community stakeholders; increase public awareness and support of utility wildfire mitigation activity; and design, translate, distribute, and evaluate effectiveness of related communications. Includes specific strategies and actions taken to address concerns and serve needs of Access and Functional Needs populations and Limited English Proficiency populations in particular.
	Cooperation and best practice sharing with agencies outside CA	Strategy and actions taken to engage with agencies outside of California to exchange best practices both for utility wildfire mitigation and for stakeholder cooperation to mitigate and respond to wildfires.

Category	Initiative activity	Definition
	Cooperation with suppression agencies	Coordination with CAL FIRE, federal fire authorities, county fire authorities, and local fire authorities to support planning and operations, including support of aerial and ground firefighting in real-time, including information-sharing, dispatch of resources, and dedicated staff.
	Forest service and fuel reduction cooperation and joint roadmap	Strategy and actions taken to engage with local, state, and federal entities responsible for or participating in forest management and fuel reduction activities; and design utility cooperation strategy and joint stakeholder roadmap (plan for coordinating stakeholder efforts for forest management and fuel reduction activities).

9.2. Citations for relevant statutes, Commission directives, proceedings and orders

Instructions: *Throughout the WMP, cite relevant state and federal statutes, Commission directives, orders, and proceedings. Place the title or tracking number of the statute in parentheses next to comment, or in the appropriate column if noted in a table. Provide in this section a brief description or summary of the relevant portion of the statute. Track citations as end- notes and order (1, 2, 3…) across sections (e.g., if section 1 has 4 citations, section 2 begins numbering at 5).*

Table 9-1: Citations

WMP Section	State and Federal Statutes, Commission Directives, Orders and Proceedings	Description
All	Resolution WSD-011	Resolution implementing the requirements of Public Utilities Code Sections 8389(d)(1), (2) and (4), related to catastrophic wildfire caused by electrical corporations subject to the Commission's regulatory authority
All	Public Utilities Code § 8386	Law that requires electric corporations to submit wildfire mitigation plans
All	R.18-10-007	Order Instituting Rulemaking (OIR) to Implement Electric Utility Wildfire Mitigation Plans Pursuant to Senate Bill 901 (2018)
Section 4.6	Resolution WSD-002	Guidance Resolution on 2020 Wildfire Mitigation Plans Pursuant to Public Utilities Code Section 8386
Section 4.6	Resolution WSD-007	Resolution Ratifying Action of the Wildfire Safety Division on Liberty Utilities' (CalPeco Electric) LLC's 2020 Wildfire Mitigation Plan Pursuant to Public Utilities Code Section 8386.
Section 4.2	R.20-07-013	OIR to Further Develop a Risk-based Decision-making Framework for Electric and Gas Utilities
Section 7.3.4	Public Resources Code § 4292	CAL FIRE requires 10 feet of minimum clearance around the base of the pole cleared of all flammable vegetation down to bare soil and the removal of all dead tree branches within this cylinder up to the cross-arm (within the State Responsibility Area)

APPENDIX

WMP Section	State and Federal Statutes, Commission Directives, Orders and Proceedings	Description
Section 7.3.9	D.20-03-004	Decision on community awareness and public outreach before, during and after a wildfire, and explaining next steps for other Phase 2 issues.
Section 8.4.2		Decision in Rulemaking 18-10-007 requiring IOUs to conduct community awareness and public outreach before, during, and after a wildfire in any language that is "prevalent" in its service territory or portions thereof.
Section 8.2	D.19-05-042	CPUC Decision Adopting De-Energization (Public Safety Power Shutoff) Guidelines (Phase 1 Guidelines)
Section 8.2	D.20-05-051	CPUC Decision Adopting Phase 2 Updated and Additional Guidelines for De-Energization of Electric Facilities to Mitigate Wildfire Risk
Section 7.1 Section 7.3 Section 7.4	General Order 95	Overhead electric line design, construction, and maintenance requirements in order to ensure adequacy of service and safety; covers topics such as proper grounding, clearances, strength requirements, and tree trimming
Section 7.1 Section 7.3 Section 7.4	General Order 165	Inspection requirements for transmission and distribution facilities in order to ensure safety and high-quality electrical service; sets maximum allowable inspection cycle lengths, scheduling and performance of corrective action, record-keeping, and reporting
Section 7.1 Section 7.3	General Order 174	Inspection requirements for substations to promote the safety of workers, the public, and enable adequacy of service
Section 4.1 Section 7.1	Wildfire Safety Division Draft GIS Data Reporting Requirements and Schema for California Electrical Corporations	Sets forth requirements for WMP spatial data submissions
Section 4.6	Wildfire Safety Division Evaluation of Liberty's First Quarterly Report	Assesses Liberty's 2020 WMP Class B Deficiencies

Attachment A

WMP Performance Metrics Data

Wildfire Safety Division Attachment 2.3

Wildifire Mitigation Plan Quarterly report - non-spatial data template

Resolution WSD-011 Attachment 2.3

Instructions for use	
1.	Fill out the tan cells (color represented here) starting with the cell below (D17: Utility). The Utility name will populate the Table tabs to follow. Date modified will vary by table.
2.	Cells will only accept valid entries. For most cells, this is positive numbers
3.	For each Table tab, after a modification is made, denote the date of the change in cell C4 for each Table tab.
4.	Some columns have an additional header in row 5 to serve as clarification for several columns. With the exception of projected data, row 5 will be highlighted in blue (color represented here)
5.	Some required metrics are future projections. For these, row 5, above the projections will be highlighted light green (color represented here)
	In future submissions, report updated projected numbers if / when projections have changed, and report actuals once the quarter / year has passed.
6.	For data required annually rather than quarterly (see Tables 7.3 - 10), report for entire year even if part of the year is projected. Once year has passed, update cell with actuals
7.	Some tables will have additional instructions provided in a **Notes** box located in cells D2 - D4
	Notes will explain terms, signal where projections are required, and provide other useful information.
8.	For the initial quarterly submission, utilities are required to submit data on annual metrics for 2015 - 2020, which should represent the most updated data from the 2020 WMP for years 2015-2019
*	Do not add or manipulate the template for any of the tabs

Update the below table to establish which year, quarter of the WMP cycle this submission this represents.

Utility	Liberty
First year of 3-year WMP cycle	2020
Submission year	2021
Submission quarter	Q4
Date Modified	3/1/2021

Utility	Liberty
Table No.	1
Date Modified	3/1/2021

Notes:
Transmission lines refer to all lines at or above 65kV, and distribution lines refer to all lines below 65kV.

Table 1: Recent performance on progress metrics

Note: These columns are placeholders for future QR submissions.

Metric type	#	Progress metric name	2015	2016	2017	2018	2019	Q1 2020	Q2 2020	Q3 2020	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	Unit(s)	Comments
1. Grid condition findings from inspection - Distribution lines in HFTD	1.a.	Number of circuit miles inspected from patrol inspections in HFTD - Distribution lines	0	0	0	0	0	0	0	0	0									# circuit miles	
	1.b.	Number of circuit miles inspected from detailed inspections in HFTD - Distribution lines	16	140	392	80.9	51.4	0	361	457.7	163									# circuit miles	
	1.c.	Number of circuit miles inspected from other inspections (list types of "other" inspections in comments) in HFTD - Distribution lines	0	0	0	0	0	0	0	0	0									# circuit miles	
	1.d.	Level 1 findings in HFTD for patrol inspections - Distribution lines	0	0	0	0	0	0	0	0	0									# findings	
	1.e.	Level 1 findings in HFTD for detailed inspections - Distribution lines	0	0	3	0	0	0	19	37	0									# findings	
	1.f.	Level 1 findings in HFTD for other inspections (list types of "other" inspections in comments) - Distribution lines	0	0	0	0	0	0	0	0	0									# findings	
	1.g.	Level 2 findings in HFTD for patrol inspections - Distribution lines	0	0	0	0	0	0	0	0	0									# findings	
	1.h.	Level 2 findings in HFTD for detailed inspections - Distribution lines	0	98	17	8	43	0	316	1102	7									# findings	
	1.i.	Level 2 findings in HFTD for other inspections (list types of "other" inspections in comments) - Distribution lines	0	0	0	0	0	0	0	0	0									# findings	
	1.j.	Level 3 findings in HFTD for patrol inspections - Distribution lines	0	0	0	0	0	0	0	0	0									# findings	
	1.k.	Level 3 findings in HFTD for detailed inspections - Distribution lines	148	728	2375	523	776	0	2895	7020	171									# findings	
	1.l.	Level 3 findings in HFTD for other inspections (list types of "other" inspections in comments) - Distribution lines	0	0	0	0	0	0	0	0	0									# findings	
1. Grid condition findings from inspection - Distribution lines total	1.a.ii.	Number of total circuit miles inspected from patrol inspections - Distribution lines	0	0	0	0	0	0	0	0	0									# circuit miles	
	1.b.ii.	Number of total circuit miles inspected from detailed inspections - Distribution lines	16	140	392	80.9	51.4	0	361	457.7	163									# circuit miles	
	1.c.ii.	Number of total circuit miles inspected from other inspections (list types of "other" inspections in comments) - Distribution lines	0	0	0	0	0	0	0	0	0									# circuit miles	
	1.d.ii.	Level 1 findings for patrol inspections - Distribution lines	0	0	0	0	0	0	0	0	0									# findings	
	1.e.ii.	Level 1 findings for detailed inspections - Distribution lines	0	0	3	0	0	0	19	37	0									# findings	
	1.f.ii.	Level 1 findings for other inspections (list types of "other" inspections in comments) - Distribution lines	0	0	0	0	0	0	0	0	0									# findings	
	1.g.ii.	Level 2 findings for patrol inspections - Distribution lines	0	0	0	0	0	0	0	0	0									# findings	
	1.h.ii.	Level 2 findings for detailed inspections - Distribution lines	0	98	17	8	43	0	316	1102	7									# findings	
	1.i.ii.	Level 2 findings for other inspections (list types of "other" inspections in comments) - Distribution lines	0	0	0	0	0	0	0	0	0									# findings	
	1.j.ii.	Level 3 findings for patrol inspections - Distribution lines	0	0	0	0	0	0	0	0	0									# findings	
	1.k.ii.	Level 3 findings for detailed inspections - Distribution lines	148	728	2375	523	776	0	2895	7020	171									# findings	
	1.l.ii.	Level 3 findings for other inspections (list types of "other" inspections in comments) - Distribution lines	0	0	0	0	0	0	0	0	0									# findings	
1. Grid condition findings from inspection - Transmission lines in HFTD	1.a.iii.	Number of circuit miles inspected from patrol inspections in HFTD - Transmission lines	0	0	0	0	0	0	0	0	0									# circuit miles	
	1.b.iii.	Number of circuit miles inspected from detailed inspections in HFTD - Transmission lines	0	0	47.7	14.5	0	0	6.4	17.1	17.28									# circuit miles	
	1.c.iii.	Number of circuit miles inspected from other inspections (list types of "other" inspections in comments) in HFTD - Transmission lines	0	0	0	0	0	0	0	0	0									# circuit miles	
	1.d.iii.	Level 1 findings in HFTD for patrol inspections - Transmission lines	0	0	0	0	0	0	0	0	0									# findings	
	1.e.iii.	Level 1 findings in HFTD for detailed inspections - Transmission lines	0	0	0	0	0	0	2	0	0									# findings	
	1.f.iii.	Level 1 findings in HFTD for other inspections (list types of "other" inspections in comments) - Transmission lines	0	0	0	0	0	0	0	0	0									# findings	
	1.g.iii.	Level 2 findings in HFTD for patrol inspections - Transmission lines	0	0	0	0	0	0	0	0	0									# findings	
	1.h.iii.	Level 2 findings in HFTD for detailed inspections - Transmission lines	0	0	0	0	0	0	0	1	0									# findings	
	1.i.iii.	Level 2 findings in HFTD for other inspections (list types of "other" inspections in comments) - Transmission lines	0	0	0	0	0	0	0	0	0									# findings	
	1.j.iii.	Level 3 findings in HFTD for patrol inspections - Transmission lines	0	0	0	0	0	0	0	0	0									# findings	
	1.k.iii.	Level 3 findings in HFTD for detailed inspections - Transmission lines	0	0	386	152	0	0	0	7	19									# findings	
	1.l.iii.	Level 3 findings in HFTD for other inspections (list types of "other" inspections in comments) - Distribution lines	0	0	0	0	0	0	0	0	0									# findings	
1. Grid condition findings from inspection - Transmission lines total	1.a.iv.	Number of total circuit miles inspected from patrol inspections - Transmission lines	0	0	0	0	0	0	0	0	0									# circuit miles	
	1.b.iv.	Number of total circuit miles inspected from detailed inspections - Transmission lines	0	0	47.7	14.5	0	0	6.4	17.1	17.28									# circuit miles	
	1.c.iv.	Number of total circuit miles inspected from other inspections (list types of "other" inspections in comments) - Transmission lines	0	0	0	0	0	0	0	0	0									# circuit miles	
	1.d.iv.	Level 1 findings for patrol inspections - Transmission lines	0	0	0	0	0	0	0	0	0									# findings	
	1.e.iv.	Level 1 findings for detailed inspections - Transmission lines	0	0	0	0	0	0	2	0	0									# findings	
	1.f.iv.	Level 1 findings for other inspections (list types of "other" inspections in comments) - Transmission lines	0	0	0	0	0	0	0	0	0									# findings	
	1.g.iv.	Level 2 findings for patrol inspections - Transmission lines	0	0	0	0	0	0	0	0	0									# findings	
	1.h.iv.	Level 2 findings for detailed inspections - Transmission lines	0	0	0	0	0	0	0	1	0									# findings	
	1.i.iv.	Level 2 findings for other inspections (list types of "other" inspections in comments) - Transmission lines	0	0	0	0	0	0	0	0	0									# findings	
	1.j.iv.	Level 3 findings for patrol inspections - Transmission lines	0	0	0	0	0	0	0	0	0									# findings	
	1.k.iv.	Level 3 findings for detailed inspections - Transmission lines	0	0	386	152	0	0	0	7	19									# findings	
	1.l.iv.	Level 3 findings for other inspections (list types of "other" inspections in comments) - Transmission lines	0	0	0	0	0	0	0	0	0									# findings	
2. Vegetation clearance findings from inspection - total	2.a.i	Number of spans insepcted where at least some vegetation was found in non-compliant condition - total	298	294	296	959	1352	190	247	309	1051									# of spans inspected with noncompliant clearance based on applicable rules and regulations at the time of inspection	
	2.a.ii	Number of spans insepcted for vegetation compliance - total	1940	1595	2072	11159	13938	4467	4123	3890	13645									# of spans inspected for vegetation compliance	
2. Vegetation clearance findings from inspection - in HFTD	2.b.i	Number of spans insepcted where at least some vegetation was found in non-compliant condition in HFTD	298	294	296	959	1352	190	247	309	1051									# of spans inspected with noncompliant clearance based on applicable rules and regulations at the time of inspection	
	2.b.ii	Number of spans insepcted for vegetation compliance in HFTD	1940	1595	2072	11159	13938	4467	4123	3890	13645									# of spans inspected for vegetation compliance	
3. Customer outreach metrics	3.a.	# Customers in an evacuation zone for utility-ignited wildfire																		# customers (if customer was in an evacuation zone for multiple wildfires, count the customer for each relevant wildfire)	
	3.b.	# Customers notified of evacuation orders																		# customers (count customer multiple times for each unique wildfire of which they were notified)	
	3.c.	% of customers notified of evacuation in evacuation zone of a utility-ignited wildfire																		Percentage of customers notified of evacuation	

Utility	Liberty
Table No.	2
Date Modified	3/1/2021

Notes:
Transmission lines refer to all lines at or above 65kV, and distribution lines refer to all lines below 65kV.

Note: These columns are placeholders for future QR submissions.

Table 2: Recent performance on outcome metrics

Metric type	#	Outcome metric name	2015	2016	2017	2018	2019	Q1 2020	Q2 2020	Q3 2020	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	Unit(s)	Comments
1. Risk events	1.a.	Number of all events with probability of ignition, including wires down, contacts with objects, line slap, events with evidence of heat generation, and other events that cause sparking or have the potential to cause ignition	99	111	137	115	278	22	17	31	54									Number per year	
	1.b.	Number of wires down (total)	5	10	3	4	5	2	1	2	1									Number of wires down per year	
	1.c.	Number of outage events not caused by contact with vegetation (total)	16	10	19	5	25	8	5	15	14									Number of outage events per year	
	1.d.	Number of outage events caused by contact with vegetation (total)	21	17	15	14	35	5	7	12	23									Number of outage events per year	
2. Utility inspection findings - Distribution	2.a.	Number of Level 1 findings (distribution - total)	0	0	3	0	0	0	19	37	0									# findings	
	2.b.	Number of Level 2 findings (distribution - total)	0	98	17	8	43	0	316	1102	7									# findings	
	2.c.	Number of Level 3 findings (distribution - total)	148	728	2375	523	776	0	2895	7020	171									# findings	
	2.d.	Number of distribution circuit miles inspected	43	280	698.4	173.8	137.2	0	740	1161	371									# circuit miles	
2. Utility inspection findings - Transmission	2.a.ii	Number of Level 1 findings (transmission - total)	0	0	0	0	0	0	2	0	0									# findings	
	2.b.ii	Number of Level 2 findings (transmission - total)	0	0	0	0	0	0	0	1	0									# findings	
	2.c.ii	Number of Level 3 findings (transmission - total)	0	0	386	152	0	0	0	7	19									# findings	
	2.d.ii	Number of transmission circuit miles inspected	0	0	45.26	14.48	0	0	6	17	17									# circuit miles	
3. Utility ignited wildfire fatalities	3.a.	Fatalities due to utility-ignited wildfire (total)	0	0	0	0	0	0	0	0	0									Number of fatalities per year	
	3.b.	Injuries due to utility-ignited wildfire (total)	0	0	0	0	0	0	0	0	0									Number of injuries per year	
4. Value of assets destroyed by utility-ignited wildfire, listed by asset type	4.a.	Value of assets destroyed by utility-ignited wildfire (total)	0	315649	0	0	9855.29	0	0	0	0									Dollars of damage or destruction per year	
5. Structures damaged or destroyed by utility-ignited wildfire	5.a.	Number of structures destroyed by utility-ignited wildfire (total)	0	18	0	0	0	0	0	0	0									Number of structures destroyed per year	
	5.b.	Critical infrastructure damaged/destroyed by utility-ignited wildfire (total)	0	0	0	0	0	0	0	0	0									Number of critical infrastructure damaged/destroyed per year	
6. Acreage burned by utility-ignited wildfire	6.a.	Acreage burned by utility-ignited wildfire (total)	10.25	196	0	0	0.5	0	0	0	0									Acres burned per year	
7. Number of utility wildfire ignitons	7.a.	Number of ignitions (total) according to existing ignition data reporting requirement	2	1	0	0	1	0	0	0	2									Number per year	
	7.b.	Number of ignitions in HFTD (subtotal)	2	1	0	0	1	0	0	0	0									Number in HFTD per year	
	7.c.	Number of ignitions in HFTD Zone 1	0	0	0	0	0	0	0	0	0									Number in HFTD Zone 1 per year	
	7.c.ii.	Number of ignitions in HFTD Tier 2	2	1	0	0	1	0	0	0	2									Number in HFTD Tier 2 per year	
	7.c.iii.	Number of ignitions in HFTD Tier 3	0	0	0	0	0	0	0	0	0									Number in HFTD Tier 3 per year	
	7.d.	Number of ignitions in non-HFTD (subtotal)	0	0	0	0	0	0	0	0	0									Number in non-HFTD per year	
8. Fatalities resulting from utility wildfire mitigation initiatives	8.a.	Fatalities due to utility wildfire mitigation activities (total) - "activities" defined as all activities accounted for in the 2020 WMP proposed WMP spend	0	0	0	0	0	0	0	0	0									Number of fatalities per year	
9. OSHA-reportable injuries from utility wildfire mitigation initiatives	9.a.	OSHA-reportable injuries due to utility wildfire mitigation activities (total) - "activities" defined as all activities accounted for in the 2020 WMP proposed WMP spend	0	0	0	0	0	0	0	0	0									Number of OSHA-reportable injuries per year	

Utility	Liberty
Table No.	3
Date Modified	3/1/2021

Note: These columns are placeholders for future QR submissions.

