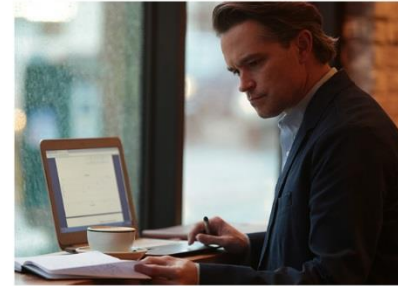


PacifiCorp 2021 PSPS Performance

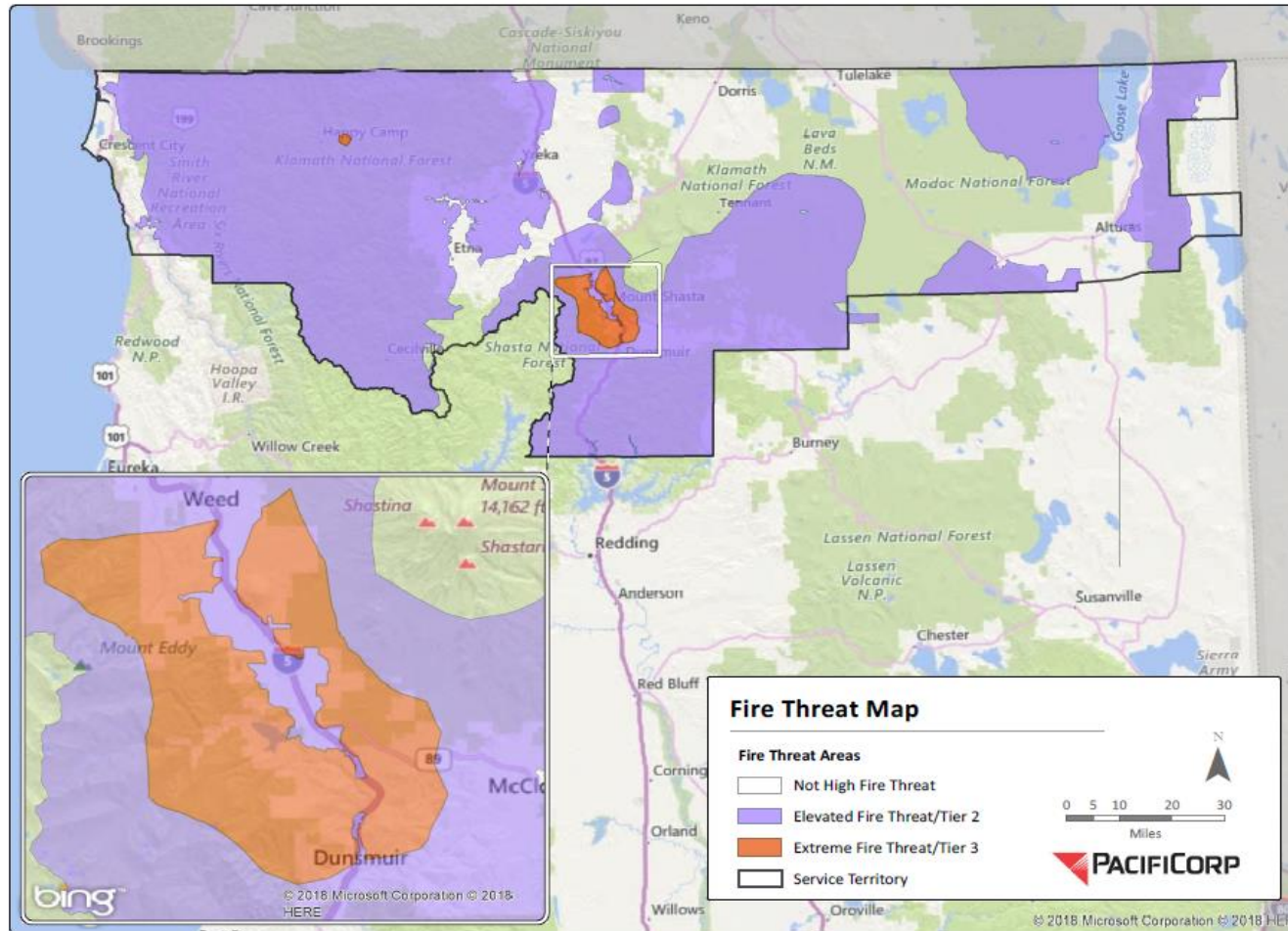
February 23, 2022

California Public Utilities Commission Briefing



Erik Brookhouse, VP System Operations
Matt McVee, VP Regulatory Policy and Operations

