



# Circuit Reliability Review

## **Bradbury**

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January 2017

# Providing Safe, Reliable, and Affordable Power

Southern California Edison is modernizing the power grid to meet the changing needs and expectations of our customers and to help California achieve its clean energy goals.

We are investing more than \$12 billion into our power grid between 2015 – 2017 with the goal of increasing power reliability through significant upgrades. These investments include:

- Updating thousands of transmission and distribution poles
- Replacing hundreds of miles of underground cables
- Replacing hundreds of underground structures such as vaults and manholes
- Upgrading critical distribution equipment; capacitor banks, switches, and circuit breakers
- Building new distribution circuits to serve electrical demands in our communities
- Inspecting and replacing overhead conductor and equipment to improve public safety

Our investments in local communities will help ensure that customers receive safe, reliable, and affordable electricity now and in the future.

# Understanding Your Reliability Report

As your electric utility, we want you to always have power when you need it. To get there, we constantly track and monitor electric outages across our service territory, and we measure our “system reliability” from this data.

The two metrics we rely on are common in the electric utility industry: the System Average Interruption Duration Index (SAIDI) and the System Average Interruption Frequency Index (SAIFI). Both are described in more detail on the next page.

Replacing and upgrading our infrastructure will help SCE maintain or improve SAIDI and SAIFI measurements.

This report provides historical reliability data for the circuits that serve your jurisdiction and our proposed infrastructure upgrades for the current year.

To view other reliability reports, visit [sce.com>Outage Center>Maintaining Reliable Service](https://www.sce.com/Outage-Center/Maintaining-Reliable-Service)

# Reliability Metrics

## MOMENTARY OUTAGES:

OUTAGES LASTING 5 MINUTES OR LESS

### MAIFI:

- The number of times the average customer is interrupted by Momentary outages each year.

## SUSTAINED OUTAGES:

OUTAGES LASTING LONGER THAN 5 MINUTES

### SAIFI:

- The number of times the average customer is interrupted by Sustained outages each year.

### SAIDI:

- The cumulative amount of time the average customer is interrupted by Sustained outages each year.

