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Today's Date (Date of Submittal) 7/8/2022 <b>Name:</b> 1. Utility Name: SDG&E 2. Document Submission Frequency (Annual, Quarterly, Monthly, Weekly, Once, Ad Hoc): Annual 3. Report Name: Electric System Reliability Report 4. Reporting Interval (the date(s) covered by the data, e.g., 2015 Q1): 2021 5. Name Suffix: Cov (for an Energy Division Cover Letter), Conf (for a confidential doc), Ltr (for a letter from utility) 6. Document File Name (format as 1+2+3+4+5): SDG&E Electric System Reliability Report 2021 7. Identify whether this filing is <input checked="" type="checkbox"/> original or <input type="checkbox"/> revision to a previous filing. a. If revision, identify date of the original filing:
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All submittals should reference both a proceeding and a decision, if applicable. If not applicable, leave blank and fill out Section C. Proceeding Number (starts with R, I, C, A, or P plus 7 numbers): R1412014 1. Decision Number (starts with D plus 7 numbers): D1601008 2. Ordering Paragraph (OP) Number from the decision: OP 1
<b>C. Documents Submitted as Requested by Other Requirements</b>
If the document submitted is in compliance with something other than a proceeding, (e.g., Resolution, Ruling, Staff Letter, Public Utilities Code, or sender's own motion), please explain: N/A
<b>D. Document Summary</b>
Provide a Document Summary that explains why this report is being filed with the Energy Division. This information is often contained in the cover letter, introduction, or executive summary, so you may want copy it from there and paste it here. This report has been prepared in response to CPUC Decision 16-01-008, which was approved January 20, 2016. Decision 16-01-008 established reliability recording, calculation, and reporting requirements for SDG&E.
<b>E. Sender Contact Information</b>
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<b>F. Confidentiality</b>
1. Is this document confidential? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes a. If Yes, provide an explanation of why confidentiality is claimed and identify the expiration of the confidentiality designation (e.g. Confidential until December 31, 2020.) <a href="#">Click here to enter text.</a>
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***ELECTRIC SYSTEM RELIABILITY  
ANNUAL REPORT 2021***

**Prepared for  
California Public Utilities Commission  
Pursuant to Decision 16-01-008**

July 8, 2022



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## **EXECUTIVE SUMMARY**

### **Background:**

The Electric System Reliability Annual Report for 2021 has been prepared in response to California Public Utility Commission (CPUC) Decision 16-01-008 (Decision). This Decision, which became effective January 14, 2016, established reliability recording, calculation, and reporting requirements for San Diego Gas & Electric (SDG&E).

The data in this report is primarily presented in tabular and graphical form. All statistics and calculations include unplanned transmission, substation, and distribution outages, and exclude planned outages and California Independent System Operator (CAISO) mandated load curtailment outages unless otherwise specified. Unplanned outages are those that are not prearranged. For the purposes of this report, sustained outages are outages that lasted more than five minutes in duration, while momentary outages are outages that lasted five minutes or less in duration.

### **2021 Reliability Indices**

#### ***Overview:***

SDG&E's 2021 System Average Interruption Duration Index (SAIDI) including MED was significantly lower than the average for the past five years, while System Average Interruption Frequency Index (SAIFI) was above the five-year average. Contributions to the 2021 year-end results included decreased red flag events, leading to decreased Public Safety Power Shutoff events and only one MED event in the year. 2021 SAIDI excluding MED was above the average for the past five years due to multiple rain/storm events in December causing multiple outages and a large substation outage which contributed approximately 6 SAIDI minutes.



### ***Identified Mitigation/Efforts to Improve System Reliability***

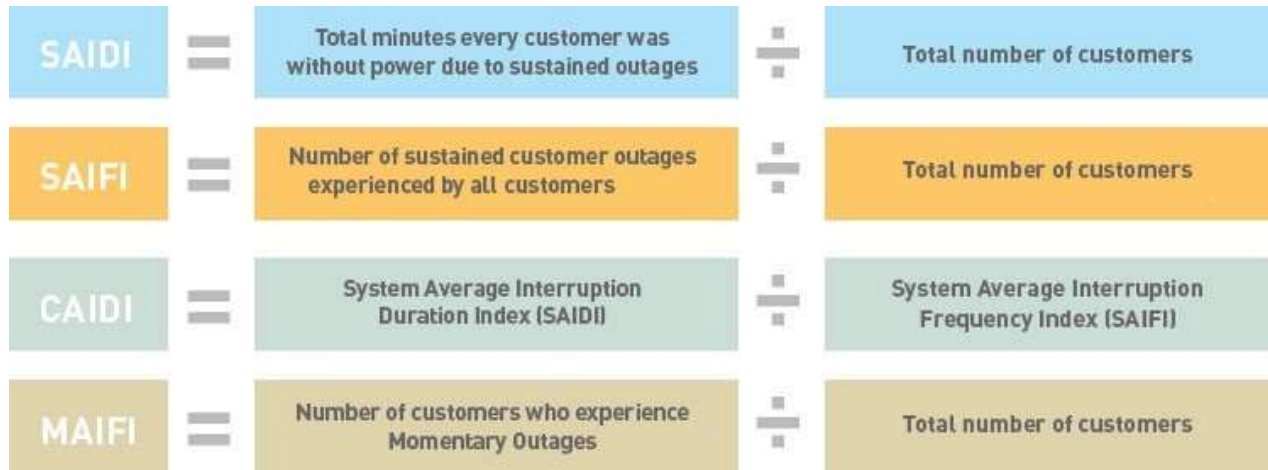
SDG&E is dedicated to providing strong electric reliability to its customers. To do so, in 2021, SDG&E focused on the following:

- Continued deployment of a system-wide electric underground connector enhancement program that both proactively replaces underground connectors prone to failure and adds sectionalizing capabilities to the electric system, enabling faster customer restoration after an outage occurs.
- Continued adding more system automation, enabling for faster outage restoration of customers.
- Reducing the time to restore service to our customers after they experience an outage through:
  - Continued better use of data analytics to aide in determining when and where to send repair crews.
  - Continued use and analysis of underground de-watering technologies and tools to improve emergency access to underground facilities.
  - Continued development of drone gathered data to more quickly find and then fix problems.
  - Leveraged relay fault distances and GIS tools to map out the location of transmission faults and reduce response times.
- Continued development of data analytics to aide in identify infrastructure that has a high likelihood of failure and replacing it before it impacts customers.
- Continued development of systems which detect incipient equipment failure on the underground and overhead distribution system to reduce forced customer outages.
- Continued deployment of the underground cable enhancement program, which replaces aging cable that is prone to failure and past its useful life.
- Increased the deployment of wireless fault indicators in key locations, assisting with reducing duration to locate outages.

### **How SDG&E Measures Reliability**

SDG&E uses four metrics commonly used in the electric utility industry to measure reliability. The reliability indicators that are tracked are as follows:

1. **SAIDI (System Average Interruption Duration Index)** – minutes of sustained outages per customer per year.
2. **SAIFI (System Average Interruption Frequency Index)** – number of sustained outages per customer per year.
3. **CAIDI (Customer Average Interruption Duration Index)** – is the average time required to restore service to a utility customer.
4. **MAIFI (Momentary Average Interruption Frequency Index)** – number of momentary outages per customer per year.



Prior to 2013, the measurement of each reliability performance indicator excluded CPUC Major Event and events that are the direct result of failures in the CAISO-controlled bulk power market, or non-SDG&E owned transmission and distribution facilities. A CPUC Major Event is defined in CPUC Decision 96-09-045 as an event that meets at least one of the following criteria:

- (a) The event is caused by earthquake, fire, or storms of sufficient intensity to give rise to a state of emergency being declared by the government, or
- (b) Any other disaster not in (a) that affects more than 15% of the system facilities or 10% of the utility's customers, whichever is less for each event.

Outages involving restricted access by a governmental agency that precluded or otherwise delayed outage restoration times were also considered CPUC Major Events and excluded from reliability results.

Beginning in 2013, the measurement of each reliability performance indicator excludes Major Event Days (MED) as defined in The Institute for Electrical and Electronic Engineers (IEEE) Guide for Electric Power Distribution Reliability Indices, aka IEEE Std 1366, instead of CPUC Major Events. A Major Event Day is defined in IEEE Std 1366-2012, Section 2 as a day in which the daily system SAIDI exceeds a threshold value. These threshold major event days are referred to as "TMED." Thus, any day in which the total system SAIDI exceeds TMED is excluded from SDG&E's reliability results. The applicable TMED value is calculated at the end of each year using SDG&E's daily SAIDI values for the prior five years. SDG&E's TMED value for 2021 was 4.80 minutes of daily system SAIDI. Other reliability indices in this report are not calculated using methodologies or formulas exactly as described in the IEEE Std 1366.

For the purposes of understanding this report, the division between distribution equipment and transmission equipment is at the distribution substation power transformer high-side bus disconnect. Transmission equipment is defined as all assets rated 69 kilovolts (kV) and above. The substation power transformer



high-side bus disconnect and all equipment on the load-side of the substation power transformer high-side bus disconnect are defined as Distribution equipment.

**SECTION 1 - SYSTEM INDICES FOR THE LAST 10 YEARS**

**SEPARATE TABLES WITH SAIDI, SAIFI, MAIFI AND CAIDI.  
MAJOR EVENT DAY'S (MED) INCLUDED AND EXCLUDED**

**Table 1-1: System Indices (MED included and excluded)**

San Diego Gas & Electric Company System Reliability Data 2012 - 2021								
MED Included					MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI	SAIDI	SAIFI	CAIDI	MAIFI
2012	64.36	0.533	120.78	0.301	64.36	0.533	120.78	0.301
2013	75.03	0.561	133.84	0.211	59.96	0.472	127.03	0.211
2014	75.81	0.632	119.88	0.262	64.60	0.603	107.16	0.244
2015	58.11	0.530	109.68	0.347	57.92	0.526	110.09	0.347
2016	86.01	0.677	126.99	0.443	72.75	0.620	117.43	0.386
2017	117.49	0.585	200.87	0.344	64.51	0.512	125.92	0.311
2018	121.02	0.658	183.88	0.319	77.76	0.628	123.84	0.319
2019	122.96	0.639	192.38	0.299	68.64	0.596	115.23	0.299
2020	198.63	0.745	266.52	0.289	68.95	0.627	109.92	0.275
2021	76.93	0.670	114.84	0.421	71.64	0.665	107.66	0.421



**Table 1-2: Distribution System Indices (MED included and excluded)**

San Diego Gas & Electric Company								
Distribution System Reliability Data 2012 - 2021								
MED Included					MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI	SAIDI	SAIFI	CAIDI	MAIFI
2012	63.32	0.510	124.20	0.289	63.32	0.510	124.20	0.289
2013	54.75	0.452	121.17	0.206	54.53	0.450	121.08	0.206
2014	74.73	0.613	121.86	0.255	63.52	0.584	108.82	0.237
2015	57.90	0.525	110.28	0.323	57.71	0.521	110.70	0.323
2016	83.93	0.647	129.67	0.438	70.67	0.590	119.88	0.380
2017	115.62	0.576	200.63	0.337	62.66	0.504	124.38	0.304
2018	120.30	0.652	184.51	0.314	77.05	0.622	123.93	0.314
2019	120.72	0.606	199.29	0.289	67.40	0.563	119.73	0.289
2020	180.52	0.678	266.26	0.276	64.26	0.568	113.11	0.265
2021	75.32	0.654	115.11	0.418	70.03	0.650	107.76	0.418