PacifiCorp's California Service Territory



General Stats

PacifiCorp provides electricity to approximately **45,000 customers** via **63 substations**, **2,520 miles** of distribution lines, and about **800 miles** of transmission lines across nearly **11,000 square miles of which just under half is classified as HFTD**

HFTD Stats

Approximately **1,200 miles** or **36%** of all overhead lines are located within the HFTD

850 miles of overhead distribution lines in the HFTD;

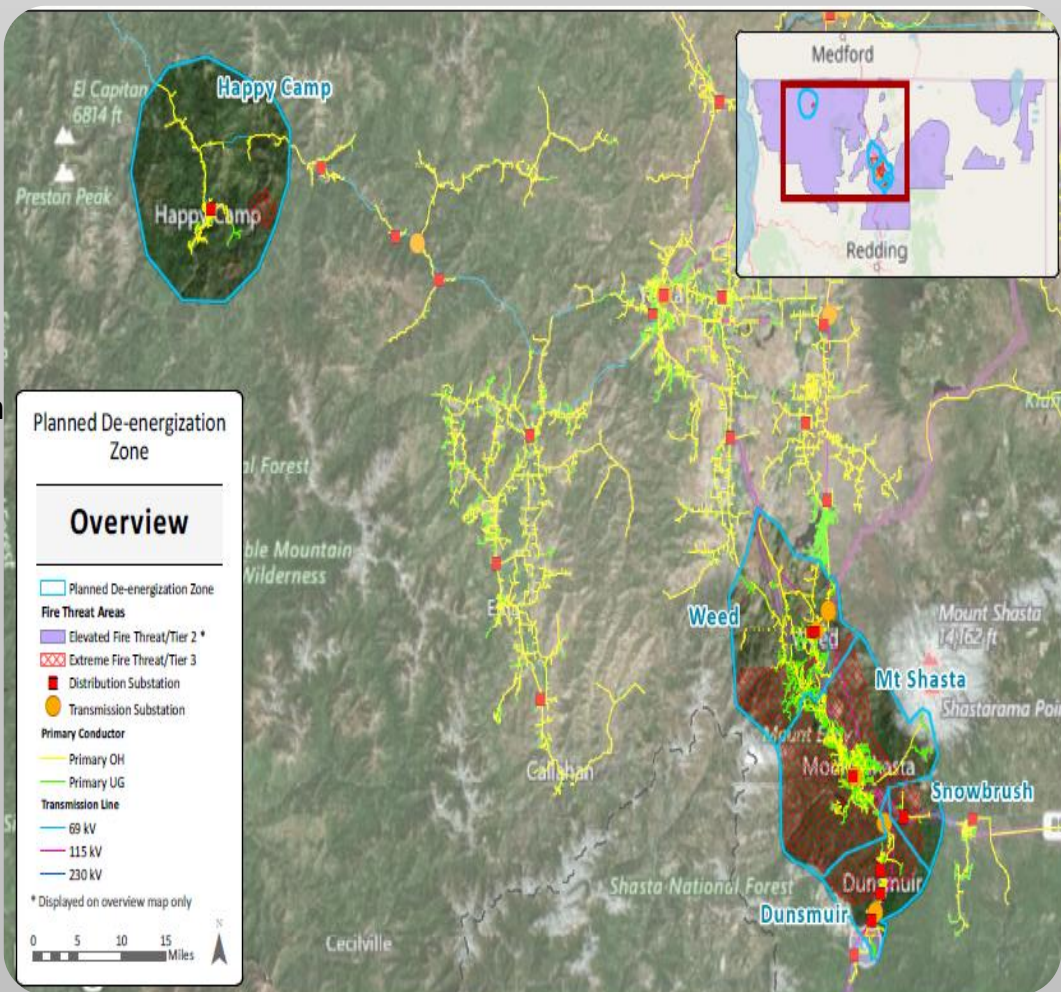
350 miles of transmission lines in the HFTD



Public Safety Power Shutoff Overview

PacifiCorp’s plan for proactive de-energization is currently limited to Tier 3 areas

Breaking the two main areas into five PSPS Areas was done to minimize customer impact where appropriate, based on weather monitoring capability and circuit topology.