Table 3: List and description of additional metrics

Metric	Definition	Purpose	Assumptions made to connect metric to purpose	Third-party validation (if any)	2015	2016	2017	2018	2019	Q1 2020	Q2 2020	Q3 2020	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	Unit(s)	Comments

Utility	Liberty
Table No.	4
Date Modified	3/1/2021

Note: These columns are placeholders for future QR submissions.

Table 4: Fatalities due to utility wildfire mitigation initiatives

								Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4		
Metric type	**#**	**Outcome metric name**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2020**	**2020**	**2020**	**2021**	**2021**	**2021**	**2021**	**2022**	**2022**	**2022**	**2022**	**Unit(s)**	**Comments**
1. Fatalities - Full-time Employee	1.a.	Fatalities due to utility inspection - Full-time employee		0	0	0	0	0	0	0	0	0								# fatalities	
	1.b.	Fatalities due to vegetation management - Full-time employee		0	0	0	0	0	0	0	0	0								# fatalities	
	1.c.	Fatalities due to utility fuel management - Full-time employee		0	0	0	0	0	0	0	0	0								# fatalities	
	1.d.	Fatalities due to grid hardening - Full-time employee		0	0	0	0	0	0	0	0	0								# fatalities	
	1.e.	Fatalities due to other - Full-time employee		0	0	0	0	0	0	0	0	0								# fatalities	
2. Fatalities - Contractor	2.a.	Fatalities due to utility inspection - Contractor		0	0	0	0	0	0	0	0	0								# fatalities	
	2.b.	Fatalities due to vegetation management - Contractor		0	0	0	0	0	0	0	0	0								# fatalities	
	2.c.	Fatalities due to utility fuel management - Contractor		0	0	0	0	0	0	0	0	0								# fatalities	
	2.d.	Fatalities due to grid hardening - Contractor		0	0	0	0	0	0	0	0	0								# fatalities	
	2.e.	Fatalities due to other - Contractor		0	0	0	0	0	0	0	0	0								# fatalities	
3. Fatalities - Member of public	3.a.	Fatalities due to utility inspection - Public		0	0	0	0	0	0	0	0	0								# fatalities	
	3.b.	Fatalities due to vegetation management - Public		0	0	0	0	0	0	0	0	0								# fatalities	
	3.c.	Fatalities due to utility fuel management - Public		0	0	0	0	0	0	0	0	0								# fatalities	
	3.d.	Fatalities due to grid hardening - Public		0	0	0	0	0	0	0	0	0								# fatalities	
	3.e.	Fatalities due to other - Public		0	0	0	0	0	0	0	0	0								# fatalities	

Utility	Liberty
Table No.	5
Date Modified	3/1/2021

Note: These columns are placeholders for future QR submissions.

Table 5: OSHA-reportable injuries due to utility wildfire mitigation initiatives

								Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4		
Metric type	**#**	**Outcome metric name**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2020**	**2020**	**2020**	**2021**	**2021**	**2021**	**2021**	**2022**	**2022**	**2022**	**2022**	**Unit(s)**	**Comments**
1. OSHA injuries - Full-time Employee	1.a.	OSHA injuries due to utility inspection - Full-time employee		0	0	0	0	0	0	0	0	0								# OSHA-reportable injuries	
	1.b.	OSHA injuries due to vegetation management - Full-time employee		0	0	0	0	0	0	0	0	0								# OSHA-reportable injuries	
	1.c.	OSHA injuries due to utility fuel management - Full-time employee		0	0	0	0	0	0	0	0	0								# OSHA-reportable injuries	
	1.d.	OSHA injuries due to grid hardening - Full-time employee		0	0	0	0	0	0	0	0	0								# OSHA-reportable injuries	
	1.e.	OSHA injuries due to other - Full-time employee		0	0	0	0	0	0	0	0	0								# OSHA-reportable injuries	
2. OSHA injuries - Contractor	2.a.	OSHA injuries due to utility inspection - Contractor		0	0	0	0	0	0	0	0	0								# OSHA-reportable injuries	
	2.b.	OSHA injuries due to vegetation management - Contractor		0	0	0	0	0	0	0	0	0								# OSHA-reportable injuries	
	2.c.	OSHA injuries due to utility fuel management - Contractor		0	0	0	0	0	0	0	0	0								# OSHA-reportable injuries	
	2.d.	OSHA injuries due to grid hardening - Contractor		0	0	0	0	0	0	0	0	0								# OSHA-reportable injuries	
	2.e.	OSHA injuries due to other - Contractor		0	0	0	0	0	0	0	0	0								# OSHA-reportable injuries	
3. OSHA injuries - Member of public	3.a.	OSHA injuries due to utility inspection - Public		0	0	0	0	0	0	0	0	0								# OSHA-reportable injuries	
	3.b.	OSHA injuries due to vegetation management - Public		0	0	0	0	0	0	0	0	0								# OSHA-reportable injuries	
	3.c.	OSHA injuries due to utility fuel management - Public		0	0	0	0	0	0	0	0	0								# OSHA-reportable injuries	
	3.d.	OSHA injuries due to grid hardening - Public		0	0	0	0	0	0	0	0	0								# OSHA-reportable injuries	
	3.e.	OSHA injuries due to other - Public		0	0	0	0	0	0	0	0	0								# OSHA-reportable injuries	

Utility	Liberty
Table No.	6
Date Modified	3/1/2021

Note: These columns are placeholders for future QR submissions.

Table 6: Weather patterns

Metric type	#	Outcome metric name	2015	2016	2017	2018	2019	Q1 2020	Q2 2020	Q3 2020	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	Unit(s)	Comments
1. Red Flag Warning Overhead circuit mile Days	1.a.	Red Flag Warning Overhead circuit mile days - entire utility territory	272	94	193	3134	869	0	101	4679	2093									Sum of overhead circuit miles of utility grid subject to Red Flag Warning each day within a given time period, calculated as the number of overhead circuit miles that were under an RFW multiplied by the number of days those circuit miles were under said RFW. For example, if 100 overhead circuit miles were under an RFW for 1 day, and 10 of those miles were under RFW for an additional day, then the total RFW OH circuit mile days would be 110.	
	1.b.	Red Flag Warning Overhead circuit mile days - HFTD Zone 1	0	0	0	0	1	0	0	3	2									Red Flag Warning Overhead circuit mile days, see above for definition	
	1.c.	Red Flag Warning Overhead circuit mile days - HFTD Tier 2	140	78	118	2593	727	0	99	3822	1737									Red Flag Warning Overhead circuit mile days, see above for definition	
	1.d.	Red Flag Warning Overhead circuit mile days - HFTD Tier 3	0	0	0	306	77	0	0	442	212									Red Flag Warning Overhead circuit mile days, see above for definition	
	1.e.	Red Flag Warning Overhead circuit mile days - Non-HFTD	112	14	64	171	48	0	2	313	101									Red Flag Warning Overhead circuit mile days, see above for definition	
2. Wind conditions	2.a.	High wind warning overhead circuit mile days	864	3508	180	126	108	11	0	0	862									Sum of overhead circuit miles of utility grid subject to High Wind Warnings (HWW, as defined by the National Weather Service) each day within a given time period, calculated as the number of overhead circuit miles that were under an HWW multiplied by the number of days those miles were under said HWW. For example, if 100 overhead circuit miles were under an HWW for 1 day, and 10 of those miles were under HWW for an additional day, then the total HWW OH circuit mile days would be 110.	
3. Other	3.a.	Other relevant weather pattern metrics tracked (add additional rows as needed)																			

Utility	Liberty
Table No.	7.1
Date Modified	3/1/2021

Notes:
Transmission lines refer to all lines at or above 65kV, and distribution lines refer to all lines below 65kV.
Data from 2015 - 2020 Q2 should be actual numbers. 2020 Q3 - 2023 should be projected. In future submissions update projected numbers with actuals

Table 7.1: Key recent and projected drivers of risk events

						Number of risk events									Projected risk events										
	Risk Event category	**Cause category**	**#**	**Sub-cause category**	**Are risk events tracked for ignition driver? (yes / no)**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2020**	**2020**	**2020**	**2021**	**2021**	**2021**	**2021**	**2022**	**2022**	**2022**	**2022**	**Unit(s)**	**Comments**
											Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4		
x	Wire down event - Distribution	1. Contact from object - Distribution	1.a.	Veg. contact- Distribution	Yes			1	1	1		1	1	2	1	1	1	1	1	1	1	1	# risk events (excluding ignitions)	
			1.b.	Animal contact- Distribution	Yes																		# risk events (excluding ignitions)	
			1.c.	Balloon contact- Distribution	Yes																		# risk events (excluding ignitions)	
			1.d.	Vehicle contact- Distribution	Yes									1				1				1	# risk events (excluding ignitions)	
			1.e.	Other contact from object - Distribution	Yes																		# risk events (excluding ignitions)	
		2. Equipment / facility failure - Distribution	2.a.	Connector damage or failure- Distribution	Yes								1										# risk events (excluding ignitions)	
			2.b.	Splice damage or failure — Distribution	Yes																		# risk events (excluding ignitions)	
			2.c.	Crossarm damage or failure - Distribution	Yes				1														# risk events (excluding ignitions)	
			2.d.	Insulator damage or failure- Distribution	Yes																		# risk events (excluding ignitions)	
			2.e.	Lightning arrestor damage or failure- Distribution	Yes																		# risk events (excluding ignitions)	
			2.f.	Tap damage or failure - Distribution	Yes																		# risk events (excluding ignitions)	
			2.g.	Tie wire damage or failure - Distribution	Yes																		# risk events (excluding ignitions)	
			2.h.	Other - Distribution	Yes			1			2						1					1	# risk events (excluding ignitions)	
		3. Wire-to-wire contact - Distribution	3.a.	Wire-to-wire contact / contamination- Distribution	Yes									2				1				1	# risk events (excluding ignitions)	
		4. Contamination - Distribution	4.a.	Contamination - Distribution	Yes																		# risk events (excluding ignitions)	
		5. Utility work / Operation	5.a.	Utility work / Operation	Yes																		# risk events (excluding ignitions)	
		6. Vandalism / Theft - Distribution	6.a.	Vandalism / Theft - Distribution	Yes																		# risk events (excluding ignitions)	
		7. Other- Distribution	7.a.	All Other- Distribution	Yes																		# risk events (excluding ignitions)	
		8. Unknown- Distribution	8.a.	Unknown - Distribution	Yes	9	3	1	5						1					1			# risk events (excluding ignitions)	
x	Wire down event - Transmission	9. Contact from object - Transmission	9.a.	Veg. contact- Transmission																			# risk events (excluding ignitions)	
			9.b.	Animal contact- Transmission																			# risk events (excluding ignitions)	
			9.c.	Balloon contact- Transmission																			# risk events (excluding ignitions)	
			9.d.	Vehicle contact- Transmission																			# risk events (excluding ignitions)	
			9.e.	Other contact from object - Transmission																			# risk events (excluding ignitions)	
		10. Equipment / facility failure - Transmission	10.a.	Connector damage or failure- Transmission																			# risk events (excluding ignitions)	
			10.b.	Splice damage or failure — Transmission																			# risk events (excluding ignitions)	
			10.c.	Crossarm damage or failure - Transmission																			# risk events (excluding ignitions)	
			10.d.	Insulator damage or failure- Transmission																			# risk events (excluding ignitions)	
			10.e.	Lightning arrestor damage or failure- Transmission																			# risk events (excluding ignitions)	
			10.f.	Tap damage or failure - Transmission																			# risk events (excluding ignitions)	
			10.g.	Tie wire damage or failure - Transmission																			# risk events (excluding ignitions)	
			10.h.	Other - Transmission																			# risk events (excluding ignitions)	
		11. Wire-to-wire contact - Transmission	11.a.	Wire-to-wire contact / contamination- Transmission																			# risk events (excluding ignitions)	
		12. Contamination - Transmission	12.a.	Contamination - Transmission																			# risk events (excluding ignitions)	
		13. Utility work / Operation	13.a.	Utility work / Operation																			# risk events (excluding ignitions)	
		14. Vandalism / Theft - Transmission	14.a.	Vandalism / Theft - Transmission																			# risk events (excluding ignitions)	
		15. Other- Transmission	15.a.	All Other- Transmission																			# risk events (excluding ignitions)	
		16. Unknown- Transmission	16.a.	Unknown - Transmission																			# risk events (excluding ignitions)	
x	Outage - Distribution	17. Contact from object - Distribution	17.a.	Veg. contact- Distribution	Yes	16	18	14	34	5	7	11	21	5	5	10	10	5	5	10	10		# risk events (excluding ignitions)	
			17.b.	Animal contact- Distribution	Yes	3	11	2	22		1	14	6	1	2	6	6	1	2	6	6		# risk events (excluding ignitions)	
			17.c.	Balloon contact- Distribution	Yes																		# risk events (excluding ignitions)	
			17.d.	Vehicle contact- Distribution	Yes		10	1	6	8	4	2	7	2	2	2	2	2	2	2	2		# risk events (excluding ignitions)	
			17.e.	Other contact from object - Distribution	Yes																		# risk events (excluding ignitions)	
		18. Equipment / facility failure - Distribution	18.a.	Capacitor bank damage or failure- Distribution	Yes																		# risk events (excluding ignitions)	
			18.b.	Conductor damage or failure — Distribution	Yes	10	5	4	9	3	4	6	16	3	3	7	7	3	3	7	7		# risk events (excluding ignitions)	
			18.c.	Fuse damage or failure - Distribution	Yes	16	46	50	122	10	9	10	13	15	15	15	15	15	15	15	15		# risk events (excluding ignitions)	
			18.d.	Lightning arrestor damage or failure- Distribution	Yes		1	1	4		1		1		1		1		1		1		# risk events (excluding ignitions)	
			18.e.	Switch damage or failure- Distribution	Yes																		# risk events (excluding ignitions)	
			18.f.	Pole damage or failure - Distribution	Yes																		# risk events (excluding ignitions)	
			18.g.	Insulator and brushing damage or failure - Distribution	Yes																		# risk events (excluding ignitions)	
			18.h.	Crossarm damage or failure - Distribution	Yes																		# risk events (excluding ignitions)	
			18.i.	Voltage regulator / booster damage or failure - Distribution	Yes																		# risk events (excluding ignitions)	
			18.j.	Recloser damage or failure - Distribution	Yes																		# risk events (excluding ignitions)	
			18.k.	Anchor / guy damage or failure - Distribution	Yes																		# risk events (excluding ignitions)	
			18.l.	Sectionalizer damage or failure - Distribution	Yes																		# risk events (excluding ignitions)	
			18.m.	Connection device damage or failure - Distribution	Yes																		# risk events (excluding ignitions)	
			18.n.	Transformer damage or failure - Distribution	Yes	7	13	7	22	2	3	12	15	3	3	7	7	3	3	7	7		# risk events (excluding ignitions)	
			18.o.	Other - Distribution	Yes	59	23	28	42	8	11	12	22	12	12	12	12	12	12	12	12		# risk events (excluding ignitions)	
		19. Wire-to-wire contact - Distribution	19.a.	Wire-to-wire contact / contamination- Distribution	Yes		2	1	4	6	2		3	3	3		3	3	3		3		# risk events (excluding ignitions)	
		20. Contamination - Distribution	20.a.	Contamination - Distribution	Yes																		# risk events (excluding ignitions)	
		21. Utility work / Operation	21.a.	Utility work / Operation	Yes																		# risk events (excluding ignitions)	
		22. Vandalism / Theft - Distribution	22.a.	Vandalism / Theft - Distribution	Yes																		# risk events (excluding ignitions)	
		23. Other- Distribution	23.a.	All Other- Distribution	Yes					14	7	8	22	15	10	10	15	15	10	10	15		# risk events (excluding ignitions)	
		24. Unknown- Distribution	24.a.	Unknown - Distribution	Yes																		# risk events (excluding ignitions)	
x	Outage - Transmission	25. Contact from object - Transmission	25.a.	Veg. contact- Transmission																			# risk events (excluding ignitions)	
			25.b.	Animal contact- Transmission																			# risk events (excluding ignitions)	
			25.c.	Balloon contact- Transmission																			# risk events (excluding ignitions)	
			25.d.	Vehicle contact- Transmission																			# risk events (excluding ignitions)	
			25.e.	Other contact from object - Transmission																			# risk events (excluding ignitions)	
		26. Equipment / facility failure - Transmission	26.a.	Capacitor bank damage or failure- Transmission																			# risk events (excluding ignitions)	
			26.b.	Conductor damage or failure — Transmission																			# risk events (excluding ignitions)	
			26.c.	Fuse damage or failure - Transmission																			# risk events (excluding ignitions)	
			26.d.	Lightning arrestor damage or failure- Transmission																			# risk events (excluding ignitions)	
			26.e.	Switch damage or failure- Transmission																			# risk events (excluding ignitions)	
			26.f.	Pole damage or failure - Transmission																			# risk events (excluding ignitions)	
			26.g.	Insulator and brushing damage or failure - Transmission																			# risk events (excluding ignitions)	
			26.h.	Crossarm damage or failure - Transmission																			# risk events (excluding ignitions)	
			26.i.	Voltage regulator / booster damage or failure - Transmission																			# risk events (excluding ignitions)	
			26.j.	Recloser damage or failure - Transmission																			# risk events (excluding ignitions)	
			26.k.	Anchor / guy damage or failure - Transmission																			# risk events (excluding ignitions)	
			26.l.	Sectionalizer damage or failure - Transmission																			# risk events (excluding ignitions)	
			26.m.	Connection device damage or failure - Transmission																			# risk events (excluding ignitions)	
			26.n.	Transformer damage or failure - Transmission																			# risk events (excluding ignitions)	
			26.o.	Other - Transmission																			# risk events (excluding ignitions)	
		27. Wire-to-wire contact - Transmission	27.a.	Wire-to-wire contact / contamination- Transmission																			# risk events (excluding ignitions)	
		28. Contamination - Transmission	28.a.	Contamination - Transmission																			# risk events (excluding ignitions)	
		29. Utility work / Operation	29.a.	Utility work / Operation																			# risk events (excluding ignitions)	
		30. Vandalism / Theft - Transmission	30.a.	Vandalism / Theft - Transmission																			# risk events (excluding ignitions)	
		31. Other- Transmission	31.a.	All Other- Transmission																			# risk events (excluding ignitions)	
		32. Unknown- Transmission	32.a.	Unknown - Transmission																			# risk events (excluding ignitions)	
x	Ignition - Distribution	33. Contact from object - Distribution	33.a.	Veg. contact- Distribution	Yes				1			1	2				1				1		# ignitions	
			33.b.	Animal contact- Distribution	Yes																		# ignitions	
			33.c.	Balloon contact- Distribution	Yes																		# ignitions	
			33.d.	Vehicle contact- Distribution	Yes		1						1				1				1		# ignitions	
			33.e.	Other contact from object - Distribution	Yes																		# ignitions	
		34. Equipment / facility failure - Distribution	34.a.	Capacitor bank damage or failure- Distribution	Yes																		# ignitions	
			34.b.	Conductor damage or failure — Distribution	Yes								2				1				1		# ignitions	
			34.c.	Fuse damage or failure - Distribution	Yes		1	1	2			1	1			1				1			# ignitions	
			34.d.	Lightning arrestor damage or failure- Distribution	Yes																		# ignitions	
			34.e.	Switch damage or failure- Distribution	Yes																		# ignitions	
			34.f.	Pole damage or failure - Distribution	Yes	3										1							# ignitions	
			34.g.	Insulator and brushing damage or failure - Distribution	Yes																		# ignitions	
			34.h.	Crossarm damage or failure - Distribution	Yes				1														# ignitions	