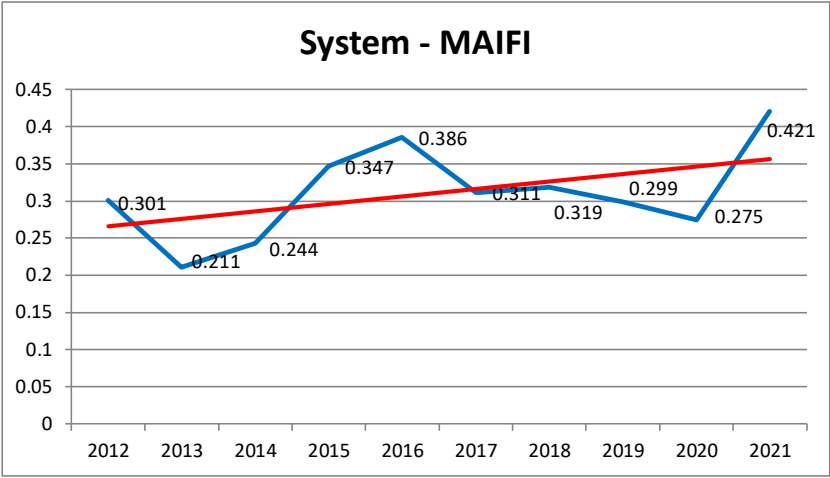
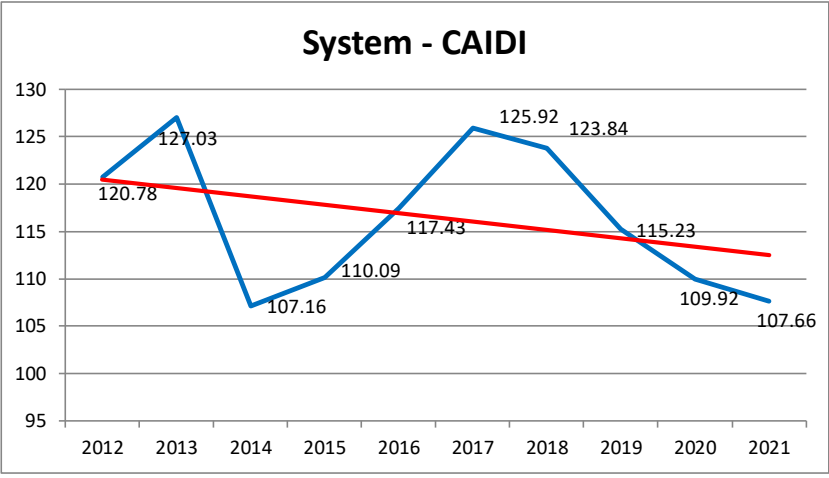
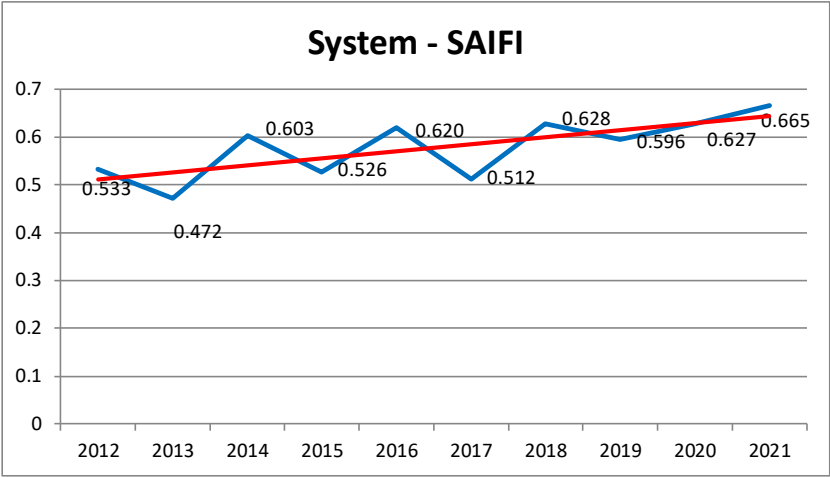
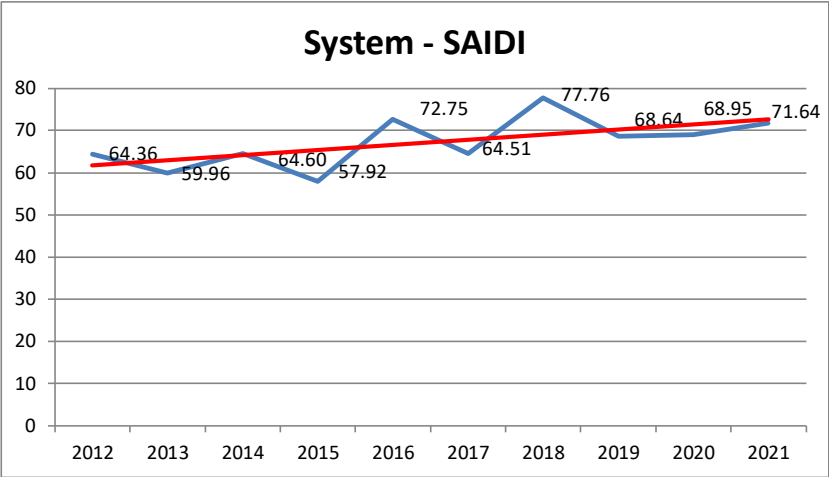
Note: Distribution System Indices includes substation distribution.

**Table 1-3: Transmission System Indices (MED included and excluded)**

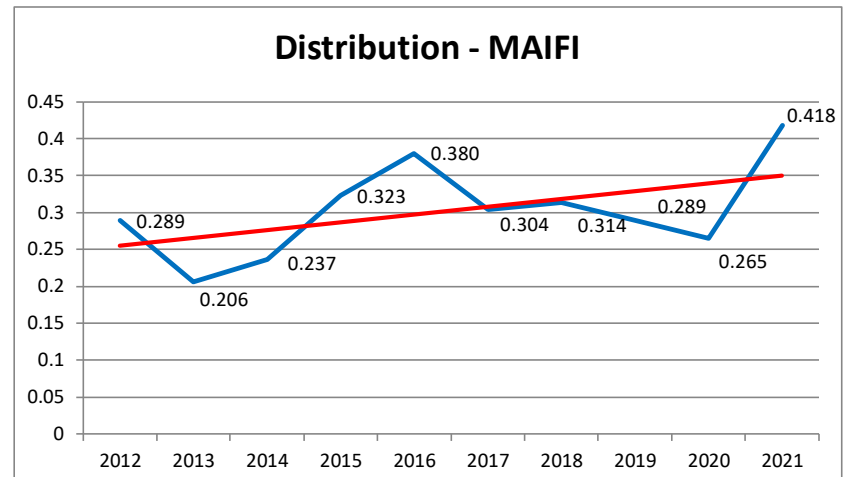
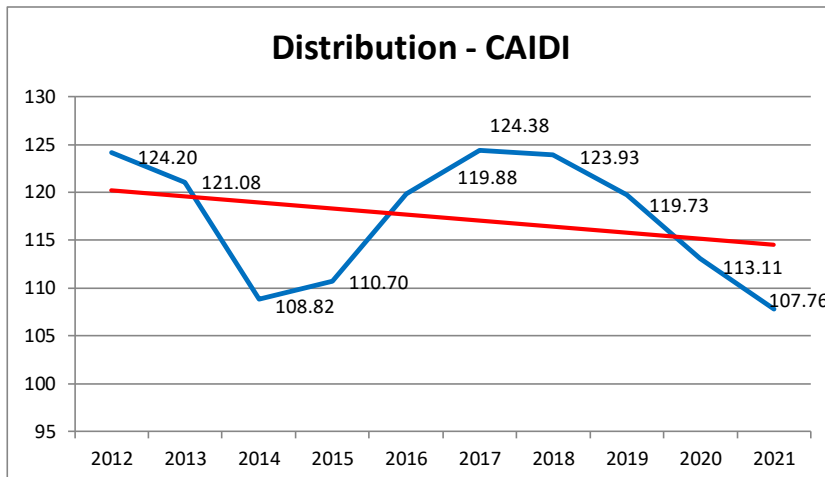
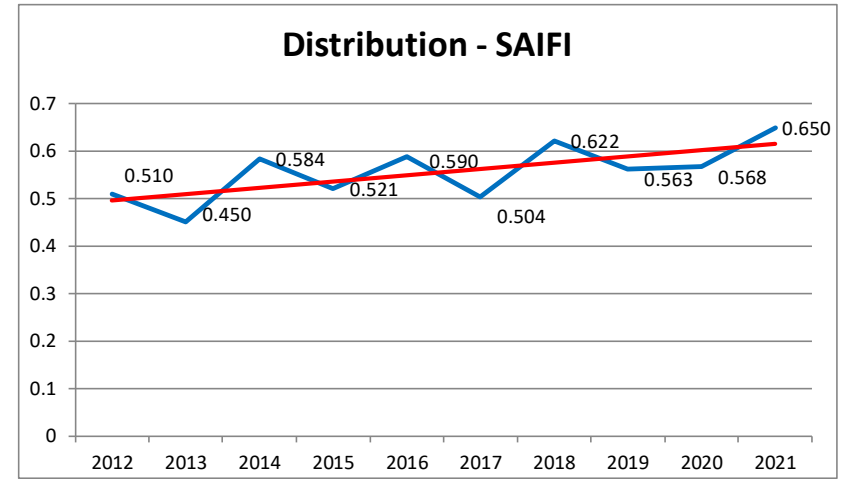
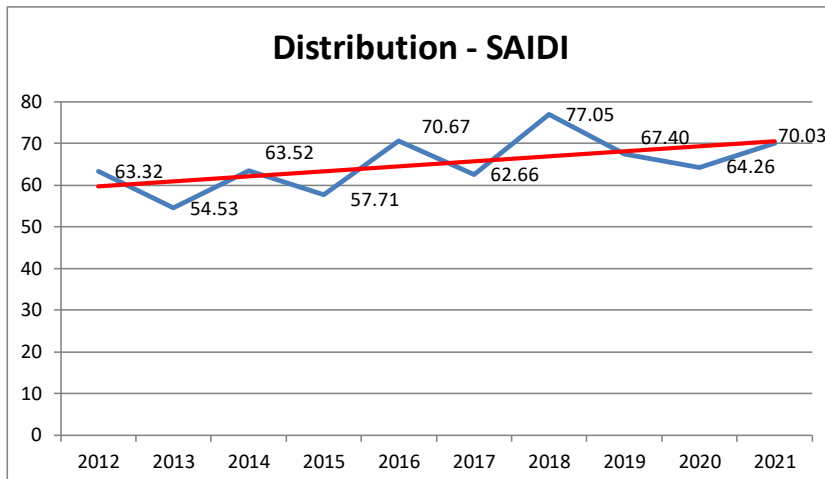
San Diego Gas & Electric Company								
Transmission System Reliability Data 2012 - 2021								
MED Included					MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI	SAIDI	SAIFI	CAIDI	MAIFI
2012	1.04	0.023	45.11	0.012	1.04	0.023	45.11	0.012
2013	20.28	0.109	186.51	0.005	5.43	0.022	250.61	0.005
2014	1.07	0.019	56.30	0.007	1.07	0.019	56.27	0.007
2015	0.21	0.005	44.08	0.024	0.21	0.005	44.08	0.024
2016	2.08	0.030	69.15	0.006	2.07	0.030	69.09	0.005
2017	1.87	0.009	217.47	0.007	1.86	0.009	216.07	0.007
2018	0.71	0.006	116.55	0.005	0.71	0.006	115.49	0.005
2019	2.24	0.033	67.01	0.009	1.24	0.033	37.82	0.009
2020	18.11	0.067	269.18	0.013	4.70	0.059	79.32	0.010
2021	1.61	0.016	103.34	0.003	1.61	0.016	103.34	0.003

Note: Transmission System Indices includes substation transmission.

