

Circuit Reliability Review

Bishop

January 2018



Building a Smarter Grid for Southern California

- Southern California Edison is developing an electric grid to support California's transition to a clean and sustainable future that meets the needs and expectations of our customers.
- We are investing more than \$13 billion in the power distribution grid over three years (2017-19). Our main investment goal is to increase power reliability through significant upgrades. The investments include:
 - Upgrading cables, poles, switches and transformers
 - Updating the grid so it can accommodate new technologies, such as smart inverters that will allow for the two-way flow of solar energy
 - Adapting the power system to accommodate future California policy related to energy storage, electric transportation and renewable energy
 - Providing enhanced automation and monitoring devices to allow us to better respond to changes on the grid
- Our investments in local communities will help ensure that customers receive safe, reliable, and affordable electricity now and in the future.
- Learn more at [edison.com/innovation](https://www.sce.com/innovation)

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](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 BISHOP District

BIG PINE

BISHOP

BISHOP PAIUTE TRIBE

BISHOP RESERVATION

BRIDGEPORT PAIUTE INDIAN COLONY

DARWIN

DIXON LANE-MEADOW CREEK

INYO COUNTY

KEELER

MAMMOTH LAKES

MESA

MONO COUNTY

ROUND VALLEY

TUOLUMNE DISTRICT 4

WEST BISHOP

WILKERSON

BENTON PAIUTE TRIBE

Reliability by SCE Districts (No Exclusions)

