



# 2018 SCE Reliability Review

**December 3<sup>rd</sup>, 2019**  
**Irwindale, California**

# Meeting Topics

- Overview of SCE
- Reliability Definition and Measurement
- SCE's 2018 Reliability Performance
- How to Obtain Local Reliability Reports?
- 2018 Reliability Improvements

# Who We Serve

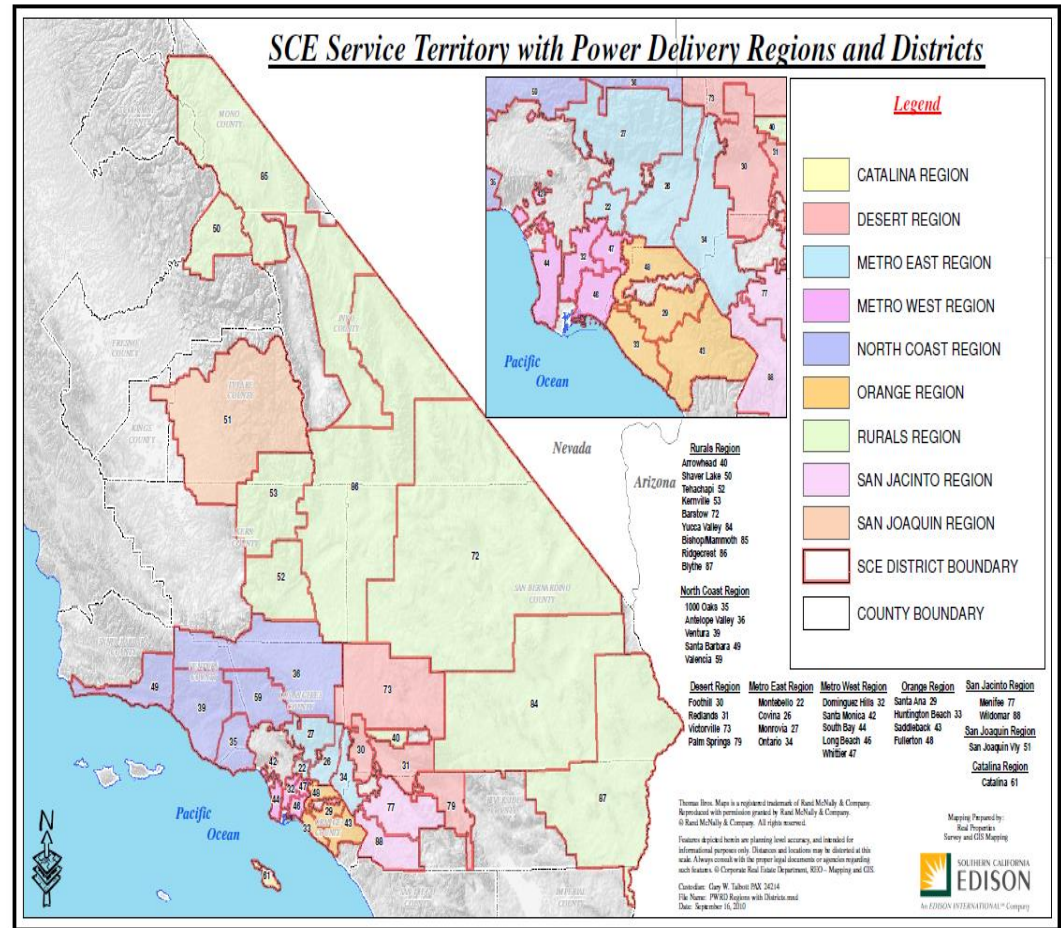
Southern California Edison is one of three major utilities that services over a million customers in California.

15M Residents

5M Customers

9 Regions and 35 Districts

445 Communities and Cities



# How We Do It

We deliver power safely, reliably and affordably. We monitor and maintain a vast electricity system that delivers more than 23,000 MW of load to customers annually

50,000 Square Mile

4,600 Circuits

1.5M Poles

119,000 Miles of D&T lines

750,000 Distribution Transformers



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# What is Reliability?