			34.i.	Voltage regulator / booster damage or failure - Distribution	Yes																		# ignitions
			34.j.	Recloser damage or failure - Distribution	Yes																		# ignitions
			34.k.	Anchor / guy damage or failure - Distribution	Yes																		# ignitions
			34.l.	Sectionalizer damage or failure - Distribution	Yes																		# ignitions
			34.m.	Connection device damage or failure - Distribution	Yes																		# ignitions
			34.n.	Transformer damage or failure - Distribution	Yes	1	2	1			2					1				1			# ignitions
			34.o.	Other - Distribution	Yes	4	3	9	1	2	4	1	1	1	1	1	1	1	1	1			# ignitions
		35. Wire-to-wire contact - Distribution	35.a.	Wire-to-wire contact / contamination- Distribution	Yes																		# ignitions
		36. Contamination - Distribution	36.a.	Contamination - Distribution	Yes																		# ignitions
		37. Utility work / Operation	37.a.	Utility work / Operation	Yes																		# ignitions
		38. Vandalism / Theft - Distribution	38.a.	Vandalism / Theft - Distribution	Yes	1																	# ignitions
		39. Other- Distribution	39.a.	All Other- Distribution	Yes																		# ignitions
		40. Unknown- Distribution	40.a.	Unknown - Distribution	Yes																		# ignitions
x	Ignition - Transmission	41. Contact from object - Transmission	41.a.	Veg. contact- Transmission																			# ignitions
			41.b.	Animal contact- Transmission																			# ignitions
			41.c.	Balloon contact- Transmission																			# ignitions
			41.d.	Vehicle contact- Transmission																			# ignitions
			41.e.	Other contact from object - Transmission																			# ignitions
		42. Equipment / facility failure - Transmission	42.a.	Capacitor bank damage or failure- Transmission																			# ignitions
			42.b.	Conductor damage or failure — Transmission																			# ignitions
			42.c.	Fuse damage or failure - Transmission																			# ignitions
			42.d.	Lightning arrestor damage or failure- Transmission																			# ignitions
			42.e.	Switch damage or failure- Transmission																			# ignitions
			42.f.	Pole damage or failure - Transmission																			# ignitions
			42.g.	Insulator and brushing damage or failure - Transmission																			# ignitions
			42.h.	Crossarm damage or failure - Transmission																			# ignitions
			42.i.	Voltage regulator / booster damage or failure - Transmission																			# ignitions
			42.j.	Recloser damage or failure - Transmission																			# ignitions
			42.k.	Anchor / guy damage or failure - Transmission																			# ignitions
			42.l.	Sectionalizer damage or failure - Transmission																			# ignitions
			42.m.	Connection device damage or failure - Transmission																			# ignitions
			42.n.	Transformer damage or failure - Transmission																			# ignitions
			42.o.	Other - Transmission																			# ignitions
		43. Wire-to-wire contact - Transmission	43.a.	Wire-to-wire contact / contamination- Transmission																			# ignitions
		44. Contamination - Transmission	44.a.	Contamination - Transmission																			# ignitions
		45. Utility work / Operation	45.a.	Utility work / Operation																			# ignitions
		46. Vandalism / Theft - Transmission	46.a.	Vandalism / Theft - Transmission																			# ignitions
		47. Other- Transmission	47.a.	All Other- Transmission																			# ignitions
		48. Unknown- Transmission	48.a.	Unknown - Transmission																			# ignitions

Utility	Liberty
Table No.	7.2
Date Modified	3/1/2021

Notes:
Transmission lines refer to all lines at or above 65kV, and distribution lines refer to all lines below 65kV.
Data from 2015 - 2019 should be actual numbers. 2020 - 2023 should be projected. In future submissions update projected numbers with actuals

Table 7.2: Key recent and projected drivers of ignitions by HFTD region

						Number of ignitions by HFTD tier																								Projected ignitions by HFTD tier									
						Non-HFTD	HFTD Zone 1	HFTD Tier 2	HFTD Tier 3	Non-HFTD	HFTD Zone 1	HFTD Tier 2	HFTD Tier 3	Non-HFTD	HFTD Zone 1	HFTD Tier 2	HFTD Tier 3	Non-HFTD	HFTD Zone 1	HFTD Tier 2	HFTD Tier 3	Non-HFTD	HFTD Zone 1	HFTD Tier 2	HFTD Tier 3	Non-HFTD	HFTD Zone 1	HFTD Tier 2	HFTD Tier 3	Non-HFTD	HFTD Zone 1	HFTD Tier 2	HFTD Tier 3	Non-HFTD	HFTD Zone 1	HFTD Tier 2	HFTD Tier 3		
		Metric type	**#**	**Ignition driver**	**Are ignitions tracked for ignition driver? (yes / no)**	**2015**	**2015**	**2015**	**2015**	**2016**	**2016**	**2016**	**2016**	**2017**	**2017**	**2017**	**2017**	**2018**	**2018**	**2018**	**2018**	**2019**	**2019**	**2019**	**2019**	**2020**	**2020**	**2020**	**2020**	**2021**	**2021**	**2021**	**2021**	**2022**	**2022**	**2022**	**2022**	**Unit(s)**	**Comments**
x	Ignition - Distribution	1. Contact from object - Distribution	1.a.	Veg. contact- Distribution	Yes																			1				3				1				1		# ignitions	
			1.b.	Animal contact- Distribution	Yes																																	# ignitions	
			1.c.	Balloon contact- Distribution	Yes																																	# ignitions	
			1.d.	Vehicle contact- Distribution	Yes																																	# ignitions	
			1.e.	Other contact from object - Distribution	Yes																																	# ignitions	
		2. Equipment / facility failure - Distribution	2.a.	Capacitor bank damage or failure- Distribution	Yes																																	# ignitions	
			2.b.	Conductor damage or failure — Distribution	Yes																							1				1						# ignitions	
			2.c.	Fuse damage or failure - Distribution	Yes															1				2				2				1				1		# ignitions	
			2.d.	Lightning arrestor damage or failure- Distribution	Yes																																	# ignitions	
			2.e.	Switch damage or failure- Distribution	Yes																																	# ignitions	
			2.f.	Pole damage or failure - Distribution	Yes																																	# ignitions	
			2.g.	Insulator and brushing damage or failure - Distribution	Yes																																	# ignitions	
			2.h.	Crossarm damage or failure - Distribution	Yes																																	# ignitions	
			2.i.	Voltage regulator / booster damage or failure - Distribution	Yes																																	# ignitions	
			2.j.	Recloser damage or failure - Distribution	Yes																																	# ignitions	
			2.k.	Anchor / guy damage or failure - Distribution	Yes																																	# ignitions	
			2.l.	Sectionalizer damage or failure - Distribution	Yes																																	# ignitions	
			2.m.	Connection device damage or failure - Distribution	Yes																																	# ignitions	
			2.n.	Transformer damage or failure - Distribution	Yes															2								2				1						# ignitions	
			2.o.	Other - Distribution	Yes															2				6				5				3				3		# ignitions	
		3. Wire-to-wire contact - Distribution	3.a.	Wire-to-wire contact / contamination- Distribution	Yes																																	# ignitions	
		4. Contamination - Distribution	4.a.	Contamination - Distribution	Yes																																	# ignitions	
		5. Utility work / Operation	5.a.	Utility work / Operation	Yes																																	# ignitions	
		6. Vandalism / Theft - Distribution	6.a.	Vandalism / Theft - Distribution	Yes																																	# ignitions	
		7. Other- Distribution	7.a.	All Other- Distribution	Yes																																	# ignitions	
		8. Unknown- Distribution	8.a.	Unknown - Distribution	Yes																																	# ignitions	
x	Ignition - Transmission	9. Contact from object - Transmission	9.a.	Veg. contact- Transmission																																		# ignitions	
			9.b.	Animal contact- Transmission																																		# ignitions	
			9.c.	Balloon contact- Transmission																																		# ignitions	
			9.d.	Vehicle contact- Transmission																																		# ignitions	
			9.e.	Other contact from object - Transmission																																		# ignitions	
		10. Equipment / facility failure - Transmission	10.a.	Capacitor bank damage or failure- Transmission																																		# ignitions	
			10.b.	Conductor damage or failure — Transmission																																		# ignitions	
			10.c.	Fuse damage or failure - Transmission																																		# ignitions	
			10.d.	Lightning arrestor damage or failure- Transmission																																		# ignitions	
			10.e.	Switch damage or failure- Transmission																																		# ignitions	
			10.f.	Pole damage or failure - Transmission																																		# ignitions	
			10.g.	Insulator and brushing damage or failure - Transmission																																		# ignitions	
			10.h.	Crossarm damage or failure - Transmission																																		# ignitions	
			10.i.	Voltage regulator / booster damage or failure - Transmission																																		# ignitions	
			10.j.	Recloser damage or failure - Transmission																																		# ignitions	
			10.k.	Anchor / guy damage or failure - Transmission																																		# ignitions	
			10.l.	Sectionalizer damage or failure - Transmission																																		# ignitions	
			10.m.	Connection device damage or failure - Transmission																																		# ignitions	
			10.n.	Transformer damage or failure - Transmission																																		# ignitions	
			10.o.	Other - Transmission																																		# ignitions	
		11. Wire-to-wire contact - Transmission	11.a.	Wire-to-wire contact / contamination- Transmission																																		# ignitions	
		12. Contamination - Transmission	12.a.	Contamination - Transmission																																		# ignitions	
		13. Utility work / Operation	13.a.	Utility work / Operation																																		# ignitions	
		14. Vandalism / Theft - Transmission	14.a.	Vandalism / Theft - Transmission																																		# ignitions	
		15. Other- Transmission	15.a.	All Other- Transmission																																		# ignitions	
		16. Unknown- Transmission	16.a.	Unknown - Transmission																																		# ignitions	

Utility	Liberty
Table No.	8
Date Modified	3/1/2021

Note: These columns are placeholders for future QR submissions.

	Metric type	#	Outcome metric name	Non-HFTD 2015	HFTD Zone 1 2015	HFTD Tier 2 2015	HFTD Tier 3 2015	Non-HFTD 2016	HFTD Zone 1 2016	HFTD Tier 2 2016	HFTD Tier 3 2016	Non-HFTD 2017	HFTD Zone 1 2017	HFTD Tier 2 2017	HFTD Tier 3 2017	Non-HFTD 2018	HFTD Zone 1 2018	HFTD Tier 2 2018	HFTD Tier 3 2018	Non-HFTD 2019	HFTD Zone 1 2019	HFTD Tier 2 2019	HFTD Tier 3 2019	Non-HFTD 2020	HFTD Zone 1 2020	HFTD Tier 2 2020	HFTD Tier 3 2020	Non-HFTD 2021	HFTD Zone 1 2021	HFTD Tier 2 2021	HFTD Tier 3 2021	Non-HFTD 2022	HFTD Zone 1 2022	HFTD Tier 2 2022	HFTD Tier 3 2022	Unit(s)	Comments
	Table 8: State of service territory and utility equipment																																				
x	1. State of service territory and equipment in urban areas	1.a.	Circuit miles (including WUI and non-WUI)																						30		429	0									Circuit miles
		1.b.	Circuit miles in WUI																						27		401	0									Circuit miles in WUI
		1.c.	Number of critical facilities (including WUI and non-WUI)																								138	3									Number of critical facilities
		1.d.	Number of critical facilities in WUI																								79	3									Number of critical facilities in WUI
		1.e.	Number of customers (including WUI and non-WUI)																						1214		16521	1									Number of customers
		1.f.	Number of customers in WUI																						1191		16194	1									Number of customers in WUI
		1.g.	Number of customers belonging to access and functional needs populations (including WUI and non-WUI)																						5		124										Number of customers belonging to access and functional needs populations
		1.h.	Number of customers belonging to access and functional needs populations in WUI																						4		123										Number of customers belonging to access and functional needs populations in WUI
		1.i.	Circuit miles of overhead transmission lines (including WUI and non-WUI)																						1		1										Circuit miles of overhead transmission lines
		1.j.	Circuit miles of overhead transmission lines in WUI																						0		1										Circuit miles of overhead transmission lines in WUI
		1.k.	Circuit miles of overhead distribution lines (including WUI and non-WUI)																						6		324	0									Circuit miles of overhead distribution lines
		1.l.	Circuit miles of overhead distribution lines in WUI																						5		306	0									Circuit miles of overhead distribution lines in WUI
		1.m.	Number of substations (including WUI and non-WUI)																								3										Number of substations
		1.n	Number of substations in WUI																								2										Number of substations in WUI
		1.o.	Number of weather stations (including WUI and non-WUI)																								1										Number of weather stations
		1.p.	Number of weather stations in WUI																																		Number of weather stations in WUI
x	2. State of service territory and equipment in rural areas	2.a.	Circuit miles (including WUI and non-WUI)																						24		1135	136									Circuit miles
		2.b.	Circuit miles in WUI																						16		874	116									Circuit miles in WUI
		2.c.	Number of critical facilities (including WUI and non-WUI)																								138	1									Number of critical facilities
		2.d.	Number of critical facilities in WUI																								49	1									Number of critical facilities in WUI
		2.e.	Number of customers (including WUI and non-WUI)																						574		23260	2961									Number of customers
		2.f.	Number of customers in WUI																						447		21705	2816									Number of customers in WUI
		2.g.	Number of customers belonging to access and functional needs populations (including WUI and non-WUI)																						3		34	24									Number of customers belonging to access and functional needs populations
		2.h.	Number of customers belonging to access and functional needs populations in WUI																						3		32	20									Number of customers belonging to access and functional needs populations in WUI
		2.i.	Circuit miles of overhead transmission lines (including WUI and non-WUI)																						0		15	2									Circuit miles of overhead transmission lines
		2.j.	Circuit miles of overhead transmission lines in WUI																						0		3	0									Circuit miles of overhead transmission lines in WUI
		2.k.	Circuit miles of overhead distribution lines (including WUI and non-WUI)																						19		757	123									Circuit miles of overhead distribution lines
		2.l.	Circuit miles of overhead distribution lines in WUI																						13		583	108									Circuit miles of overhead distribution lines in WUI
		2.m.	Number of substations (including WUI and non-WUI)																								7	1									Number of substations
		2.n	Number of substations in WUI																								3										Number of substations in WUI
		2.o.	Number of weather stations (including WUI and non-WUI)																								15	1									Number of weather stations
		2.p.	Number of weather stations in WUI																																		Number of weather stations in WUI
x	3. State of service territory and equipment in highly rural areas	3.a.	Circuit miles (including WUI and non-WUI)																						79		228										Circuit miles
		3.b.	Circuit miles in WUI																						61		146										Circuit miles in WUI
		3.c.	Number of critical facilities (including WUI and non-WUI)																								138										Number of critical facilities
		3.d.	Number of critical facilities in WUI																								6										Number of critical facilities in WUI
		3.e.	Number of customers (including WUI and non-WUI)																						1921		2468										Number of customers
		3.f.	Number of customers in WUI																						1764		2113										Number of customers in WUI
		3.g.	Number of customers belonging to access and functional needs populations (including WUI and non-WUI)																						38		30										Number of customers belonging to access and functional needs populations
		3.h.	Number of customers belonging to access and functional needs populations in WUI																						37		30										Number of customers belonging to access and functional needs populations in WUI
		3.i.	Circuit miles of overhead transmission lines (including WUI and non-WUI)																								0										Circuit miles of overhead transmission lines
		3.j.	Circuit miles of overhead transmission lines in WUI																																		Circuit miles of overhead transmission lines in WUI
		3.k.	Circuit miles of overhead distribution lines (including WUI and non-WUI)																						70		184										Circuit miles of overhead distribution lines
		3.l.	Circuit miles of overhead distribution lines in WUI																						54		112										Circuit miles of overhead distribution lines in WUI
		3.m.	Number of substations (including WUI and non-WUI)																						1		2										Number of substations
		3.n	Number of substations in WUI																						1		1										Number of substations in WUI
		3.o.	Number of weather stations (including WUI and non-WUI)																						3		9										Number of weather stations
		3.p.	Number of weather stations in WUI																								5										Number of weather stations in WUI

Utility	Liberty
Table No.	9
Date Modified	3/1/2021

Notes:
Transmission lines refer to all lines at or above 65kV, and distribution lines refer to all lines below 65kV. Report net additions using positive numbers and net removals and undergrounding using negative numbers for circuit miles and numbers of substations. Only report changes expected within the target year.
For example, if 20 net overhead circuit miles are planned for addition by 2023, with 15 being added by 2022 and 5 more added by 2023, then report "15" for 2022 and "5" for 2023. Do not report cumulative change across years. In this case, do not report "20" for 2023, but instead the number planned to be added for just that year, which is "5".

Table 9: Location of actual and planned utility equipment additions or removal year over year

				Actual				Projected									
				Non-HFTD	HFTD Zone 1	HFTD Tier 2	HFTD Tier 3	Non-HFTD	HFTD Zone 1	HFTD Tier 2	HFTD Tier 3	Non-HFTD	HFTD Zone 1	HFTD Tier 2	HFTD Tier 3		
	Metric type	**#**	**Outcome metric name**	**2020**	**2020**	**2020**	**2020**	**2021**	**2021**	**2021**	**2021**	**2022**	**2022**	**2022**	**2022**	**Unit(s)**	**Comments**
x	1. Planned utility equipment net addition (or removal) year over year - in urban areas	1.a.	Circuit miles of overhead transmission lines (including WUI and non-WUI)													Circuit miles	
		1.b.	Circuit miles of overhead distribution lines (including WUI and non-WUI)													Circuit miles	
		1.c.	Circuit miles of overhead transmission lines in WUI													Circuit miles in WUI	
		1.d.	Circuit miles of overhead distribution lines in WUI													Circuit miles in WUI	
		1.e.	Number of substations (including WUI and non-WUI)		0	0	0	0	0	0	-1	0	0	0	0	Number of substations	
		1.f.	Number of substations in WUI		0	0	0	0	0	0	-1	0	0	0	0	Number of substations in WUI	
		1.g.	Number of weather stations (including WUI and non-WUI)		0	0	1	0								Number of weather stations	TBD
		1.h.	Number of weather stations in WUI		0	0	1	0								Number of weather stations in WUI	TBD
x	2. Planned utility equipment net addition (or removal) year over year - in rural areas	2.a.	Circuit miles of overhead transmission lines (including WUI and non-WUI)													Circuit miles	
		2.b.	Circuit miles of overhead distribution lines (including WUI and non-WUI)													Circuit miles	
		2.c.	Circuit miles of overhead transmission lines in WUI													Circuit miles in WUI	
		2.d.	Circuit miles of overhead distribution lines in WUI													Circuit miles in WUI	
		2.e.	Number of substations (including WUI and non-WUI)		0	0	0	0	0	0	0	0	0	0	0	Number of substations	
		2.f.	Number of substations in WUI		0	0	0	0	0	0	0	0	0	0	0	Number of substations in WUI	
		2.g.	Number of weather stations (including WUI and non-WUI)		0	0	8	0								Number of weather stations	TBD
		2.h.	Number of weather stations in WUI		0	0	8	0								Number of weather stations in WUI	TBD
x	3. Planned utility equipment net addition (or removal) year over year - in highly rural areas	3.a.	Circuit miles of overhead transmission lines (including WUI and non-WUI)													Circuit miles	
		3.b.	Circuit miles of overhead distribution lines (including WUI and non-WUI)													Circuit miles	
		3.c.	Circuit miles of overhead transmission lines in WUI													Circuit miles in WUI	
		3.d.	Circuit miles of overhead distribution lines in WUI													Circuit miles in WUI	
		3.e.	Number of substations (including WUI and non-WUI)		0	0	0	0	0	0	0	0	0	0	0	Number of substations	
		3.f.	Number of substations in WUI		0	0	0	0	0	0	0	0	0	0	0	Number of substations in WUI	
		3.g.	Number of weather stations (including WUI and non-WUI)		2	0	8	0								Number of weather stations	TBD
		3.h.	Number of weather stations in WUI		0	0	0	0								Number of weather stations in WUI	TBD

