

2019 SCE Reliability Review

Dec 3rd, 2020

Livestream

Meeting Topics

- Overview of SCE
- Reliability Definition and Measurement
- SCE's 2019 Reliability Performance
- How to Obtain Local Reliability Reports?
- 2019 Reliability Improvements

Who We Are

- Southern California Edison (SCE) is an Edison International company
- One of the nation's largest electric utilities
- More than 130 years of history
- Headquartered in Rosemead, California
- Regulated by the California Public Utilities Commission (CPUC) and the Federal Energy Regulatory Commission (FERC)
- 50,000 square miles of SCE service area across Central, Coastal, and Southern California



How We Serve

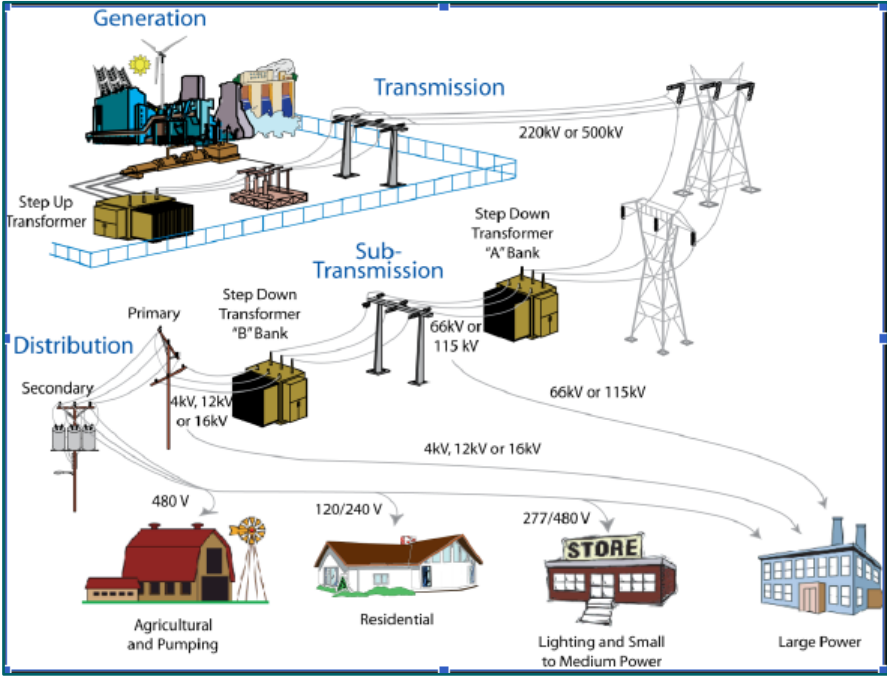
To deliver power safely, reliably and affordably, we monitor and maintain a vast electricity system.

5M Customers and 15M Residents

4600 Circuits

119,000 Miles of Transmission and Distribution Lines

730,000 Transformers



Reliability Definition and Measurement

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)
 - a) Sustained Outage (>5 mins)
 - b) Momentary Outage (<5 mins)
 3. Public Safety Power Shutoff (aka PSPS)



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
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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?”

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

SCE 2019 Reliability Performance

Energy for What's Ahead®



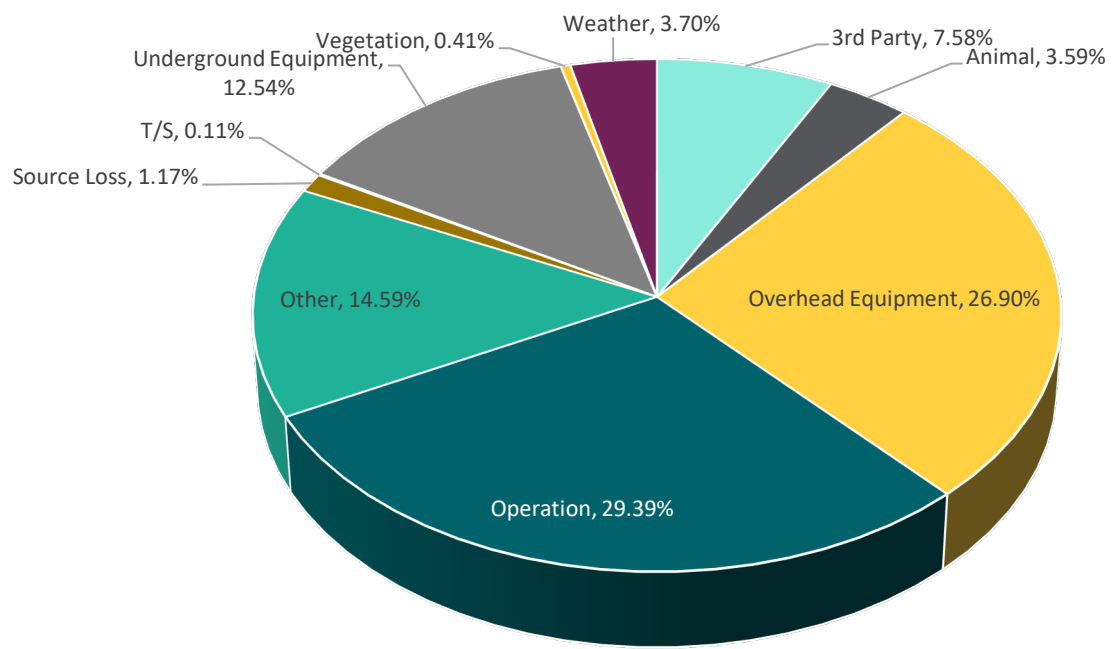
2009- 2019 System Reliability History (Excluding MED¹) – Unplanned