- In simplest terms:  
*Having dependable electricity when you need it.*
- Outages:
  1. Maintenance outages (aka planned outages)
  2. Repair outages (aka unplanned outages)
    - Sustained Outage = An outage lasting > **5 minutes**
    - Momentary Outage = An outage lasting  $\leq$  **5 minutes**
  3. Public Safety Power Shutoff (aka PSPS)
    - Sustained Outage
    - National Weather Services Red Flag Warning



**I. Major Event Day (MED) :** A day in which the daily system SAIDI exceeds a threshold value. For the purposes of calculating daily system SAIDI, any interruption that spans multiple calendar days is accrued to the day on which the interruption began. Statistically, days having a daily system SAIDI greater than a threshold value are days on which the energy delivery system experienced stresses beyond that normally expected (such as severe weather).

**II. Public Safety Power Shutoff (PSPS) :** An operational protocol that SCE implements under extreme weather conditions in order to minimize the threat of wildfires and keep communities safe from potentially dangerous situations. These types of sustained outages are temporary and usually involve situations where high fire areas are experiencing adverse weather or public safety is at risk.

# How Do We Measure Reliability?

SAIDI

SAIFI

MAIFI

CAIDI

**SAIDI**

=

Total minutes every SCE customer was without power due to sustained outages (CMI)

÷

Total number of customers

“What’s the total time my power service will be unexpectedly interrupted this year?”

System Average Interruption Duration Index

**SAIFI**

=

Number of sustained customer outages experienced by all SCE customers (CI)

÷

Total number of customers

“How many times will my power service be unexpectedly interrupted this year?”

System Average Interruption Frequency Duration Index

**CAIDI**

=

System Average Interruption Duration Index (SAIDI)

÷

System Average Interruption Frequency Index (SAIFI)

“How long will it take to restore my power after an unexpected interruption?”

Customer Average Interruption Duration Index

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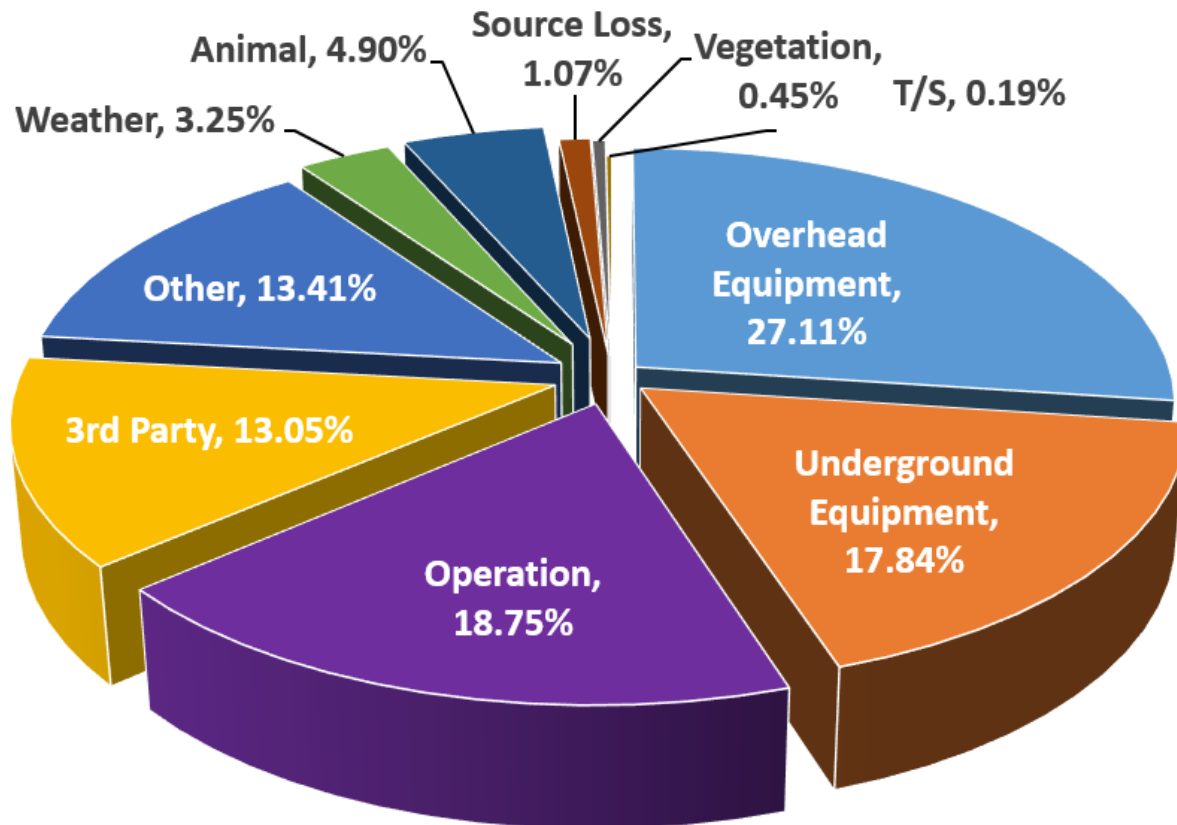