Utility	Liberty
Table No.	10
Date Modified	3/1/2021

Notes:
Transmission lines refer to all lines at or above 65kV, and distribution lines refer to all lines below 65kV.
In future submissions update planned upgrade numbers with actuals
In the comments column on the far-right, enter the relevant program target(s) associated

Table 10: Location of actual and planned utility infrastructure upgrades year over year

				Actual					Projected									
				Non-HFTD	HFTD Zone 1	HFTD Tier 2	HFTD Tier 3	Non-HFTD	HFTD Zone 1	HFTD Tier 2	HFTD Tier 3	Non-HFTD	HFTD Zone 1	HFTD Tier 2	HFTD Tier 3			
	Metric type	**#**	**Outcome metric name**	**2020**	**2020**	**2020**	**2020**	**2021**	**2021**	**2021**	**2021**	**2022**	**2022**	**2022**	**2022**	**Unit(s)**	**Comments**
x	1. Planned utility infrastructure upgrades year over year - in urban areas	1.a.	Circuit miles of overhead transmission lines planned for upgrades (including WUI and non-WUI)					0	0	0	0	0	0	0	0	Circuit miles	
		1.b.	Circuit miles of overhead distribution lines planned for upgrades (including WUI and non-WUI)					0	0	1	0	0	0	1	0	Circuit miles	
		1.c.	Circuit miles of overhead transmission lines planned for upgrades in WUI					0	0	0	0	0	0	0	0	Circuit miles in WUI	
		1.d.	Circuit miles of overhead distribution lines planned for upgrades in WUI					0	0	1	0	0	0	1	0	Circuit miles in WUI	
		1.e.	Number of substations planned for upgrades (including WUI and non-WUI)		0	0	1	0	0	0	1	0	0	0	0	Number of substations	
		1.f.	Number of substations planned for upgrades in WUI		0	0	1	0	0	0	1	0	0	0	0	Number of substations in WUI	
		1.g.	Number of weather stations planned for upgrades (including WUI and non-WUI)		0	0	1	0	0	0	1	0	0	0	0	Number of weather stations	
		1.h.	Number of weather stations planned for upgrades in WUI		0	0	1	0	0	0	1	0	0	0	0	Number of weather stations in WUI	
x	2. Planned utility infrastructure upgrades year over year - in rural areas	2.a.	Circuit miles of overhead transmission lines planned for upgrades (including WUI and non-WUI)					0	0	0	0	0	0	0	3	Circuit miles	
		2.b.	Circuit miles of overhead distribution lines planned for upgrades (including WUI and non-WUI)					0	0	10	0	0	0	18	7	Circuit miles	
		2.c.	Circuit miles of overhead transmission lines planned for upgrades in WUI					0	0	0	0	0	0	0	0	Circuit miles in WUI	
		2.d.	Circuit miles of overhead distribution lines planned for upgrades in WUI					0	0	4	0	0	0	12	0	Circuit miles in WUI	
		2.e.	Number of substations planned for upgrades (including WUI and non-WUI)		0	0	0	0	0	0	2	1	1	0	0	Number of substations	
		2.f.	Number of substations planned for upgrades in WUI		0	0	0	0	0	0	2	1	1	0	0	Number of substations in WUI	
		2.g.	Number of weather stations planned for upgrades (including WUI and non-WUI)		0	0	0	0	0	0	2	1	1	0	0	Number of weather stations	
		2.h.	Number of weather stations planned for upgrades in WUI		0	0	0	0	0	0	2	1	1	0	0	Number of weather stations in WUI	
x	3. Planned utility infrastructure upgrades year over year - in highly rural areas	3.a.	Circuit miles of overhead transmission lines planned for upgrades (including WUI and non-WUI)					0	0	0	0	0	0	0	0	Circuit miles	
		3.b.	Circuit miles of overhead distribution lines planned for upgrades (including WUI and non-WUI)					0	0	0	0	0	0	0	0	Circuit miles	
		3.c.	Circuit miles of overhead transmission lines planned for upgrades in WUI					0	0	0	0	0	0	0	0	Circuit miles in WUI	
		3.d.	Circuit miles of overhead distribution lines planned for upgrades in WUI					0	0	0	0	0	0	0	0	Circuit miles in WUI	
		3.e.	Number of substations planned for upgrades (including WUI and non-WUI)		0	0	0	0	0	0	0	0	0	0	0	Number of substations	
		3.f.	Number of substations planned for upgrades in WUI		0	0	0	0	0	0	1	0	0	0	0	Number of substations in WUI	
		3.g.	Number of weather stations planned for upgrades (including WUI and non-WUI)		0	0	0	0	0	0	0	0	0	0	0	Number of weather stations	
		3.h.	Number of weather stations planned for upgrades in WUI		0	0	0	0	0	0	1	0	0	0	0	Number of weather stations in WUI	

Utility	Liberty	Notes:
Table No.	11	"PSPS" = Public Safety Power Shutoff
		In future submissions update planned
Date Modified	3/1/2021	upgrade numbers with actuals

Table 11: Recent use of PSPS and other PSPS metrics

			Actual									Projected									
								Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4		
Metric type	**#**	**Outcome metric name**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2020**	**2020**	**2020**	**2021**	**2021**	**2021**	**2021**	**2022**	**2022**	**2022**	**2022**	**Unit(s)**	**Comments**
1. Recent use of PSPS	1.a.	Frequency of PSPS events (total)	0	0	0	1	0	0	0	0	0									Number of instances where utility operating protocol requires de-energization of a circuit or portion thereof to reduce ignition probability, per year. Only include events in which de-energization ultimately ocurred	
	1.b.	Scope of PSPS events (total)	0	0	0	3	0	0	0	0	0									Circuit-events, measured in number of events multiplied by number of circuits de-energized per year	
	1.c.	Duration of PSPS events (total)	0	0	0	90	0	0	0	0	0									Customer hours per year	
2. Customer hours of PSPS and other outages	2.a.	Customer hours of planned outages including PSPS (total)		5,124	7,025	31,470	113,282	30	16,743	1,522	31,517									Total customer hours of planned outages per year	
	2.b.	Customer hours of unplanned outages, not including PSPS (total)	112,599	111,988	133,267	75,720	246,866	6,294	10,143	47,305	84,162									Total customer hours of unplanned outages per year	
	2.c.	System Average Interruption Duration Index (SAIDI) (including PSPS)	358	214	1597	288	417	8	12	58	103									SAIDI index value = sum of all interruptions in time period where each interruption is defined as sum(duration of interruption * # of customer interruptions) / Total number of customers served	
	2.d.	System Average Interruption Duration Index (SAIDI) (excluding PSPS)	358	214	1597	288	417	8	12	58	103									SAIDI index value = sum of all interruptions in time period where each interruption is defined as sum(duration of interruption * # of customer interruptions) / Total number of customers served	
	2.e.	System Average Interruption Frequency Index (SAIFI) (including PSPS)	2	1	4	2	3	0	0	1	0									SAIFI index value = sum of all interruptions in time period where each interruption is defined as (total # of customer interruptions) / (total # of customers served)	
	2.f.	System Average Interruption Frequency Index (SAIFI) (excluding PSPS)	2	1	4	2	3	0	0	1	0									SAIFI index value = sum of all interruptions in time period where each interruption is defined as (total # of customer interruptions) / (total # of customers served)	
3. Critical infrastructure impacted by PSPS	3.a.	Critical infrastructure impacted by PSPS	0	0	0	0	0	0	0	0	0									Number of critical infrastructure (in accordance with D.19-05-042) locations impacted per hour multiplied by hours offline per year	
4. Community outreach of PSPS metrics	4.a.	# of customers impacted by PSPS	0	0	0	30	0	0	0	0	0									# of customers impacted by PSPS (if multiple PSPS events impact the same customer, count each event as a separate customer)	
	4.b.	# of medical baseline customers impacted by PSPS	0	0	0	0	0	0	0	0	0									# of customers impacted by PSPS (if multiple PSPS events impact the same customer, count each event as a separate customer)	
	4.c.	# of customers notified prior to initiation of PSPS event	0	0	0	0	0	0	0	0	0									# of customers notified of PSPS event prior to initiation (if multiple PSPS events impact the same customer, count each event in which customer was notified as a separate customer)	
	4.d.	# of medical baseline customers notified prior to initiation of PSPS event	0	0	0	0	0	0	0	0	0									# of customers notified of PSPS event prior to initiation (if multiple PSPS events impact the same customer, count each event in which customer was notified as a separate customer)	
	4.e.	% of customers notified prior to a PSPS event impacting them	0	0	0	0	0	0	0	0	0									=4.c. / 4.a.	
	4.f.	% of medical baseline customers notified prior to a PSPS event impacting them	0	0	0	0	0	0	0	0	0									=4.d. / 4.b.	
5. Other PSPS metrics	5.a.	Number of PSPS events triggered where no de-energization occurred	0	0	0	0	0	0	0	0	0									Number of instances where utility notified the public of a potential PSPS event but no de-energization followed	
	5.b.	Number of customers located on de-energized circuit	0	0	0	185	0	0	0	0	0									Number of customers	
	5.c.	Customer hours of PSPS per RFW OH circuit mile day	0	0	0	0.03	0	0	0	0	0									=1.c. / RFW OH circuit mile days in time period	
	5.d.	Frequency of PSPS events (total) - High Wind Warning wind conditions	0	0	0	0	0	0	0	0	0									Events over time period that overlapped with a High Wind Warning as defined by the National Weather Service	
	5.e.	Scope of PSPS events (total) - High Wind Warning wind conditions	0	0	0	30	0	0	0	0	0									Estimated customers impacted over time period that overlapped with a High Wind Warning as defined by the National Weather Service	
	5.f.	Duration of PSPS events (total) - High Wind Warning wind conditions	0	0	0	90	0	0	0	0	0									Customer hours over time period that overlapped with a High Wind Warning as defined by the National Weather Service	

Utility		Liberty
Table No.		12
Date Modified		3/1/2021

Notes:
Risk-Spend-Efficiency (RSE) is defined as "An estimate of the cost-effectiveness of initiative, calculated by dividing the mitigation risk reduction benefit by the mitigation cost estimate based on the full set of risk reduction benefits estimated from the incurred costs."
CAPEX = Capital expenditure; OPEX = Operating expenditure.
In future submissions update planned spend, line miles treated, RSE, etc. with updated projections and actuals. Additional instructions can be found in QR information.