¹Exclusions 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.



2019 Outage Causes



■ 3rd Party ■ Animal ■ Overhead Equipment ■ Operation ■ Other ■ Source Loss ■ T/S ■ Underground Equipment ■ Vegetation ■ Weather

Worst 1% of Circuits by System SAIDI

Circuit (1)	District (2)	2019 Customer Count (3)	Substation (4)	Circuit Miles (5)	%UG (6)	%OH (7)	Circuit Breaker or Auto-Recloser Operation 1 (8)	Sys-SAIDI Rank (9)	Sys-SAIDI2 (9)	Ckt-SAIDI Rank (10)	Ckt SADI (10)
Rim 12kV	40	1,915	Burnt Mill 33/12	29.15	0	1	43	1	0.5346	53	1,438
Corsica 16kV	39	6,145	Gonzales 66/16	46.52	1	0	27	2	0.4052	281	340
Castro 16kV	39	2,369	Wakefield 66/16	40.61	0	1	29	3	0.3914	108	851
Cachuma 16kV	49	4,021	Vegas 66/16	80.90	0	1	42	4	0.3817	189	489
Hollywood 16kV	42	3,576	Fairfax 66/16	11.03	1	0	10	5	0.3312	194	477
Campanula 25kV*	84	1,969	Nugget 33/25	132.70	0	1	74	6	0.3046	117	796
Tenneco 12kV*	36	4,733	Frazier Park 66/12	112.90	0	1	21	7	0.2868	312	312
January 12kV*	33	4,372	Lafayette 66/12	23.74	1	0	18	8	0.2617	318	308
Taggart 12kV	40	619	Running Springs 33/12	11.15	0	1	16	9	0.2526	30	2,103
North Shore 12kV	40	1,134	Burnt Mill 33/12	16.52	0	1	21	10	0.2518	72	1,144
Turnbull 12kV	26	1,394	Walnut 66/12	14.76	1	0	5	11	0.2495	94	921
Landers 25kV*	84	1,785	Nugget 33/25	142.90	0	1	76	12	0.2475	128	713
Spinnaker 16kV*	39	4,989	Channel Island 66/16	29.11	0	1	18	13	0.2442	406	252
Surfside 16kV*	39	5,581	Channel Island 66/16	31.62	1	0	21	14	0.2423	469	223
Asteroid 16kV*	22	4,399	Alhambra 66/16	23.02	0	1	12	15	0.2340	367	273
Beachcomber 16kV	42	3,923	Santa Monica 66/16	5.98	0	1	6	16	0.2256	326	296
Peacor 12kV	84	880	Peacor P.T. 33/12	96.78	0	1	39	17	0.2194	59	1,284
Mettler 12kV	52	1,632	Cummings 66/12	32.91	0	1	38	18	0.2168	135	684
Gardea 16kV	22	3,391	Amador 66/16	17.05	0	1	10	19	0.2141	291	325
Windjammer 16kV*	39	6,992	Channel Island 66/16	41.11	1	0	22	20	0.2121	750	156
Rosebud 12kV	50	797	Pitman 33/12	21.88	0	1	22	21	0.1974	60	1,274
Energy 16kV	35	1,700	Chatsworth 66/16	43.74	0	1	22	22	0.1964	151	594
Roi-Tan 12kV	31	2,808	Shandin 115/12	33.72	0	1	22	23	0.1890	260	346
Sundown 12kV	73	2,937	Helendale 33/12	57.90	1	0	20	24	0.1872	284	328
Conifer 16kV	35	3,209	Oak Park 66/16	24.40	1	-	7	25	0.1855	316	297
Scow 12kV	33	4,217	Bolsa 66/12	31.36	1	0	14	26	0.1844	450	225
Cuddeback 12kV	52	1,356	Cummings 66/12	21.20	0	1	31	27	0.1833	131	696
Heavy 33kV	86	13	Randsburg 115/33	43.10	-	1	10	28	0.1769	1	70,106
Brookline 16kV	22	1,536	Rush 66/16	24.09	0	1	16	29	0.1748	150	586
Morongo 12kV	84	708	Morongo P.T. 33/12	35.37	0	1	23	30	0.1728	62	1,256
Perimeter 12kV	50	1,247	Timberwine 33/12	38.68	0	1	21	31	0.1721	124	710
Addis 16kV	44	3,130	Victoria 66/16	13.37	0	1	10	32	0.1717	335	282
Moritz 12kV	40	2,079	Huston 33/12	30.51	0	1	52	33	0.1713	203	424
Veterans 16kV	59	1,814	San Fernando 66/16	24.16	0	1	12	34	0.1713	177	486
Bolton 16kV	32	3,121	Jersey 66/16	23.39	0	1	15	35	0.1706	335	281
Chargers 12kV*	33	3,982	Slater 66/12	29.86	1	0	13	36	0.1696	464	219
Caliente 12kV	52	2,145	Cummings 66/12	34.61	0	1	26	37	0.1672	212	401
Viento 12kV	52	2,920	Monolith 66/12	99.94	0	1	92	38	0.1652	318	291
Otis 16kV	32	3,440	Cudahy 66/16	21.77	0	1	9	39	0.1638	404	245
Ballard 12kV	22	2,208	Narrows 66/12	17.94	0	1	10	40	0.1636	228	381
Raiders 12kV	33	3,633	Slater 66/12	18.64	1	0	10	41	0.1628	427	230
Kay 16kV	22	2,208	Alhambra 66/16	15.72	0	1	5	42	0.1617	230	377
Ravenna 12kV	46	2,128	Cypress 66/12	13.72	1	0	3	43	0.1600	220	387
Mist 16kV	49	394	Capitan 66/16	50.12	0	1	22	44	0.1562	29	2,042
Highball 12kV*	30	1,635	Bloomington 66/12	24.14	0	1	17	45	0.1553	175	487
Skyland 2.4kV	40	852	Huston 33/2.4	7.07	0	1	32	46	0.1551	87	937

