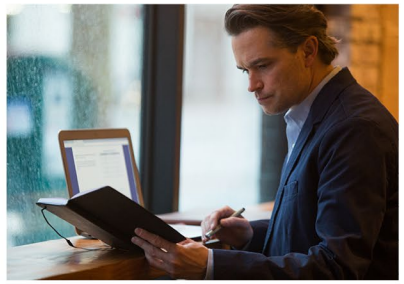
Enhanced Safety Settings Troubleshooting

OWEC
December 4, 2025





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  - Definition and purpose
  - Customer communications
- **ESS outages troubleshooting**
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- **ESS reliability troubleshooting**
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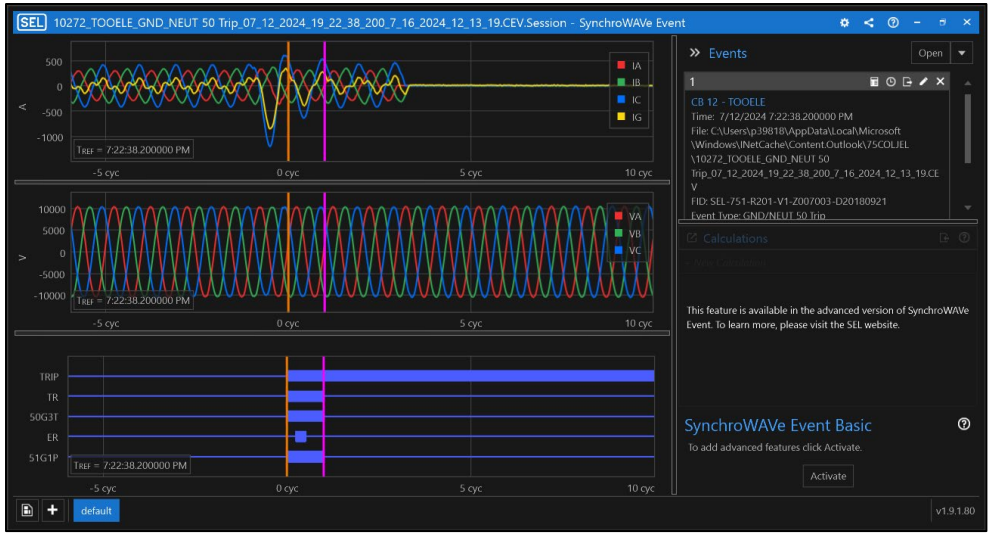
- **Waveform learnings**
  - Understanding the different waveform types
  - How it is used in ESS troubleshooting



ESS Program Overview

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Pacific Power summary

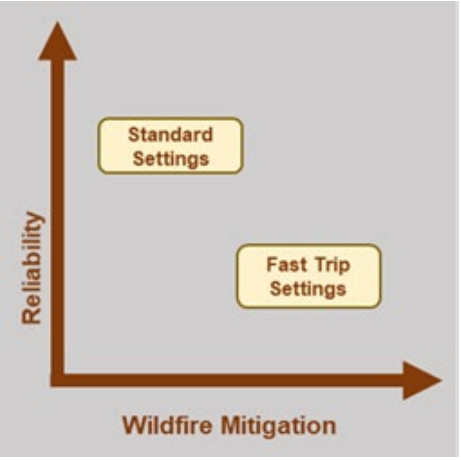
Oregon	2025
SAIDI Excluding ESS	**110.3***
SAIDI ESS	**123.1***
Number of Circuits	**547**
Number of ESS Activated Circuits	**274** (50% of Total)
Number of Protective Devices (Circuit Breaker, Recloser, Fuse saver)	**1,158**
Number of Protective Devices ESS Activated	**664** (57% of Total)
Number of Protective Devices ESS Activated with SCADA	**169** (14% of Total)
Number of Protective Devices with HIF Trip	**188** (16% of Total)
Number of Communicating Fault Circuit Indicators (CFCI's)	**953**
Number of CFCI's on ESS Activated Circuits	**700** (73% of Total)

Definition and purpose

- Enhanced Safety Settings (ESS) are **protection settings on relays** designed to clear faults in < 1 second to limit arc energy as compared to traditional schemes where clearing times can be 4-10 seconds.
  - Additionally, these settings are designed to limit potential expulsion protection device operation (fuses).