District Name	2013				2014				2015				2016				2017			
	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	94.42	22	0.62	31	51.05	35	0.59	34	104.34	22	0.68	30	107.67	24	0.87	29	103.19	23	0.87	27
ARROWHEAD	180.59	7	1.39	8	193.25	5	1.59	5	362.61	4	3.97	1	659.46	3	2.85	5	816.52	2	3.86	3
BARSTOW	204.33	6	1.40	7	201.53	4	1.34	10	187.11	8	1.17	12	134.83	18	1.35	9	357.47	6	2.65	6
BIG CREEK	176.51	8	3.08	1	920.25	1	1.34	11	422.77	2	3.42	2	1062.01	2	4.99	1	4273.52	1	7.95	2
BISHOP	104.44	17	0.51	35	118.79	17	0.59	35	298.11	6	2.22	4	168.59	8	1.22	14	190.51	10	1.93	9
BLYTHE	483.13	1	1.38	9	707.54	2	2.42	2	427.00	1	1.52	7	396.38	5	2.71	6	684.48	3	2.38	7
CATALINA	105.94	16	2.97	2	97.02	24	4.17	1	42.56	35	2.25	3	65.01	35	3.66	3	70.67	34	0.54	35
COVINA	100.51	19	0.86	20	91.60	27	0.87	22	100.08	23	0.81	25	112.13	22	0.97	24	117.18	20	0.93	23
DOMINGUEZ HILLS	89.17	26	0.80	21	82.30	29	0.71	28	130.63	15	0.97	17	146.38	12	1.11	17	123.60	18	0.83	28
FOOTHILL	85.80	27	0.79	24	93.35	25	0.93	21	109.64	20	0.95	20	142.81	14	1.03	21	110.53	21	1.12	13
FULLERTON	90.57	25	0.79	22	82.23	30	0.72	27	76.59	29	0.67	31	92.72	30	0.76	34	89.29	28	0.68	33
HUNTINGTON BEACH	66.51	32	0.68	29	79.61	31	0.78	25	98.32	25	0.95	19	128.02	20	1.26	12	99.07	26	0.98	21
KERNVILLE	232.18	4	1.96	3	178.69	8	1.99	3	286.38	7	0.96	18	2421.32	1	3.67	2	305.53	7	3.29	4
LONG BEACH	75.11	30	0.70	28	66.33	34	0.61	32	164.46	9	0.89	23	135.16	17	0.86	31	77.17	32	0.71	32
MENIFEE	107.39	15	1.26	10	156.68	11	1.32	12	111.46	19	0.98	16	156.75	9	1.31	10	130.47	16	0.96	22
MONROVIA	99.12	20	1.02	16	133.32	14	1.16	16	96.68	26	0.88	24	116.57	21	0.84	32	105.00	22	0.98	20
MONTEBELLO	118.08	13	1.17	12	158.34	10	1.16	15	150.28	12	1.18	11	133.52	19	1.17	15	123.98	17	0.99	19
ONTARIO	77.39	29	0.79	23	97.91	23	1.00	19	94.04	27	0.74	27	105.07	27	0.93	27	100.43	24	1.13	12
PALM SPRINGS	112.80	14	0.77	25	107.04	20	0.71	29	99.54	24	0.80	26	107.58	25	1.07	19	119.10	19	1.02	17
REDLANDS	96.48	21	1.04	15	154.25	12	1.04	18	124.52	17	1.01	14	137.11	16	0.98	23	142.59	14	1.01	18
RIDGECREST	161.95	9	1.12	13	176.84	9	1.57	6	148.90	13	1.01	15	254.31	6	1.05	20	164.28	11	1.09	14
SADDLEBACK	70.69	31	0.53	34	99.07	22	0.74	26	46.03	34	0.39	35	65.99	34	0.65	35	65.35	35	0.58	34
SAN JOAQUIN	244.44	2	1.45	6	138.25	13	1.17	14	127.50	16	1.05	13	108.44	23	1.09	18	191.66	9	1.34	11
SANTA ANA	93.35	24	0.74	26	91.68	26	0.84	23	67.46	32	0.71	29	97.27	29	1.00	22	81.90	31	0.71	31
SANTA BARBARA	82.00	28	0.70	27	183.78	7	1.38	9	152.37	11	1.52	6	156.66	10	1.41	8	408.43	5	9.21	1
SANTA MONICA	122.78	12	1.00	17	110.76	19	0.99	20	75.41	30	0.62	32	91.08	31	0.95	26	71.89	33	0.71	30
SOUTH BAY	142.15	10	1.49	5	125.28	16	1.39	8	164.07	10	1.31	8	183.90	7	1.88	7	99.19	25	0.93	24
TEHACHAPI	232.67	3	1.12	14	130.70	15	1.29	13	298.96	5	1.21	9	97.29	28	1.13	16	86.51	29	1.05	16
THOUSAND OAKS	93.86	23	0.91	18	104.37	21	1.10	17	106.59	21	0.92	21	143.78	13	1.31	11	151.74	12	1.43	10
VALENCIA	51.04	34	0.53	33	79.23	32	0.61	33	72.27	31	0.61	33	105.09	26	0.97	25	136.62	15	1.08	15
VENTURA	100.52	18	1.21	11	183.79	6	1.65	4	148.85	14	1.19	10	150.41	11	1.24	13	520.90	4	3.12	5
VICTORVILLE	61.33	33	0.63	30	68.85	33	0.63	31	87.03	28	0.91	22	79.35	33	0.92	28	84.07	30	0.89	26
WHITTIER	135.04	11	0.86	19	87.60	28	0.70	30	114.52	18	0.73	28	137.34	15	0.81	33	148.91	13	0.90	25
WILDOMAR	40.51	35	0.56	32	118.49	18	0.81	24	52.70	33	0.60	34	84.01	32	0.87	30	90.15	27	0.80	29
YUCCA VALLEY	216.97	5	1.50	4	304.25	3	1.49	7	389.08	3	1.80	5	463.68	4	3.39	4	300.33	8	1.96	8
SCE SystemWide	102.61		0.91		112.10		0.97		114.83		0.92		134.48		1.10		139.73		1.19	

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 Bishop

There are 2 circuits that serve Bishop

1

Circuit Type	Customers	Circuit Type	Customers	Circuit Type	Customers	Circuit Type	Customers
INYO LUMBER(12KV)	2,334						
UNDERWOOD(12KV)	1,566						

Grand Total 3,900

Reliability History of Circuits Serving Bishop (No Exclusions)