The list captures the 1% worst performing circuits (WPC) by SAIDI. It shows the total number of circuits and the associated district. Worst performing circuits are calculated based on a historical three-year weighted average and excludes MEDS

Worst 1% of Circuits by System SAIFI

Circuit (1)	District (2)	2019 Customer Count (3)	Substation (4)	Circuit Miles (5)	%UG (6)	%OH (7)	Circuit Breaker or Auto-Recloser Operation 1 (8)	Sys-SAIFI Rank (9)	Sys-SAIFI2 (9)	Ckt-SAIFI Rank (10)	Ckt SAIFI4 (10)
Corsica 16kV*	39	6,145	Gonzales 66/16	46.52	1	0	27	1	0.0082	25	7
Sundown 12kV*	73	2,937	Helendale 33/12	57.90	1	0	20	2	0.0034	32	6
Spinnaker 16kV*	39	4,989	Channel Island 66/16	29.11	0	1	18	3	0.0028	193	3
Gardea 16kV	22	3,391	Amador 66/16	17.05	0	1	10	4	0.0027	93	4
January 12kV*	33	4,372	Lafayette 66/12	23.74	1	0	18	5	0.0026	162	3
Surfside 16kV*	39	5,581	Channel Island 66/16	31.62	1	0	21	6	0.0025	319	2
Moritz 12kV	40	2,079	Huston 33/12	30.51	0	1	52	7	0.0024	32	6
Crosson 16kV*	39	4,691	Camarillo 66/16	40.81	1	0	19	8	0.0024	242	3
Salmon 16kV*	44	3,958	El Nido 66/16	18.94	0	1	14	9	0.0024	156	3
Hollywood 16kV*	42	3,576	Fairfax 66/16	11.03	1	0	10	10	0.0023	125	3
Cachuma 16kV*	49	4,021	Vegas 66/16	80.90	0	1	42	11	0.0022	187	3
Windjammer 16kV*	39	6,992	Channel Island 66/16	41.11	1	0	22	12	0.0022	650	2
Jeep 12kV	40	2,057	Arrowhead 33/12	26.25	0	1	33	13	0.0021	42	5
Roi-Tan 12kV	31	2,808	Shandin 115/12	33.72	0	1	22	14	0.0020	107	4
Bolton 16kV	32	3,121	Jersey 66/16	23.39	0	1	15	15	0.0019	141	3
Snead 12kV	33	3,322	Lafayette 66/12	20.78	1	0	6	16	0.0018	191	3
Campanula 25kV*	84	1,969	Nugget 33/25	132.70	0	1	74	17	0.0018	68	5
Raiders 12kV*	33	3,633	Slater 66/12	18.64	1	0	10	18	0.0017	259	2
Kasota 12kV	73	1,789	Victorville 33/12	21.17	1	0	16	19	0.0017	56	5
Rim 12kV	40	1,915	Burnt Mill 33/12	29.15	0	1	43	20	0.0017	67	5
Test 16kV	22	3,692	Alhambra 66/16	28.59	1	0	22	21	0.0017	277	2
Big Rock 16kV	35	2,802	Chatsworth 66/16	27.22	0	1	10	22	0.0017	146	3