# 2009- 2018 System Reliability History (Excluding MED<sup>1</sup>) – Unplanned



<sup>1</sup>Exclusions are days which utilities are allowed to remove from their metrics because the outages on those days were caused by a severe acts of nature and meet MED threshold.

# 2018 Outage Causes



SCE 2018 SAIDI DISTRIBUTION : UNPLANNED OUTAGE EXCLUDING MED

# Worst 1% of Circuits by System SAIDI

The list below captures the 1% worst performing circuits (WPC) by SAIDI. The following are the total number of circuits and the associated district and cities.

1% WORST PERFORMING CIRCUITS BY SYSTEM SAIDI		
DISTRICT	CITIES	CIRCUITS
ANTELOPE VALLEY	KERN COUNTY	1
BARSTOW	BARSTOW	1
BLYTHE	RIVERSIDE COUNTY, SAN BERNARDINO COUNTY	2
COVINA	LA PUENTE	1
DOMINGUEZ HILLS	COMPTON, LA COUNTY	2
FOOTHILL	JURUPA VALLEY	1
HUNTINGTON BEACH	COSTA MESA, NEWPORT BEACH, ORANGE COUNTY	4
LONG BEACH	LONG BEACH	1
MENIFEE	RIVERSIDE COUNTY	1
MONROVIA	LA COUNTY	2
MONTEBELLO	LA COUNTY, SOUTH PASADENA	2
REDLANDS	BEAUMONT	1
SAN JOAQUIN VALLEY	TULARE COUNTY	1
SANTA ANA	SANTA ANA	1
SANTA BARBARA	SANTA BARBARA, SANTA BARBARA COUNTY	2
SANTA MONICA	MARNIA DEL RAY, WEST HOLLYWOOD	2
SOUTH BAY	HAWTHORNE, INGLEWOOD, SOUTH BAY CITIES, TORRANCE	5
THOUSAND OAKS	LA COUNTY, SIMI VALLEY, THOUSAND OAKS	4
VENTURA	OXNARD, PORT HUENEME, VENTURA COUNTY	5
VICTORVILLE	SAN BERNARDINO COUNTY	3
WILDOMAR	RIVERSIDE COUNTY	2
YUCCA VALLEY	SAN BERNARDINO COUNTY	2

Note: Worst performing circuits are calculated based on a historical three year weighted average and excludes MEDs

# Worst 1 % of Circuits by System SAIFI

The list below captures the 1% worst performing circuits (WPC) by SAIFI. The following are the total number of circuits and the associated district and cities.

1% WORST PERFORMING CIRCUITS BY SYSTEM SAIFI		
DISTRICT	CITIES	CIRCUITS
ANTELOPE VALLEY	LA COUNTY	1
DOMINGUEZ HILLS	CUDAHY	1
HUNTINGTON BEACH	COSTA MESA, NEWPORT BEACH, ORANGE COUNTY, HUNTINGTON BEACH	6
LONG BEACH	NORWALK	1
MENIFEE	RIVERSIDE COUNTY	1
MONROVIA	LA COUNTY	1
MONTEBELLO	SAN GABRIEL	2
SANTA BARBARA	SANTA BARBARA, SANTA BARBARA COUNTY	4
SANTA MONICA	MARINA DEL REY, WEST HOLLYWOOD, SANTA MONICA	3
SOUTH BAY	HAWTHORN, INGLEWOOD, LA COUNTY, SOUTHBAY CITIES, TORRANCE, LOMITA	8
THOUSAND OAKS	LA COUNTY, THOUSAND OAKS	3
VENTURA	OXNARD, PORT HUENEME, VENTURA CONTY, VENTURA	8
VICTORVILLE	SAN BERNARDINO, HESPERIA	2
YUCCA VALLEY	SAN BERNARDINO COUNTY	1
SADDLEBACK	LAGUNA WOODS	1
VALENCIA	LA COUNTY, SANTA CLARITA	2
PALM SPRINGS	DESERT HOT SPRINGS	1

Note: Worst performing circuits are calculated based on a historical three year weighted average and excludes MEDs

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# How can I get reliability information?