## System Indices (Excludes Planned, ISO and MED)

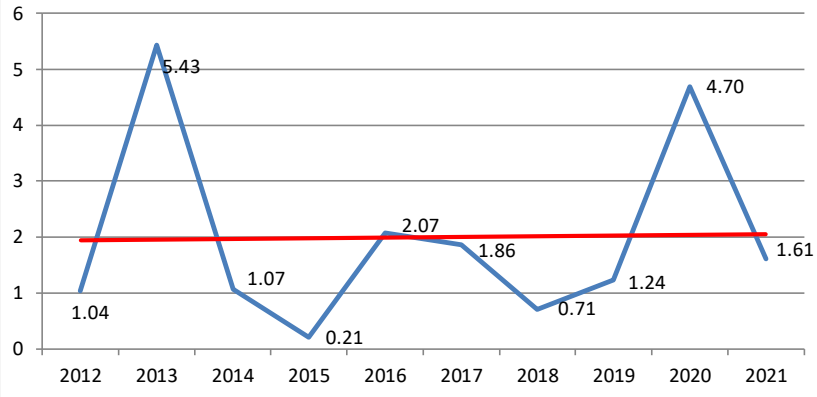


## Distribution System Indices (Excludes Planned, ISO and MED)

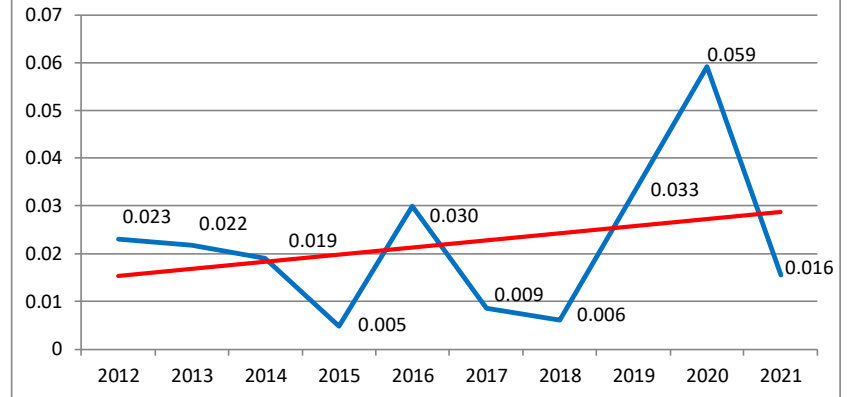


## Transmission System Indices (Excludes Planned, ISO and MED)

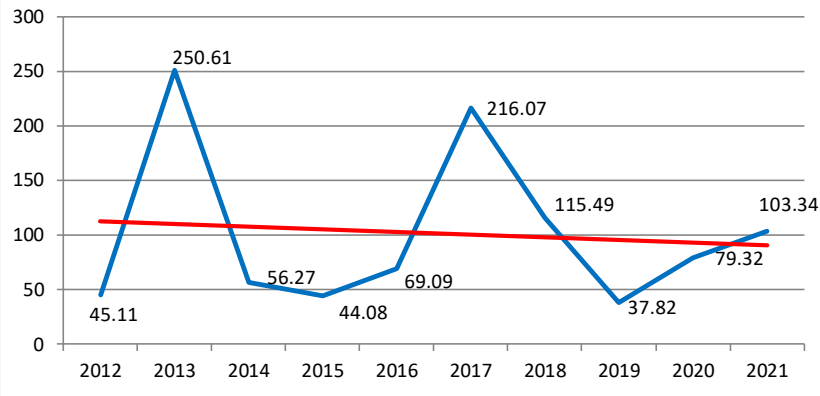
### Transmission - SAIDI



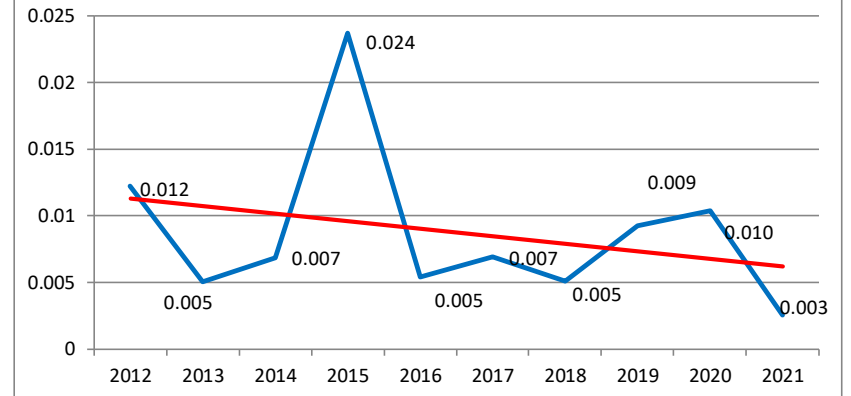
### Transmission - SAIFI



### Transmission - CAIDI



### Transmission - MAIFI



**SECTION 2 – DISTRICT RELIABILITY INDICES FOR THE PAST 10 YEARS INCLUDING AND EXCLUDING MED**

**A. SUMMARY OF ELECTRIC SYSTEM RELIABILITY FOR EACH OF SDG&E’S SIX DISTRICTS (EXCLUDES PLANNED AND CAISO OUTAGES)**

- INDICES REPRESENT THE COMBINED TRANSMISSION, SUBSTATION AND DISTRIBUTION OUTAGE IMPACTS AT THE DISTRICT LEVEL

**Table 2-1: Beach Cities – District Reliability Indices (2012 – 2021)**

Year	MED Included					MED Excluded			
	SAIDI	SAIFI	CAIDI	MAIFI		SAIDI	SAIFI	CAIDI	MAIFI
2012	39.54	0.338	116.80	0.401		39.54	0.338	116.80	0.401
2013	34.08	0.244	139.40	0.122		34.08	0.244	139.40	0.122
2014	41.37	0.366	113.09	0.136		38.78	0.357	108.66	0.113
2015	62.80	0.514	122.18	0.349		62.76	0.513	122.28	0.349
2016	90.55	0.699	129.48	0.385		77.04	0.651	118.31	0.385
2017	55.66	0.552	100.84	0.372		49.11	0.470	104.52	0.338
2018	74.63	0.634	117.74	0.293		74.17	0.626	118.49	0.293
2019	56.82	0.672	84.54	0.252		55.75	0.650	85.73	0.252
2020	58.61	0.602	97.43	0.300		54.52	0.578	94.36	0.300
2021	55.52	0.502	110.61	0.400		55.52	0.502	110.61	0.400

**Table 2-2: Eastern - District Reliability Indices (2012 – 2021)**

MED Included					MED Excluded				
Year	SAIDI	SAIFI	CAIDI	MAIFI	SAIDI	SAIFI	CAIDI	MAIFI	
2012	87.40	0.688	127.07	0.339	87.40	0.688	127.07	0.339	
2013	78.39	0.643	121.93	0.223	77.04	0.634	121.58	0.223	
2014	91.73	0.574	159.75	0.243	77.80	0.528	147.39	0.238	
2015	50.17	0.461	108.79	0.263	50.17	0.461	108.79	0.263	
2016	108.24	0.820	132.06	0.326	84.93	0.705	120.41	0.292	
2017	177.22	0.637	278.38	0.358	83.72	0.529	158.23	0.322	
2018	203.88	0.688	296.39	0.362	108.94	0.654	166.62	0.362	
2019	208.02	0.599	347.49	0.288	64.70	0.513	126.02	0.288	
2020	400.19	0.888	450.66	0.364	103.07	0.695	148.40	0.355	
2021	113.30	0.645	175.64	0.585	84.69	0.623	135.86	0.585	

**Table 2-3: Metro - District Reliability Indices (2012 – 2021)**

MED Included					MED Excluded				
Year	SAIDI	SAIFI	CAIDI	MAIFI	SAIDI	SAIFI	CAIDI	MAIFI	
2012	46.88	0.376	124.63	0.336	46.88	0.376	124.63	0.336	
2013	44.75	0.401	111.46	0.294	44.75	0.401	111.46	0.294	
2014	72.41	0.654	110.74	0.371	62.03	0.625	99.19	0.326	
2015	68.48	0.546	125.41	0.489	68.26	0.538	126.83	0.489	
2016	70.79	0.628	112.67	0.615	64.39	0.595	108.26	0.573	
2017	96.54	0.524	184.28	0.474	57.48	0.443	129.65	0.414	
2018	73.87	0.658	112.29	0.390	71.99	0.645	111.65	0.390	
2019	67.08	0.581	115.54	0.308	67.06	0.580	115.53	0.308	
2020	64.38	0.600	107.28	0.322	49.66	0.538	92.35	0.303	
2021	61.51	0.584	105.38	0.477	61.47	0.583	105.40	0.477	

**Table 2-4: North Coast - District Reliability Indices (2012 – 2021)**

MED Included					MED Excluded				
Year	SAIDI	SAIFI	CAIDI	MAIFI		SAIDI	SAIFI	CAIDI	MAIFI
2012	75.68	0.602	125.67	0.215		75.68	0.602	125.67	0.215
2013	60.17	0.509	118.27	0.181		59.50	0.507	117.25	0.181
2014	76.33	0.606	125.92	0.294		59.96	0.590	101.59	0.282
2015	49.79	0.439	113.49	0.275		49.78	0.438	113.78	0.275
2016	78.82	0.501	157.21	0.558		61.31	0.411	149.09	0.412
2017	79.85	0.524	152.48	0.299		64.43	0.483	133.32	0.299
2018	80.59	0.571	141.25	0.399		61.47	0.540	113.75	0.399
2019	82.50	0.624	132.18	0.305		58.58	0.600	97.64	0.305
2020	110.69	0.551	200.88	0.184		58.58	0.463	126.43	0.183
2021	83.36	0.758	109.96	0.420		83.36	0.758	109.96	0.420

**Table 2-5: Northeast - District Reliability Indices (2012 – 2021)**

MED Included					MED Excluded				
Year	SAIDI	SAIFI	CAIDI	MAIFI		SAIDI	SAIFI	CAIDI	MAIFI
2012	78.46	0.626	125.32	0.272		78.46	0.626	125.32	0.272
2013	102.07	0.708	144.08	0.213		102.06	0.708	144.09	0.213
2014	95.74	0.899	106.48	0.174		75.92	0.832	91.22	0.173
2015	63.02	0.764	82.49	0.359		62.25	0.755	82.40	0.359
2016	93.94	0.815	115.27	0.323		82.15	0.779	105.39	0.270
2017	234.23	0.739	316.98	0.203		79.82	0.651	122.59	0.182
2018	244.84	0.788	310.65	0.200		90.33	0.694	130.20	0.200
2019	282.64	0.808	349.68	0.301		108.37	0.683	158.71	0.301
2020	539.87	1.166	463.18	0.251		97.92	0.843	116.14	0.218
2021	95.825	0.881	108.71	0.237		89.61	0.875	102.47	0.237

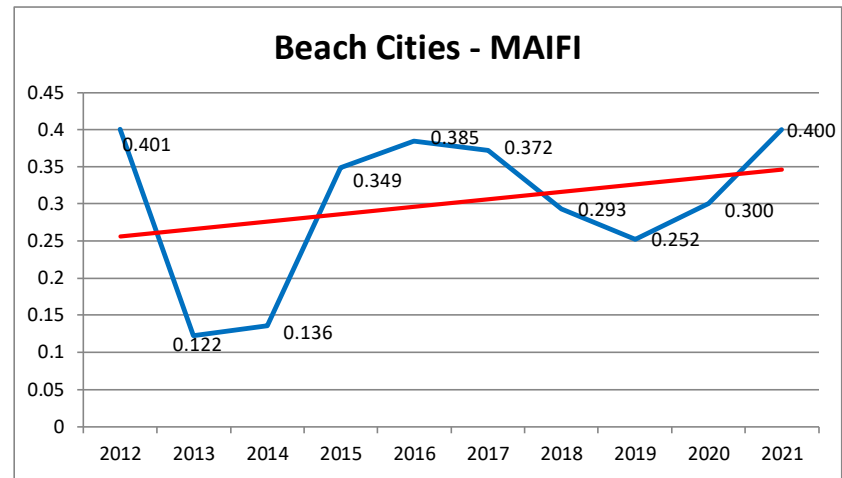
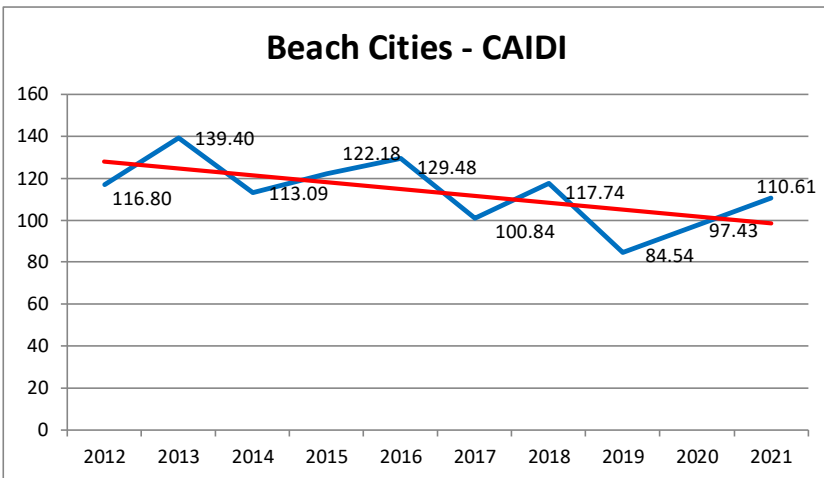
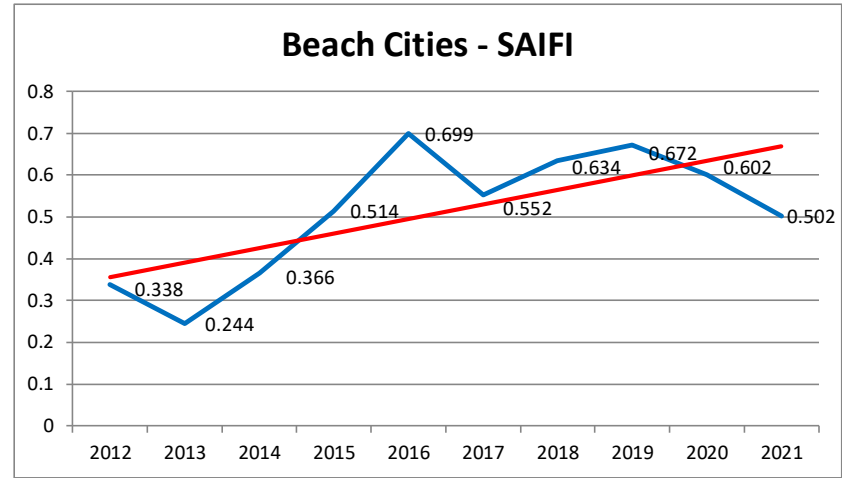
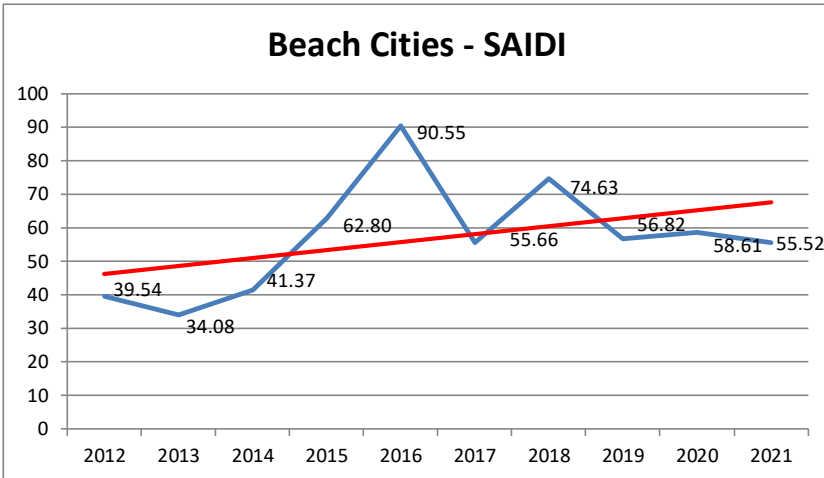


**Table 2-6: Orange County - District Reliability Indices (2012 – 2021)**

MED Included					MED Excluded				
Year	SAIDI	SAIFI	CAIDI	MAIFI	SAIDI	SAIFI	CAIDI	MAIFI	
2012	75.86	0.794	95.52	0.156	75.86	0.794	95.52	0.156	
2013	216.07	1.328	162.74	0.183	47.75	0.336	142.19	0.183	
2014	87.79	0.752	116.68	0.334	87.74	0.752	116.63	0.334	
2015	39.43	0.372	105.95	0.195	39.43	0.372	105.95	0.195	
2016	80.99	0.608	133.21	0.277	71.29	0.579	123.13	0.179	
2017	54.82	0.567	96.62	0.242	54.46	0.564	96.61	0.210	
2018	56.02	0.585	95.80	0.168	56.02	0.585	95.80	0.168	
2019	55.38	0.522	106.00	0.368	52.22	0.497	104.98	0.368	
2020	64.61	0.807	80.07	0.311	61.92	0.785	78.92	0.289	
2021	55.56	0.738	75.33	0.368	55.56	0.738	75.33	0.368	