Fantail 16kV*	42	4,888	Tahiti 66/16	15.99	1	0	5	23	0.0017	527	2
Scow 12kV	33	4,217	Bolsa 66/12	31.36	1	0	14	24	0.0017	381	2
Hoss 16kV	35	2,395	Royal 66/16	27.85	1	0	15	25	0.0016	113	3
Tenneco 12kV	36	4,733	Frazier Park 66/12	112.90	0	1	21	26	0.0016	544	2
Diablo 16kV*	39	4,266	San Miguel 66/16	38.34	1	0	7	27	0.0016	438	2
Albatross 16kV	42	4,805	Santa Monica 66/16	10.59	1	0	4	28	0.0016	576	2
Octane 16kV	44	3,698	Yukon 66/16	12.42	0	1	12	29	0.0015	333	2
Ebony 16kV*	44	4,188	Torrance 66/16	18.51	1	0	6	30	0.0015	438	2
Saunders 12kV*	77	2,385	Idyllwild 33/12	37.95	0	1	64	31	0.0015	127	3
Jameson 16kV	49	2,797	Santa Barbara 66/16	22.02	1	0	9	32	0.0015	190	3
Conifer 16kV	35	3,209	Oak Park 66/16	24.40	1	-	7	33	0.0015	263	2
Campbell 12kV	51	2,068	Porterville 66/12	41.21	0	1	13	34	0.0015	101	4
Dandelion 12kV	48	2,365	Barre 66/12	16.60	0	1	10	35	0.0015	131	3
Cimarron 16kV*	44	3,679	Inglewood 66/16	15.14	0	1	9	36	0.0014	373	2
Huskie 12kV*	43	3,446	Moulton 66/12	22.14	1	0	2	37	0.0013	388	2
King 16kV*	44	3,806	Victoria 66/16	14.95	1	0	8	38	0.0013	478	2
Otis 16kV*	32	3,440	Cudahy 66/16	21.77	0	1	9	39	0.0013	394	2
Chargers 12kV*	33	3,982	Slater 66/12	29.86	1	0	13	40	0.0013	543	2
Kay 16kV	22	2,208	Alhambra 66/16	15.72	0	1	5	41	0.0013	143	3
Galahad 16kV*	35	2,126	Latigo 66/16	79.81	0	1	21	42	0.0013	135	3
Beachcomber 16kV	42	3,923	Santa Monica 66/16	5.98	0	1	6	43	0.0013	532	2
Rhumba 16kV	44	4,037	Brighton 66/16	16.77	0	1	10	44	0.0013	570	2
Cable 12kV	34	2,066	San Antonio 66/12	16.12	1	0	14	45	0.0013	131	3
Ricardo 16kV	39	2,723	San Miguel 66/16	21.74	0	1	15	46	0.0013	255	2

The list captures the 1% worst performing circuits (WPC) by SAIFI. It shows the total number of circuits and the associated district. Worst performing circuits are calculated based on a historical three-year weighted average and excludes MEDS

How to Obtain Local Reliability Reports



How can I get Reliability Information?