Table 12: Mitigation initiative financials

Metric type	WMP Table # / Category	WMP Initiative #	Initiative activity	Primary driver targeted	Secondary driver targeted	Year initiated	Estimated RSE in non-HFTD region	Estimated RSE in HFTD Zone 1	Estimated RSE in HFTD Tier 2	Estimated RSE in HFTD Tier 3	If existing: most recent proceeding that has reviewed program	If new: memorandum account	Current compliance status - In / exceeding compliance with regulations	Associated rule(s) - if multiple, separate by semi-colon - ";"	If spend not disaggregated by this activity, note activity where relevant spend is tracked in or mark "general operations"	Alternative units in which initiative is reported (if not line miles); still required to report line miles	Comments	Actual CAPEX ($ thousands) 2020	Actual OPEX ($ thousands) 2020	Actual Line miles to be treated 2020	Actual Alternative units (if used) 2020	Projected CAPEX ($ thousands) 2021	Projected OPEX ($ thousands) 2021	Projected Line miles to be treated 2021	Projected Alternative units (if used) 2021	Projected CAPEX ($ thousands) 2022	Projected OPEX ($ thousands) 2022	Projected Line miles to be treated 2022	Projected Alternative units (if used) 2022
Other	Risk Assessment & Mapping	7.3.1.1.	A summarized risk map that shows the overall ignition probability and estimated wildfire consequence along the electric lines and equipment	Contact with vegetation	Equipment failure	2020	NA	NA	NA	NA	N/A							-	67,465	-	-	-	10,000	-	-	-	10,000	-	-
Other	Risk Assessment & Mapping	7.3.1.2.	Climate-driven risk map and modelling based on various relevant weather scenarios	PSPS - for sectionalization, etc.	Contact with vegetation	2020	NA	NA	NA	NA	N/A							-	-	-	-	-	-	-	-	-	-	-	-
Other	Risk Assessment & Mapping	7.3.1.3.	Ignition probability mapping showing the probability of ignition along the electric lines and equipment	Contact with vegetation	Other contact with object	2020	NA	NA	NA	NA	N/A							-	-	-	-	-	-	-	-	-	-	-	-
Other	Risk Assessment & Mapping	7.3.1.4.	Initiative mapping and estimation of wildfire and PSPS risk-reduction impact	PSPS - for sectionalization, etc.	Other contact with object	2021	NA	NA	NA	NA	N/A							-	-	-	-	-	-	-	-	-	-	-	-
Other	Risk Assessment & Mapping	7.3.1.5.	Match drop simulations showing the potential wildfire consequence of ignitions that occur along the electric lines and equipment	Other contact with object	Contact with vegetation	2020	NA	NA	NA	NA	N/A							-	-	-	-	-	-	-	-	-	-	-	-
Other	Situational Awareness & Forecasting	7.3.2.1.	Advanced weather monitoring and weather stations	PSPS - for sectionalization, etc.		2019	NA	NA	NA	NA	2020 WMP	WFMMA	Exceeds compliance with regulations			# of weather stations installed		242,879	-	-	20 weather stations	120,000	-	-	10 weather stations	15,000	-	-	1 weather station
Other	Situational Awareness & Forecasting	7.3.2.2.	Continuous monitoring sensors	Equipment failure			NA	171.56	171.56	171.56								158,125	-	-	-	50,000	115,000	-	-	100,000	115,000	-	-
Other	Situational Awareness & Forecasting	7.3.2.3.	Fault indicators for detecting faults on electric lines and equipment	Equipment failure			NA	NA	NA	NA								-	-	-	-	-	-	-	-	-	-	-	-
Other	Situational Awareness & Forecasting	7.3.2.4.	Forecast of a fire risk index, fire potential index, or similar	PSPS - for sectionalization, etc.		2020	NA	NA	NA	NA	2020 WMP	WFMMA	Exceeds			N/A		-	44,313	-	-	-	10,000	-	-	-	10,000	-	-
Other	Situational Awareness & Forecasting	7.3.2.5.	Personnel monitoring areas of electric lines and equipment in elevated fire risk conditions	Equipment failure	Other contact with object	2019	NA	NA	NA	NA					Personnel work procedures and training in conditions of elevated fire risk			-	-	-	-	-	-	-	-	-	-	-	-
Other	Situational Awareness & Forecasting	7.3.2.6.	Weather forecasting and estimating impacts on electric lines and equipment	PSPS - for sectionalization, etc.			NA	NA	NA	NA								-	-	-	-	-	-	-	-	-	-	-	-
Grid hardening	Grid Design & System Hardening	7.3.3.1.	Capacitor maintenance and replacement program	Equipment failure		2011	NA	NA	NA	NA			In compliance GO 165	GO 165				-	-	-	-	-	-	-	-	-	-	-	-
Grid hardening	Grid Design & System Hardening	7.3.3.2.	Circuit breaker maintenance and installation to de-energize lines upon detecting a fault	Equipment failure		TBD	NA	NA	NA	NA			Exceeds compliance with regulations					-	-	-	-	500,000	-	-	-	5,500,000	-	-	-
Grid hardening	Grid Design & System Hardening	7.3.3.3.	Covered conductor installation	Other contact with object	Equipment failure	2019	NA	0.27	0.27	0.27	2020 WMP		In compliance with R20A	R20A				7,820,185	-	-	-	16,564,617	-	-	-	12,034,498	-	-	-
Grid hardening	Grid Design & System Hardening	7.3.3.4.	Covered conductor maintenance			TBD	NA	NA	NA	NA			TBD					-	-	-	-	-	-	-	-	-	-	-	-
Grid hardening	Grid Design & System Hardening	7.3.3.5.	Crossarm maintenance, repair, and replacement	Equipment failure		2021	NA						In compliance with GO95, GO 165	GO 95; GO165				89,121	5,450	-	-	-	-	-	-	-	-	-	-
Grid hardening	Grid Design & System Hardening	7.3.3.6.	Distribution pole replacement and reinforcement, including with composite poles	Equipment failure		2011					2020 WMP		In compliance GO 165	GO 165				3,651,519	-	-	-	10,605,000	-	-	-	2,610,250	-	-	-
Grid hardening	Grid Design & System Hardening	7.3.3.7.	Expulsion fuse replacement	Equipment failure		2011	2.29	2.29	2.29	2.29	2020 WMP		In compliance GO 165	GO 165				737,939	-	-	853	1,200,000	-	-	1,500	1,702,260	-	-	-
Grid hardening	Grid Design & System Hardening	7.3.3.8.	Grid topology improvements to mitigate or reduce PSPS events	PSPS - for sectionalization, etc.		2011					2020 WMP		In compliance with R20A	R20A				671,872	-	-	-	-	-	-	-	-	-	-	-
Grid hardening	Grid Design & System Hardening	7.3.3.9.	Installation of system automation equipment	PSPS - for sectionalization, etc.		2011					2020 WMP		Exceeds compliance with regulations					453,588	-	-	-	300,000	-	-	-	360,000	-	-	-
Grid hardening	Grid Design & System Hardening	7.3.3.10.	Maintenance, repair, and replacement of connectors, including hotline clamps			2011							In compliance GO 174	GO 174				-	-	-	-	-	-	-	-	-	-	-	-
Grid hardening	Grid Design & System Hardening	7.3.3.11.	Mitigation of impact on customers and other residents affected during PSPS event			2020							Exceeds compliance with regulations					-	-	-	-	-	-	-	-	-	-	-	-
Grid hardening	Grid Design & System Hardening	7.3.3.12.	Other corrective action			TBD							TBD					1,357,691	14,861	-	-	2,290,000	-	-	-	2,501,500	-	-	-
Grid hardening	Grid Design & System Hardening	7.3.3.13.	Pole loading infrastructure hardening and replacement program based on pole loading assessment program	Equipment failure		2011	0.80	0.80	0.80	0.80	2020 WMP		In compliance GO 165	GO 165				-	-	-	-	-	-	-	-	-	-	-	-
Grid hardening	Grid Design & System Hardening	7.3.3.14.	Transformers maintenance and replacement			2011	NA	NA	NA	NA			In compliance GO 165, GO 95	GO 95; GO 165				-	-	-	-	-	-	-	-	-	-	-	-
Grid hardening	Grid Design & System Hardening	7.3.3.15.	Transmission tower maintenance and replacement			2019	NA	NA	NA	NA			Exceeds compliance with regulations					-	-	-	-	-	-	-	-	-	-	-	-
Grid hardening	Grid Design & System Hardening	7.3.3.16.	Undergrounding of electric lines and/or equipment	Other contact with object	Equipment failure	TBD	0.44	0.44	0.44	0.44	2020 WMP		Exceeds compliance with regulations					522,414	-	-	-	1,445,414	-	-	-	7,654,120	-	-	-
Grid hardening	Grid Design & System Hardening	7.3.3.17.	Updates to grid topology to minimize risk of ignition in HFTDs	Equipment failure	Other contact with object	2020					2020 WMP		Exceeds compliance with regulations					-	-	-	-	-	-	-	-	-	-	-	-
Asset inspection	Asset Management & Inspections	7.3.4.1.	Detailed inspections of distribution electric lines and equipment	Equipment failure	Other contact with object	2011	0	0	0	0	2019 GRC		In Compliance	GO95; GO128; GO165	Detailed inspections of distribution electric lines and equipment	Detailed inspections of distribution electric lines and equipment	Liberty CalPeco does not have separate programs for distribution and transmission inspections	-	837,622	-	-	-	200,000	-	-	-	300,000	-	-
Asset inspection	Asset Management & Inspections	7.3.4.2.	Detailed inspections of transmission electric lines and equipment	Equipment failure	Other contact with object	2011	0	0	0	0	2019 GRC		In Compliance	GO95; GO128; GO165	Detailed inspections of transmission electric lines and equipment	Detailed inspections of transmission electric lines and equipment	Liberty CalPeco does not have separate programs for distribution and transmission inspections	-	-	-	-	-	-	-	-	-	-	-	-
Asset inspection	Asset Management & Inspections	7.3.4.3.	Improvement of inspections	Equipment failure	Other contact with object	2020	0	0	0	0	2020 WMP		In Compliance	GO95; GO128; GO165	Improvement of inspections	Improvement of inspections		-	-	-	-	-	150,000	-	-	-	150,000	-	-
Asset inspection	Asset Management & Inspections	7.3.4.4.	Infrared inspections of distribution electric lines and equipment	Equipment failure	Other contact with object	2021	0	0	0	0	N/A		In Compliance		Infrared inspections of distribution electric lines and equipment	Infrared inspections of distribution electric lines and equipment	RFP in 2021, pilot in 2022	-	-	-	-	-	35,000	-	-	-	200,000	-	-
Asset inspection	Asset Management & Inspections	7.3.4.5.	Infrared inspections of transmission electric lines and equipment	Equipment failure	Other contact with object	2021	0	0	0	0	N/A		In Compliance		Infrared inspections of transmission electric lines and equipment	Infrared inspections of transmission electric lines and equipment	RFP in 2021, pilot in 2022	-	-	-	-	-	-	-	-	-	-	-	-
Asset inspection	Asset Management & Inspections	7.3.4.6.	Intrusive pole inspections	Equipment failure	Other contact with object	2011	0	0	0	0	2019 GRC		In Compliance	GO95; GO165	Intrusive pole inspections	Intrusive pole inspections		-	10,404	-	-	-	147,000	-	-	-	101,626	-	-
Asset inspection	Asset Management & Inspections	7.3.4.7.	LiDAR inspections of distribution electric lines and equipment	Equipment failure	Other contact with object	0	0	0	0	0	N/A		In Compliance		LiDAR inspections of distribution electric lines and equipment	LiDAR inspections of distribution electric lines and equipment	No plans for LiDAR inspections this filing	-	-	-	-	-	-	-	-	-	-	-	-
Asset inspection	Asset Management & Inspections	7.3.4.8.	LiDAR inspections of transmission electric lines and equipment	Equipment failure	Other contact with object	0	0	0	0	0	N/A		In Compliance		LiDAR inspections of transmission electric lines and equipment	LiDAR inspections of transmission electric lines and equipment	No plans for LiDAR inspections this filing	-	-	-	-	-	-	-	-	-	-	-	-
Asset inspection	Asset Management & Inspections	7.3.4.9.	Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations	Equipment failure	Other contact with object	2020	0	0	0	0	2020 WMP		Exceeds Compliance	GO95; GO128; GO165	Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations	Other discretionary inspection of distribution electric lines and equipment, beyond inspections mandated by rules and regulations	System Survey completed in 2020	-	-	-	-	-	2,300,000	-	-	-	-	-	-
Asset inspection	Asset Management & Inspections	7.3.4.10.	Other discretionary inspection of transmission electric lines and	Equipment failure	Other contact with object	2020	0	0	0	0	2020 WMP		Exceeds Compliance	GO95; GO128; GO165	Other discretionary inspection of transmission electric lines and	Other discretionary inspection of transmission electric lines and	System Survey completed in 2020	2,994,266	-	-	-	-	-	-	-	-	-	-	-
Asset inspection	Asset Management & Inspections	7.3.4.11.	Patrol inspections of distribution electric lines and equipment	Equipment failure	Other contact with object	2011	0	0	0	0	2019 GRC		In Compliance	GO95; GO165	Patrol inspections of distribution electric lines and equipment	Patrol inspections of distribution electric lines and equipment	Liberty CalPeco does not have separate programs for distribution and transmission inspections	-	-	-	-	-	-	-	-	-	-	-	-
Asset inspection	Asset Management & Inspections	7.3.4.12.	Patrol inspections of transmission electric lines and equipment	Equipment failure	Other contact with object	2011	0	0	0	0	2019 GRC		In Compliance	GO95; GO165	Patrol inspections of transmission electric lines and equipment	Patrol inspections of transmission electric lines and equipment	Liberty CalPeco does not have separate programs for distribution and transmission inspections	-	-	-	-	-	-	-	-	-	-	-	-
Asset inspection	Asset Management & Inspections	7.3.4.13.	Pole loading assessment program to determine safety factor	Equipment failure	Other contact with object	2013	0	0	0	0	2019 GRC		In Compliance	GO95	Pole loading assessment program to determine safety factor	Pole loading assessment program to determine safety factor		-	-	-	-	-	100,000	-	-	-	100,000	-	-
Asset inspection	Asset Management & Inspections	7.3.4.14.	Quality assurance / quality control of inspections	Equipment failure	Other contact with object	2021	0	0	0	0	N/A		In Compliance	GO95; GO128; GO165	Quality assurance / quality control of inspections	Quality assurance / quality control of inspections	RFP in 2021, pilot in 2022	-	-	-	-	-	35,000	-	-	-	200,000	-	-
Asset inspection	Asset Management & Inspections	7.3.4.15.	Substation inspections	Equipment failure	Other contact with object	2016	0	0	0	0	2019 GRC		In Compliance	GO174	Substation inspections	Substation inspections		-	-	-	-	-	10,000	-	-	-	10,000	-	-
Vegetation management project	Vegetation Management & Inspections	7.3.5.1.	Additional efforts to manage community and environmental impacts	Contact with vegetation		2020					2020 WMP	WMPMA	Exceeding	GO 95 Rule 35; PRC 4293				-	771,043	-	-	-	750,000	-	-	-	772,100	-	-
Vegetation inspection	Vegetation Management & Inspections	7.3.5.2.	Detailed inspections of vegetation around distribution electric lines and equipment	Contact with vegetation		2011	0.27	0.27	0.27	0.27	2019 GRC		Exceeding	GO 95 Rule 35; PRC 4293		Number of trees inspected resulting in a work order		-	555,763	-	-	-	610,000	-	-	-	628,300	-	-
Vegetation inspection	Vegetation Management & Inspections	7.3.5.3.	Detailed inspections of vegetation around transmission electric lines and equipment															-	-	-	-	-	-	-	-	-	-	-	-
Vegetation management project	Vegetation Management & Inspections	7.3.5.4.	Emergency response vegetation management due to red flag warning or other urgent conditions															-	-	-	-	-	-	-	-	-	-	-	-
Vegetation management project	Vegetation Management & Inspections	7.3.5.5.	Fuel management and reduction of "slash" from vegetation management activities	Equipment failure		2020					2020 WMP	WMPMA	Exceeding	PRC 4291; PRC 4292				-	354,689	-	-	-	2,000,000	-	-	-	2,000,000	-	-
Vegetation inspection	Vegetation Management & Inspections	7.3.5.6.	Improvement of inspections				0.27	0.27	0.27	0.27								-	-	-	-	-	-	-	-	-	-	-	-
Vegetation inspection	Vegetation Management & Inspections	7.3.5.7.	LiDAR inspections of vegetation around distribution electric lines and equipment	Contact with vegetation		2020						WMPMA	Exceeding	GO 95 Rule 35; PRC 4293				369,298	-	320	-	400,000	420,000	328	-	-	820,000	-	-
Vegetation inspection	Vegetation Management & Inspections	7.3.5.8.	LiDAR inspections of vegetation around transmission electric lines and equipment															-	-	-	-	-	-	-	-	-	-	-	-
Vegetation inspection	Vegetation Management & Inspections	7.3.5.9.	Other discretionary inspections of vegetation around distribution electric lines and equipment	Contact with vegetation		2020					2020 WMP	WMPMA	Exceeding	GO 95 Rule 35; PRC 4293		Number of trees inspected resulting in a work order		-	85,139	-	-	-	-	-	-	-	-	-	-
Vegetation inspection	Vegetation Management & Inspections	7.3.5.10.	Other discretionary inspections of vegetation around transmission electric lines and equipment															-	-	-	-	-	-	-	-	-	-	-	-
Vegetation inspection	Vegetation Management & Inspections	7.3.5.11.	Patrol inspections of vegetation around distribution electric lines and equipment	Contact with vegetation		2018					2019 GRC					Number of trees inspected resulting in a work order		-	420,800	-	-	-	450,000	-	-	-	465,000	-	-
Vegetation inspection	Vegetation Management & Inspections	7.3.5.12.	Patrol inspections of vegetation around transmission electric lines and equipment															-	NA	-	-	-	-	-	-	-	-	-	-
Vegetation inspection	Vegetation Management & Inspections	7.3.5.13.	Quality assurance / quality control of vegetation inspections	Contact with vegetation		2020	NA	NA	NA	NA	2020 WMP	WMPMA						-	67,033	-	-	-	250,000	-	-	-	250,000	-	-
Vegetation management project	Vegetation Management & Inspections	7.3.5.14.	Recruiting and training of vegetation management personnel				NA	NA	NA	NA								-	-	-	-	-	-	-	-	-	-	-	-
Vegetation management project	Vegetation Management & Inspections	7.3.5.15.	Remediation of at-risk species	Contact with vegetation		2011					2019 GRC		Exceeding	GO 95 Rule 35; PRC 4293		Number of trees pruned or removed		-	7,338,323	-	-	-	5,500,000	-	-	-	5,150,000	-	-
Vegetation management project	Vegetation Management & Inspections	7.3.5.16.	Removal and remediation of trees with strike potential to electric lines and equipment	Contact with vegetation		2018					2019 GRC		Exceeding	GO 95 Rule 35; PRC 4293		Number of trees pruned or removed		-	2,722,530	-	-	-	2,200,000	-	-	-	2,200,000	-	-
Vegetation inspection	Vegetation Management & Inspections	7.3.5.17.	Substation inspection				NA	NA	NA	NA								-	-	-	-	-	-	-	-	-	-	-	-
Vegetation management project	Vegetation Management & Inspections	7.3.5.18.	Substation vegetation management				NA	NA	NA	NA								-	-	-	-	-	-	-	-	-	-	-	-
Vegetation management project	Vegetation Management & Inspections	7.3.5.19.	Vegetation inventory system				NA	NA	NA	NA								-	-	-	-	-	-	-	-	-	-	-	-
Vegetation management project	Vegetation Management & Inspections	7.3.5.20.	Vegetation management to achieve clearances around electric lines and equipment	Contact with vegetation		2011					2019 GRC		Exceeding	GO 95 Rule 35; PRC 4293				-	-	-	-	-	1,000,000	-	-	-	1,500,000	-	-
Other	Grid Operations & Operating Protocols	7.3.6.1.	Automatic recloser operations	Contact with vegetation	Equipment failure	2011	NA	NA	NA	NA	2020 WMP	WMPMA	In compliance					-	-	-	-	-	-	-	-	-	-	-	-
Other	Grid Operations & Operating Protocols	7.3.6.2.	Crew-accompanying ignition prevention and suppression resources and services				NA	NA	NA	NA								-	-	-	-	-	-	-	-	-	-	-	-
Other	Grid Operations & Operating Protocols	7.3.6.3.	Personnel work procedures and training in conditions of elevated fire risk				NA	NA	NA	NA								-	278,576	-	-	-	250,000	-	-	-	250,000	-	-
Other	Grid Operations & Operating Protocols	7.3.6.4.	Protocols for PSPS re-energization	PSPS - for sectionalization, etc.	Other contact with object	2020	NA	NA	NA	NA	GO 166	WMPMA	In compliance					-	-	-	-	-	-	-	-	-	-	-	-
Other	Grid Operations & Operating Protocols	7.3.6.5.	PSPS events and mitigation of PSPS impacts				NA	NA	NA	NA								-	-	-	-	-	-	-	-	-	-	-	-
Other	Grid Operations & Operating Protocols	7.3.6.6.	Stationed and on-call ignition prevention and suppression resources and services				NA	NA	NA	NA								92,731	-	-	-	298,000	-	-	-	200,000	-	-	-
Other	Data Governance	7.3.7.1.	Centralized repository for data				NA	NA	NA	NA								-	-	-	-	-	162,500	-	-	-	165,875	-	-
Other	Data Governance	7.3.7.2.	Collaborative research on utility ignition and/or wildfire	Contact with vegetation	Other contact with object	2021	NA	NA	NA	NA	2020 WMP	WMPMA	In compliance					-	1,138	-	-	-	255,000	-	-	100,000	85,000	-	-
Other	Data Governance	7.3.7.3.	Documentation and disclosure of wildfire-related data and algorithms				NA	NA	NA	NA								-	-	-	-	-	-	-	-	-	-	-	-
Other	Data Governance	7.3.7.4.	Tracking and analysis of near miss data				NA	NA	NA	NA								-	-	-	-	-	-	-	-	-	-	-	-
Other	Resource Allocation Methodology	7.3.8.1.	Allocation methodology development and application				NA	NA	NA	NA								-	-	-	-	-	123,750	-	-	-	254,925	-	-
Other	Resource Allocation Methodology	7.3.8.2.	Risk reduction scenario development and analysis				NA	NA	NA	NA								-	-	-	-	-	-	-	-	-	-	-	-
Other	Resource Allocation Methodology	7.3.8.3.	Risk spend efficiency analysis				NA	NA	NA	NA								-	-	-	-	-	-	-	-	-	-	-	-
Other	Emergency Planning & Preparedness	7.3.9.1.	Adequate and trained workforce for service restoration	PSPS - for sectionalization, etc.	Other contact with object	2011	NA	NA	NA	NA	2020 WMP	WMPMA	In compliance					-	502,233	-	-	-	899,598	-	-	-	1,304,068	-	-
Other	Emergency Planning & Preparedness	7.3.9.2.	Community outreach, public awareness, and communications efforts				NA	NA	NA	NA								-	-	-	-	-	-	-	-	-	-	-	-
Other	Emergency Planning & Preparedness	7.3.9.3	Customer support in emergencies				NA	NA	NA	NA								-	-	-	-	-	-	-	-	-	-	-	-
Other	Emergency Planning & Preparedness	7.3.9.4.	Disaster and emergency preparedness plan				NA	NA	NA	NA								-	-	-	-	-	-	-	-	-	-	-	-
Other	Emergency Planning & Preparedness	7.3.9.5.	Preparedness and planning for service restoration	PSPS - for sectionalization, etc.	Equipment failure	2011	NA	NA	NA	NA	2020 WMP		In compliance					-	-	-	-	-	-	-	-	-	-	-	-
Other	Emergency Planning & Preparedness	7.3.9.6.	Protocols in place to learn from wildfire events				NA	NA	NA	NA								-	-	-	-	-	-	-	-	-	-	-	-
Other	Stakeholder Cooperation & Community Engagement	7.3.10.1	Community engagement			2019	NA	NA	NA	NA	2020 WMP	WMPMA	Exceeds	P.U. Code § 451				-	92,084	-	-	-	251,250	-	-	-	390,375	-	-
Other	Stakeholder Cooperation & Community Engagement	7.3.10.2	Cooperation and best practice sharing with agencies outside CA															-	-	-	-	-	-	-	-	-	-	-	-
Other	Stakeholder Cooperation & Community Engagement	7.3.10.3	Cooperation with suppression agencies															-	-	-	-	-	-	-	-	-	-	-	-
Other	Stakeholder Cooperation & Community Engagement	7.3.10.4	Forest service and fuel reduction cooperation and joint roadmap															-	-	-	-	-	-	-	-	-	-	-	-
																		$ 19,161,628	$ 14,169,467			$ 33,773,031	$ 18,234,098			$ 32,777,628	$ 17,432,269		

Attachment B

WMP Resiliency Program Design Concept

February 16th, 2021

Customer Resiliency Program Design Concept

Liberty CalPeco Wildfire Mitigation Plan

Prepared for:

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Table of Contents

1 Program Overview 1

1.1 Goals and Objectives 1

2 Resiliency Corridors 2

2.1 Hazard Probability & Analysis 2

2.2 Disruption Challenges 3

2.3 Penetration of Critical Customers 4

2.4 Societal and Economic Impact 6

3 Application Filing Proposed Process 7

4 Resiliency Programs & Pathways 8

4.1 Program Tenants 8

4.1.1 Target Customers 8

4.1.2 Determining Resiliency Outage Duration 9

4.2 Program 1: Community Core Microgrid 9

4.2.1 Targeted Community Cores 10

4.2.2 Program Process 11

4.2.3 Financing and Ownership Options 12

4.3 Program 2: Medical Baseline Customers: Behind-the-Meter Resiliency 12

4.3.1 Program Process 13

4.3.2 Financing and Ownership Options 13

4.4 Program 3: Critical Facilities & Large Customers: Behind-the-Meter Resiliency 13

4.4.1 Program Process 14

4.4.2 Financing and Ownership Options 14

4.5 Program Innovations 15

4.5.1 Connection with EVs and future DRIVE programs 15

5 Energy Storage System Value Streams 16

5.1.1 Summary 16

5.1.2 Customer Value Streams 16

5.1.3 Utility Value Streams 17

5.1.4 Societal Value Streams 17

6 Conclusions 18

Tables

Table 1: California IOU Reliability 2019 3

Table 2: Customers by Customer Class 5

Table 3: Critical Customer Count 5

Figures

Figure 1: Resiliency Prioritization Framework 2

Figure 2: Top 20 Circuit Outages 4

Figure 3: Customer Minutes of Interruption (CMI) by Cause 4

Figure 4. Regional Socio-Economic Factors 6

Figure 5: Application Filing Proposed Process 7

Figure 6: Program Pathways 9

Figure 5. Community Core Model 10

Figure 6. Liberty Program 1 Elements 10

Figure 9. Liberty Program 2 Elements 12

Figure 10. Liberty Program 3 Elements 14

1 Program Overview

In February of 2020, Liberty Utilities (CalPeco Electric) LLC ("Liberty") filed a Wildfire Mitigation Plan that focused on efforts to address grid reliability and resiliency considering the increased risk of wildfires in the region. With fire risks expected to increase in the next ten years and an aging customer population, Liberty believes that providing customer-centered resiliency services that complement grid hardening and vegetation management are critical to ensure resiliency of the community during and after disasters.

Liberty proposes a portfolio of customer resiliency programs (Programs) that will: 1) establish a set of prioritized resiliency corridors in the region where focused customer engagement and outreach will occur to provide resiliency services (back-up power) to central areas within a community (modeled after PG&E's Community Microgrid Enablement Program) and, 2) provide specifically-targeted resiliency services to both medical baseline customers and critical customers alike. The following sections provide a conceptual overview of the goals of these programs, their objectives, and pathways for facilitating participation. A detailed program portfolio application that expands on these concepts will be filed in June of 2021.

1.1 Goals and Objectives

Liberty defines energy resiliency as the ability to avoid, prepare for, minimize, adapt to, and recover from anticipated and unanticipated energy disruptions in order to ensure energy availability and reliability. The energy availability will be sufficient to provide for critical load assurance and readiness, including Emergency Support Functions related to readiness, and to execute or rapidly reestablish critical lifeline essential requirements[1]. This definition was adopted by the Electric Power Research Institute's (EPRI) value of resiliency working group. The Program portfolio sets forth the following goal and objectives to help guide customer engagement.

Goal: Provide cost-effective Customer Resiliency offerings to prioritized resiliency corridors, medical baseline customers, and other critical customers within Liberty 's service territory to ensure customers have reliable and backup power during wildfire, public safety power shutoff (PSPS), and winter storm events.