## City Reliability Reports

- City Reliability Reports can be found at **SCE > Outage Center > Reliability Reports**
- There are over 240 City Reliability Presentations available, including unincorporated cities
- These reports are updated annually
- City Reliability Reports include the following information:
  - Listing of circuits serving that city
  - Circuit reliability performance
  - Causes of repair outages on those circuits
  - Capital Improvement Plans on those circuits

# City Overview and Reliability Metrics

- Each city report will list all circuits that serve that city as well as the number of customers on each of those circuits
- Provides reliability history for the current year and the prior 3 years
  - SAIDI
  - SAIFI
  - MAIFI

## Overview of Anytown There are 20 circuits that serve Anytown

Circuit Type	Sum of Customers	Circuit Type	Sum of Customers	Circuit Type	Sum of Customers
BOOK(33KV)	2				
BURRITO(12KV)	1,486				
BUSINESS(4.16KV)	130				
COLOR(4.16KV)	379				
EXPRESS(33KV)	1				
FRITO(33KV)	1				
HIGH(4.16KV)	414				
HUEVOS(12KV)	2,457				
JUDY(12KV)	923				
LAUTERBACH(4.16KV)	297				
MAUEL(12KV)	1,168				
MONTARA(33KV)	1				
PATIO(12KV)	565				
PESQ(12KV)	1,803				
POCO(33KV)	18				
POUCE(12KV)	959				
POOL(4.16KV)	381				
REMOTE(33KV)	34				
TAMALE(12KV)	672				
TURKEY(12KV)	936				

**Grand Total** 12,627

Southern California Edison

## Reliability History of Circuits Serving Anytown (No Exclusions)

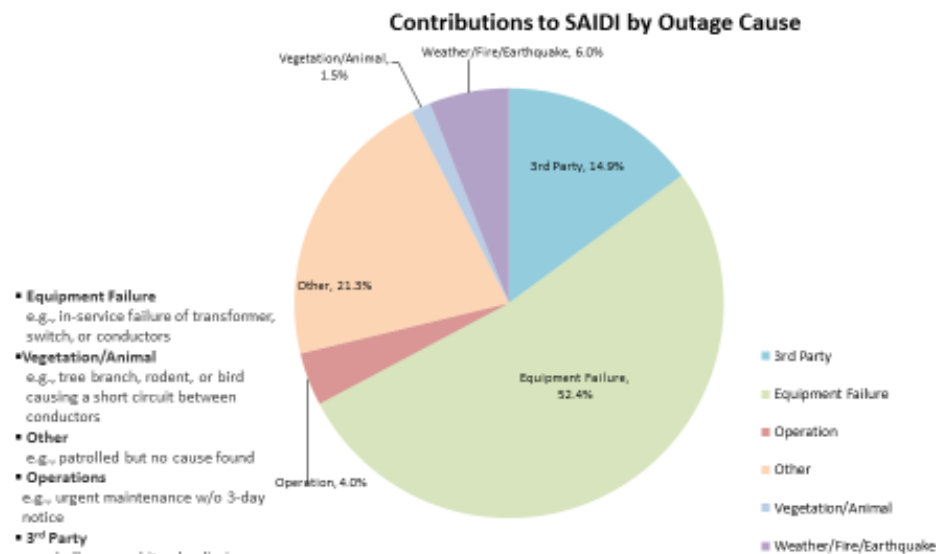


# Outage Causes

- Each report will provide the % contribution by SAIDI & SAIFI based on the outage cause categories

- 3<sup>rd</sup> Party
- Equipment Failure
- Operation
- Other
- Vegetation/Animal
- Weather/Fire/Earthquake