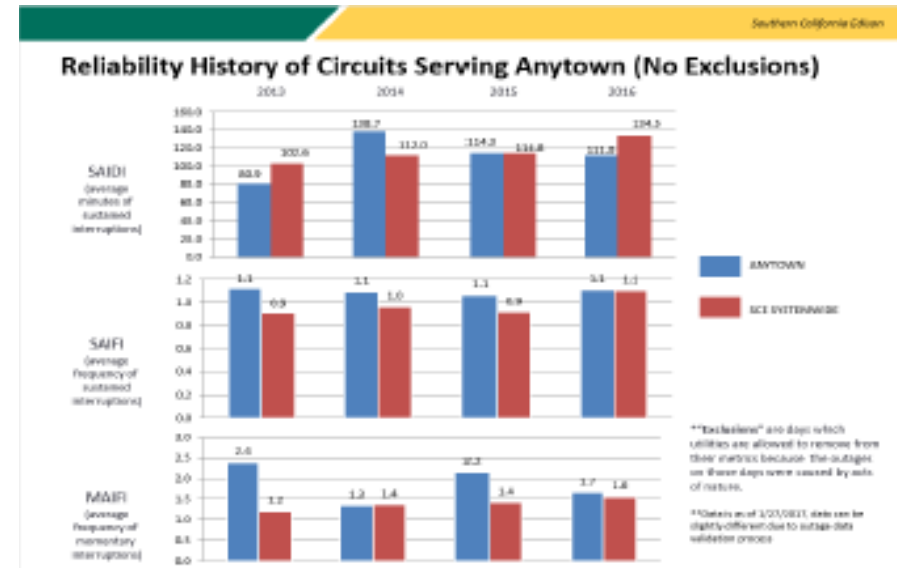
- City Reliability Reports can be found **at SCE > Outage Center > Reliability Reports**
- There are over 240 City Reliability Presentations available, including unincorporated cities
- These reports are updated annually
- City Reliability Reports include the following information:
 - Listing of circuits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

City Overview and Reliability Reports

- 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

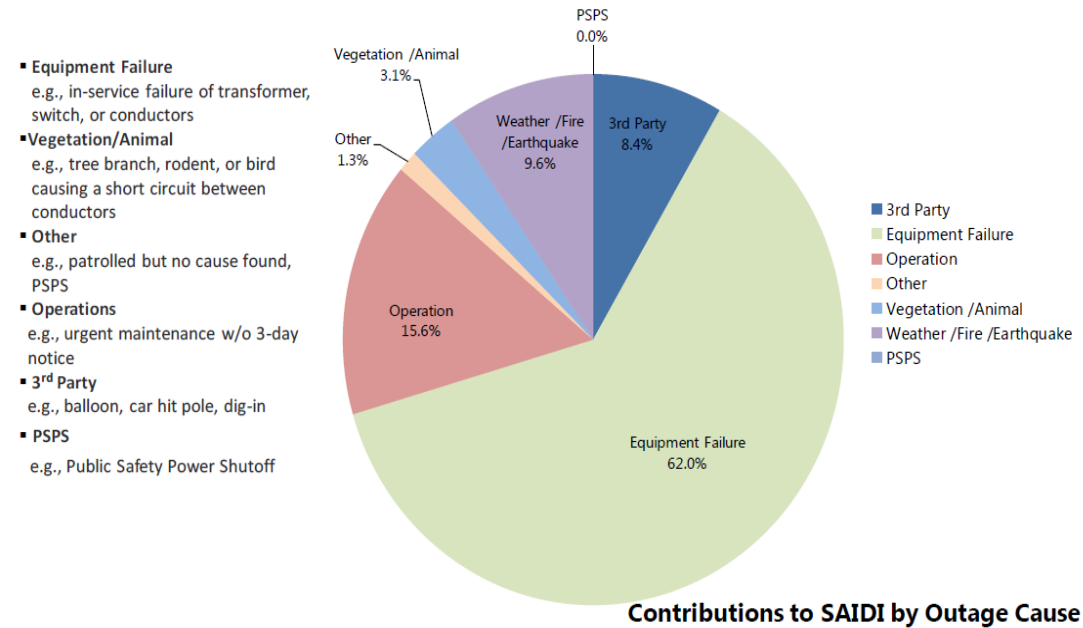
Circuit Type	Sum of Customers	Circuit Type	Sum of Customers	Circuit Type	Sum of Customers
BOPR(238V)	2				
BURR(10(128V)	4,480				
BURR(10(128V)	4,480				
COLOR(4.380V)	870				
EXPRES(180V)	1				
FRTD(380V)	1				
HOBAN(380V)	414				
HUBVOS(120V)	2,437				
JUPITER(0V)	302				
LAUTERBACH(4.380V)	297				
MARU(1238V)	1,380				
MORFARAC(380V)	1				
RATSC(420V)	646				
REDC(280V)	4,803				
ROCC(380V)	18				
ROUCE(120V)	800				
ROUCE(120V)	881				
ROUCE(120V)	94				
SANVAL(120V)	872				
TURKEY(120V)	930				
Grand Total	32,627				