Objectives

- Deliver resiliency programs to be launched to customers by 2022
- Identify additional value streams associated with energy storage beyond resiliency that support the utility business case and provide stackable values to customer, Liberty, and society
- Investigate opportunities for Program expansion throughout the territory

Liberty understands that resiliency is the primary need for Liberty customers; however, other value streams could also be harnessed through the Programs during blue sky operations. Further details on this potential are provided in *Section 5. Battery Storage Value Streams*.

[1] EPRI.. (2020, March). Value of Resilience Interest Group. https://www.epri.com/research/products/000000003002018412

2 Resiliency Corridors

The first step in developing the resiliency program portfolio is identifying key resiliency corridors that must remain operational during hazard events. After identifying these resiliency corridors, Liberty will work with customers to determine the best pathway for their participation and opportunity to receive resiliency services (further described in *Section 4. Resiliency Program Pathways)*. This effort, and the resulting Resiliency Corridor program, represents the first of the two primary resiliency program offerings that will make up the resiliency program portfolio.

Liberty will utilize the prioritization framework in Figure 1 to map areas of critical need for resiliency interventions (resiliency corridors) and focus customer engagement:

- **Layer 1.** Understand the high hazard probability and locations that are most at risk of wildfires, PSPS, and winter storms. This is a future looking analysis.
- **Layer 2.** Identify circuits with current disruption challenges and typical outage lengths.
- **Layer 3.** Explore the percentage penetration of critical customers; this includes critical facilities as defined by the CPUC and medical baseline customers.
- **Layer 4.** Investigate areas that have large societal and economic impact due to outages. For example, areas like Kings Beach which if offline for multiple days would cause distress to the local economies.

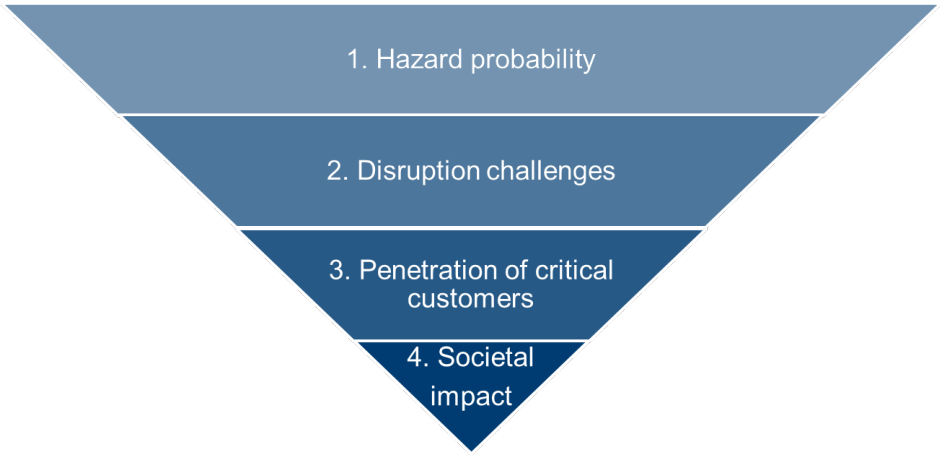

Figure 1: Resiliency Prioritization Framework

2.1 Hazard Probability & Analysis

Liberty's territory sits within a mountainous zone and heavily treed area that experiences multiple hazards throughout the year. Wildfires, winter storms, and PSPS events are the main hazards expected to increase over the next ten years, growing more frequent and extreme.[2] Liberty's resiliency Programs are designed to address these three major hazards experienced by customers.

Considering that Liberty is a winter-peaking utility, the impacts of increased winter storms is paramount to address with urgency. Additionally, while Liberty did not have any PSPS events in 2019, one event did

[2] Michael Goss *et al* 2020 *Environ.* https://iopscience.iop.org/article/10.1088/1748-9326/ab83a7

occur in 2018. Liberty staff received weather reports from National Weather Service (NWS) that indicated a storm was approaching with high winds and the conditions warranted a Fire Weather Watch. This was the first significant storm of the season and the local vegetation had not received enough precipitation to reduce the high fire danger. The PSPS event began at 12:00 PM on November 21, 2018 and lasted until 3:00 PM that afternoon. The de-energized lines included lines in South Lake Tahoe, Kings Beach and Tahoe City. In total, de-energization impacted 30 customers (29 residential customers and one commercial customer). The wind and storm impacts did not develop to the extent forecasted. Liberty Utilities staff determined that the fire danger had passed and the decision was made to restore all circuits.

In 2019, neighboring utility Pacific Gas and Electric (PG&E) experienced multiple PSPS events ranging from outages of 3-16 days[3]. Considering the changing climate and projected shifts, Liberty is expecting PSPS events to become more frequent and necessary to protect from future wildfires, and therefore taking a proactive approach in developing this Program to ensure resiliency for customers and minimize the impact of PSPS events.

2.2 Disruption Challenges

While Liberty disruption metrics are in the middle of the California IOU average (see Table 1), identifying the locations that experience the most outages within the territory will ensure resilience planning target the most vulnerable circuits and against the most common causes. When investigating opportunities for resiliency corridors, the Liberty team is looking at occurrences when larger customer groups are impacted by outages, which could be an entire substation or circuit. These are locations in most need of resiliency services.

Figure 2 shows the Liberty circuits that experienced the highest average interruption duration in 2019. Targeting the circuits most susceptible to interruptions with infrastructure hardening and resilience program efforts can reduce 90% of the cumulative interruption duration. Figure 3 shows the customer minutes of interruption (CMI) by cause of interruption. Together, vegetation- related – including tree fell and broken tree limbs – and vehicle-related causes account for roughly half of all CMI experienced.

Investor Owned Utility	SAIDI with Major Event Day (MED)	SAIFI with Major Event Day (MED)
Pacific Gas & Electric Co.	1,355	1.80
PacifiCorp	590	3.05
Liberty Utilities	417	2.96
Bear Valley Electric Service	318	2.20
Southern California Edison Co	178	1.04
San Diego Gas & Electric Co	123	0.64

Table 1: California IOU Reliability 2019

[3] https://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Utilities_and_Industries/Energy/Energy_Programs/Electrical_Infrastructure,_Planning,_and_Permitting/Reliability_and_Distribution_Infrastructure/Reliability/2019_PGE.pdf

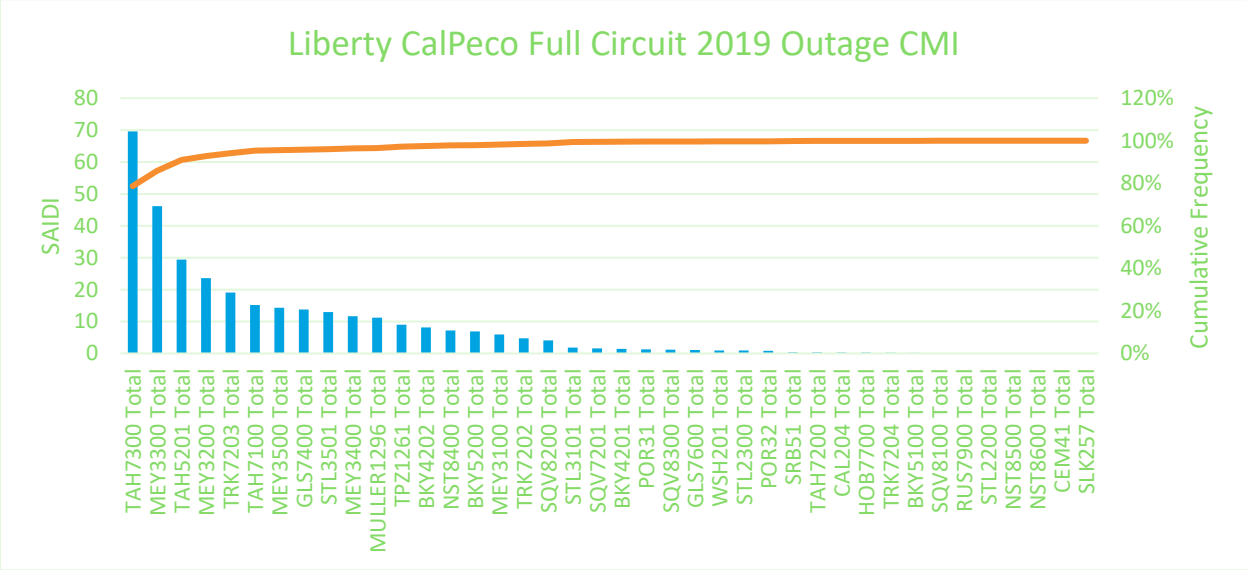

Figure 2: Top Circuit Outages

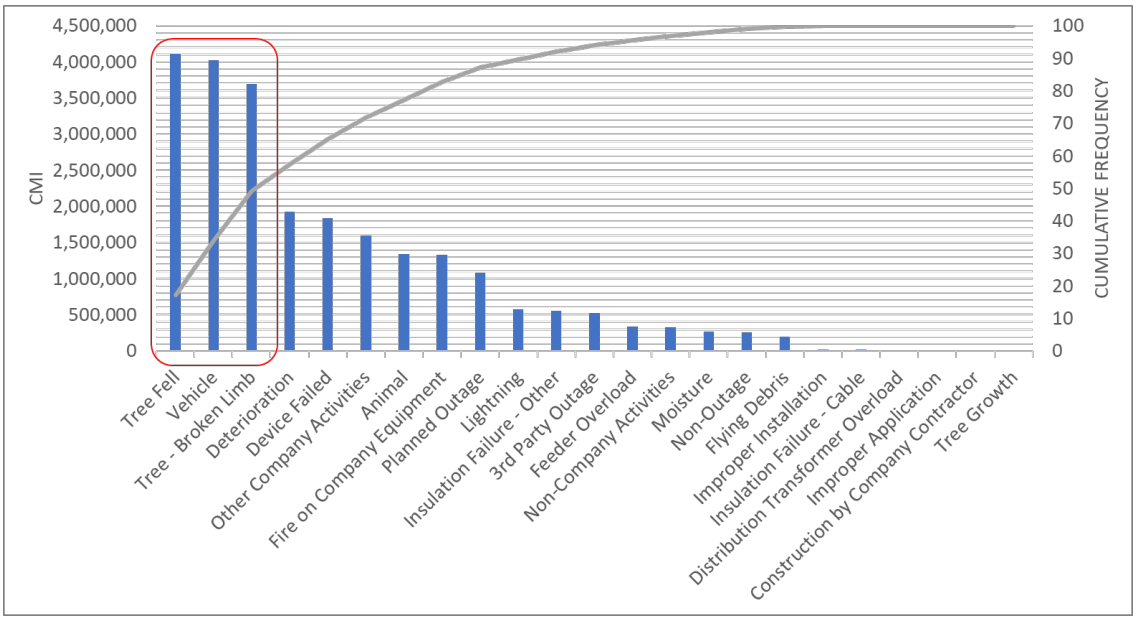

Figure 3: Customer Minutes of Interruption (CMI) by Cause

2.3 Penetration of Critical Customers

Critical customers make up approximately 1% of Liberty's customer base of 49,000 customers. Medical baseline customers make up 0.94% of the Residential customer base. Critical facilities are a mix of large,

medium, and commercial customers. Initial investigation into critical facilities has identified over 130 may exist in the territory. This layer is critical to understand where resiliency services are most at need.

Customer Rate Class: 2020	Customer Count	% Total
Large Commercial	52	0.11%
Medium Commercial	232	0.47%
Small Commercial	5,261	10.72%
Residential Primary	14,473	29.49%
Residential Non-Primary	25,371	51.70%
CARE- Low Income	3,686	7.51%
	49,075	

Table 2: Customers by Customer Class

Customer Rate Class: 2020	Customer Count	% Customer Group and Total
Critical Facilities	138	27% Commercial .2% total
Medical Baseline	278	0.94% Residential 0.77% total

Table 3: Critical Customer Count

Critical customers are defined as facilities that are essential to the public safety and that require additional assistance and advance planning to improve resiliency during de-energization events[4].

- **Emergency Services Sector:** Police stations, fire stations, and emergency operations centers
- **Government Facilities Sector:** Schools, jails, and prisons
- **Healthcare and Public Health Sector:** Public health departments and medical facilities, including hospitals, skilled nursing facilities, nursing homes, blood banks, health care facilities, dialysis centers, and hospice facilities
- **Energy Sector:** Public and private utility facilities vital to maintaining or restoring normal service, including, but not limited to, interconnected publicly-owned utilities and electric cooperatives
- **Water and Wastewater Systems Sector:** Facilities associated with the provision of drinking water or processing of wastewater including facilities used to pump, divert, transport, store, treat, and deliver water or wastewater
- **Communications Sector:** Communication carrier infrastructure including selective routers, central offices, head ends, cellular switches, remote terminals, and cellular sites

[4] Definition adopted from the CPUC ruling https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M313/K975/313975481.PDF

- **Chemical Sector:** Facilities associated with the provision of manufacturing, maintaining, or distributing hazardous materials and chemicals

Medical Baseline customers are defined as those residential customers that are billed at the "Baseline Allowance" and those that receive extra allowances for relying on life support equipment or those who have life threatening illnesses or compromised immune systems. Within the Residential Primary and Residential Non-Primary customer groups, there are 378 Medical customers, accounting for 0.94% of the residential groups (Primary and Non-Primary) and 0.77% total customer count.

2.4 Societal and Economic Impact

Liberty has identified several target regions that are of economic importance to their communities and will take these areas into consideration for the Resiliency Program. Primary areas include North and South Lake Tahoe, which drive economic activity for much of the region and could present significant losses and distress to the broader community through extended outages. Secondary areas, with more modest but still important economic activity, include Portola, Loyalton, Walker-Coleville, and Markleeville. Figure 4 illustrates sample socio-economic factors[5] to consider through the program.

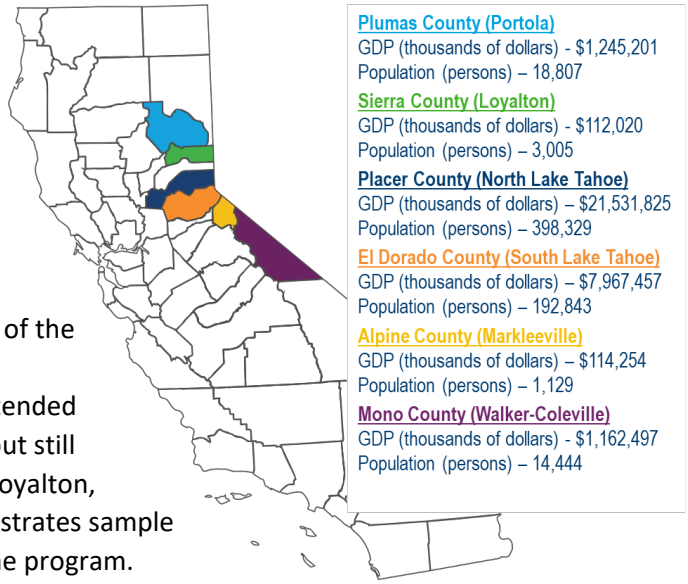

Figure 4. Regional Socio-Economic Factors

[5] https://www.bea.gov/data/gdp/gdp-county-metro-and-other-areas

3 Application Filing Proposed Process

Liberty plans to embark on a comprehensive resiliency program portfolio design initiative to develop the detailed filing application by June of 2021. Figure 3 illustrates the approach Liberty plans to undertake to develop the application.

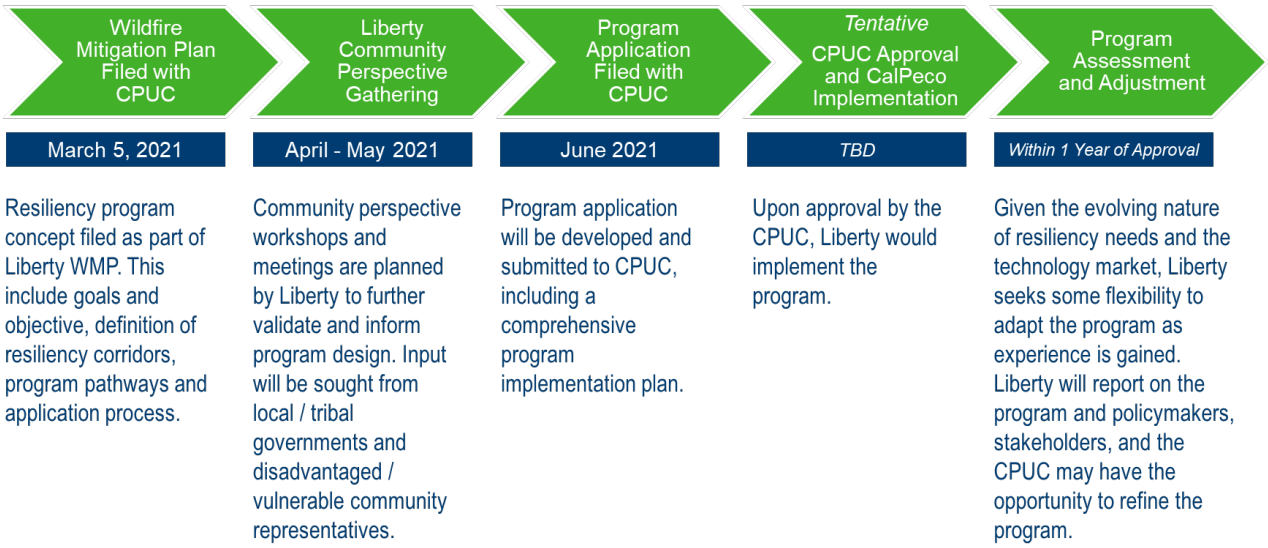

Figure 5: Application Filing Proposed Process

4 Resiliency Programs & Pathways

4.1 Program Tenants

As discussed earlier, the goal of the Programs are to both provide resiliency services to key regions identified as resiliency corridors and to provide resiliency services targeted towards critical facilities and medical baseline customers both inside and outside resiliency corridors. The Program will also consider providing resiliency solutions to large commercial (A3) customers utilizing participation in the program as a way to cost-share program expenses. Winter storms, wildfires, and PSPS events continue to be the main drivers of this need and the resiliency Programs will help targeted customers avoid, prepare for, minimize, adapt to, and recover from anticipated and unanticipated energy disruptions.

Liberty anticipates the resiliency programs to start in 2022 with customer enrollment and enablement continuing through 2024. Enrollment can be phased in accordance with annual targets to mitigate any perceived risk with enablement and performance. The resiliency programs will be investigated holistically to identify potential synergies between each program path and how the resources can be utilized in a modern grid for management and control, aggregating the resources for both resiliency and blue sky operations.

4.1.1 Target Customers

The Programs will provide resiliency services to three main customer sets, both to and behind the meter to meet the overall goals and objectives of the program. In some cases, this will result in redundancy and increased flexibility in responding to longer outages for specific customers. The target customer paths – akin to distinct programmatic offerings - include: 1) community core, 2) medical baseline customers, and 3) critical facilities. Program participants will be supported by resiliency specialists to navigate which program path to take. The solution assessments will be addressed on a portfolio basis to ensure that resiliency solutions are leveraged between the site locations.