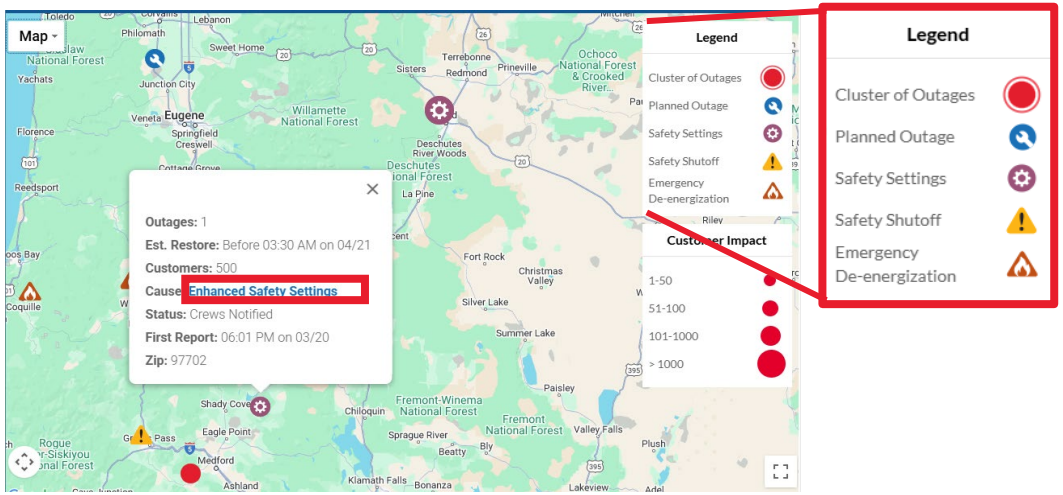
- Depending on the relay capability ESS can mean different things.
  - A summary of the ESS settings that are currently implemented by the company is provided on the right.

ESS Setting	Relay Trip Response
Tagged/Hold	Instantaneous Pickup, Lockout
Fire Mode or Elevated Fire Risk (EFR)	Harmonic Restrained Fast Curve (HR-Fast), 30 second open interval, HR-Fast, Lockout
Lever Down (FuseSaver only)	Instantaneous Pickup, Lockout



Customer communications

- Pacific Power uses multiple methods to inform customers about Enhanced Safety Settings before and during wildfire season, including:
  - Pre-season emails and bill messages
  - Community events (in-person, virtual)
  - Handouts
  - Paid advertising (targeted to areas previously impacted)
  - Local media stories
  - Social media messaging
  - Website
  - Sharing resources with partners
- Customers receive a letter or email letting them know when they have been placed on settings for the season:
  - Explaining why and how settings are used
  - What to expect from Pacific Power
  - How customers can prepare



ESS Outage Troubleshooting

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General response/restoration process

- The goals for risk mitigation for restoration of ESS circuits is the same as the activation, being to limit arc energy and limiting potential for expulsion protection devices to operate (fuses).

1 Targets

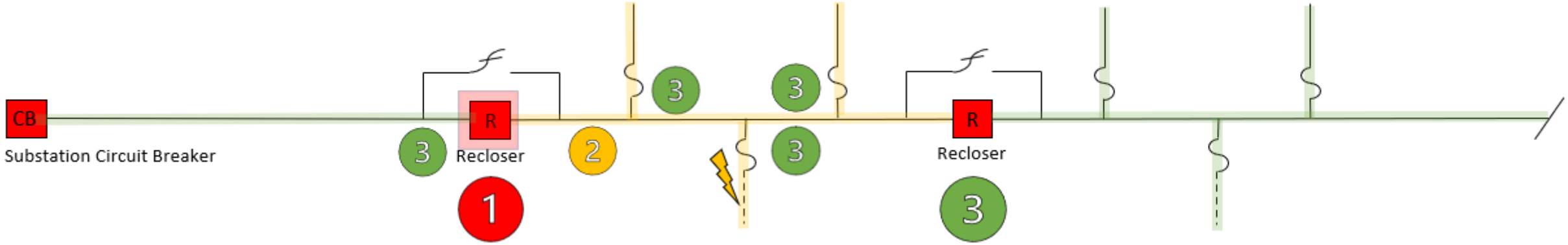
Retrieve fault magnitude and targets from the relay. This provides indication of where to start looking and allows RTE/FE to provide fault map to system operator to provide first responder potential fault locations.