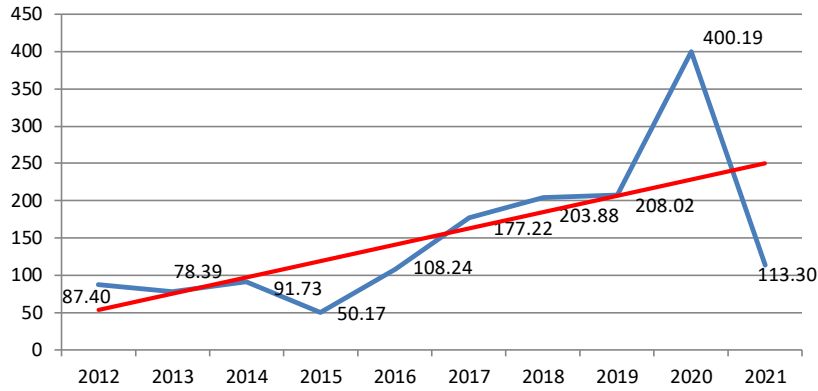
**B. CHARTS FOR EACH OF SDG&E'S SIX DISTRICTS WITH LINEAR TREND LINE (EXCLUDES PLANNED AND CAISO OUTAGES; INCLUDES MED)**

**District Reliability Indices (Excludes Planned and ISO; Includes MED)**

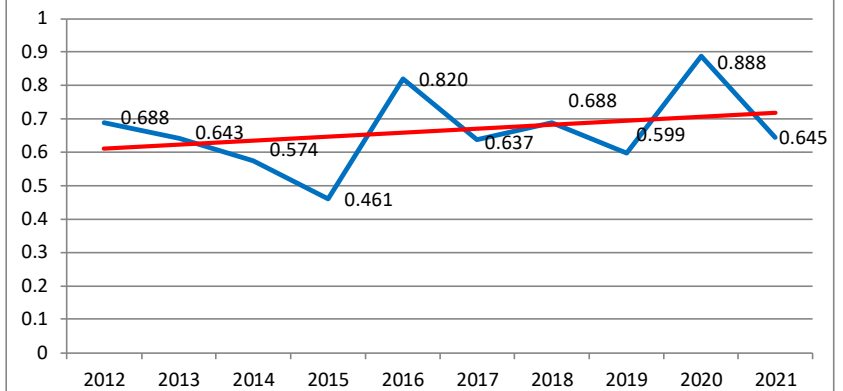


## District Reliability Indices (Excludes Planned and ISO; Includes MED)

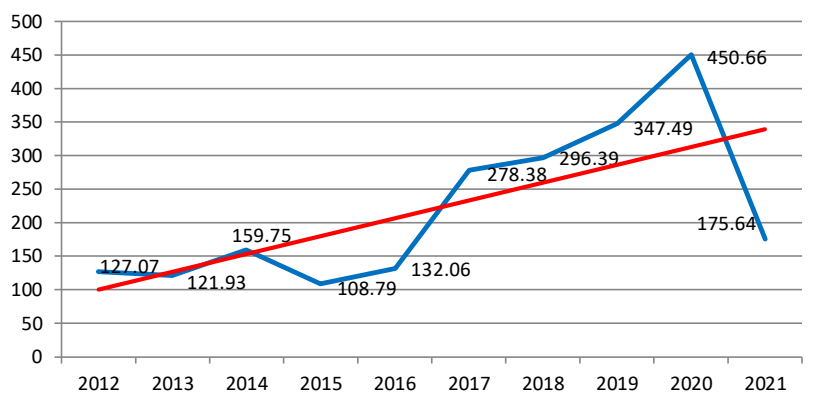
### Eastern - SAIDI



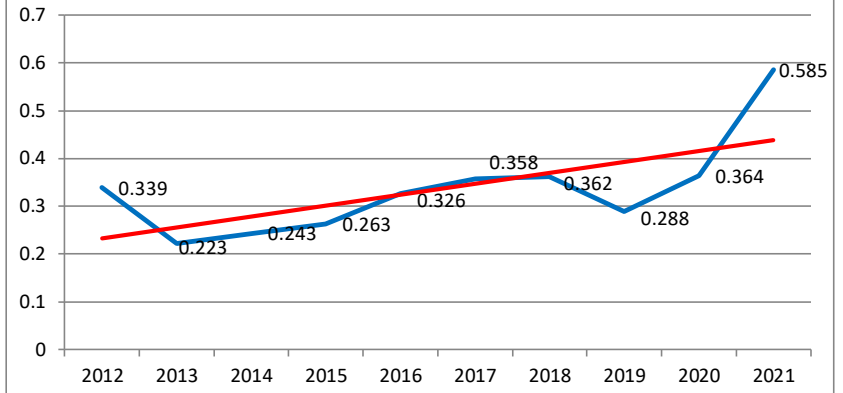
### Eastern - SAIFI



### Eastern - CAIDI

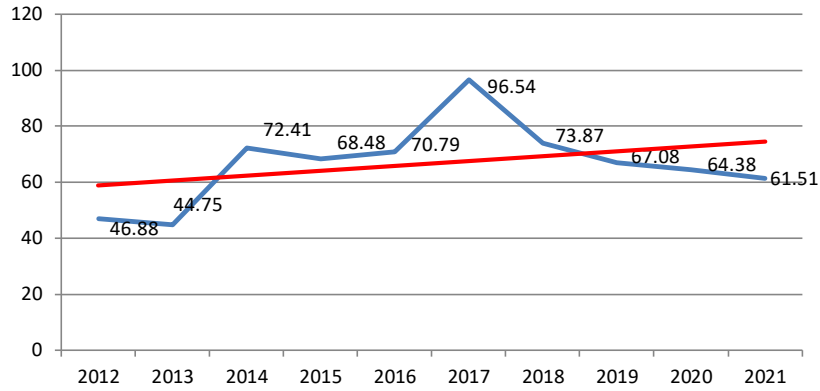


### Eastern - MAIFI

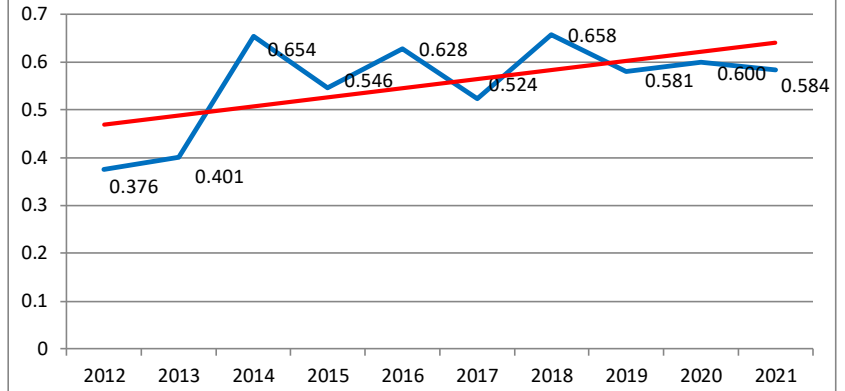


## District Reliability Indices (Excludes Planned and ISO; Includes MED)

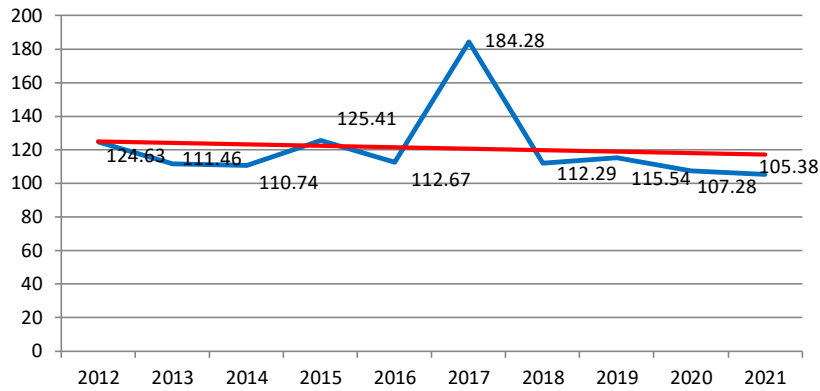
### Metro - SAIDI



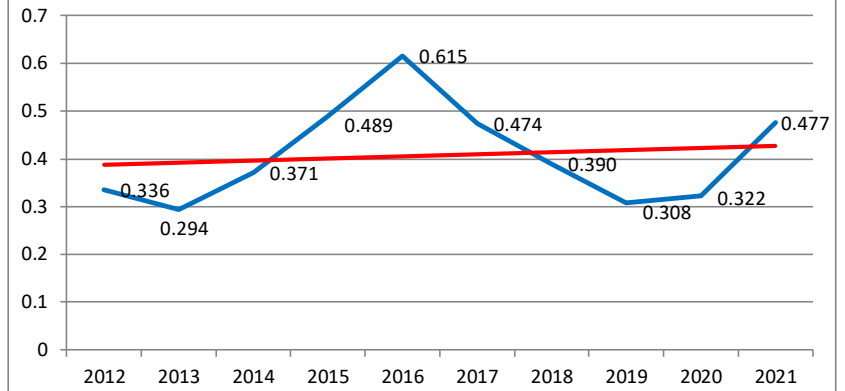
### Metro - SAIFI



### Metro - CAIDI

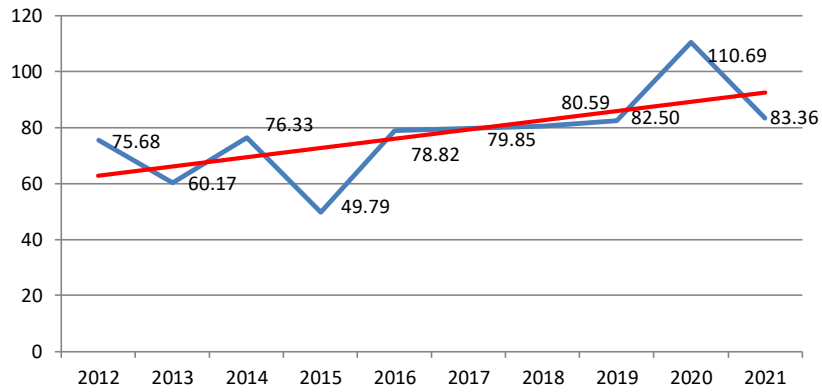


### Metro - MAIFI

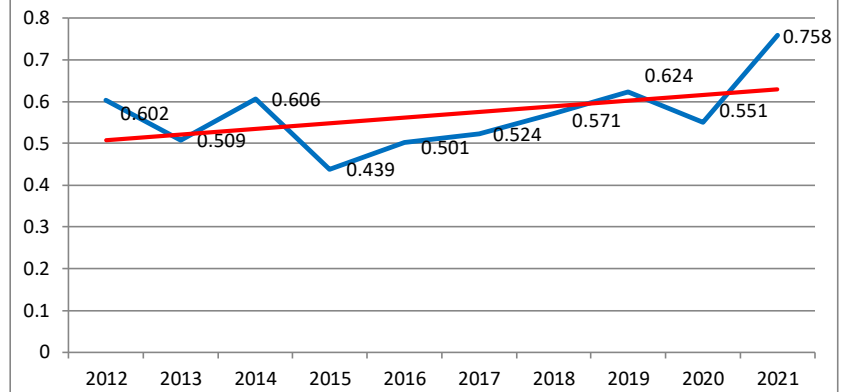


## District Reliability Indices (Excludes Planned and ISO; Includes MED)

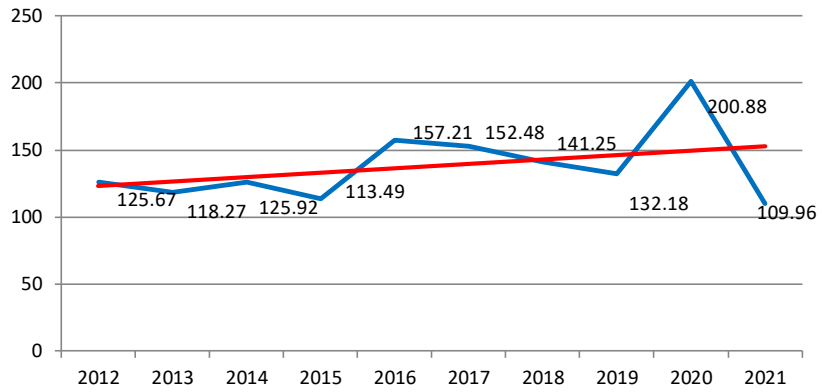