# Cities in the Monrovia District

Altadena

Arcadia

Azusa

Baldwin Park

**Bradbury**

Duarte

East Pasadena

East San Gabriel

Glendale

Irwindale

La Canada Flintridge

La Crescenta-Montrose

Los Angeles

Mayflower Village

Monrovia

Pasadena

San Gabriel

San Marino

Sierra Madre

South Pasadena

Temple City

Vincent

West Puente Valley

# Reliability by SCE District (No Exclusions)

District Name	2012				2013				2014				2015				2016			
	District SAIDI	SAIDI RANKING	District SAIFI	SAIFI Ranking	District SAIDI	SAIDI RANKING	District SAIFI	SAIFI Ranking	District SAIDI	SAIDI RANKING	District SAIFI	SAIFI Ranking	District SAIDI	SAIDI RANKING	District SAIFI	SAIFI Ranking	District SAIDI	SAIDI RANKING	District SAIFI	SAIFI Ranking
ANTELOPE VALLEY	78.60	28	0.56	31	94.42	22	0.62	31	51.05	35	0.59	34	104.34	22	0.68	30	107.67	24	0.87	29
ARROWHEAD	129.58	13	1.31	7	180.59	7	1.39	8	193.25	5	1.59	5	362.61	4	3.97	1	659.46	3	2.85	5
BARSTOW	184.80	7	1.15	12	204.33	6	1.40	7	201.53	4	1.34	10	187.11	8	1.17	12	134.83	18	1.35	9
BIG CREEK	1184.25	1	4.52	1	176.51	8	3.08	1	920.25	1	1.34	11	422.77	2	3.42	2	1062.01	2	4.99	1
BISHOP	463.09	2	1.25	9	104.44	17	0.51	35	118.79	17	0.59	35	298.11	6	2.22	4	168.59	8	1.22	14
BLYTHE	225.88	6	1.53	3	483.13	1	1.38	9	707.54	2	2.42	2	427.00	1	1.52	7	396.38	5	2.71	6
CATALINA	78.46	30	0.72	29	105.94	16	2.97	2	97.02	24	4.17	1	42.56	35	2.25	3	65.01	35	3.66	3
COVINA	108.73	19	0.92	19	100.51	19	0.86	20	91.60	27	0.87	22	100.08	23	0.81	25	112.13	22	0.97	24
DOMINGUEZ HILLS	117.22	18	0.82	24	89.17	26	0.80	21	82.30	29	0.71	28	130.63	15	0.97	17	146.38	12	1.11	17
FOOTHILL	91.69	25	0.90	20	85.80	27	0.79	24	93.35	25	0.93	21	109.64	20	0.95	20	142.81	14	1.03	21
FULLERTON	68.99	33	0.42	35	90.57	25	0.79	22	82.23	30	0.72	27	76.59	29	0.67	31	92.72	30	0.76	34
HUNTINGTON BEACH	95.78	23	0.89	21	66.51	32	0.68	29	79.61	31	0.78	25	98.32	25	0.95	19	128.02	20	1.26	12
KERNVILLE	226.76	5	1.31	6	232.18	4	1.96	3	178.69	8	1.99	3	286.38	7	0.96	18	2421.32	1	3.67	2
LONG BEACH	75.83	31	0.55	33	75.11	30	0.70	28	66.33	34	0.61	32	164.46	9	0.89	23	135.16	17	0.86	31
MENIFEE	99.32	22	0.84	23	107.39	15	1.26	10	156.68	11	1.32	12	111.46	19	0.98	16	156.75	9	1.31	10
MONROVIA	108.11	20	1.13	15	99.12	20	1.02	16	133.32	14	1.16	16	96.68	26	0.88	24	116.57	21	0.84	32
MONTEBELLO	131.06	12	1.13	14	118.08	13	1.17	12	158.34	10	1.16	15	150.28	12	1.18	11	133.52	19	1.17	15
ONTARIO	93.09	24	0.87	22	77.39	29	0.79	23	97.91	23	1.00	19	94.04	27	0.74	27	105.07	27	0.93	27
PALM SPRINGS	175.92	8	1.27	8	112.80	14	0.77	25	107.04	20	0.71	29	99.54	24	0.80	26	107.58	25	1.07	19
REDLANDS	120.13	16	1.11	16	96.48	21	1.04	15	154.25	12	1.04	18	124.52	17	1.01	14	137.11	16	0.98	23
RIDGECREST	229.65	4	1.44	4	161.95	9	1.12	13	176.84	9	1.57	6	148.90	13	1.01	15	254.31	6	1.05	20
SADDLEBACK	83.01	27	0.73	27	70.69	31	0.53	34	99.07	22	0.74	26	46.03	34	0.39	35	65.99	34	0.65	35
SAN JOAQUIN	135.90	10	1.04	18	244.44	2	1.45	6	138.25	13	1.17	14	127.50	16	1.05	13	108.44	23	1.09	18
SANTA ANA	78.60	29	0.55	32	93.35	24	0.74	26	91.68	26	0.84	23	67.46	32	0.71	29	97.27	29	1.00	22
SANTA BARBARA	153.81	9	1.15	13	82.00	28	0.70	27	183.78	7	1.38	9	152.37	11	1.52	6	156.66	10	1.41	8
SANTA MONICA	101.69	21	0.79	25	122.78	12	1.00	17	110.76	19	0.99	20	75.41	30	0.62	32	91.08	31	0.95	26
SOUTH BAY	122.68	15	1.17	10	142.15	10	1.49	5	125.28	16	1.39	8	164.07	10	1.31	8	183.90	7	1.88	7
TEHACHAPI	117.96	17	1.43	5	232.67	3	1.12	14	130.70	15	1.29	13	298.96	5	1.21	9	97.29	28	1.13	16
THOUSAND OAKS	127.73	14	1.05	17	93.86	23	0.91	18	104.37	21	1.10	17	106.59	21	0.92	21	143.78	13	1.31	11
VALENCIA	62.01	35	0.46	34	51.04	34	0.53	33	79.23	32	0.61	33	72.27	31	0.61	33	105.09	26	0.97	25
VENTURA	134.81	11	1.15	11	100.52	18	1.21	11	183.79	6	1.65	4	148.85	14	1.19	10	150.41	11	1.24	13
VICTORVILLE	67.70	34	0.66	30	61.33	33	0.63	30	68.85	33	0.63	31	87.03	28	0.91	22	79.35	33	0.92	28
WHITTIER	72.60	32	0.74	26	135.04	11	0.86	19	87.60	28	0.70	30	114.52	18	0.73	28	137.34	15	0.81	33
WILDOMAR	88.54	26	0.72	28	40.51	35	0.56	32	118.49	18	0.81	24	52.70	33	0.60	34	84.01	32	0.87	30
YUCCA VALLEY	319.82	3	3.41	2	216.97	5	1.50	4	304.25	3	1.49	7	389.08	3	1.80	5	463.68	4	3.39	4
<b>SCE SystemWide</b>	<b>108.13</b>		<b>0.89</b>		<b>102.61</b>		<b>0.91</b>		<b>112.00</b>		<b>0.96</b>		<b>114.83</b>		<b>0.92</b>		<b>134.48</b>		<b>1.10</b>	