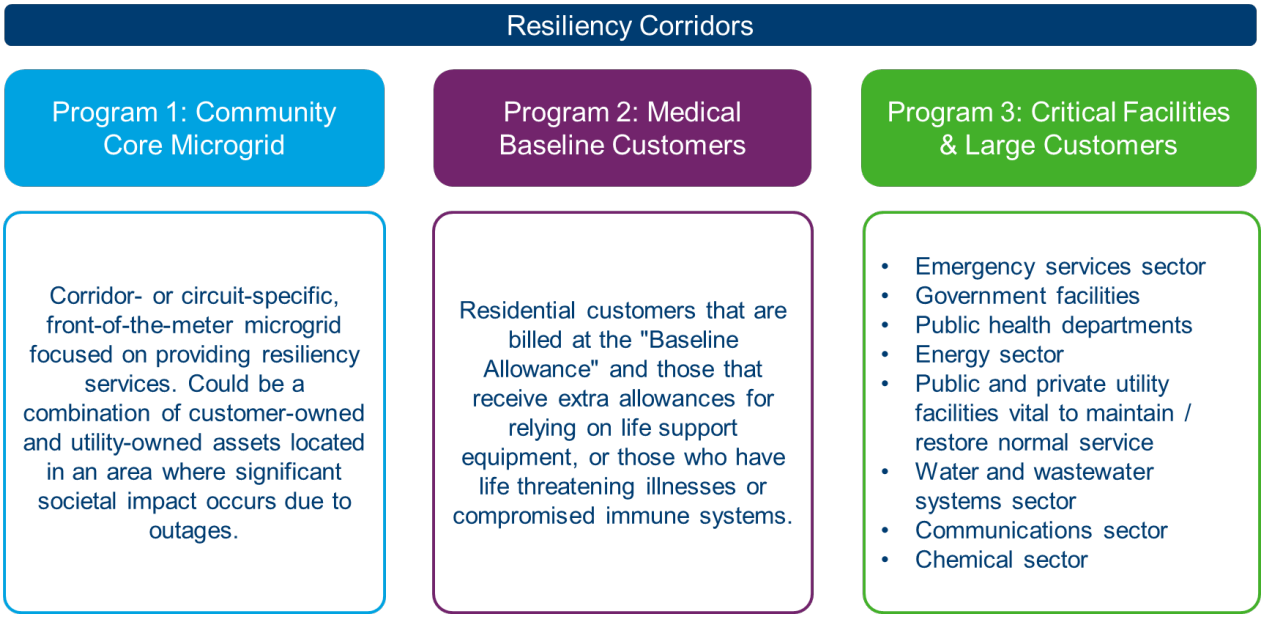

Figure 6: Program Pathways

4.1.2 Determining Resiliency Outage Duration

Utilizing industry best practices, Liberty sets outage durations for resiliency for greater than 16 hours. This builds from industry standard tools such as the Interruption Cost Estimate (ICE) Calculator[6], which values the cost of interruption mainly on short-term outages less than 16 hours. Liberty plans to investigate resiliency for target customers through a scenario approach, exploring outages for: 1) 24 hours, 2) 72 hours, and 3) outages greater than one week. While the sizing may be appropriate for smaller outages, Liberty will continuously review against future outages to ensure that increasing outage duration isn't required.

4.2 Program 1: Community Core Microgrid

Program Path 1 mimics the approach taken by PG&E in the most recent development of its Community Microgrid Enablement Program (CMEP)[7]. This program will establish in-front-of-the-meter microgrids for specific locations within resiliency corridors that ensure connectivity of key community cores already connected via a specific substation or circuit.

[6] https://www.icecalculator.com/
[7] https://www.pge.com/tariffs/assets/pdf/adviceletter/ELEC_5918-E.pdf

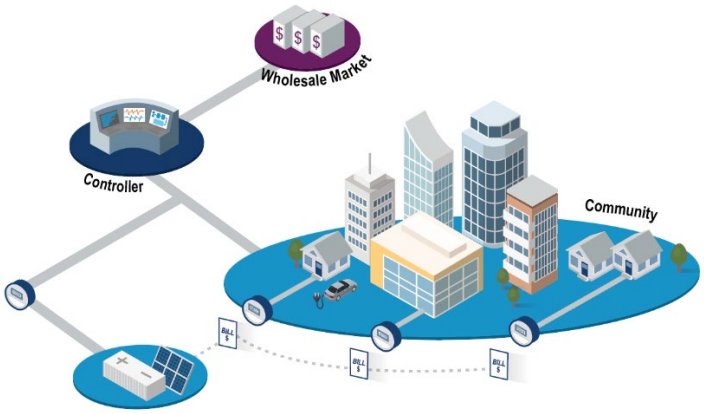

Figure 7. Community Core Model

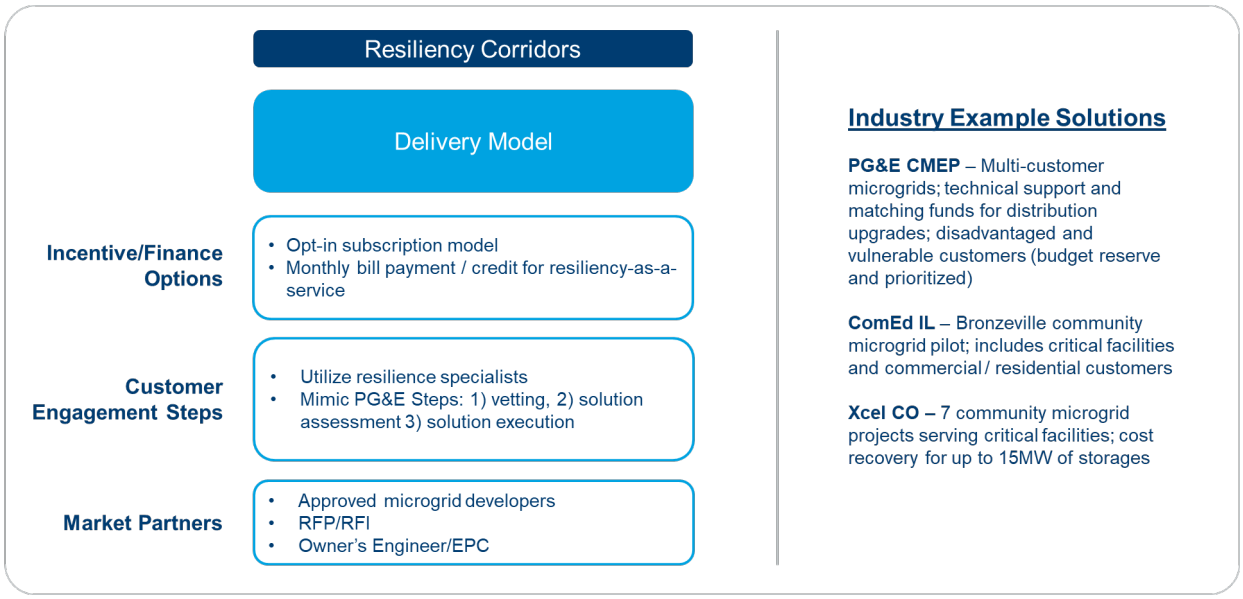

Figure 8. Liberty Program 1 Elements

4.2.1 Targeted Community Cores

The community core model is a circuit-specific, front-of-the-meter microgrid focused on providing resiliency services. The thrust of this program is to enable prioritized communities with resiliency; however, as there are likely medical baseline and critical customers within these corridors, it is worth noting that this program type is not mutually exclusive of the other two programs to be discussed later in this paper. By selectively combining of both community core efforts and customer-sided investments portfolio of programs can ensure that critical facilities and medical baseline customers can install additional assets on their side of the meter. For example, critical customers, such as hospitals or water treatment facilities, or medical baseline customers may be best served by behind-the-meter applications even when those facilities may exist within the community core. In that case, the technical assistance services provided by Liberty would help customers navigate the best options for participation in the resiliency Program. Thus, in its totality, this program could include a combination of customer-owned and utility-owned assets located in an area where significant societal impact occurs due to outages. But,

for this particular program – community core - the programmatic investments will be focused on grid-sided assets and controls.

Considering the size of the Liberty territory, this model may focus on four to five locations throughout the territory. For example, Kings Beach, located in the North Lake Tahoe resiliency corridor, is already underway with planned construction in 2021. The project includes the installation of covered conductors between 12 MW of existing diesel generation at Kings Beach substation and HWY 28 to keep underground portions of the Kings Beach community energized. Additional facilities and investigation could also create greater resiliency for this key community core.

4.2.2 Program Process

This approach provides heavy technical assistance and support to specific community cores as they explore the option for microgrids. Liberty's suggested steps leverage the work already completed by the PG&E Community Microgrid Enablement Program[8]:

- **Step 1. Vetting and determining feasibility.** Liberty will work with community representatives that are seeking a resiliency solution for a community core. Liberty will utilize a team of resilience specialists that will help the community understand options available to them and share basic grid characteristics in the area that may impact the extent of likely upgrades needed under different scenarios. Feasibility criteria is not limited but may include the following:
    - Facility Composition: Locations with a concentration of 'critical' facilities are scored high
    - Historical Reliability/PSPS Risk Profile: Locations with lower historical reliability and high PSPS risk are scored highest
    - DER Penetration: Locations with high DER penetration is favorable such as potential for District Energy thermal with combined heat and power, biomass, etc.
    - Stackable benefits: DER integration, load shifting/smoothing, voltage/frequency regulation
    - Avoid/defer system upgrades: The closer the existing equipment is to its maximum rating, the more favorable the location
    - Land available/site prep: Practical deployment considerations such as the availability of land and the complexity of site preparation
- **Step 2. Solution identification.** In this step, Liberty will provide more specific technical guidance and support to the community and its technical/engineering partner(s) according to the type of resilience solution being sought. Liberty
- may require more detailed information about the core facilities and their loads as well as any service planning upgrades needed. Solution identification support could include the following:
    - Training on grid data tools;
    - Limited microgrid design support;
    - Tariff application guidance, if applicable;
    - Tariff and interconnection policy support;
    - Investigation into energy efficiency opportunities, additional controllable loads, and potential for demand response; and
    - Microgrid Islanding Study ("MIS") and consultation, if applicable

[8] https://www.pge.com/tariffs/assets/pdf/adviceletter/ELEC_5918-E.pdf

- **Step 3. Execution.** In this step, Liberty will provide continuing support for eligible multi-customer solutions up to project commissioning. Liberty's Resilience Specialists will provide ongoing program management and coordination. This may include: support with necessary agreements (Microgrid Operating Agreement ("MOA") and Special Facilities Agreement ("SFA")) to obtain eligible cost offsets for special facilities and control and communication integration support. Liberty would engage with different market actors support implementation of the microgrid, this could be done through a shortlist of approved microgrid developers, RFI's or even hosted within Liberty as an engineering, procurement, contractor (EPC) engagement.

4.2.3 Financing and Ownership Options

In this program, the utility would most likely own the assets as well as the infrastructure upgrades required to make the community core resilient. Cost-recovery would be aimed at non-generating assets where feasible, such as microgrid controllers and other grid-side support technologies. The benefits would be correlated to the community core and values identified, such as the social and utility benefits derived from the system. This could be avoided cost associated with distribution and transmission deferral as well as resource adequacy or arbitrage participation in other markets.

4.3 Program 2: Medical Baseline Customers: Behind-the-Meter Resiliency

Program path 2 will provide resiliency services to medical baseline customers. For those medical baseline customers within the resiliency corridor, Liberty Resiliency Specialists will determine if additional redundancy is necessary for those customers to stay online during an event. The technology most applicable for this model would likely be lithium-ion batteries paired with solar to enable longer duration support during an outage. The resiliency duration for these customers may be a bit longer in time but specifics will be determined as Liberty investigates average loads and critical devices of the customers.

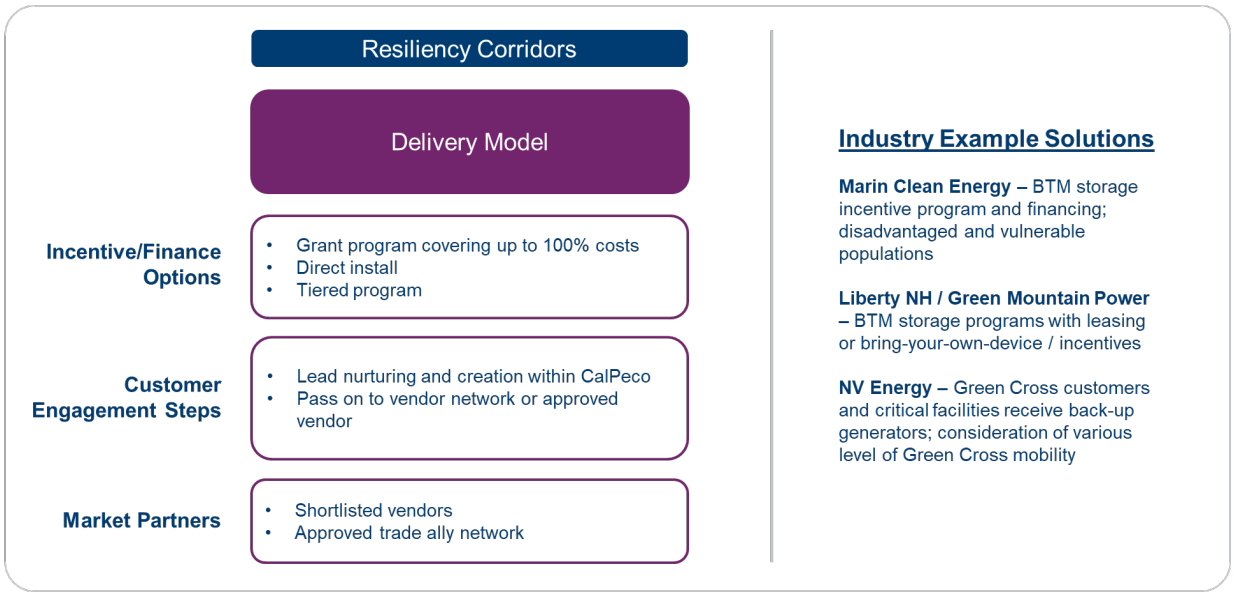

Figure 9. Liberty Program 2 Elements

4.3.1 Program Process

Medical baseline customers would participate in the Program through the following suggested steps:

- **Step 1. Complete customer screening.** The medical baseline customers would be screened for participation prior to the lead list being developed. Eligibility would be tiered, similar to NV Energy's Natural Disaster Protection Plan[9], where those medical baseline customers unable to leave their homes would be prioritized.
- **Step 2. Develop lead list and lead nurture.** Resilience Specialists would develop the lead list and nurture leads, engaging and supporting customers through the application process.
- **Step 3. Determine market actors.** Liberty would either create a shortlist of qualified battery storage developers or issue an RFP that would match the specifications required for these customers and eligible technologies.
- **Step 4. Direct install.** Liberty would hand over the leads to the qualified vendor(s) and apply a direct install approach to ensure that these critical customers receive backup power services quickly upon Program rollout.

4.3.2 Financing and Ownership Options

Program 2 would be delivered as a grant program where depending on the eligibility and need of the customers, they would be able to receive up to 100% incentive funds to cover the costs of the asset. Alternatively, Liberty could own the assets and shift the rate burden among all customers to support those most in need.

4.4 Program 3: Critical Facilities & Large Customers: Behind-the-Meter Resiliency

Similar to Program Path 2 for medical baseline customers, Program Path 3 will provide resiliency services to critical facilities as well as large customers to ensure cost-sharing of resiliency costs (as defined in *Section 2.3*). For those critical facilities within the resiliency corridor, Liberty Resiliency Specialists would determine if additional redundancy is necessary for those customers to stay online during an event. As with medical baseline customers, this behind-the-meter approach would most likely utilize lithium-ion battery technology paired with solar to enable longer duration support during outages. The resiliency duration for these customers would be determined after a critical load analysis is completed to understand how long duration would be required to support operations, as a hospital's need would be different than a town hall. Large customers would be considered within this program pathway as well. However, prioritization and incentive levels will vary dependent on the critical nature of the facilities.

[9] http://pucweb1.state.nv.us/PDF/AxImages/DOCKETS_2020_THRU_PRESENT/2020-2/5119.pdf

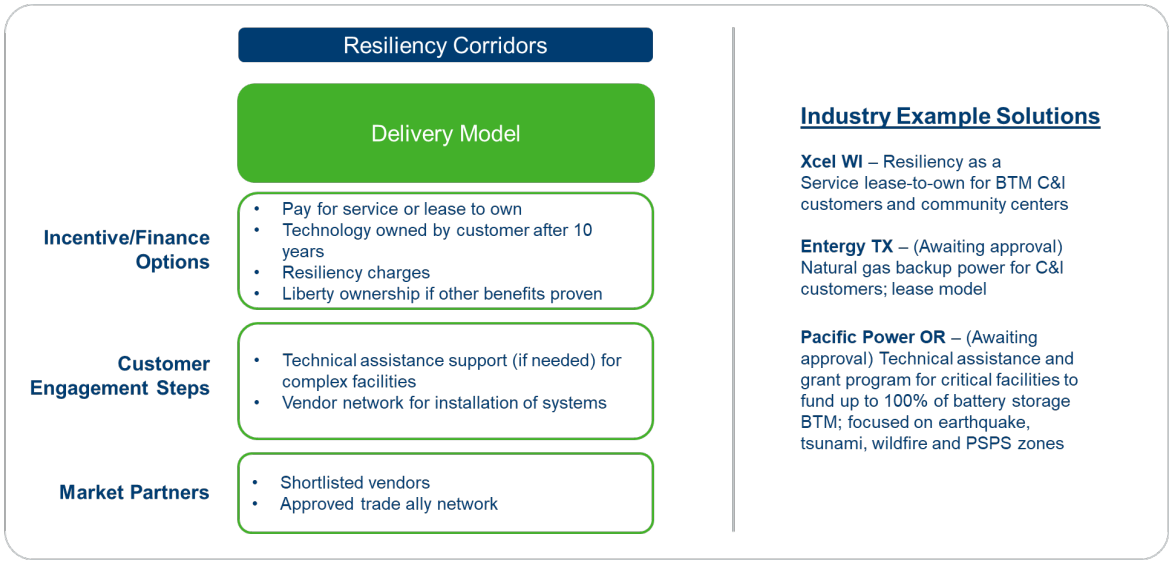

Figure 10. Liberty Program 3 Elements

4.4.1 Program Process

Critical facilities would participate in the Program through the following suggested steps:

- **Step 1. Develop lead list and lead nurture.** Resiliency Specialists would develop the lead list and nurture leads reaching out and hosting discussions with critical facilities throughout the resiliency corridors.
- **Step 2. Customer screening and determining eligibility.** Interested customers would submit applications or interest forms to Liberty , and customer screening and eligibility determinations would be made.
- **Step 3. Complete technical assistance and feasibility.** For those facilities that require additional analysis, Resilience Specialists would support a technical feasibility study to understand sizing and siting information for the behind-the-meter storage facility.
- **Step 3. Determine market actors.** Liberty would either create a shortlist of qualified battery storage developers or issue an RFP that would match the specifications required for these customers and eligible technologies.
- **Step 4. Direct Install.** Liberty would hand over the leads to the qualified vendor(s) and support the critical facility in working with the vendor to install the battery storage systems.

4.4.2 Financing and Ownership Options

Liberty suggests using a model similar to Xcel Energy in Wisconsin for their Resiliency Service Pilot. Liberty would own, install, operate, and maintain the assets as critical facilities or with large customers. Customers would participate in an opt-in model for the resiliency services gained. Utilizing a subscription model or resiliency-as-a-service charge the customers would pay over a ten-year term through on bill charges: a) program (admin and O&M) and b) resiliency (equipment and O&M). Ownership could transfer after the ten-year term is complete. Resiliency service charges would continue after ownership transfer. The assets would be considered capital investment and rate-based. Liberty will investigate each

program individually as well as the portfolio program to determine the most cost-effective option for customers.

4.5 Program Innovations

4.5.1 Connection with EVs and future DRIVE programs

The CPUC's rulemaking to continue the Development Of Rates And Infrastructure For Vehicle Electrification (DRIVE) proceeding seeks to, among other things, facilitate vehicle-grid integration (VGI) policy for all California utilities. Towards this end, the CPUC established the VGI Working Group which identified one of its policy areas as the need to accelerate use of electric vehicles (EVs) for bi-directional non-grid-export power and public safety power shut-off resiliency and backup, including for PSPS events. In their December 17, 2020, decision, the CPUC accepted the working group's recommendation and directed the large utilities to implement VGI pilots that would explore EV's role in supporting system resiliency. Liberty is not mandated to deploy these pilots but must consider VGI strategies in future transportation electrification filings.