### North Coast - SAIDI



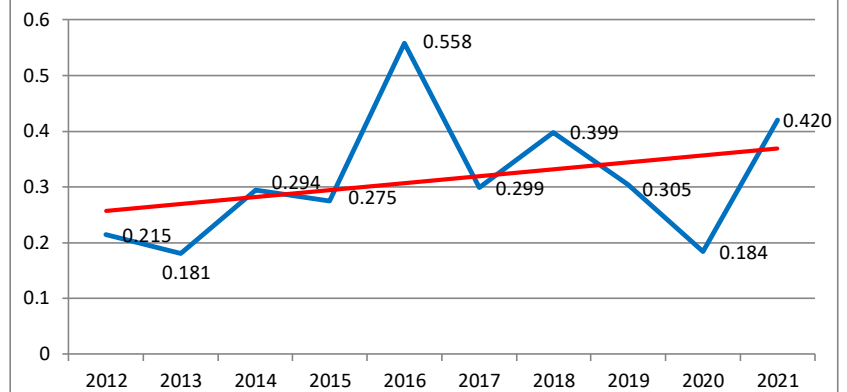
### North Coast - SAIFI



### North Coast - CAIDI

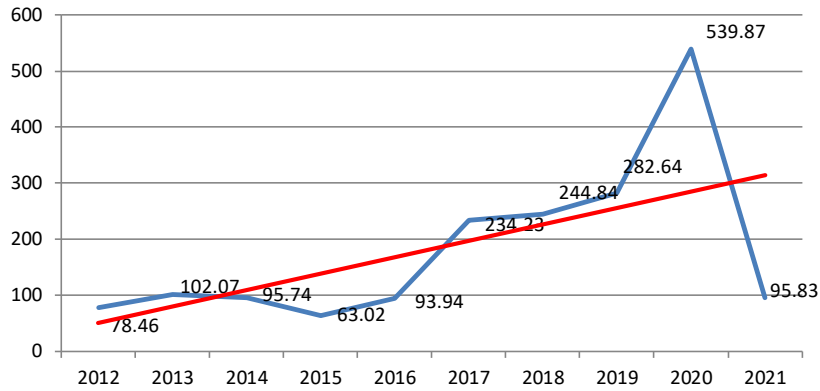


### North Coast - MAIFI

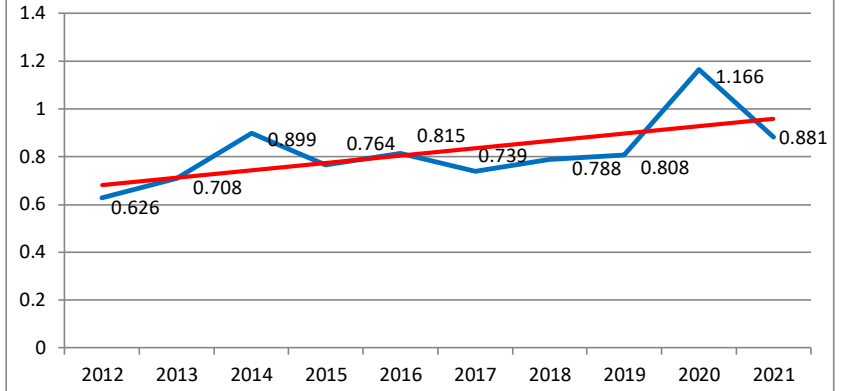


## District Reliability Indices (Excludes Planned and ISO; Includes MED)

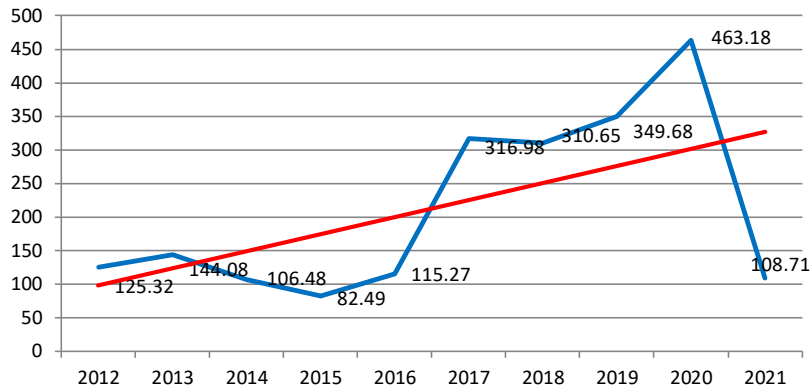
### Northeast - SAIDI



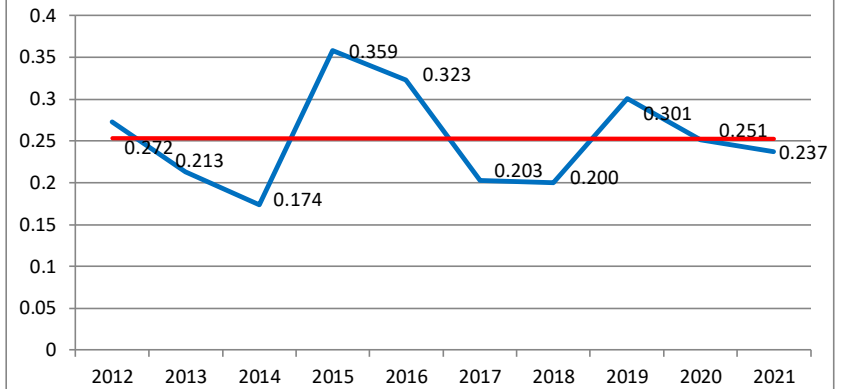
### Northeast - SAIFI



### Northeast - CAIDI

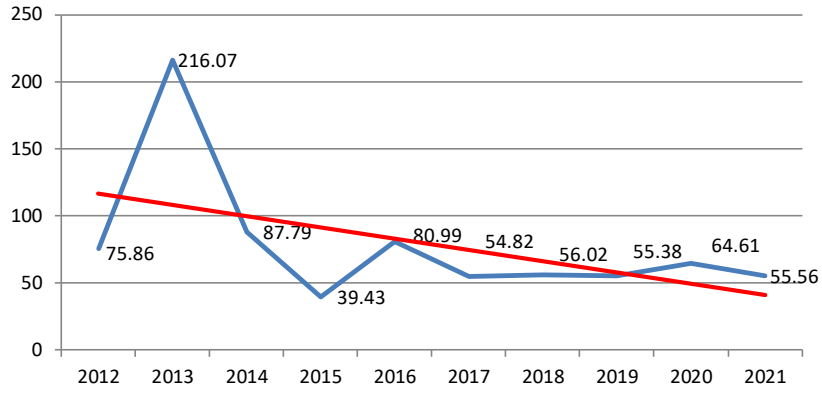


### Northeast - MAIFI

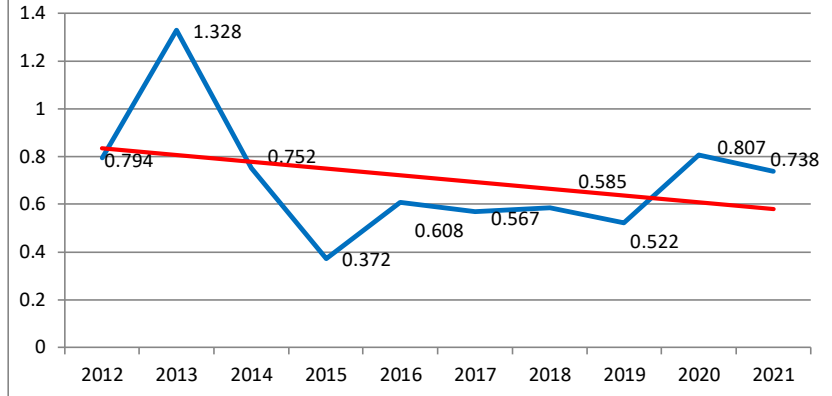


## District Reliability Indices (Excludes Planned and ISO; Includes MED)

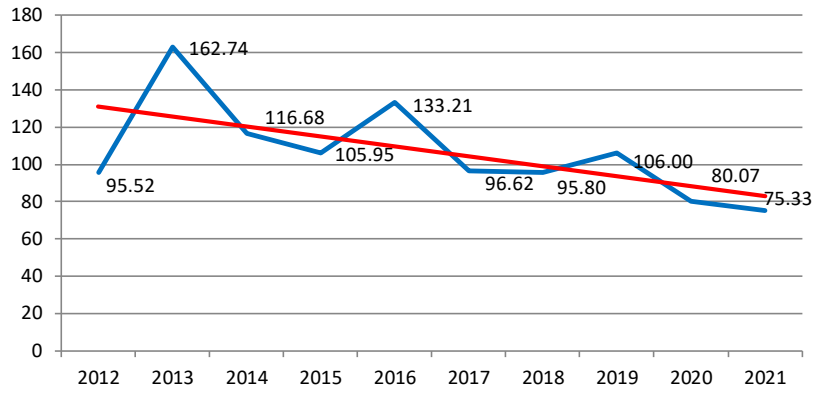
### Orange County - SAIDI



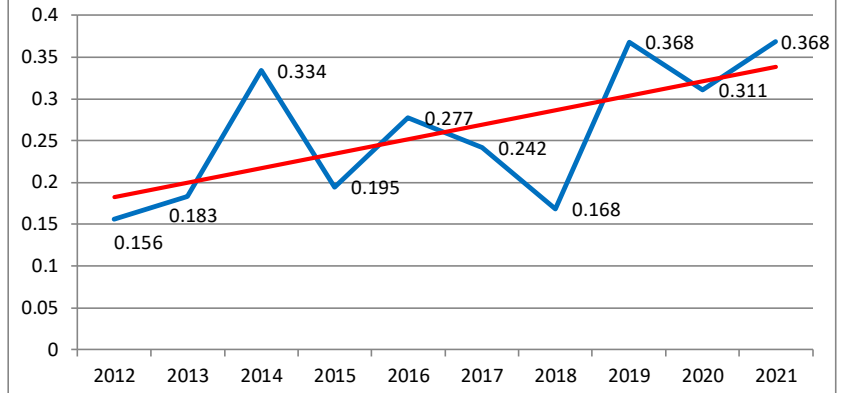
### Orange County - SAIFI



### Orange County - CAIDI

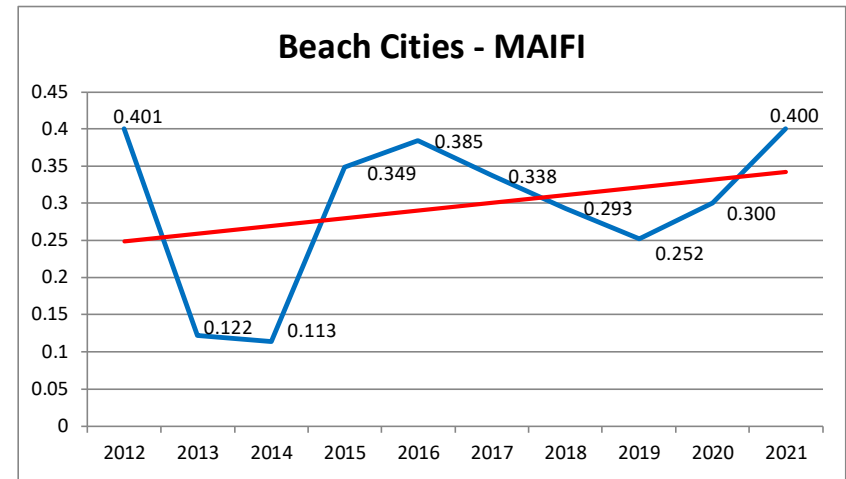
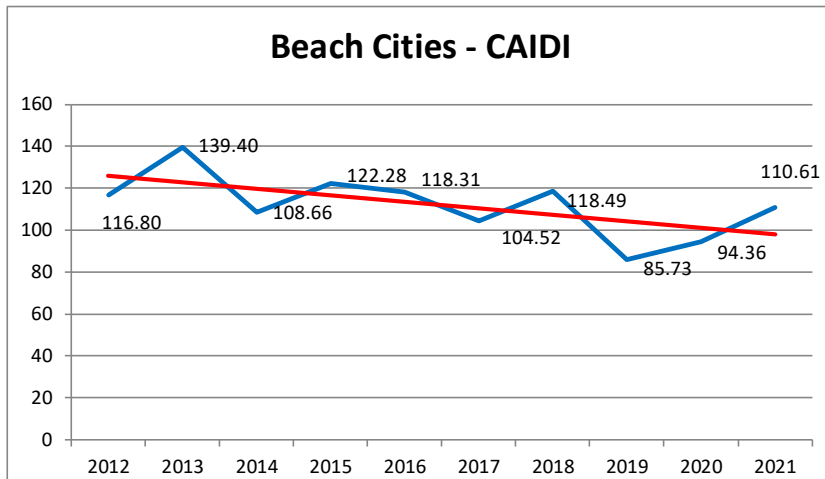
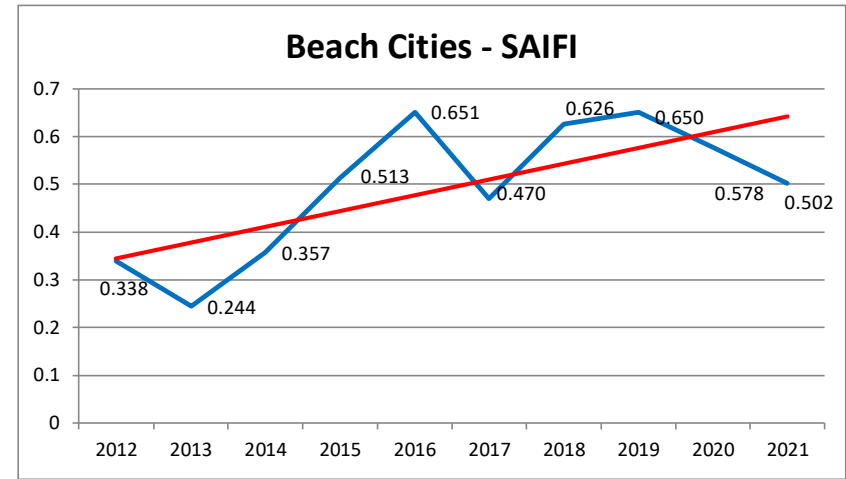
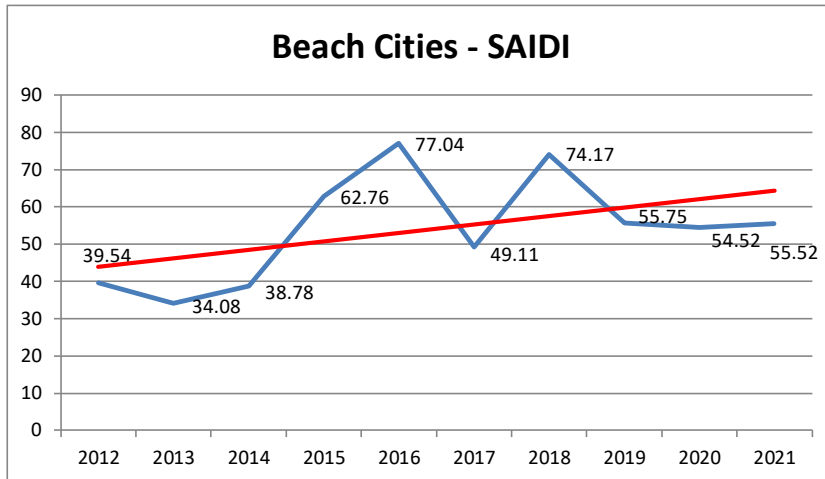