\*\*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.

\*\*In the columns showing "Rank," lower numbers indicate poorer performance.

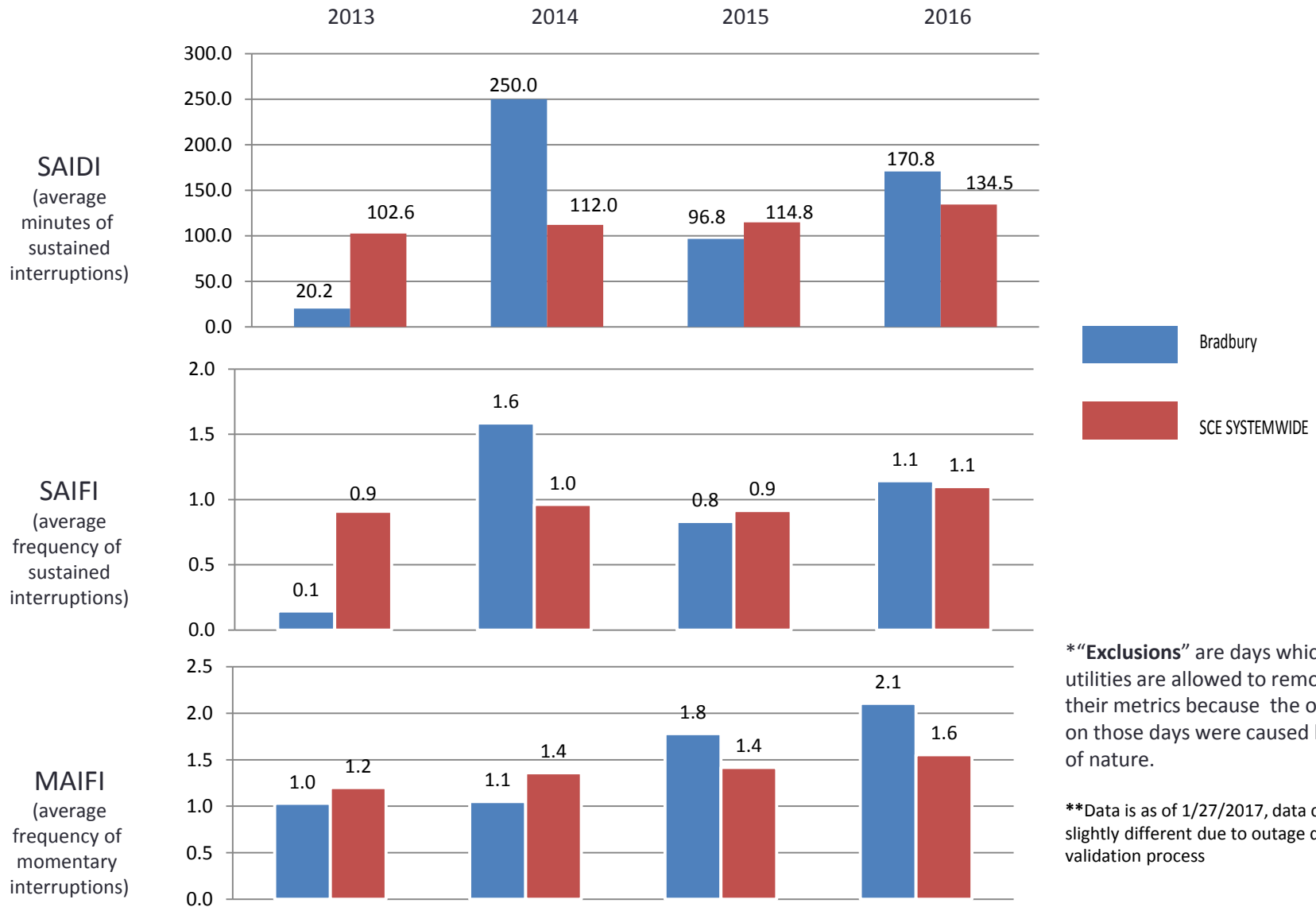
# Overview of Bradbury

## There are 4 circuits that serve Bradbury

Circuit Type	Sum of Customers	Circuit Type	Sum of Customers	