2 Patrol and isolate

Patrol the line to identify the outage cause. If areas haven't been patrolled or can't be seen, isolate them. "If you haven't seen it, isolate it" (reclosers, switches, underground dips, etc.).

3 Step Restore

Step restore the circuit by closing in device that locked out. Close in overhead taps first sequentially. Once all overhead taps have been energized, close in underground dips sequentially.



Restoration process can vary with meteorology risk color. See SOP-202 for policy and procedures.

Customer communications

- Pacific Power notifies customers when outages related to Enhanced Safety Settings occur:
  - **Real time outage notifications**
    - Updated before 2025 wildfire season to be specific to enhanced safety settings
  - **Outage map**
    - Updated before 2025 wildfire season to show enhanced safety settings icon and link to additional information

- Some customers will be restored before others due to step restoration process

Figure 7: Visual Depiction of Single Restoration vs Step Restoration

ESS Reliability Troubleshooting

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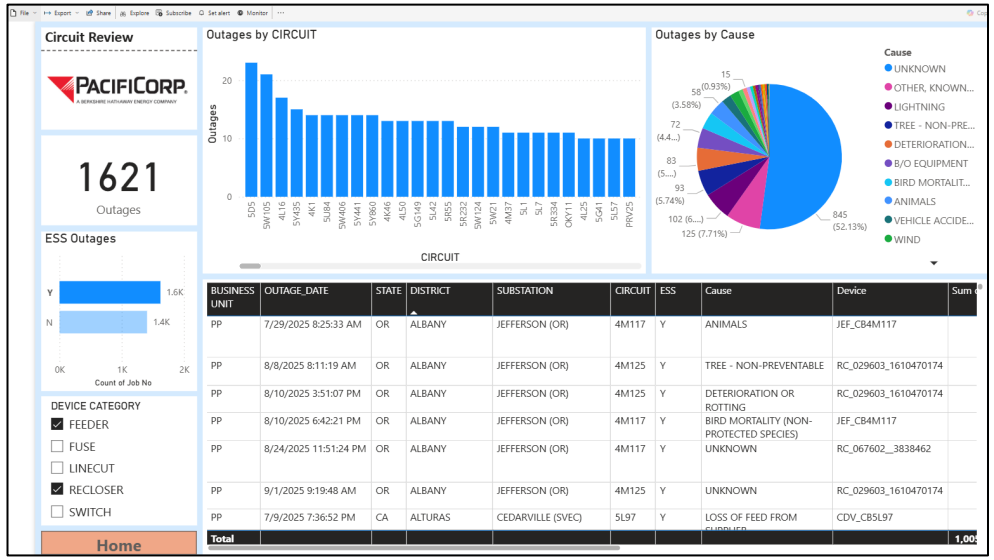
Thresholds for review

ESS Criteria	Ops Count	# of Days
Any Recloser, Circuit Breaker, or Fusesaver with **2 Lockouts in ESS in 1 week**	2	7
Any Recloser, Circuit Breaker, or Fusesaver with **4 Lockouts in ESS in 1 month**	4	30
Any Recloser, Circuit Breaker, or Fusesaver with **6 Lockouts in ESS in a season**	6	365