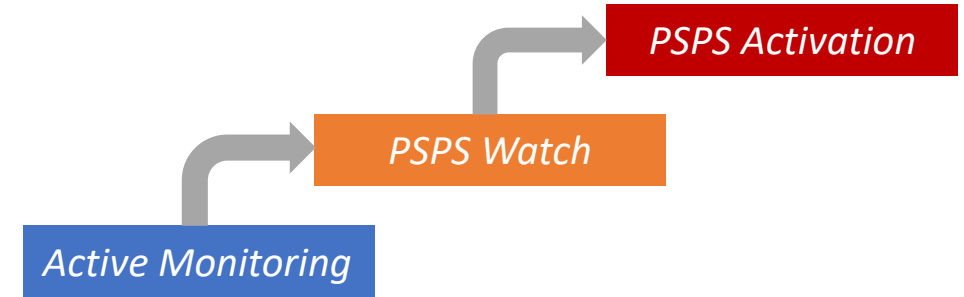


	PSPS Area	Substation	# of Circuits	Customers	Distribution OH	Distribution UG
1	Happy Camp	Seiad, Happy Camp	3	865	48.4	5.9
2	Weed	Weed, International Paper	5	2,589	90.5	62.1
3	Mt. Shasta	Mt. Shasta	6	5,074	86.4	76.7
4	Dunsmuir	N & S Dunsmuir, Nutglade	5	1,806	30.0	8.6
5	Snowbrush	Snowbrush	1	17	4.2	1.2
	Total	9 Substations	20	10,351	259.5	154.5

PSPS Decision Making Framework

- PacifiCorp uses a range on inputs in its assessment and decision-making process:

- ✓ Weather Forecasting & Risk
- ✓ Localized System Impact Assessment
- ✓ Real Time Local Conditions
- ✓ Dynamic Input from Local Partners



- The following metrics are used as part of the inputs in decision making:
 - **Hourly Fosberg Fire Weather Index (FFWI)** combines temperature, relative humidity, and 10-minute wind-speed factored into a single weather index correlated to influence on fire spread
 - **The Keetch-Byram Drought Index (KBDI)** assesses the risk of fire by representing the net effect of evapotranspiration and precipitation in producing cumulative moisture deficiency.
 - **Localized Vapor Pressure Deficit (VPD)** measures the department from normal dryness in a shorter term to complement KBDI
 - Forecasted wind speeds and potential sustained gusts.

2020 v. 2021 PSPS Performance and Execution

	2020	2021
De-energization Events	1	1
Total Hours De-energized	7.9	9.6
Customers Affected	2,559	1,953
AFN other than Medical Baseline Customers Affected	5	7
Medical Baseline Customers Affected		4
Critical Facilities Affected	13	19
Circuits De-energized	2	6
Community Resource Centers Activated	0	1
Hazards Identified Post-event	0	0

- 2020 and 2021 had similar PSPS performance and execution metrics
- Improvements based on 2020 lessons learned were executed in 2021 creating better data capture, streamlined response and increased outreach during events

PSPS is Used as a Measure of Last Resort

Protocols ensure PSPS is a measure of last resort to minimize frequency and impact

- Customers notified based on forecasts
- De-energized on real time conditions
- Circuit segmentation created for Tier 3 circuits
- Pre-event review of current system conditions and vegetation work plans

Additional pre-event actions include:

- Engagement of critical customers
- Engagement with local emergency responders

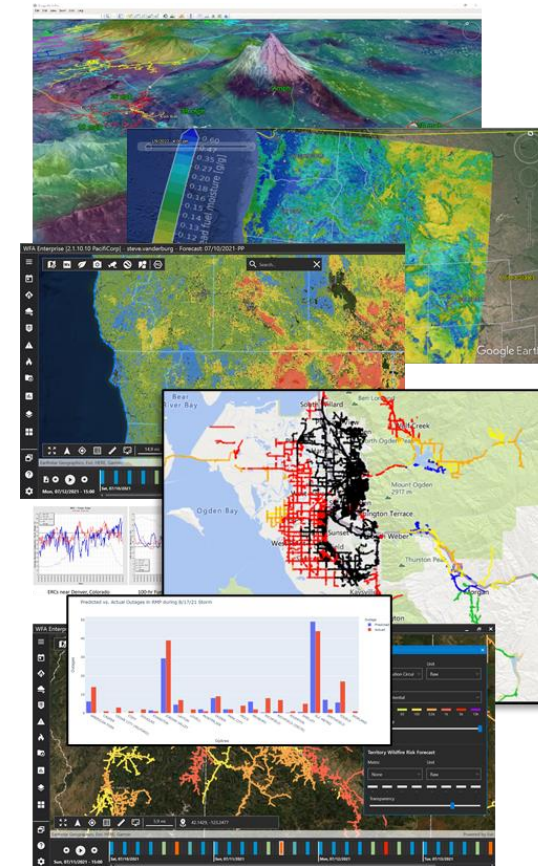
Date	Location	Total Customers Notified	Total Customers De-energized	Medical + AFN Customers De-energized	Counties De-energized	Tribes De-energized
8/17/2021	Dunsmuir	1,953	1,953	11	1	0

August 17, 2021 Event

- Duration 9 hours & 36 minutes (3:41 p.m. until 1:17 a.m.)
- Field inspections and patrols instituted in the affected area, recording wind observations, submitting weather observations, videos, and pictures of the current conditions
- Final inspection of the de-energized circuits performed in sections prior to re-energization
- The company did not identify any equipment that was damaged during the August 17 event
- Event affected six distribution circuits (5G69, 7G71, 7G73, 7G75, 8G65, 8G95)

Weather Forecasting & Fire Science Technologies in 2021

- PacifiCorp made significant investments in meteorology and fire science technologies in 2021 which included hiring full-time meteorologists and implementing high-performance computing, numerical weather prediction, and wildfire consequence modeling.
 - **Localized Risk Assessment Model (LRAM)** - An operational LRAM Outage Model was implemented in 2021 and has had demonstrated success in predicting wind-related power outages for both small and large wind events.
 - **PacifiCorp Weather Research & Forecast (WRF) model** – PacifiCorp recently implemented a custom WRF that provides twice-daily hourly weather and fuels forecast data at 2km resolution across a 96-hour time horizon. Although not yet implemented at the time of the Dunsmuir PPS, PacifiCorp's WRF has since demonstrated skill at forecasting localized, high-impact wind events and fuels conditions that contribute to extreme fire behavior.
 - **Technosylva's Wildfire Analyst-Enterprise (WFA-E)** – PacifiCorp piloted WFA-E during the 2021 fire season. WFA-E uses meteorological and environmental forecast data to map out wildfire potential, behavior and consequence across the landscape. Although WFA-E had not yet been implemented at the time of the Dunsmuir PPS, it has demonstrated success in both identifying high risk situations and modeling actual wildfires.
- 2021 PPS challenges were mostly related to forecast model and observational limitations
 - The above solutions were in development during the 2021 fire season and not fully implemented until late 2021.
 - NOAA's HRRR data which feeds LRAM is only available at 3km resolution and across a 48-hour forecast horizon.
 - Weather station coverage was limited in some areas.
- PacifiCorp's Meteorology team actively engaged the meteorology teams at SDG&E, SCE, and PG&E in 2021 to discuss best practices, current technologies, and lessons learned.