Outage Causes

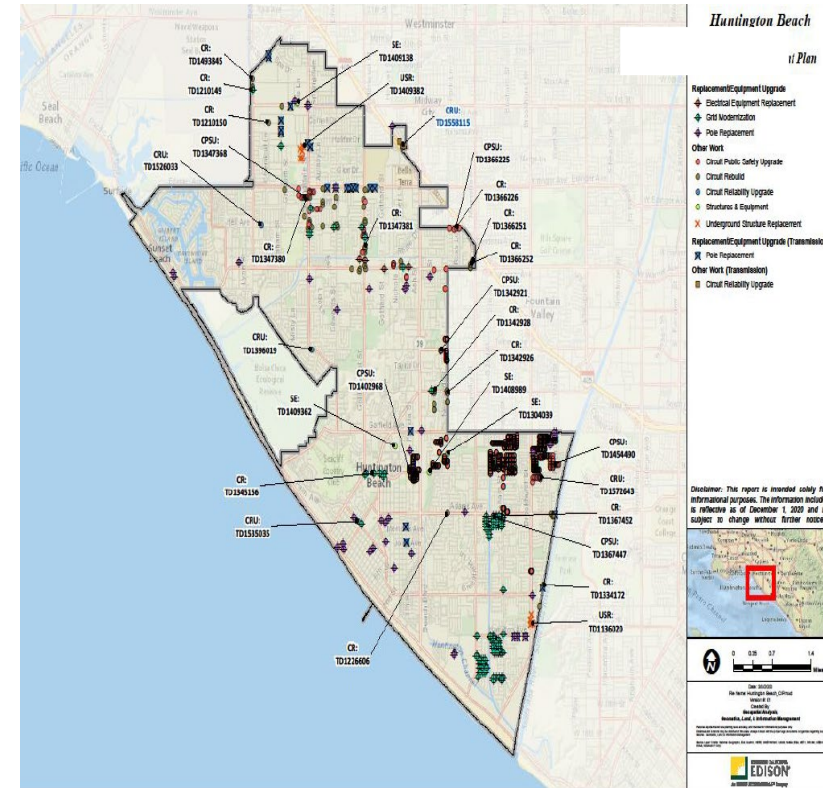
Each report will provide the %contribution by SAIDI and SAIFI based on the outage cause categories

- 3rd Party
- Equipment Failure
- Operation
- Other
- Vegetation/Animal
- Weather/Fire/Earthquake
- PPS



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.



2019 Reliability Improvements

Energy for What's Ahead®



2019 Reliability Improvements

SCE plans to maintain, improve, and harden its infrastructure by focusing on the following areas

- **Infrastructure reliability** – updating underground cables, poles, switches, and transformers
- **Wildfire mitigation** – hardening infrastructure, bolstering situational awareness capabilities, and enhancing operational practices
- **Transmission** – connecting renewables, installing new substations, and updating lines
- **Grid readiness** – updating the grid for impacts from new technologies
- **Long-term energy policy** – supporting energy



2019 Capital Investment

- 179 miles of underground cable replaced
- 502 miles of overhead conductor replaced for public safety
- 16.4k distribution poles replaced
- 4.3k transmission poles replaced
- 71 underground structure replacements



Addressing Wildfire Risk



- SCE continues to build upon the progress made in 2019 to reduce the risk of fire ignitions caused by utility infrastructure
- SCE crews will continue to work to install hi-tech wildfire mitigation tools and technologies to make communities safer, more resilient, and to help reduce the number of Public Safety Power Shutoffs (PSPS)

Questions?

Contact
CircuitReliability@sce.com