### Orange County - MAIFI



C. CHARTS FOR EACH OF SDG&E'S SIX DISTRICTS WITH LINEAR TREND LINE (EXCLUDES PLANNED, CAISO AND MED)

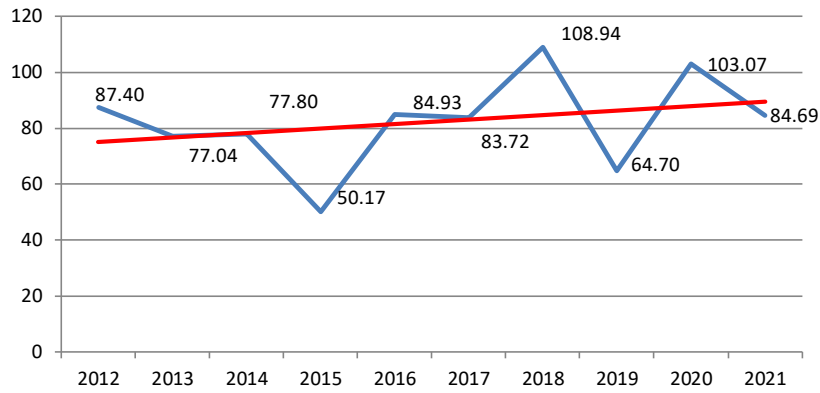
**District Reliability Indices (Excludes Planned, ISO and MED)**