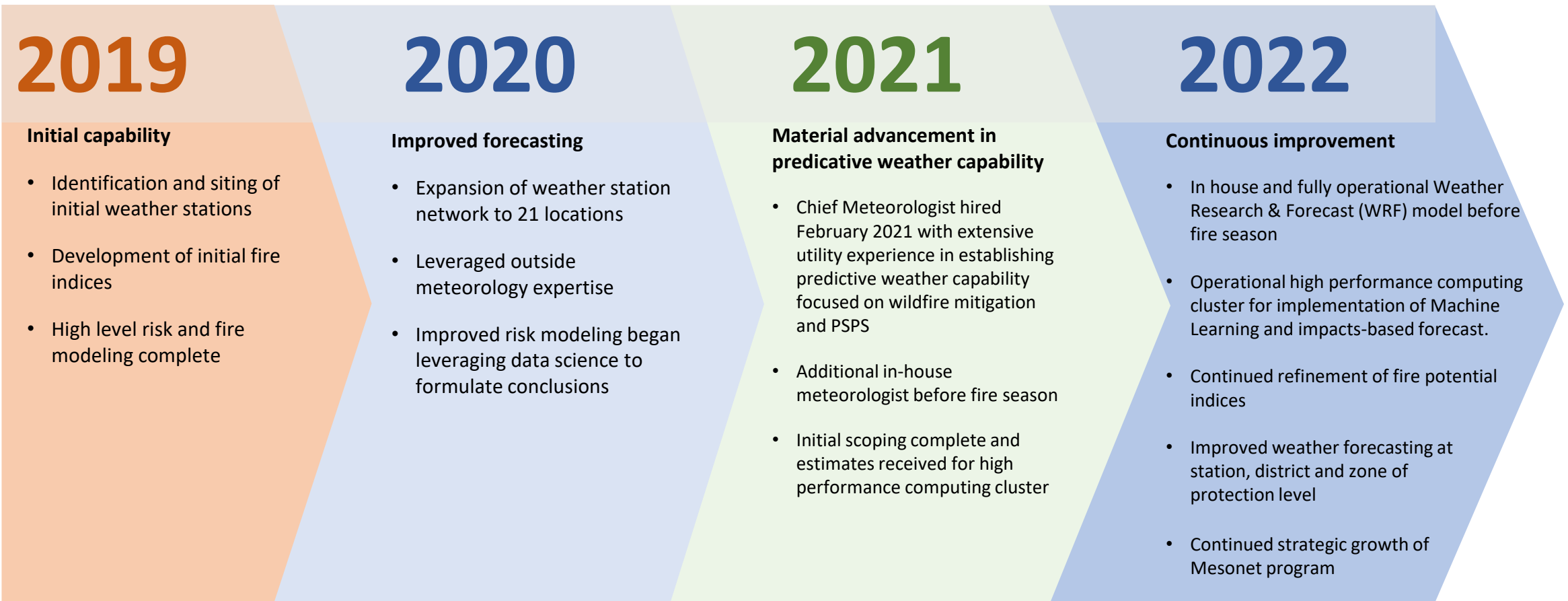


Weather Forecasting & Fire Science Technologies – Improvements Coming in 2022

- PacifiCorp is working to complete a high-resolution, 30-year WRF reanalysis of hourly weather and fuels conditions across its entire service territory (much of the Western U.S.)
 - Create a detailed climatology of weather, fuels, and fire weather indices at the asset level.
 - Correlate weather extremes with system events (outages, damages, etc.) as well as fire occurrence to create an impacts-based forecasting system.
- LRAM Outage Model forecast horizon to be extended from 48 hours to 96 hours and will expand to include all weather-related hazards at the zone of protection level for each circuit.
 - Additional lead time accomplished by replacing the current weather model (NOAA's HRRR) with PacifiCorp's new WRF.
 - Machine learning techniques to leverage the upcoming 30-year WRF reanalysis to improve the outage model.
 - Translates the fuels and fire weather forecasts into percentiles to better understand how "extreme" an event may be.
- Technosylva's Wildfire Analyst-Enterprise coverage to expand in coverage and leverage PacifiCorp's WRF and 30-year reanalysis to better forecast fire risk and consequence.
 - Development of new products to better identify risks associated with large summertime wildfires.
 - Development of a Fire Potential Index utilizing the technology behind WFA-E.
- Weather station network expansion to include 47 new stations in CA (bringing the total to 80).

Public Safety Power Shutoff Improvements

PacifiCorp is committed to further improve its predictive weather and PSPS forecasting capability



External Agency Coordination & Engagement

Communications Providers

Outreach to support preparedness:

- 8 communications providers / 4 located in PSPS Zones
- Initial outreach conducted to establish primary & secondary contacts:
 - ✓ *Primary* – 100%
 - ✓ *Secondary* – 50%
- Outreach continuing to improve preparedness and coordination

Engagement with Tribal Communities

Working to enhance coordination:

- ✓ Holding twice monthly meetings
- ✓ Established engagement with the Karuk Tribe newly hired emergency manager
- ✓ Continuing to coordinate and provide information to tribal communities
- ✓ Establishing set meetings in the future

Engagement with Public Safety Partners

Working to enhance coordination:

- ✓ Collaborate formally through 2 Annual Tabletop and Functional Exercises
- ✓ Engage and maintain local situational awareness through applicable county emergency manager(s)