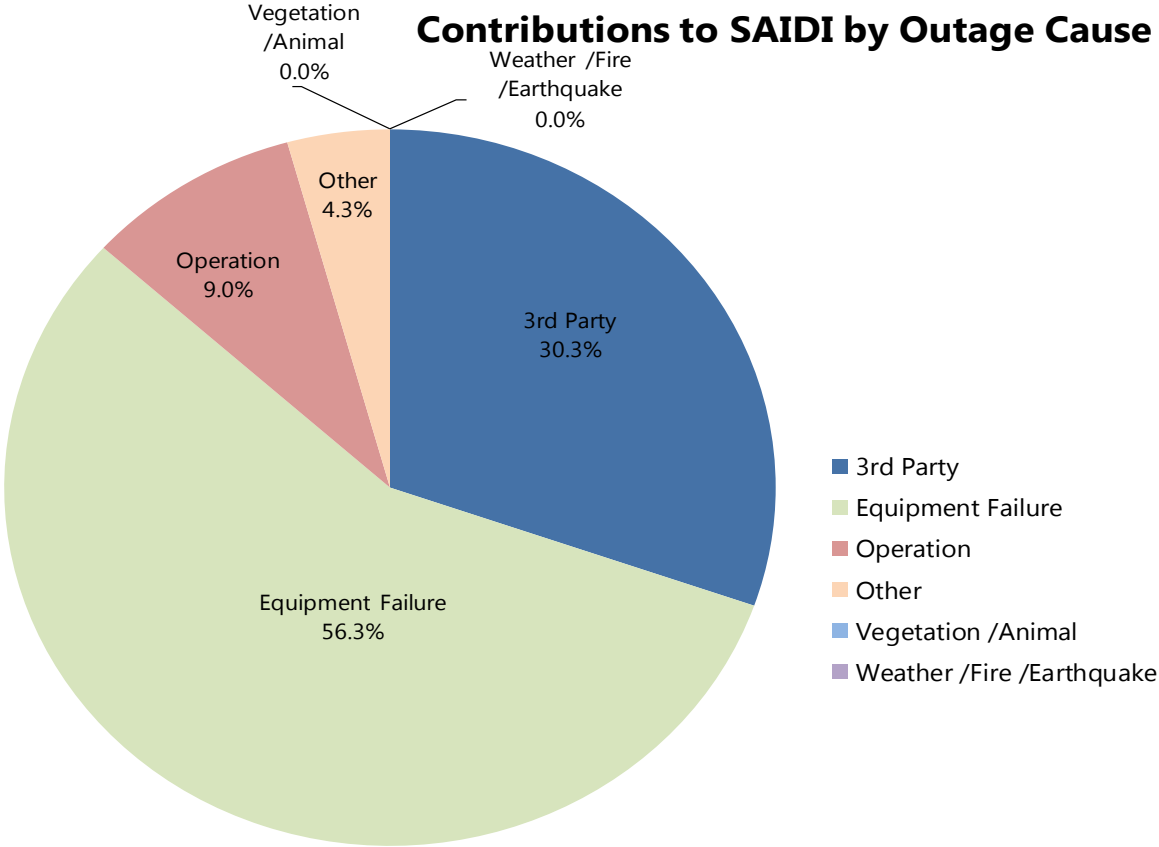


**“Exclusions” are days which utilities are allowed to remove from their metrics because the outages on those days were caused by acts of nature.