Recognizing that 52% of the homes in the Liberty service territory are second homes and, therefore, the residents' vehicles would be registered and maintained in different jurisdictions, it is difficult to conceive of a program at this time that would fulfill the resiliency benefit presented by VGI working group. However, given the progression of the EV market, state-sponsored initiatives and general technological progress, Liberty will continue to monitor opportunities to engage VGI as a tool in its resiliency kit in future years.

5 Energy Storage System Value Streams

5.1.1 Summary

Energy storage (such as battery, CHP, backup diesel generation, etc.) can provide various benefits to both the customer and the grid, which are not necessarily mutually exclusive. In fact, these benefits can be stacked to enable a single system to capture multiple value streams. Example benefits include backup power and transmission and distribution deferral, among others.

Accurately capturing the stacked benefits of energy storage requires detailed analysis of both the operational characteristics of the storage technologies and the nature of the value streams it captures. In addition, the availability of benefits varies depending on factors such as the state regulatory landscape and utility in question. Liberty believes that there are different benefits for customers, Liberty, and society that can be stacked to support the business case for a resiliency Program. Liberty will explore the potential to capture the following value streams through the portfolio. In addition, Liberty plans to engage customers during the stakeholder feedback sessions (slated for April and May) on the value of resiliency from their perspective as needs. This will directly influence how the business case and value streams are established for the resiliency programs.

5.1.2 Customer Value Streams

- **Backup Power.** Battery energy storage provides a more resilient backup system than a standard backup generator because it reduces customer's dependency on fuel deliveries and infrastructure corridors that provide relief services during disaster events. Battery energy storage and solar components can reduce or eliminate run time and fuel usage of the backup generator, resulting in fuel cost savings and reducing risk of a failure of fuel supply occurring.
- **Demand Charge Reduction**. Many of the behind-the-meter battery energy storage systems deployed to date in the United States have been designed to provide utility bill cost reductions for customers, typically through demand charge management and/or time-of-use (TOU) cost management. A common behind-the-meter battery energy storage application is demand charge management, sometimes called peak shaving or load shifting in which battery dispatches stored energy to level demand (kW) use to reduce the associated charges on utility bills. The battery energy storage system is recharged during hours when the load is much lower, allowing the facility to stay below a demand limit and maintain cost savings. Due to inherent electrical losses of battery energy storage systems, more energy is always required to charge the battery than can be discharged. Therefore, total bill savings may come from a combination of demand charges and the cost differential between the charge and discharge energy inherent in time-of-use (TOU) rates, but also must take into account the losses.
- **Increased Renewable Self-Consumption**. Liberty does provide net metering rates to customers. Further investigation will be required, but there could be incentive for customers to increase renewable self-consumption instead of export back to the grid to recover the net metering rate.

5.1.3 Utility Value Streams

- **Transmission and Distribution Deferral.** A key aspect of the Wildfire Mitigation Plan is grid hardening. In many cases, storage can defer or avoid the need for a transmission and distribution equipment upgrade due to demand growth or even for assets at end of life. The resiliency Program will investigate how this value can support adoption of resiliency services in the Liberty territory.
- **Energy Arbitrage.** Another benefit that can be harnessed and levered by Liberty if the program gets to scale is the practice of purchasing and storing electricity during off-peak times, and then utilizing that stored power during periods when electricity prices are the highest. California has a number of ancillary markets to participate in that could provide additional revenue and support for this resiliency Program.
- **Resource Adequacy.** Similar to the above, Liberty could also utilize the storage resources as resource adequacy. However, if storage primary use is for resiliency, dedicated resources may need to be added for resource adequacy. Resource adequacy is a condition in which the region is assured that, in aggregate, utilities or other load serving entities (LSE) have acquired sufficient resources to satisfy forecasted future loads reliably.
- **Frequency Response and Operating Reserves.** Frequency response is the immediate and automatic response to power to a change in locally sensed frequency while operating reserves are the generation capacity that is online and able to serve load immediately during unexpected outages. Both of these values streams will be explored to understand the potential benefit to Liberty.

5.1.4 Societal Value Streams

- **Community Resiliency.** While a catastrophic disaster, such as a major earthquake, may happen once in a system's useful life, severe weather like snowstorms and wildfires will occur more frequently in the Liberty territory. During a grid outage, the value of having backup power to ensure the availability of the emergency services that these facilities provide can be valued in terms of avoided property damage, injuries, lives lost, and to a lesser extent, lost revenue. This community resiliency value can be explored utilizing Federal Emergency Management Agency's (FEMA) benefit calculator to determine resiliency benefits in high-consequence, low-probability events. While the FEMA tool provided a standard valuation approach, valuing resiliency industrywide is still more art than science and a lot of uncertainty and a lack of comprehensive standards exist for valuing the overall importance of resiliency.
- **GHG Emissions Reductions.** GHG emissions reductions from a solar plus battery energy storage resiliency system come from offsetting utility energy consumption during normal operations and reducing or eliminating fossil fueled backup generator operation during an outage.

6 Conclusions

In summary, the proposed Liberty resiliency program portfolio would ensure that resiliency services sustain critical customers during future outages. The proposed approach would offer customers three pathways of participation:

- Development of community core microgrids that would harness technical resiliency specialists to support community partners in building out an in front-of-the meter microgrid where utility would own the assets and facilities would opt-in via a monthly resiliency charge.
- Avenue for medical baseline customers to apply for grant funding to receive behind-the-meter battery storage solutions for increased resiliency at home during events.
- Path for critical facilities and large customers to adopt and implement commercial-scale storage systems in to provide critical load backup during outage events and ensure that critical services are provided to the communities in the Liberty territory.

Liberty plans to file in June of 2021 the full application and business case to receive approval from the CPUC in launching the Resiliency Program Portfolio by 2022.

Attachment C

WMP Risk Spend Efficiency Calculations

Table C-1: WMP Risk Spend Efficiency (RSE) Calculations[1]

Initiative Name	RSE (Avg./High)[2]	Cost Horizon (2021-2025)	HFTD 2/3?	Comments
Intrusive Asset Inspections/Replace & Repair	0.8/1.8	$23,646,000	Covers all of the service territory	2021 Liberty has undertook an aggressive pole replacement program based on fire condition risk information from intrusive inspections, and the risk mapping completed by Reax.
Undergrounding - Apache	0.76/1.7	$711,367	Both HFTD 2 & 3	Liberty plans to underground segments of its risky Meyers 3100 line located in South Lake Tahoe. Meyers 3100 lies in both HFTD 2 & HFTD 3 areas.
Undergrounding - North Beach Tahoe Vista	0.13/0.3	$11,331,090	HFTD 2	The Brockway 5200 circuit is targeted to be underground by the utility. This circuit has historically been an issue for Liberty, as there have been six-related ignition events on the circuit. An ignition event is not necessarily a reportable incident, but is an incident in which burning, melting, smoking, smoldering, sparking, or arcing has occurred.
Expulsion Fuse Replacement	2.29/5.14	$8,536,953	Will roll out to entire service territory	Liberty is now able to target it's scheduling of its expulsion fuse replacement aligning it with its fire risk profile, addressing the riskiest regions in its service territory first.
Microgrid - Sagehen	0.73/1.64	$671,872	HFTD 2	Liberty has constructed its first microgrid project on the HOB7700 line. The RSE approaches 5 for this location suggesting that it is one of the better options to select for this location.
Microgrid - MEY3300 (Prospective/Study)	0.23/0.52	$2,200,000	Both HFTD 2 & 3	Liberty continues to study strategic locations for grid resiliency and wildfire prevention. The utility's South Lake Tahoe region is the riskiest region, with the heaviest commercial concentration as well. Meyers 3300 & 3400 lines are the highest ranked risk tier at "Very High".
Microgrid - MEY3400 (Prospective/Study)	0.25/0.57	$4,500,000	Both HFTD 2 & 3	Liberty continues to study strategic locations for grid resiliency and wildfire prevention. The utility's South Lake Tahoe region is the riskiest region, with the heaviest commercial concentration as well. Meyers 3300 & 3400 lines are the highest ranked risk tier at "Very High".
Covered Conductor - MEY3300	0.19/0.42	$5,630,192	Both HFTD 2 & 3	Liberty continues to study strategic locations for grid resiliency and wildfire prevention. The utility's South Lake Tahoe region is the riskiest region, with the heaviest commercial concentration as well. Meyers 3300 & 3400 lines are the highest ranked risk tier at "Very High".
Covered Conductor - MEY3400	0.24/0.54	$17,768,226	Both HFTD 2 & 3	Liberty continues to study strategic locations for grid resiliency and wildfire prevention. The utility's South Lake Tahoe region is the riskiest region, with the heaviest commercial concentration as well. Meyers 3300 & 3400 lines are the highest ranked risk tier at "Very High".

[1] Liberty will provide all work papers supporting RSE calculations and explanation of underlying assumptions upon request since the study and results consists of voluminous model outputs and analytical reports

[2] Neural Network machine learning RSEs have been calculated for initiatives, however, limited ignition-related risk drivers and CPUC reportable ignitions have produced results less reliable than the RSEs calculated above under a standard approach.

Initiative Name	RSE (Avg./High)[2]	Cost Horizon (2021-2025)	HFTD 2/3?	Comments
Covered Conductor - TAH7300	0.24/0.55	$1,946,643	HFTD 2	The TAH7300 line has historically been a circuit with high performance risk. Surrounded in an area with a lot of vegetation, the line has experienced almost 80 forced outages in six years.
Covered Conductor - TPZ1261	0.4/0.9	$1,461,400	HFTD 2	Liberty's Topaz 1261 line has historically been a line affected by adverse weather, namely strong winds causing service interruptions to customers. While not much vegetation or commercial activity lies in this region, the ability for a fire to spread very quickly is unquestionable.
Enhanced Vegetation Management.	0.27/0.61	$32,255,650	Will cover whole service territory	Targeted and enhanced vegetation management, along with the inclusion of LiDAR now provides Liberty with the ability to make best use of its resources and address the riskiest vegetation in the highest fire risk areas.
Distribution Fault Anticipation	171.56/385.29	$600,000	Will roll out to entire service territory	DFA technology offers a very high RSE due to its ability to be a highly effective, relatively low-cost, quickly implemented option on the company's feeders.

Table C-2: WMP RSE Additional Calculations

Control/Mitigation	Ignition Events Reduced over Life	NPV Cost of Control/Mitigation over Life	RSE - Avg. Case	RSE - Tail (High Impact Case)
Intrusive Asset Inspections/Replace & Repair	214.6	$42,793,440	0.80	1.80
Undergrounding - Apache	1.3	$279,629	0.76	1.70
Undergrounding - North Beach Tahoe Vista	7.9	$9,603,864	0.13	0.30
Expulsion Fuse Replacement	97.1	$6,780,835	2.29	5.14
Microgrid - Sagehen	3.8	$823,684	0.73	1.64
Microgrid - MEY3300 (Prospective/Study)	4.0	$2,742,086	0.23	0.52
Microgrid - MEY3400 (Prospective/Study)	8.8	$5,577,082	0.25	0.57
Covered Conductor - MEY3300	5.6	$4,737,049	0.19	0.42
Covered Conductor - MEY3400	23.6	$15,601,566	0.24	0.54
Covered Conductor - TAH7300	2.7	$1,790,572	0.24	0.55
Covered Conductor - TPZ1261	3.5	$1,388,105	0.40	0.90
Enhanced Vegetation Management.	43.7	$25,916,294	0.27	0.61
Distribution Fault Anticipation	568.9	$530,283	171.56	385.29

Table C-3: Risk Scores Associated with RSE Calculations

Financial Impact - Average Case	Financial Impact - Tail Case	Safety (Serious Inj.) - Average Case	Safety (Serious Inj.) - Tail Case	Safety (Fatalities) - Average Case	Safety (Fatalities) - Tail Case	Reliability - Average Case	Reliability - Tail Case
0.00550	0.0103	0.0878	0.1986	0.0666	0.1501	0.00002	0.00011

Table C-4: Circuit Risk

Circuit	Overall Rating	Circuit Risk Rank	Pole Risk	Vegetation Risk	Performance Risk	FORCE OUTAGE (2015-2020)	Outage % of System	Ignitions	Ignitions /Outage	OH Length	Out / Length	Weighted Risky Trees	Regressed Spark Rate/mi.	Vegetation Outage /Line mi.
111	Moderate	15	High	Moderate	Very Low	0	0.0%	0	0.0%	6.4	0.0	20	0.20%	0
132	Low	28	Very Low	Moderate	Very Low	0	0.0%	0	0.0%	12.5	0.0	40	0.20%	0.00
160	Very Low	42	Very Low	Very Low	Very Low	0	0.0%	0	0.0%	0.4	0.0	0	0.20%	0.00
608	Low	28	Very Low	Moderate	Very Low	5	0.5%	0	0.0%	0.0	105.9	217	0.16%	21.19
609	Moderate	15	Low	High	Very Low	0	0.0%	0	0.0%	10.1	0.0	160	0.20%	0.00
619	Very Low	42	Very Low	Very Low	Very Low	5	0.5%	0	0.0%	0.0	480.6	6	0.16%	0.00
625	Low	28	Very Low	Moderate	Very Low	0	0.0%	0	0.0%	17.9	0.0	134	0.20%	0.00
629	Low	28	Very Low	Moderate	Very Low	1	0.1%	0	0.0%	5.2	0.2	83	0.16%	0.00
640	Low	28	Low	Low	Very Low	0	0.0%	0	0.0%	8.1	0.0	10	0.20%	0.00
650	Low	28	Very Low	Moderate	Very Low	0	0.0%	0	0.0%	7.7	0.0	32	0.20%	0.00
BKY4201	Moderate	15	Moderate	Moderate	High	13	1.3%	2	15.4%	9.4	1.4	40	1.78%	0.11
BKY4202	Moderate	15	Moderate	Low	High	19	1.9%	2	10.5%	9.3	2.0	91	0.80%	0.00
BKY5100	Moderate	15	Moderate	Moderate	Very Low	0	0.0%	0	0.0%	2.2	0.0	27	0.20%	0.00
BKY5200	High	4	High	Moderate	Very High	39	3.9%	6	15.4%	23.3	1.7	121	1.09%	0.26
CAL204	Moderate	15	Very Low	Low	High	24	2.4%	0	0.0%	4.3	5.5	24	0.16%	0.23
CEM41	Low	28	Very Low	Very Low	Moderate	11	1.1%	1	9.1%	6.0	1.8	10	1.35%	0.17
CEM42	Low	28	Low	Very Low	Low	6	0.6%	1	16.7%	3.4	1.8	18	1.56%	0.00
FAR7800	Very Low	42	Very Low	Very Low	Very Low	0	0.0%	0	0.0%	0.0	0.0	9	0.20%	0.00
GLS7400	High	4	Low	High	Very High	32	3.2%	4	12.5%	32.9	1.0	328	0.93%	0.18
GLS7600	Low	28	Low	Very Low	Low	7	0.7%	0	0.0%	5.2	1.3	0	0.16%	0.19
HOB7700	Low	28	Very Low	High	Very Low	6	0.6%	0	0.0%	8.9	0.7	169	0.16%	0.34
KBS2800	Very Low	42	Low	Very Low	Very Low	0	0.0%	0	0.0%	0.4	0.0	0	0.20%	0.00
MEY3100	High	4	High	Moderate	Very High	43	4.3%	0	0.0%	17.6	2.4	52	0.16%	0.63
MEY3200	High	4	High	Moderate	Very High	62	6.2%	0	0.0%	21.8	2.8	32	0.16%	0.41

Circuit	Overall Rating	Circuit Risk Rank	Pole Risk	Vegetation Risk	Performance Risk	FORCE OUTAGE (2015-2020)	Outage % of System	Ignitions	Ignitions /Outage	OH Length	Out / Length	Weighted Risky Trees	Regressed Spark Rate/mi.	Vegetation Outage /Line mi.
MEY3300	Very High	1	Highest	Highest	High	65	6.5%	1	1.5%	52.8	1.2	364	0.23%	0.17
MEY3400	Very High	1	Very High	Very High	High	67	6.7%	1	1.5%	55.1	1.2	882	0.25%	0.25
MEY3500	Very High	1	Very High	Very High	Very High	45	4.5%	2	4.4%	27.1	1.7	230	0.41%	0.18
MULLER1296	High	4	Moderate	High	Very High	51	5.1%	2	3.9%	43.9	1.2	171	0.56%	0.09
NST8400	Very Low	42	Very Low	Very Low	Low	2	0.2%	1	50.0%	0.0	0.0	6	0.00%	0.00
NST8500	Very Low	42	Very Low	Very Low	Low	4	0.4%	0	0.0%	0.0	0.0	1	0.00%	0.00
NST8600	Very Low	42	Very Low	Very Low	Low	4	0.4%	0	0.0%	0.1	31.3	0	0.16%	0.00
POR31	Moderate	15	Low	Very Low	High	32	3.2%	0	0.0%	14.2	2.2	48	0.16%	0.21
POR32	Moderate	15	Moderate	Low	High	46	4.6%	1	2.2%	21.0	2.2	204	0.40%	0.33
RUS7900	Low	28	Very Low	Moderate	Low	5	0.5%	0	0.0%	3.3	1.5	27	0.16%	0.61
SQV7201	High	4	High	High	Very High	29	2.9%	1	3.4%	12.0	2.4	88	0.66%	0.25
SQV8100	Very Low	42	Very Low	Very Low	Very Low	1	0.1%	0	0.0%	0.0	0.0	0	0.00%	0.00
SQV8200	High	4	High	High	High	19	1.9%	1	5.3%	4.9	3.8	62	0.91%	0.81
SQV8300	Low	28	Moderate	Very Low	Low	3	0.3%	0	0.0%	1.4	2.2	9.6	0.16%	0.00
SRB51	Low	28	Low	Low	Low	9	0.9%	0	0.0%	6.8	1.3	13	0.16%	0.15
STL2200	Very Low	42	Low	Very Low	Very Low	0	0.0%	0	0.0%	0.3	0.0	2	0.20%	0.00
STL2300	Moderate	15	Moderate	Low	Moderate	10	1.0%	1	10.0%	3.0	3.4	57.5	1.31%	0.00
STL3101	High	4	High	Low	Very High	39	3.9%	2	5.1%	15.6	2.5	77	0.68%	0.51
STL3501	Moderate	15	Moderate	Low	High	33	3.3%	1	3.0%	14.0	2.4	44	0.39%	0.22
TAH5201	High	4	High	High	Very High	41	4.1%	3	7.3%	21.4	1.9	284	0.72%	0.37
TAH7100	Moderate	15	Moderate	Moderate	High	26	2.6%	2	7.7%	13.3	2.0	110	0.79%	0.30
TAH7200	Low	28	Moderate	Low	Low	3	0.3%	0	0.0%	5.1	0.6	27	0.16%	0.20
TAH7300	High	4	Moderate	High	Very High	78	7.8%	2	2.6%	57.8	1.4	629	0.30%	0.35
TPZ1261	High	4	Moderate	Moderate	Highest	86	8.6%	5	5.8%	55.6	1.5	166	0.95%	0.04
TRK7202	Moderate	15	Moderate	High	Moderate	16	1.6%	1	6.3%	12.2	1.3	109	0.82%	0.25
TRK7203	Moderate	15	Low	Low	High	11	1.1%	2	18.2%	9.8	1.1	36	2.17%	0.00

Circuit	Overall Rating	Circuit Risk Rank	Pole Risk	Vegetation Risk	Performance Risk	FORCE OUTAGE (2015-2020)	Outage % of System	Ignitions	Ignitions /Outage	OH Length	Out / Length	Weighted Risky Trees	Regressed Spark Rate/mi.	Vegetation Outage /Line mi.
TRK7204	Very Low	42	Very Low	Very Low	Low	2	0.2%	0	0.0%	6.9	0.3	0	0.20%	0.00
WAS201	Very Low	42	Very Low	Low	Very Low	0	0.0%	0	0.0%	7.3	0.0	20	0.20%	0.00