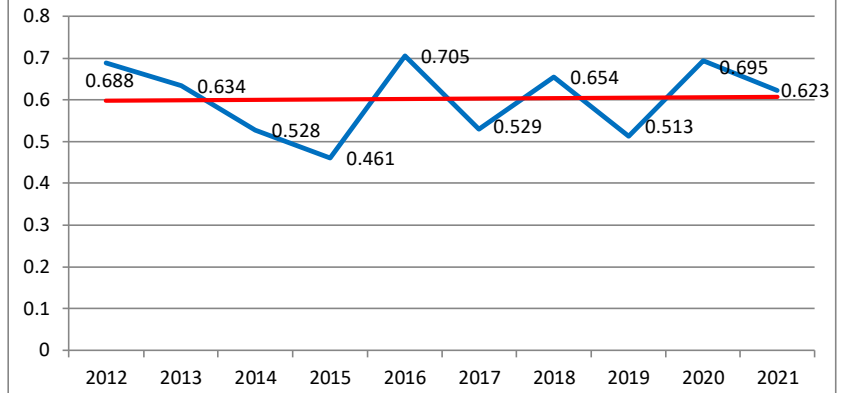


## District Reliability Indices (Excludes Planned, ISO and MED)

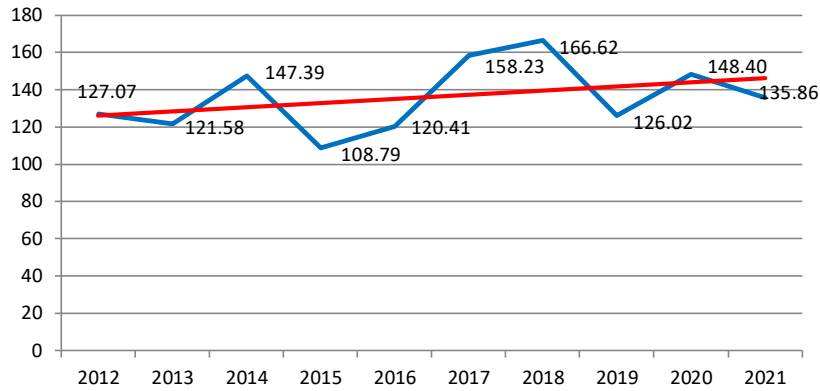
### Eastern - SAIDI



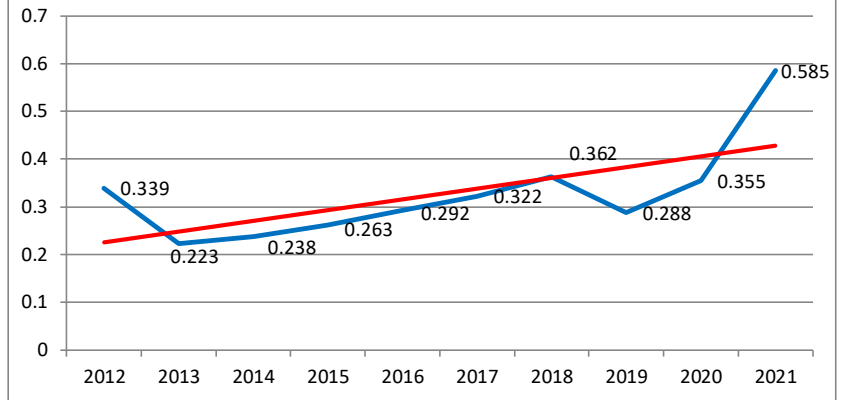
### Eastern - SAIFI



### Eastern - CAIDI

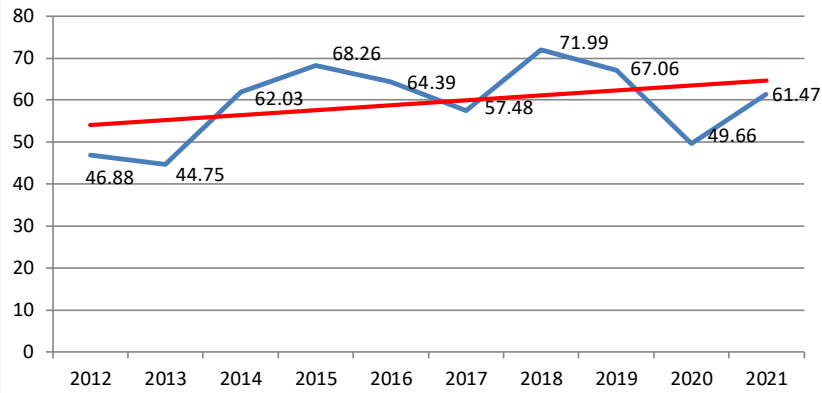


### Eastern - MAIFI

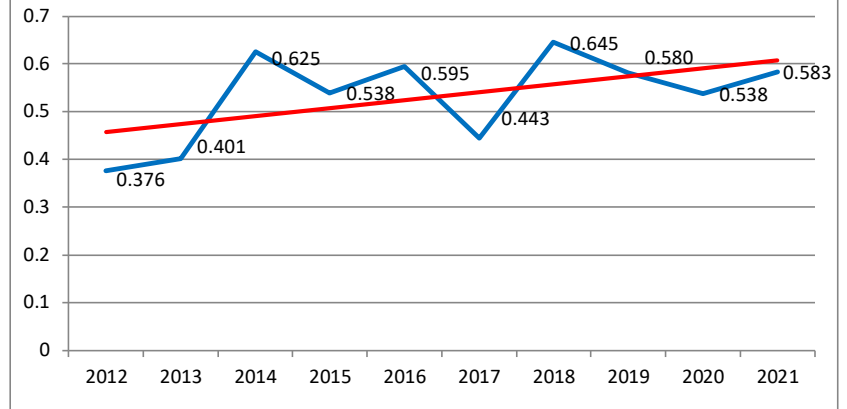


## District Reliability Indices (Excludes Planned, ISO and MED)

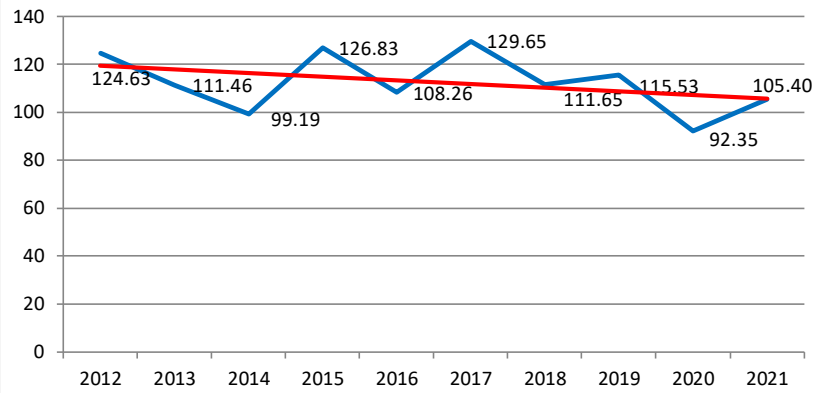
### Metro - SAIDI



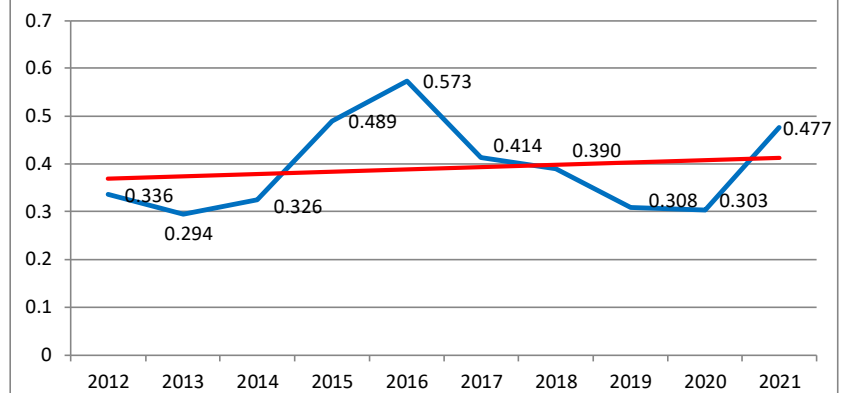
### Metro - SAIFI



### Metro - CAIDI

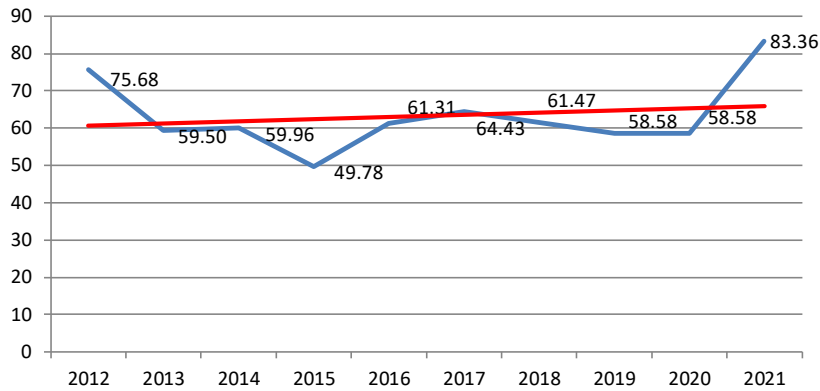


### Metro - MAIFI

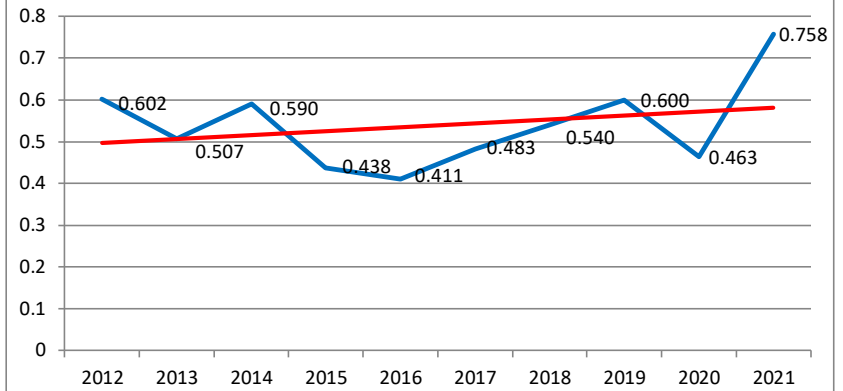


## District Reliability Indices (Excludes Planned, ISO and MED)

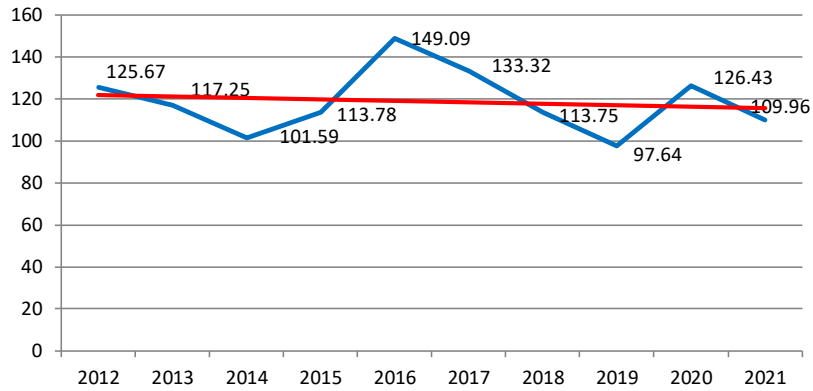
### North Coast - SAIDI



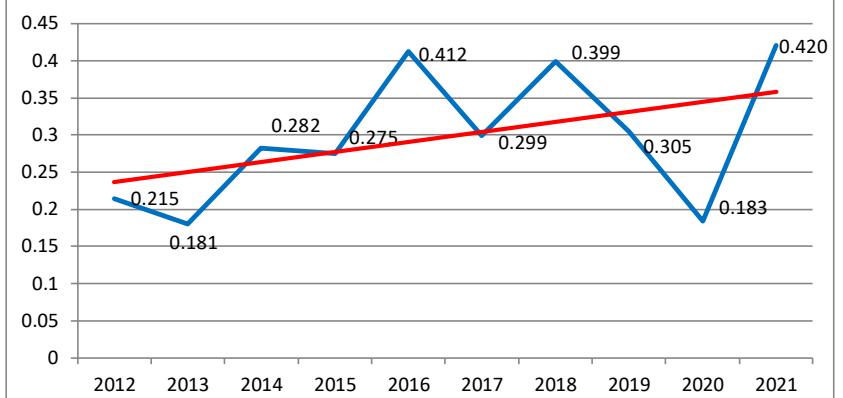
### North Coast - SAIFI



### North Coast - CAIDI

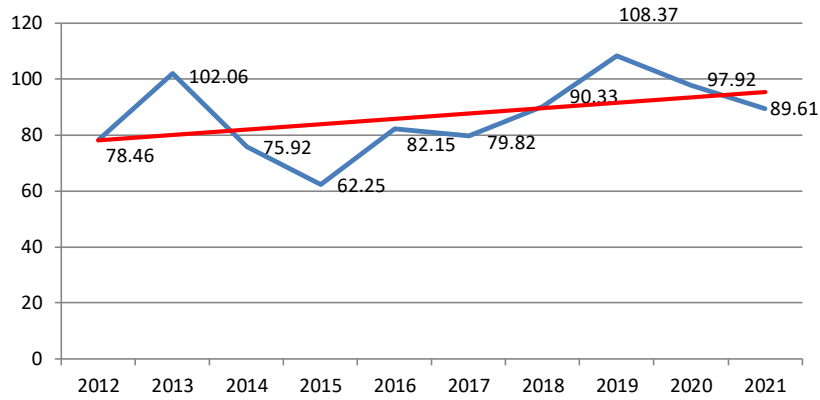


### North Coast - MAIFI

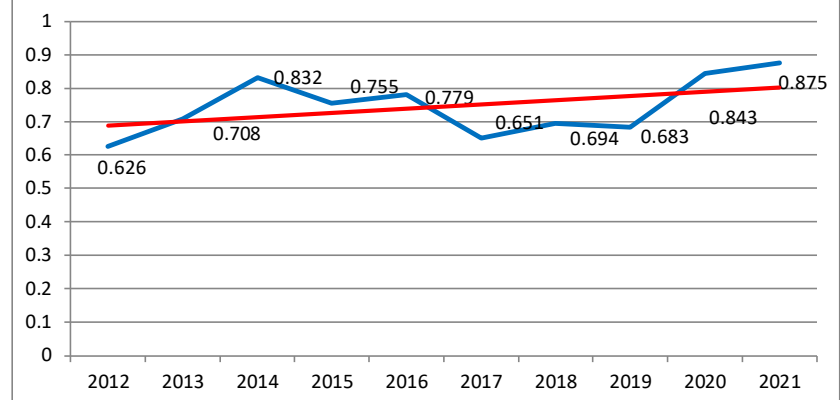


## District Reliability Indices (Excludes Planned, ISO and MED)

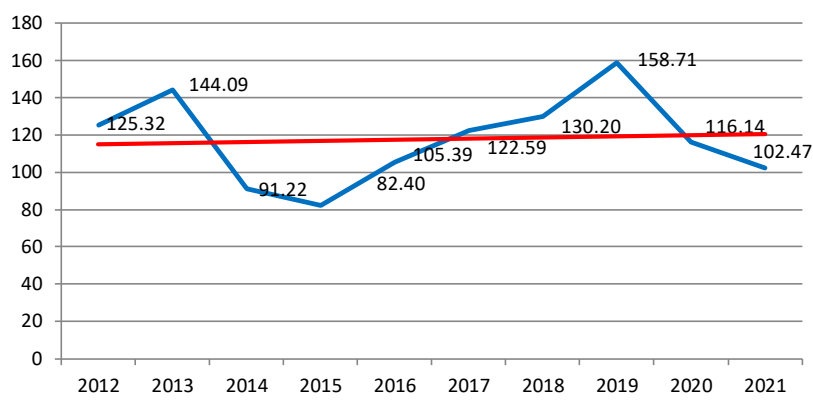
### Northeast - SAIDI



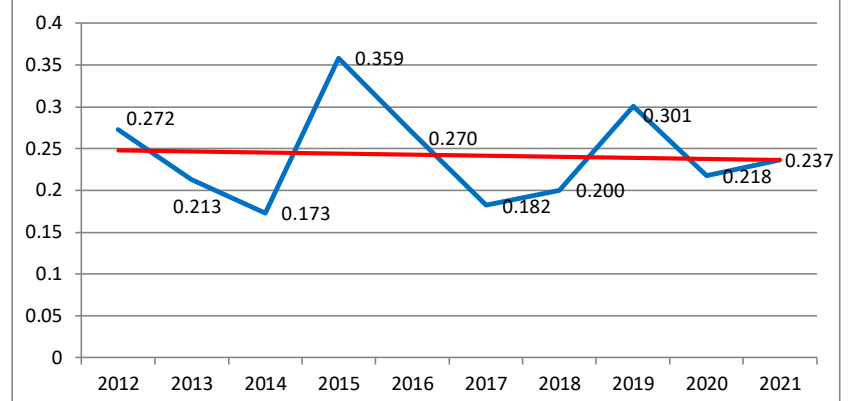
### Northeast - SAIFI



### Northeast - CAIDI

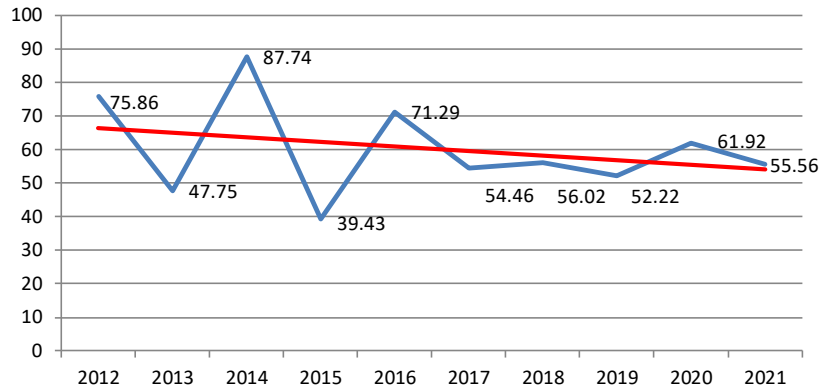


### Northeast - MAIFI

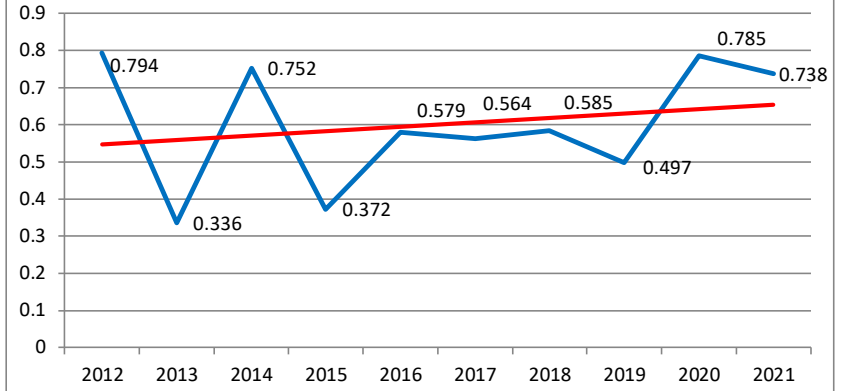


## District Reliability Indices (Excludes Planned, ISO and MED)

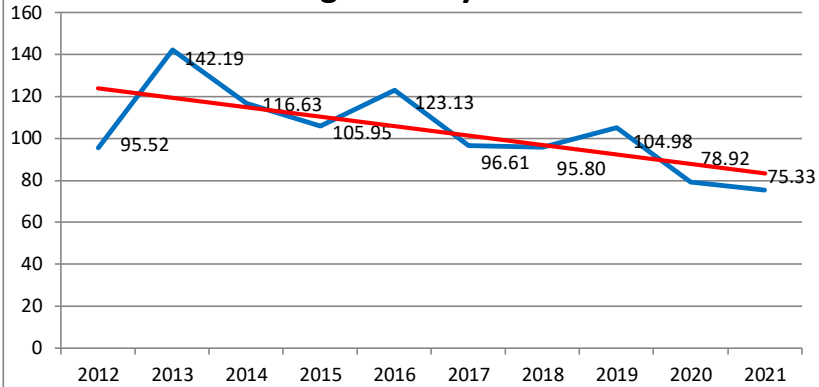
### Orange County - SAIDI



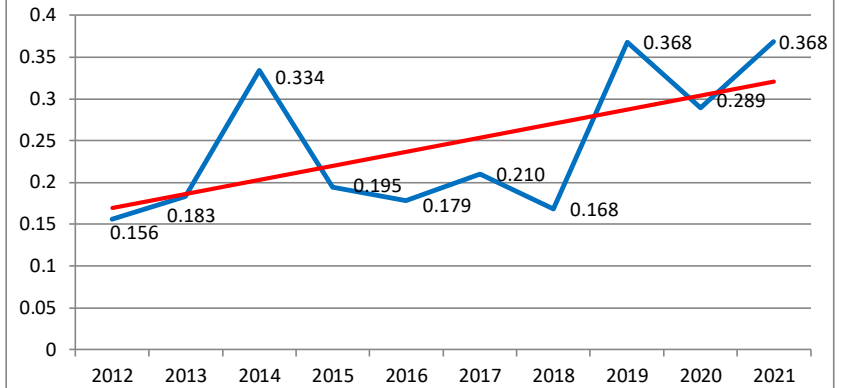
### Orange County - SAIFI



### Orange County - CAIDI



### Orange County - MAIFI



**SECTION 3 – SYSTEM AND DISTRICT INDICES BASED ON IEEE 1366 FOR THE PAST 10 YEARS INCLUDING PLANNED OUTAGES AND INCLUDING AND EXCLUDING MED**

The Decision requires SDG&E to track and report planned outages on a historic running 10-year period. However, prior to the Decision, SDG&E kept and tracked planned outage data on a running three-year period, and because SDG&E started using a newly implemented outage management system in September 2012, SDG&E has recorded planned outage data from only 2013 onward.

Moving forward, SDG&E will maintain 10 years’ worth of planned outage data as directed per the Decision. Each year SDG&E will provide an additional years’ worth of data and in the 2022 annual report will report a running 10 years’ worth of planned outage data.