**Data is as of 02/20/2018, data can be slightly different due to outage data validation process

Causes of Repair Outages in Bishop 2017

Contributions to SAIDI by Outage Cause



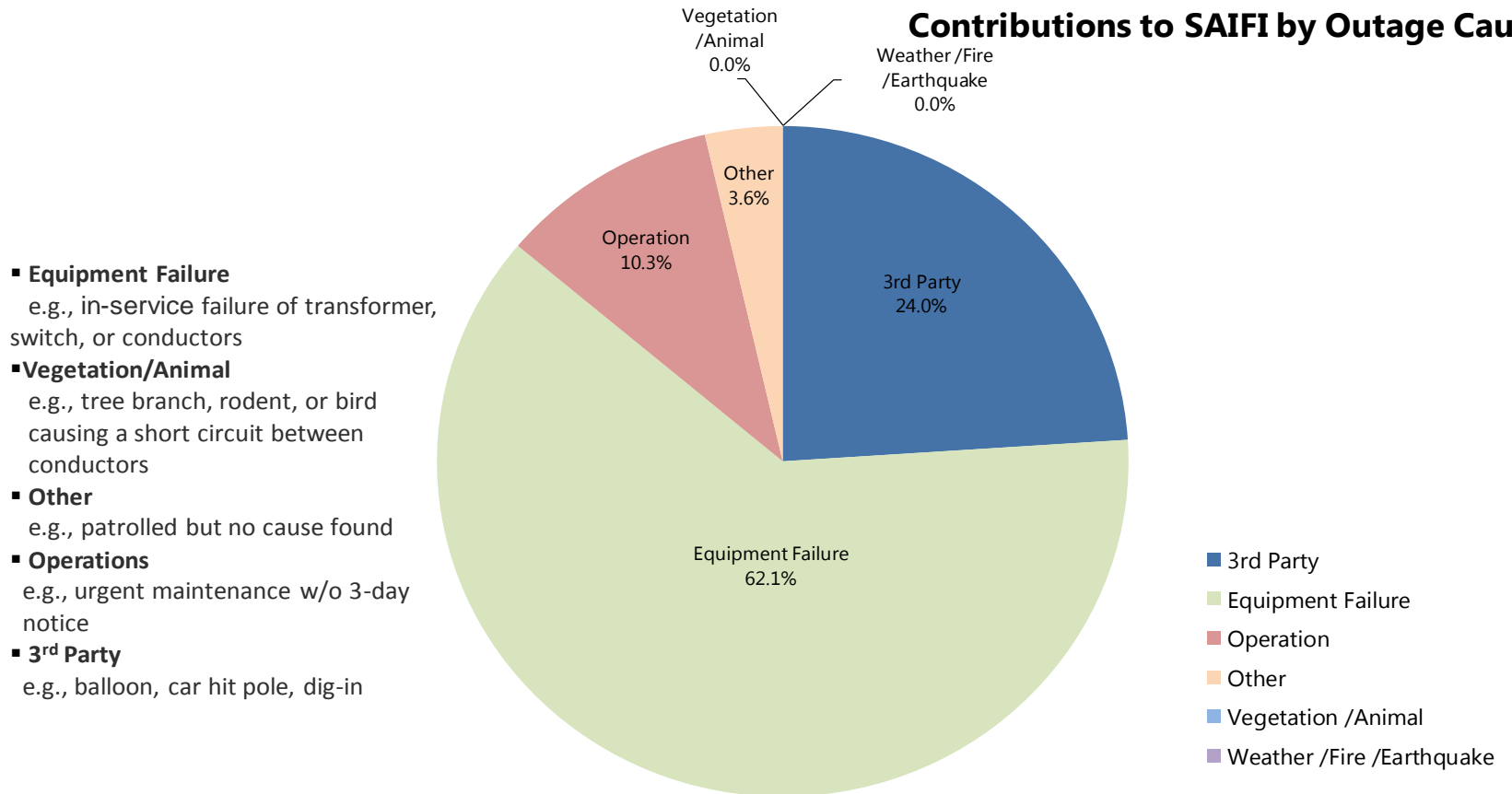
- **Equipment Failure**
e.g., in-service failure of transformer, switch, or conductors
- **Vegetation/Animal**
e.g., tree branch, rodent, or bird causing a short circuit between conductors
- **Other**
e.g., patrolled but no cause found
- **Operations**
e.g., urgent maintenance w/o 3-day notice
- **3rd Party**
e.g., balloon, car hit pole, dig-in