Circuit Type	Sum of Customers	Circuit Type	Sum of Customers
BONNIE(4.16KV)	489						
PAYNE(16KV)	2,181						
PRIMROSE(16KV)	2,369						
SPINKS(4.16KV)	475						

**Grand Total**      5,514

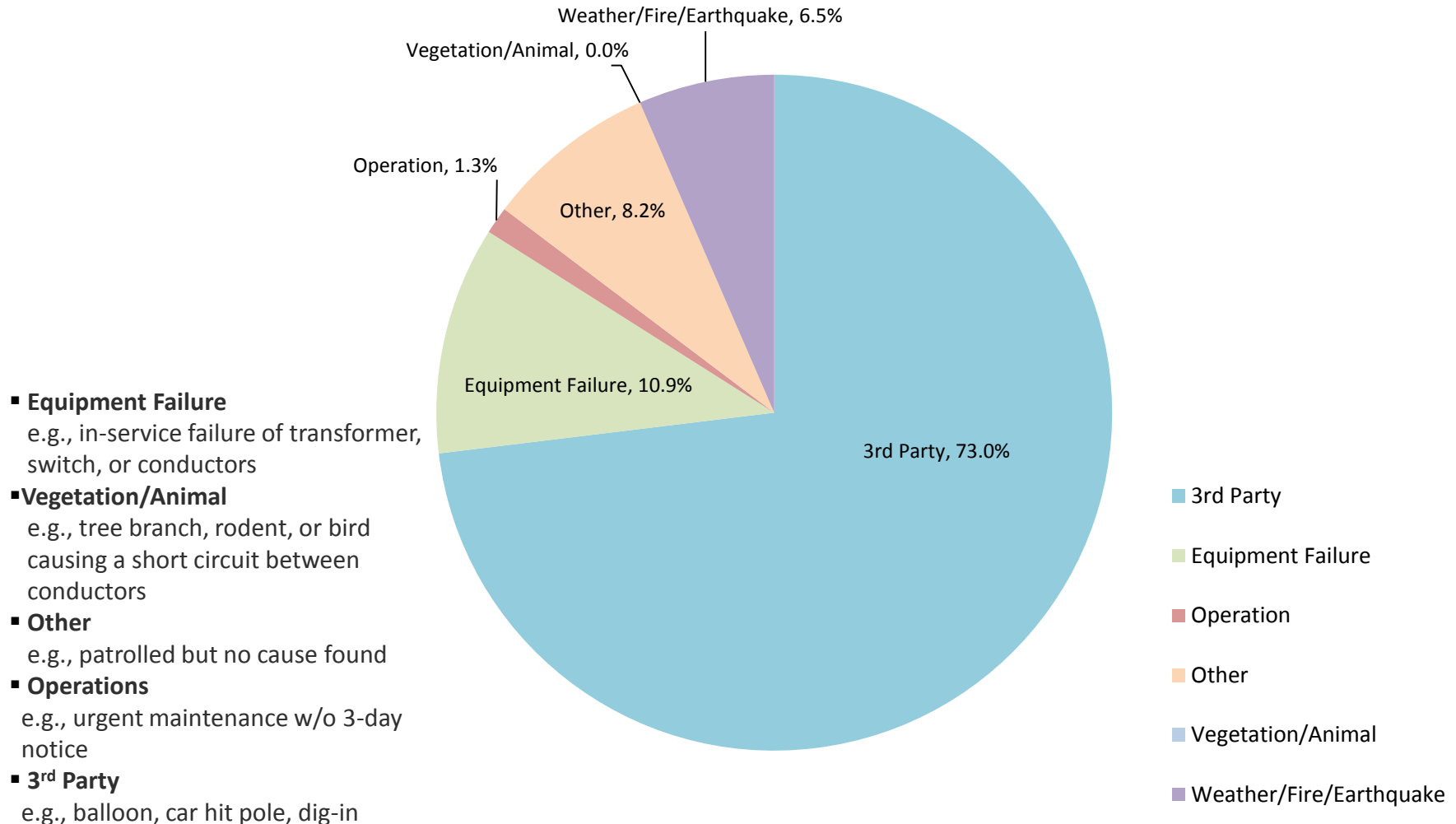
# Reliability History of Circuits Serving Bradbury (No Exclusions)