## Causes of Repair Outages in Anytown Circuits 2016 YTD

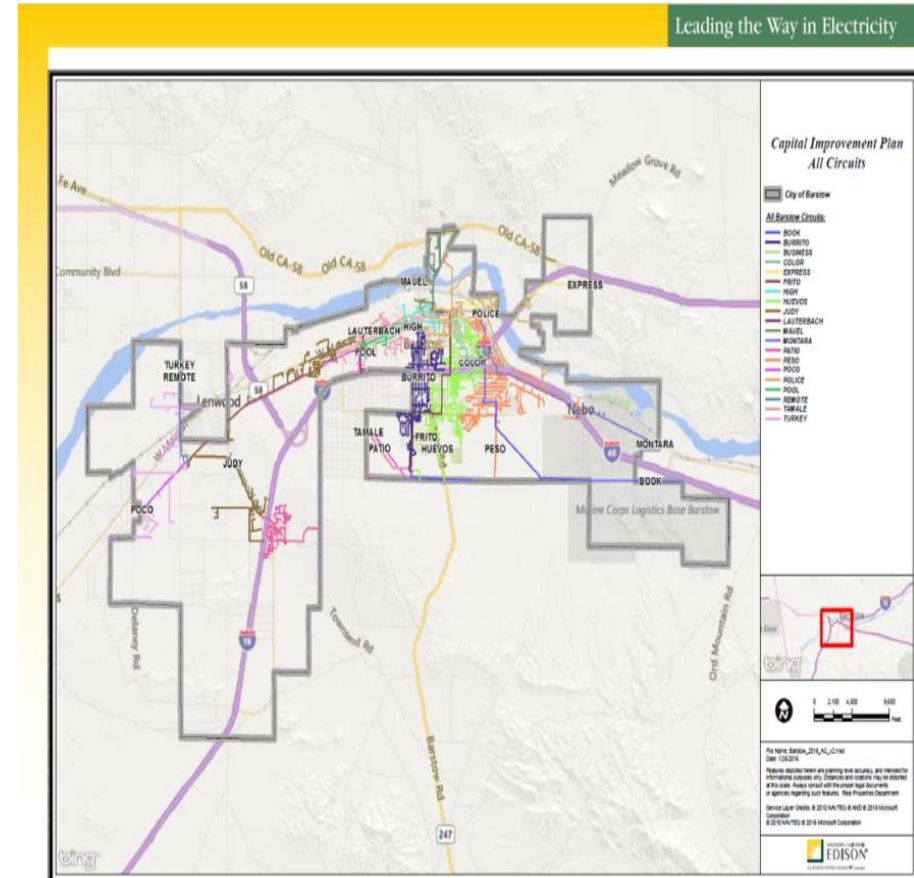


SAIDI = the cumulative amount of time the average customer is interrupted by "sustained" outages each year.



# Capital Improvement Work

- The report provides a map of all the circuits that serve that city
- The map will also highlight capital improvement work being performed on the circuits (includes Transmission work, if applicable).
  - Pole Replacement
  - Circuit Rebuild
  - Electrical Equipment Replacement
  - Etc.



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# 2018 Reliability Improvements

Improvement areas focus on prevention and response:

	<b>Improvement Focus</b>	<b>Objective</b>
1	Analytics & Reporting	Analyze the drivers of reliability
2	Real-Time Outage Diagnostics	Increase oversight during outages
3	Outage Response	Increase response time to identify, diagnose and respond to outages
4	Infrastructure Replacement	Scoping the right projects and executing effectively
5	Infrastructure Improvement	Reduce the number of customers impacted
6	Optimal Circuit Design	Design reliability into the system
7	Predictive Maintenance	Replace equipment before it fails in service

# 2018 Capital Investment

250 miles of underground cable replaced

780 miles of overhead conductor replaced for public safety

18,600 Distribution poles replaced

4,100 Transmission poles replaced

116 Underground structure replacements



# Reliability Strategy and Improvements

Improvement Activities	Status	Year
System Hardening	In Progress	-
Predictive Modeling Team	Complete	2018
Fire Management Response Team	Complete	2019
Remote Control Switching	In Progress	-
Enhanced OH/UG Inspections	In Progress	-
Tree Trimming	In Progress	-
Weather Stations and Cameras	In Progress	-

Grid Reliability and Strategy	Status	Year
Digital Customer Communications	Complete	2018
Grid Modernization	In Progress	-
Branch Line Fuse Strategy	In Progress	-
High Impact Outage Reductions	Complete	2018

# Why This Matters

Our focus on reliability benefits the public's safety and our customers depend on us.



# Questions?

Contact

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