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

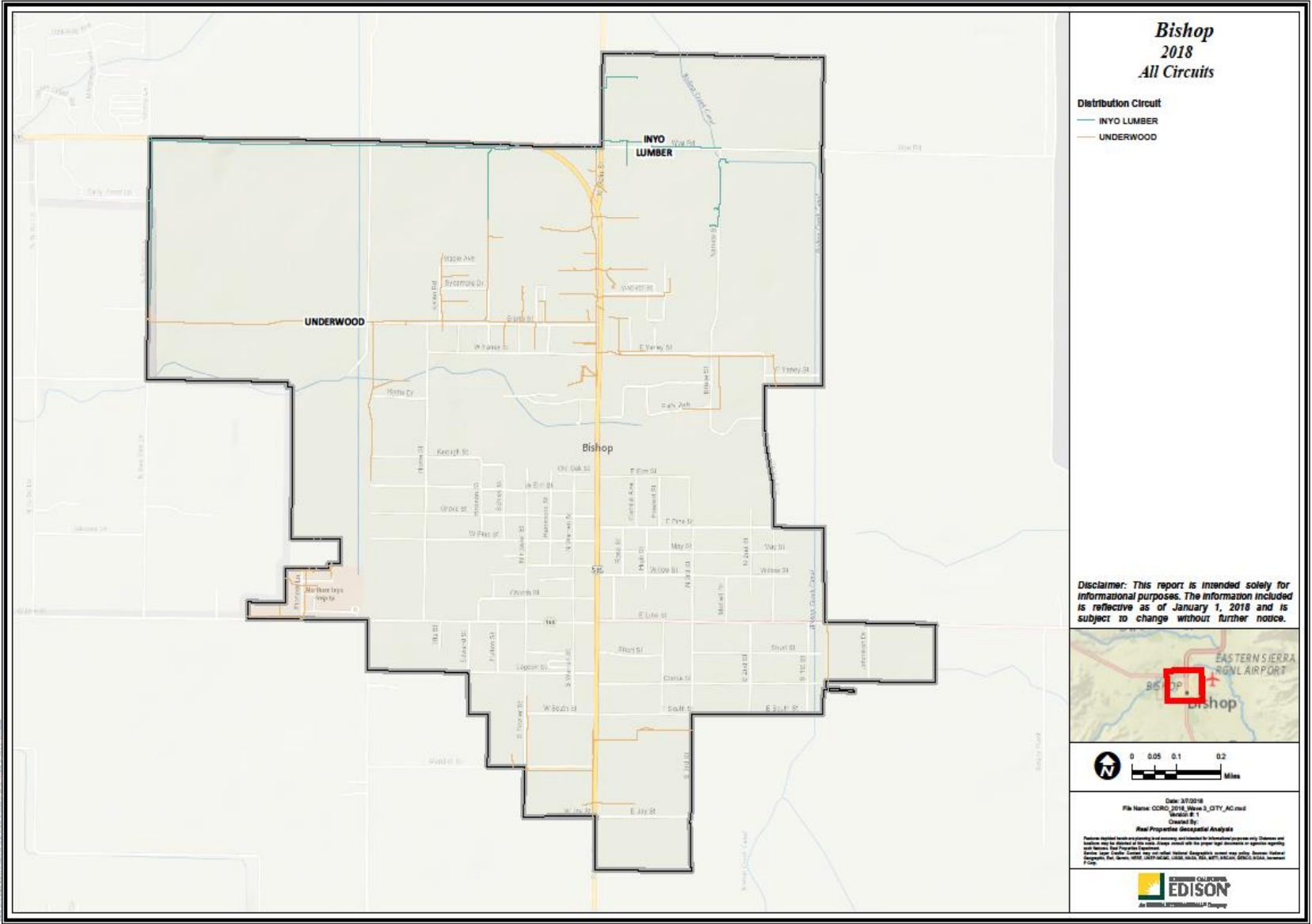
SAIDI = the cumulative amount of time the average customer is interrupted by “sustained” outages each year.