# Causes of Repair Outages in Bradbury Circuits 2016 YTD

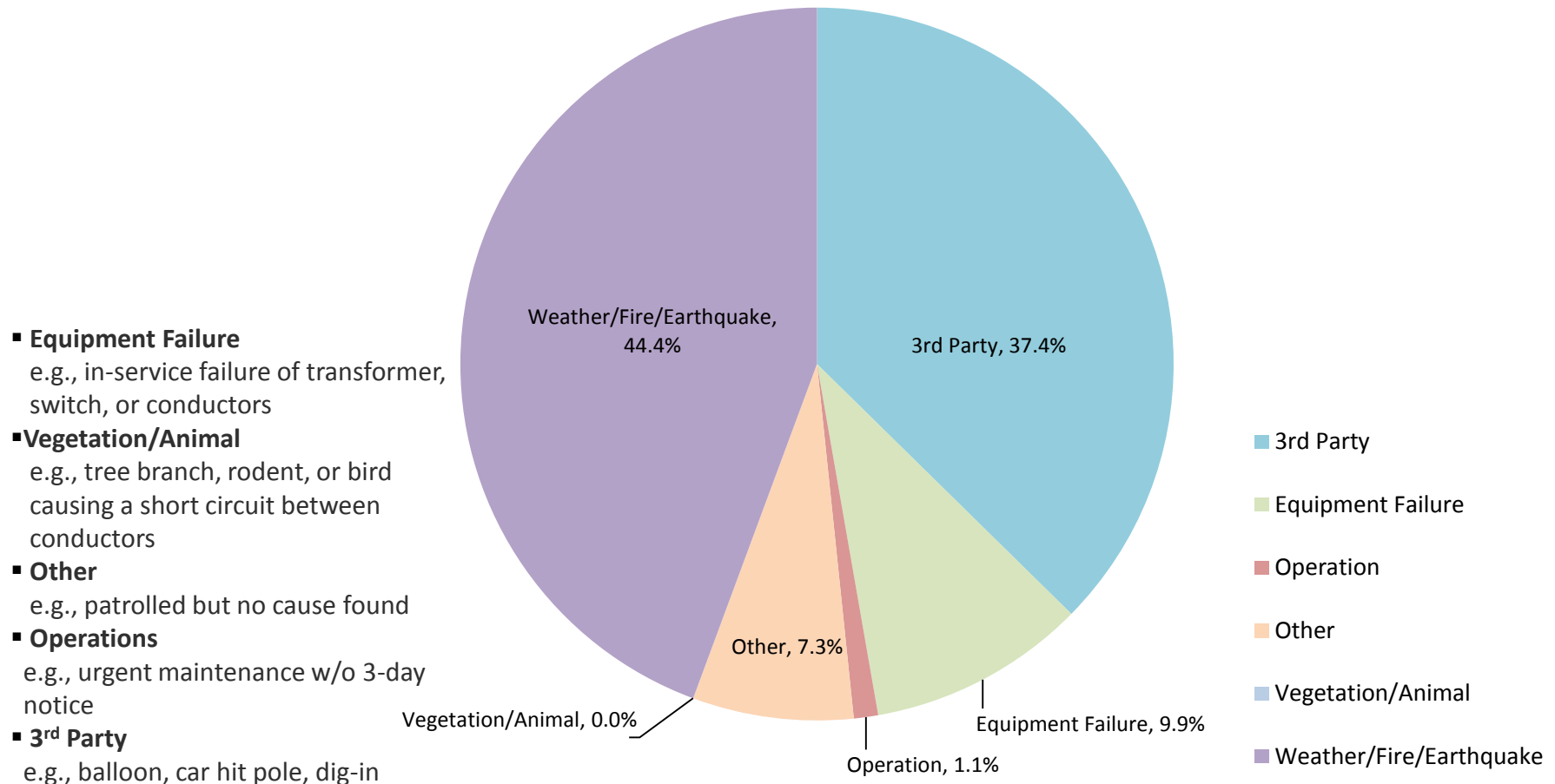
## Contributions to SAIDI by Outage Cause