Feedback from External Agencies and Public Safety Partners

Aspects Working Well

- ✓ Joint Information System coordination has been established and will continue to be a valuable partnership
- ✓ State, County, local and private emergency management plans are aligned and function well together
- ✓ Partnerships established between state, county, local and private agencies to support coordination with access and functional needs populations

Areas to Watch

- Continued work through established partnerships is needed to improve coordination with Access and Functional Needs population
- Additional public outreach to customers regarding wildfire risk and mitigation strategies is needed
- Communications providers have limited bandwidth for some areas requiring secondary and tertiary contingency plans

PSPS Community Support Programs

Free Portable Battery Program

PacifiCorp implemented a program to provide back-up batteries - at no cost - to medical baseline customers who depend on medical equipment powered by electricity. The contracted service provides a battery to the customer along with education and training for longer term operation of the batteries which are wholly owned and operated by the customer.

- Batteries were delivered to 28 registered medical baseline customers within PSPS areas in December of 2021.
- The program expanded in 2022 to include remaining areas in the California service territory – with a goal to deliver an additional 50 batteries by May of 2022.



California Generator Rebate Program

PacifiCorp is offering eligible California customers a rebate on the purchase of a portable generator or portable power station to help prepare for potential power outages.



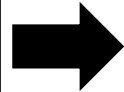
Program Eligibility:

- Reside in Tier 2 or Tier 3 high-fire threat areas on the California High Fire Threat District map.
- The purchased product must be on the qualified product list.
- The applicant must have an active Pacific Power account number as either a customer or tenant of a Pacific Power customer.

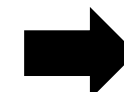
Public Education & Outreach

Customer Survey Conducted Quarter 4, 2021

Survey Participation	✓ 579 Total Surveys Completed ➤ 74 Phone Based Surveys ➤ 505 Web Based Surveys
Key Findings	
✓ 61% are aware of wildfire safety communications, which is in line with prior surveys. ✓ Pacific Power remains the primary source for wildfire preparedness information. ✓ Respondents rated the <i>Pacific Power website</i> as the <i>most useful</i> and clear source of information. ✓ 73% have taken action to prevent wildfires or to prepare their home or business for the event of a wildfire. ✓ 16% experienced PSPS event in 2021, over three quarters (81%) say they received adequate notification and information to prepare for an event.	

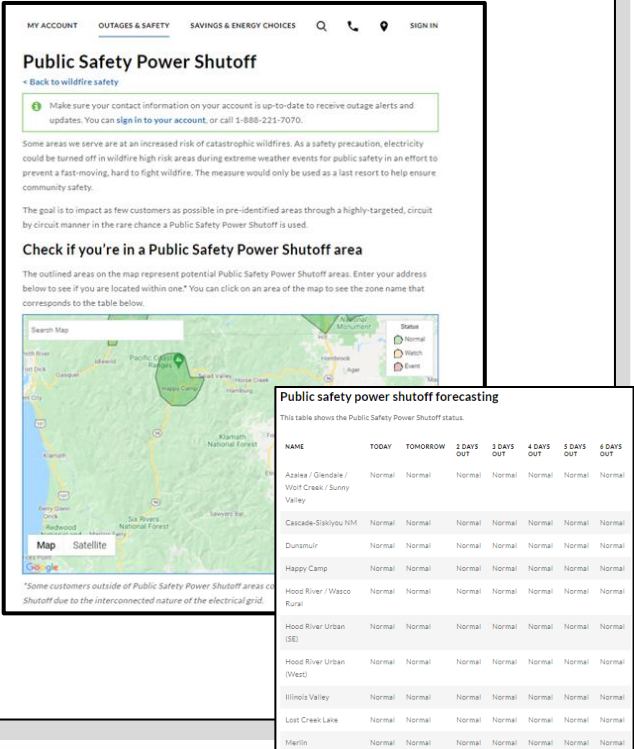


Recommendations
✓ Continue educating customers about Pacific Power's efforts to reduce the risk of wildfire. ✓ The increase in awareness compared to August 2021 suggests that messaging has been effective or more frequent during the peak of the fire season. ✓ Continue utilizing TV news, social networking, and email to communicate with customers about wildfire preparedness and safety. ✓ Evaluate strategy used to inform customers of a PSPS map on the Pacific Power website and how they can update their contact information with Pacific Power to receive notifications.