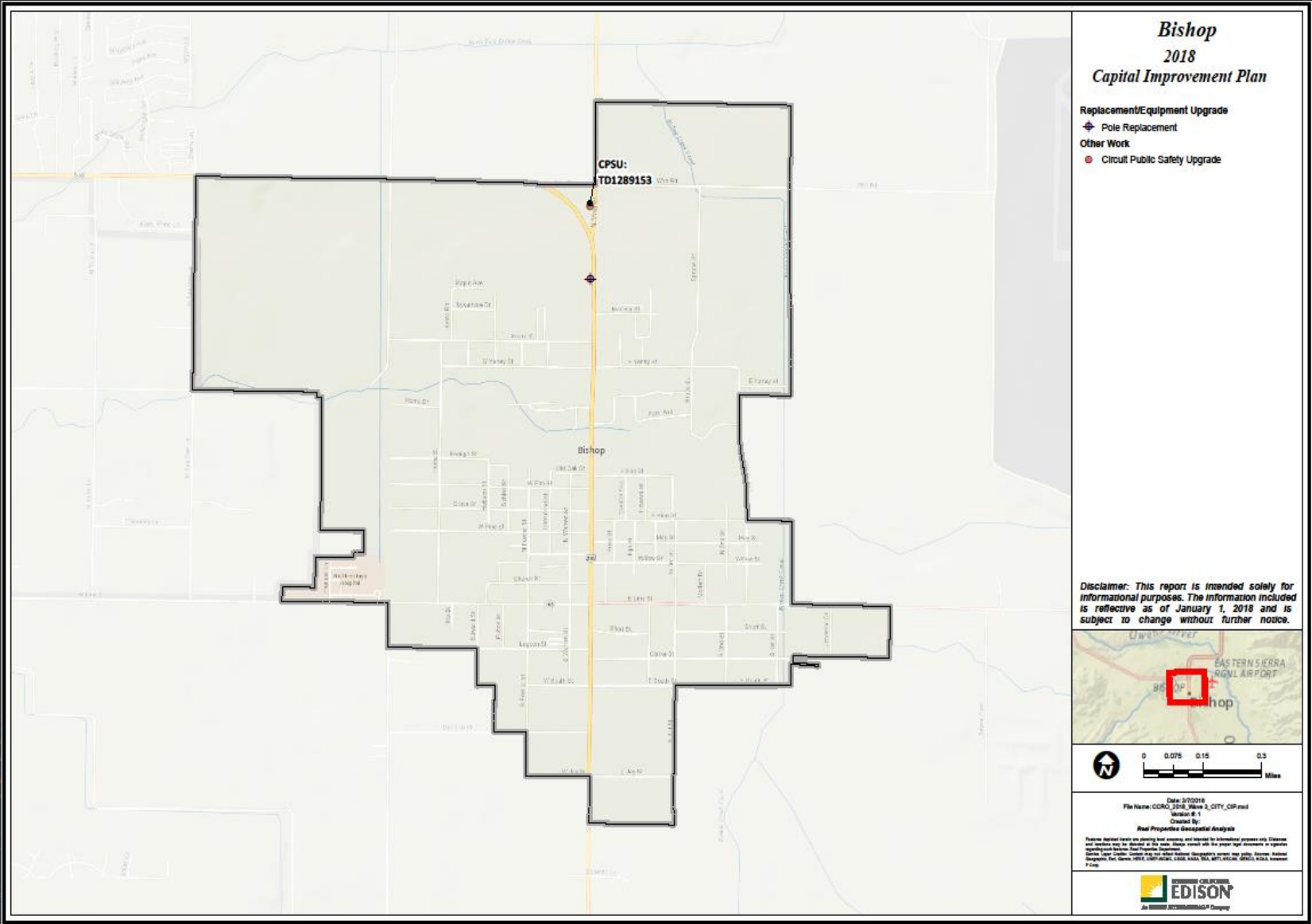
Causes of Repair Outages in Bishop 2017

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 Bishop

Updated through Dec 2017

Average Reliability of 2 Circuits Serving Bishop

	2014			2015			2016			1st Qtr 2017			2nd Qtr 2017			3rd Qtr 2017			4th Qtr 2017			2017		
	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI
2 Circuits Serving Bishop -- Total Customers:																								
3,900	74.4	0.9	1.3	105.9	1.9	3.0	19.2	0.1	2.6	11.6	0.1	0.2	12.1	0.1	0.1	20.0	0.2	0.1	43.3	0.1	0.4	87.1	0.4	0.7
3rd Party	6%	7%	23%	-	-	4%	-	-	-	-	-	-	46%	75%	-	1%	0%	100%	48%	47%	-	30%	24%	13%
Equipment Failure	54%	37%	11%	85%	25%	19%	51%	32%	-	70%	69%	-	23%	8%	-	99%	100%	-	42%	35%	80%	56%	62%	39%
Operation	1%	2%	-	4%	1%	-	38%	44%	36%	30%	31%	49%	-	-	-	0%	0%	-	10%	18%	-	9%	10%	15%
Other	4%	3%	60%	11%	73%	77%	2%	7%	10%	-	-	51%	31%	16%	100%	-	-	-	-	-	-	4%	4%	24%
Vegetation/Animal	-	-	-	0%	0%	-	6%	16%	8%	-	-	-	-	-	-	-	-	-	-	-	20%	-	-	10%
Weather/Fire/Earthquake	35%	51%	5%	-	-	-	3%	2%	45%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SCE SYSTEMWIDE	112.1	1.0	1.4	114.8	0.9	1.4	134.5	1.1	1.6	42.6	0.3	0.5	23.6	0.2	0.4	29.2	0.2	0.4	44.3	0.4	0.5	139.7	1.2	1.8

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

3rd 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 Bishop - 1 of 1

	2014			2015			2016			1st Qtr 2017			2nd Qtr 2017			3rd Qtr 2017			4th Qtr 2017			2017		