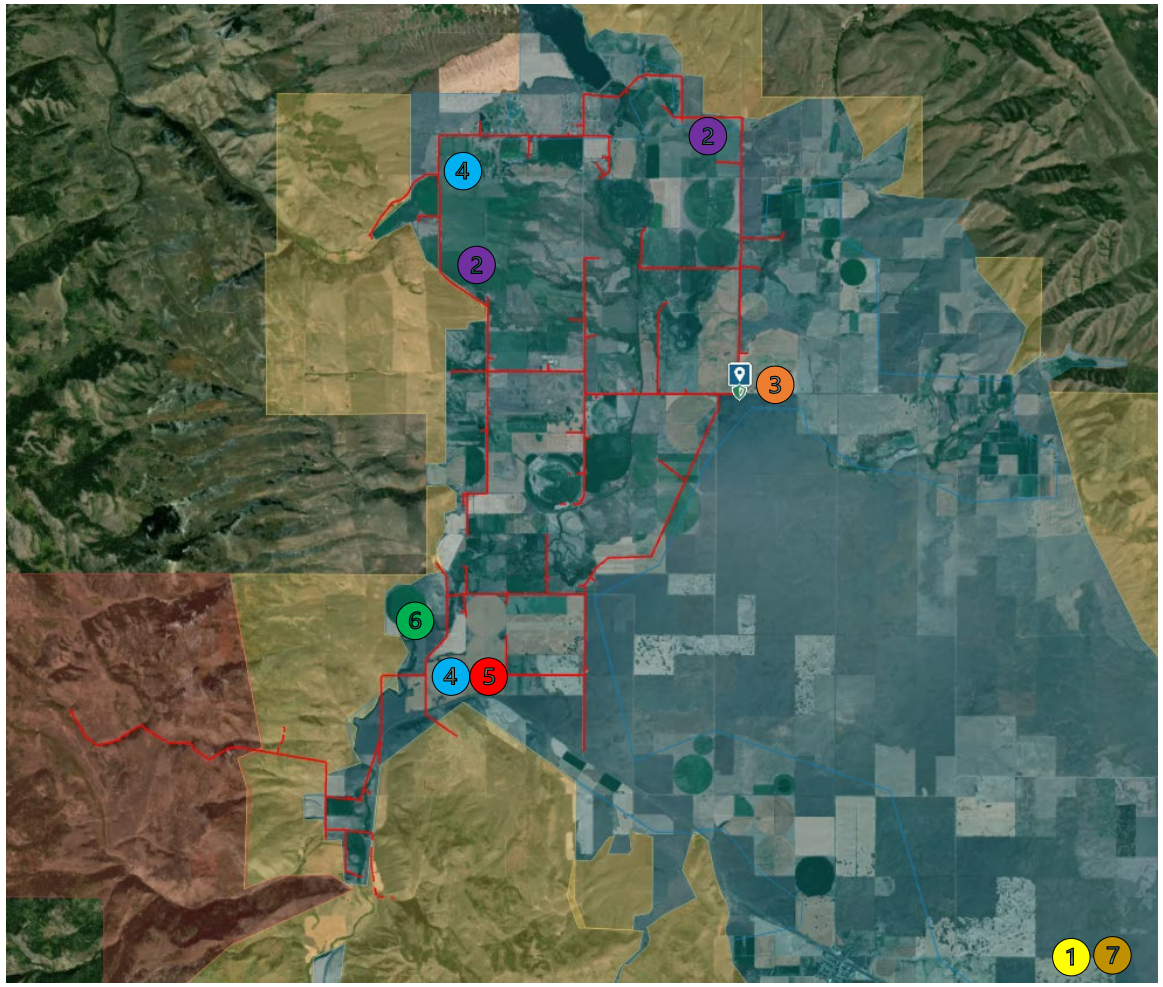
Other methods include:

- Customer Feedback

General review process

1. Review outage history, outstanding conditions and relay event data
2. Verify meteorology fuel/terrain polygons
3. Implement new settings on existing protective devices (if possible)
4. Install additional protective devices to further isolate wildfire risk areas (i.e. reclosers, fuse savers, etc.)
5. Install Communication Faulted Circuit Indicators (CFCIs)
6. Additional inspections (mainly via drone, but can include visual or detail)
7. Expedite existing reliability/wildfire hardening projects currently in progress (if any)