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

# Causes of Repair Outages in Bradbury Circuits 2016 YTD

## Contributions to SAIFI by Outage Cause



**SAIFI** = the number of times the average customer is interrupted by “sustained” outages each year.





# Back-up Slides

**Reliability Histories of Circuits Serving Bradbury**

**Updated through Year-End 2016**

# Average Reliability of 4 Circuits Serving Bradbury

	2013			2014			2015			1st Qtr 2016			2nd Qtr 2016			3rd Qtr 2016			4th Qtr 2016			2016		
	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI
<b>Bradbury</b>	<b>20.2</b>	<b>0.1</b>	<b>1.0</b>	<b>250.0</b>	<b>1.6</b>	<b>1.1</b>	<b>96.8</b>	<b>0.8</b>	<b>1.8</b>	<b>128.6</b>	<b>0.4</b>	<b>0.4</b>	<b>21.7</b>	<b>0.5</b>	<b>1.0</b>	<b>19.2</b>	<b>0.2</b>	<b>0.2</b>	<b>1.4</b>	<b>0.0</b>	<b>0.5</b>	<b>170.8</b>	<b>1.1</b>	<b>2.1</b>
3rd Party	24%	5%	78%	34%	34%	27%	69%	88%	31%	97%	97%	78%	0%	0%	44%	0%	0%	38%	0%	0%	0%	73%	37%	39%
Equipment Failure	49%	63%	0%	2%	0%	0%	27%	8%	0%	1%	1%	0%	16%	1%	0%	69%	54%	0%	0%	0%	0%	11%	10%	0%
Operation	8%	14%	0%	0%	0%	0%	2%	0%	0%	2%	2%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%
Other	7%	5%	9%	53%	48%	59%	0%	4%	11%	0%	0%	0%	53%	14%	9%	6%	5%	0%	100%	100%	9%	8%	7%	6%
Vegetation/Animal	12%	13%	13%	2%	14%	6%	0%	0%	58%	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	7%	0%	0%	3%
Weather/Fire/Earthquake	0%	0%	0%	9%	4%	8%	1%	0%	0%	0%	0%	22%	30%	85%	44%	25%	41%	62%	0%	0%	84%	7%	44%	51%
<b>SCE Systemwide</b>	<b>102.6</b>	<b>0.9</b>	<b>1.2</b>	<b>112.0</b>	<b>1.0</b>	<b>1.4</b>	<b>114.8</b>	<b>0.9</b>	<b>1.4</b>	<b>40.5</b>	<b>0.3</b>	<b>0.4</b>	<b>34.8</b>	<b>0.3</b>	<b>0.4</b>	<b>29.4</b>	<b>0.2</b>	<b>0.3</b>	<b>29.8</b>	<b>0.3</b>	<b>0.4</b>	<b>134.5</b>	<b>1.1</b>	<b>1.6</b>

## Notes:

No outages are excluded from the metrics.

## Outage Causes:

Other: e.g., patrolled but no cause could be found

Operations: e.g., urgent maintenance w/o 3-day notice to customers

3<sup>rd</sup> Party: e.g., balloons, car hit pole, dig-in

Vegetation/Animal: e.g., tree branch, rodent, or bird causing short circuit across conductors

SAIDI (minutes) = the cumulative amount of time the average customer is interrupted by "sustained" (longer than 5 minutes) outages.

SAIFI (interruptions) = the number of times the average customer is interrupted by "sustained" outages.

MAIFI (interruptions) = the number of times the average customer is interrupted by "momentary" (lasting 5 minutes or less) outages.