	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI	SAIDI	SAIFI	MAIFI
INYO LUMBER(12KV) - Customers: 2,334	57.1	0.3	0.6	155.8	1.8	4.2	27.8	0.1	3.8	19.4	0.2	0.2	10.9	0.0	0.1	33.1	0.3	-	31.1	0.0	0.6	94.5	0.5	0.9
3rd Party	13%	35%	84%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Equipment Failure	76%	45%	16%	94%	44%	24%	48%	33%	-	70%	69%	-	43%	32%	-	100%	100%	-	98%	82%	80%	86%	84%	55%
Operation	2%	5%	-	-	-	-	42%	42%	42%	30%	31%	100%	-	-	-	-	-	-	2%	18%	-	7%	12%	22%
Other	9%	15%	-	6%	56%	76%	-	-	3%	-	-	-	57%	68%	100%	-	-	-	-	-	-	7%	5%	10%
Vegetation/Animal	-	-	-	-	-	-	7%	23%	2%	-	-	-	-	-	-	-	-	-	-	-	20%	-	-	13%
Weather/Fire/Earthquake	-	-	-	-	-	-	4%	2%	53%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UNDERWOOD(12KV) - Customers: 1,566	99.7	1.7	2.4	32.8	2.1	1.3	6.4	0.1	0.9	-	-	0.3	13.8	0.2	-	0.5	0.0	0.2	61.6	0.1	-	75.9	0.3	0.5
3rd Party	-	-	-	-	-	22%	-	-	-	-	-	-	100%	99%	-	92%	67%	100%	84%	81%	-	87%	93%	44%
Equipment Failure	36%	36%	10%	21%	1%	-	70%	29%	-	-	-	-	0%	1%	-	-	-	-	0%	1%	-	0%	1%	-
Operation	0%	1%	-	31%	3%	-	14%	50%	-	-	-	-	-	-	-	8%	33%	-	16%	19%	-	13%	7%	-
Other	-	-	83%	45%	96%	78%	15%	21%	53%	-	-	100%	-	-	-	-	-	-	-	-	-	-	-	56%
Vegetation/Animal	-	-	-	2%	0%	-	-	-	47%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Weather/Fire/Earthquake	63%	64%	7%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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