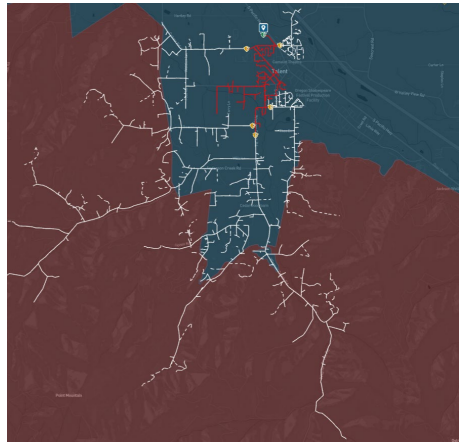
Example: Chesterfield CB11



Customer communications

- When an area experiences reliability impacts due to enhanced safety settings, additional outreach and communications are used, including:
  - Targeted customer emails
  - Communication to key stakeholders
  - Community events (where appropriate)
    - Example: Talent, Oregon

- The focus of these communications are to let customers know what Pacific Power is doing and what to expect



Waveform Learnings

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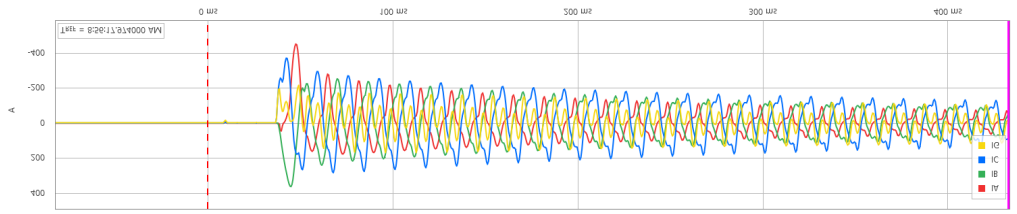
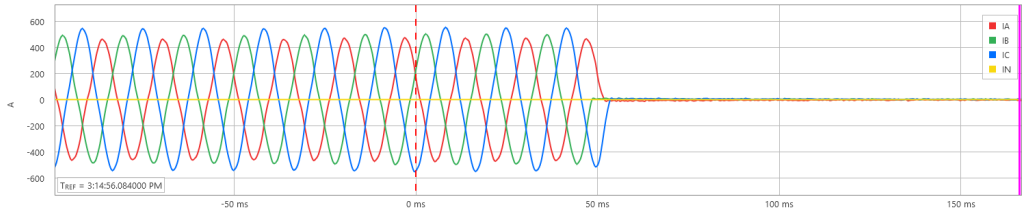
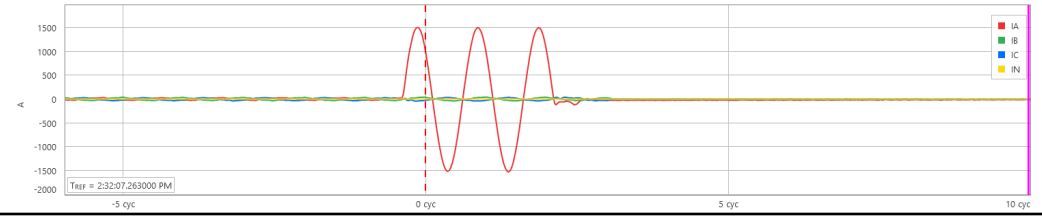
How it is used in ESS troubleshooting

Potential Troubleshooting Solution Examples			
Waveform Type		Potential Solution	
		Outage	Reliability
Inrush		Sectionalize further during step restoration	Add isolation locations, additional protective device, or adjust protective device settings
Cold Load		Sectionalize further during step restoration	Add isolation locations, phase balancing, additional protective device, or adjust protective device settings
Fault		Use fault current information for fault map. Continue Patrol to find cause.	Circuit hardening, installation of CFCI's, or additional protective device

Oscillography/Waveform Data Sources: *Protective Device Relays (SEL-351, SEL-651R2, SEL-751) and CFCI's (MM3)*

Questions?

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Thank you

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Learn more

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