# Reliability Histories for Individual Circuits Serving Bradbury

	2013			2014			2015			1st Qtr 2016			2nd Qtr 2016			3rd Qtr 2016			4th Qtr 2016			2016		
	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI
<b>BONNIE(4.16KV) - Customers: 489</b>	<b>0.2</b>	<b>0.0</b>	<b>1.0</b>	<b>128.6</b>	<b>2.0</b>	<b>1.0</b>	<b>34.1</b>	<b>0.1</b>	<b>2.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>14.3</b>	<b>0.2</b>	<b>1.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>14.3</b>	<b>0.2</b>	<b>1.0</b>
3rd Party	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	100%
Equipment Failure	0%	0%	0%	12%	2%	0%	100%	100%	0%	0%	0%	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	100%	100%	0%
Operation	100%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Other	0%	0%	100%	73%	49%	100%	0%	0%	50%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Vegetation/Animal	0%	0%	0%	15%	49%	0%	0%	0%	50%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Weather/Fire/Earthquake	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
<b>PAYNE(16KV) - Customers: 2,181</b>	<b>10.2</b>	<b>0.1</b>	<b>2.3</b>	<b>162.0</b>	<b>1.1</b>	<b>0.0</b>	<b>147.7</b>	<b>0.8</b>	<b>2.7</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>6.5</b>	<b>0.1</b>	<b>0.0</b>	<b>11.9</b>	<b>0.2</b>	<b>0.4</b>	<b>0.0</b>	<b>0.0</b>	<b>0.1</b>	<b>18.4</b>	<b>0.3</b>	<b>0.5</b>
3rd Party	0%	0%	86%	97%	92%	0%	61%	76%	52%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Equipment Failure	0%	0%	0%	0%	0%	0%	36%	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Operation	6%	1%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Other	34%	27%	0%	0%	0%	0%	1%	9%	10%	0%	0%	0%	100%	100%	0%	0%	0%	0%	0%	0%	0%	35%	24%	0%
Vegetation/Animal	60%	72%	14%	3%	8%	0%	0%	0%	38%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	21%
Weather/Fire/Earthquake	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	100%	100%	100%	0%	0%	0%	65%	76%	79%
<b>PRIMROSE(16KV) - Customers: 2,369</b>	<b>15.1</b>	<b>0.0</b>	<b>0.0</b>	<b>379.8</b>	<b>1.8</b>	<b>2.4</b>	<b>81.5</b>	<b>1.2</b>	<b>1.0</b>	<b>296.9</b>	<b>1.0</b>	<b>0.7</b>	<b>36.4</b>	<b>1.1</b>	<b>2.1</b>	<b>0.2</b>	<b>0.0</b>	<b>0.0</b>	<b>3.2</b>	<b>0.0</b>	<b>1.1</b>	<b>336.8</b>	<b>2.1</b>	<b>3.9</b>
3rd Party	78%	43%	0%	14%	17%	30%	90%	97%	0%	98%	99%	100%	0%	0%	49%	0%	0%	0%	0%	0%	0%	86%	47%	44%
Equipment Failure	8%	32%	0%	1%	0%	0%	6%	3%	0%	1%	1%	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	1%	0%	0%
Operation	14%	25%	0%	0%	0%	0%	3%	0%	0%	1%	1%	0%	2%	1%	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%
Other	0%	0%	0%	71%	75%	55%	0%	0%	0%	0%	0%	0%	57%	10%	0%	0%	0%	0%	100%	100%	9%	7%	5%	3%
Vegetation/Animal	0%	0%	0%	0%	0%	7%	0%	0%	100%	0%	0%	0%	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%	0%	2%
Weather/Fire/Earthquake	0%	0%	0%	14%	8%	9%	0%	0%	0%	0%	0%	0%	41%	90%	48%	0%	0%	0%	0%	0%	91%	4%	47%	51%
<b>SPINKS(4.16KV) - Customers: 475</b>	<b>99.8</b>	<b>1.0</b>	<b>0.0</b>	<b>187.7</b>	<b>2.2</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>1.0</b>	<b>14.0</b>	<b>0.1</b>	<b>1.0</b>	<b>40.1</b>	<b>0.0</b>	<b>1.0</b>	<b>152.0</b>	<b>1.1</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>206.0</b>	<b>1.2</b>	<b>2.0</b>
3rd Party	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Equipment Failure	95%	85%	0%	5%	1%	0%	0%	0%	0%	0%	0%	0%	100%	100%	0%	91%	90%	0%	0%	0%	0%	87%	85%	0%
Operation	5%	15%	0%	0%	0%	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	7%	0%
Other	0%	0%	0%	84%	52%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	9%	10%	0%	0%	0%	0%	7%	9%	50%
Vegetation/Animal	0%	0%	0%	11%	47%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Weather/Fire/Earthquake	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	50%