PSPS Mapping & Transparency

Working to update and enhance website material, including real time PSPS status updates



Public safety power shutoff forecasting

This table shows the Public Safety Power Shutoff status.

NAME	TODAY	TOMORROW	2 DAYS OUT	3 DAYS OUT	4 DAYS OUT	5 DAYS OUT	6 DAYS OUT
Azules / Glendale / Wolf Creek / Sunny Valley	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Cascade-Siskiyou NM	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Dunsmuir	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Happy Camp	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Hood River / Wasco Rural	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Hood River Urban (SE)	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Hood River Urban (West)	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Illinois Valley	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Lost Creek Lake	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Marlin	Normal	Normal	Normal	Normal	Normal	Normal	Normal

AFN & Medical Baseline Customers

Access and Functional Needs Plan for 2022

- ✓ **Collaborate with State and Community Based Organizations (CBOs) to leverage the common definition and identify targeted outreach opportunities.**
- ✓ Continue to deploy and expand strategies to enhance identification of individuals with AFN:
- ✓ **Partner with state agencies, hospital associations, healthcare providers, and CBOs to identify targeted audiences**
- ✓ **Marketing to promote beneficial programs like Medical Baseline and CARE to reach AFN individuals**
- ✓ AFN Marketing and outreach to encourage customers to self-identify as individuals with AFN
- ✓ Continue to promote the ability for customers to “self-certify/identify” as individuals with AFN/Vulnerable Customer status across new channels including websites

PSPS De-Energization Zone	Medical Baseline AFN	Non-Medical Baseline AFN	Total
Inside	26	97	123
Outside	77	267	344
Total	103	364	467

Resources		
Community Resource Centers	Wi-Fi, ADA-accessible restroom, bottled water, snacks, charging, chairs, ice, event information & area/weather items	✓
Power Resiliency	Portable backup batteries for Medical Baseline customers	✓
	Generator Rebate Program	✓
Customer Communications	Annual Preparedness Outreach	✓
	In Language Materials	✓
	Accessible Materials	✓
	CBO Partners	✓
Training	General Information	✓
	Tabletop exercises and full-scale exercises	✓
Community Engagement	IOU hosted events, Webinars, Advisory Boards, Working Groups	✓
PSPS Notifications	Account Holders	✓
	Non-Account Holders	✓
	Broad: via multicultural media, CBOs, and social media	✓
Notification Confirmation (Phone retrievals & in person doorbell rings)	Life Support/Critical Care	✓
	Medical Baseline	✓
	Self-Certified Vulnerable Customer Status	✓

AFN customers are Individuals who are at an increased risk of harm to their health and safety during a Public Safety Power Shutoff. Including, but not limited to:

- Medical & Non-Medical,
- Behavioral, Mental & Emotional Health,
- Mobility & Movement,
- Communication, and
- Individuals who require devices for health, safety and independence.

Opportunities Identified in 2021

- Communication companies have bandwidth limitations such that PacifiCorp's customer notifications need to be staggered to not overload the communication system
- The need to coordinate directly with telecommunication emergency management teams during PSPS events
- Additional coordination and collaboration with tribal leaders
- The need to effectively coordinate with Community and Religious Based Organizations would allow better outreach to AFN population prior to, during and recovering from a PSPS event
- Ensuring Joint Information System has timely and accurate information to ensure all cooperating agencies have appropriate messaging
- CRC activation was the first for PacifiCorp and while it was effective some logistical and communication adjustments have been made for future deployments
- Real time production of GIS mapping data was more challenging to produce and distribute than anticipated
- The need for customer communication verification



Looking Forward to 2022

- Leveraging full capabilities of the internal meteorological team established in 2021 and new forecast modeling tools currently being implemented for the 2022 fire season
- Improved coordination with key stakeholders such as telecommunications providers, tribal leaders, critical infrastructure customers and public safety partners with expanded emergency management organization
- Expanded PSPS exercise frequency to ensure all involved understand their role and responsibilities during an actual event
- Continued participation in coordination meetings with other IOUs
- Implementation of revised and improved customer communication strategies
- Improved Community and Religious Based Organization outreach to enhance support for AFN community



Continuous Improvement

Thank you