**INDICES BELOW REPRESENT THE COMBINED TRANSMISSION, SUBSTATION AND DISTRIBUTION OUTAGE IMPACTS AT THE SYSTEM AND DISTRICT LEVELS.**

System Indices (2013 – 2021) Planned and Unplanned								
MED Included					MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI	SAIDI	SAIFI	CAIDI	MAIFI
2013	106.19	0.668	158.96	0.230	91.09	0.579	157.25	0.230
2014	105.94	0.746	141.92	0.277	94.72	0.717	132.13	0.259
2015	100.59	0.661	152.16	0.370	100.40	0.657	152.72	0.370
2016	122.06	0.802	152.18	0.467	108.78	0.744	146.21	0.409
2017	164.71	0.744	221.32	0.368	111.57	0.671	166.22	0.335
2018	167.13	0.827	202.15	0.344	123.87	0.796	155.52	0.344
2019	166.42	0.805	206.71	0.343	111.72	0.760	146.99	0.343
2020	244.05	0.917	266.09	0.326	114.19	0.798	143.02	0.312
2021	149.14	0.918	162.39	0.445	143.85	0.914	157.40	0.445

<b>Beach Cites - District Indices (2013 – 2021)</b>								
<b>Planned and Unplanned</b>								
<b>MED Included</b>					<b>MED Excluded</b>			
<b>Year</b>	<b>SAIDI</b>	<b>SAIFI</b>	<b>CAIDI</b>	<b>MAIFI</b>	<b>SAIDI</b>	<b>SAIFI</b>	<b>CAIDI</b>	<b>MAIFI</b>
2013	80.72	0.376	214.82	0.126	80.70	0.376	214.89	0.126
2014	75.05	0.476	157.61	0.143	72.45	0.467	155.06	0.120
2015	85.76	0.592	144.92	0.357	85.73	0.591	145.04	0.357
2016	109.46	0.766	142.81	0.401	95.95	0.718	133.58	0.401
2017	100.41	0.694	144.63	0.388	93.85	0.612	153.32	0.353
2018	142.64	0.859	166.08	0.316	142.18	0.851	167.08	0.316
2019	107.19	0.888	120.72	0.299	105.21	0.863	121.91	0.299
2020	96.18	0.779	123.47	0.350	92.00	0.755	121.90	0.350
2021	147.15	0.818	180.00	0.403	147.15	0.818	180.00	0.403

<b>Eastern - District Indices (2013 – 2021)</b>								
<b>Planned and Unplanned</b>								
<b>MED Included</b>					<b>MED Excluded</b>			
<b>Year</b>	<b>SAIDI</b>	<b>SAIFI</b>	<b>CAIDI</b>	<b>MAIFI</b>	<b>SAIDI</b>	<b>SAIFI</b>	<b>CAIDI</b>	<b>MAIFI</b>
2013	121.78	0.776	156.95	0.239	120.37	0.767	157.02	0.239
2014	121.34	0.670	181.05	0.245	107.36	0.623	172.21	0.240
2015	82.12	0.555	147.87	0.289	82.12	0.555	147.87	0.289
2016	136.40	0.911	149.76	0.332	113.09	0.797	141.97	0.298
2017	207.65	0.763	272.23	0.386	113.74	0.654	173.89	0.351
2018	241.61	0.830	291.11	0.394	146.67	0.796	184.28	0.394
2019	249.63	0.749	333.45	0.308	106.30	0.663	160.24	0.308
2020	466.28	1.100	423.85	0.459	168.89	0.905	186.54	0.450
2021	181.24	0.874	207.35	0.643	152.63	0.852	179.07	0.643

Metro - District Indices (2013 – 2021) Planned and Unplanned								
MED Included					MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI	SAIDI	SAIFI	CAIDI	MAIFI
2013	65.17	0.472	137.98	0.295	65.11	0.472	138.00	0.295
2014	105.54	0.752	140.25	0.374	95.16	0.724	131.43	0.328
2015	141.46	0.721	196.31	0.492	141.25	0.713	198.16	0.492
2016	114.66	0.759	150.99	0.617	108.20	0.725	149.25	0.575
2017	151.01	0.683	221.25	0.478	111.61	0.601	185.64	0.417
2018	104.76	0.777	134.89	0.408	102.88	0.764	134.73	0.408
2019	100.65	0.692	145.37	0.325	99.78	0.688	144.97	0.325
2020	105.64	0.730	144.69	0.326	90.53	0.667	135.78	0.307
2021	119.98	0.761	157.74	0.483	119.94	0.760	157.79	0.483

North Coast - District Indices (2013 – 2021) Planned and Unplanned								
MED Included					MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI	SAIDI	SAIFI	CAIDI	MAIFI
2013	90.52	0.625	144.79	0.191	89.84	0.624	144.02	0.191
2014	104.10	0.741	140.56	0.322	87.72	0.725	121.06	0.310
2015	87.90	0.580	151.58	0.299	87.89	0.579	151.88	0.299
2016	114.65	0.664	172.72	0.584	97.14	0.574	169.34	0.438
2017	108.76	0.665	163.62	0.329	93.34	0.624	149.51	0.329
2018	118.73	0.712	166.71	0.419	99.62	0.682	146.05	0.419
2019	115.12	0.774	148.68	0.319	91.20	0.750	121.59	0.319
2020	154.26	0.678	227.46	0.201	102.12	0.590	172.97	0.200
2021	162.39	1.014	160.11	0.433	162.39	1.014	160.11	0.433

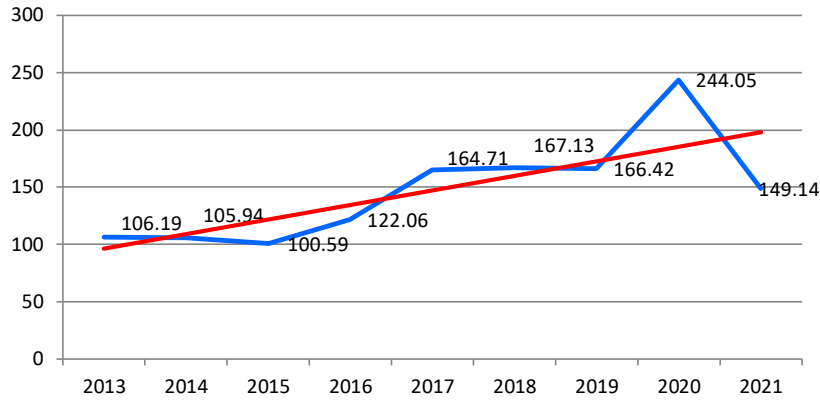


Northeast - District Indices (2013 – 2021) Planned and Unplanned								
MED Included					MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI	SAIDI	SAIFI	CAIDI	MAIFI
2013	130.01	0.817	159.11	0.264	129.99	0.817	159.12	0.264
2014	117.88	1.016	115.97	0.217	98.06	0.950	103.26	0.215
2015	95.03	0.911	104.37	0.431	94.26	0.902	104.50	0.431
2016	154.02	1.010	152.56	0.410	142.23	0.974	146.02	0.357
2017	315.41	0.986	319.80	0.261	161.00	0.898	179.20	0.240
2018	312.53	1.043	299.75	0.234	158.02	0.948	166.64	0.234
2019	344.80	1.051	328.19	0.444	170.52	0.925	184.34	0.444
2020	596.86	1.448	412.18	0.304	154.77	1.124	137.67	0.271
2021	167.36	1.168	143.32	0.303	161.14	1.161	138.82	0.303

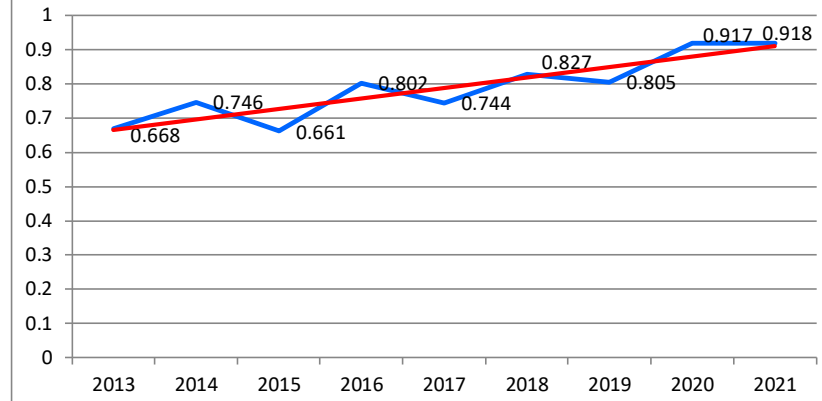
Orange County - District Indices (2013 – 2021) Planned and Unplanned								
MED Included					MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI	SAIDI	SAIFI	CAIDI	MAIFI
2013	233.85	1.430	163.49	0.245	65.52	0.438	149.54	0.245
2014	122.61	0.906	135.36	0.348	122.56	0.906	135.33	0.348
2015	80.31	0.505	158.94	0.211	80.31	0.505	158.94	0.211
2016	98.96	0.688	143.86	0.288	89.26	0.659	135.47	0.190
2017	87.10	0.692	125.90	0.260	86.58	0.688	125.91	0.229
2018	89.71	0.716	125.27	0.198	89.71	0.716	125.27	0.198
2019	101.98	0.656	155.49	0.404	98.82	0.631	156.68	0.404
2020	85.25	0.901	94.66	0.329	82.56	0.878	94.00	0.307
2021	122.87	1.002	122.67	0.370	122.87	1.002	122.67	0.370

## System Indices - Planned and Unplanned (Excludes ISO; Includes MED)

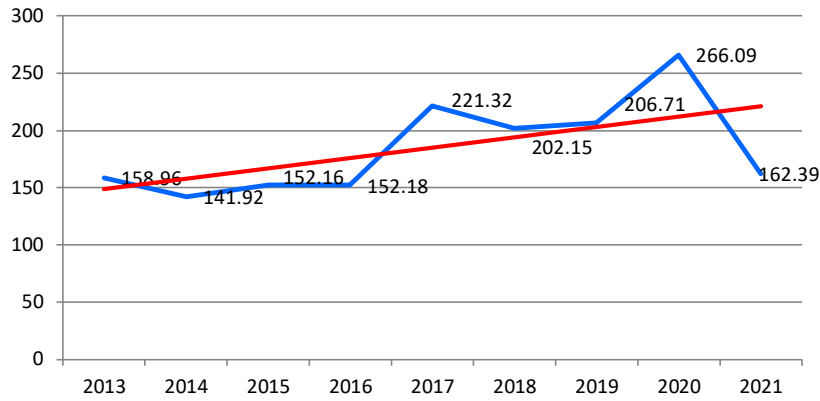
### System - SAIDI



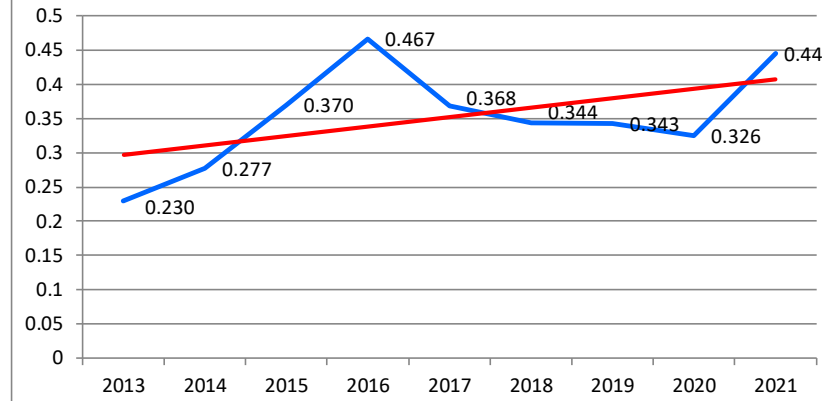
### System - SAIFI



### System - CAIDI

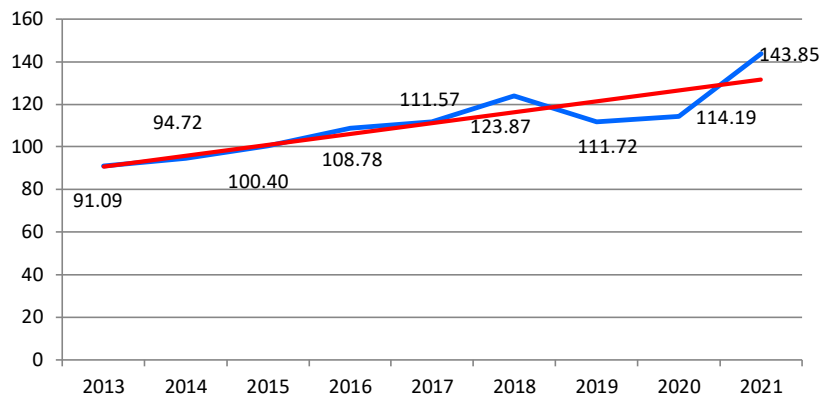


### System - MAIFI

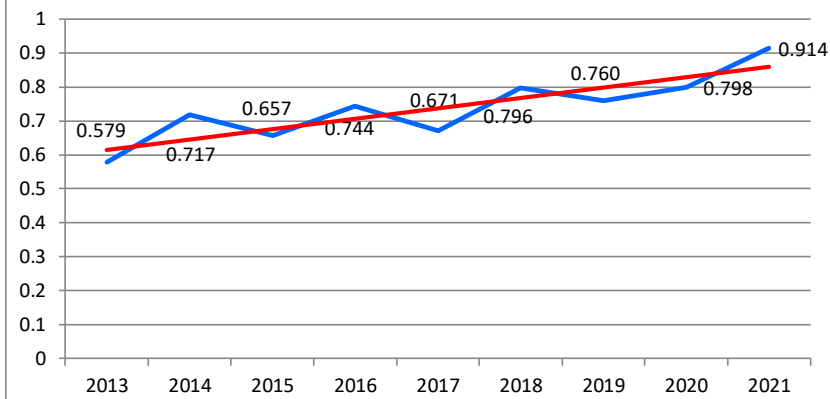


## System Indices - Planned and Unplanned (Excludes ISO and MED)

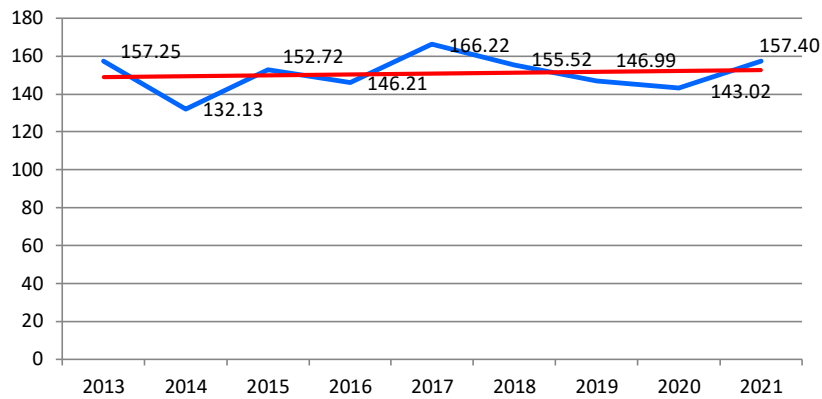
### System - SAIDI



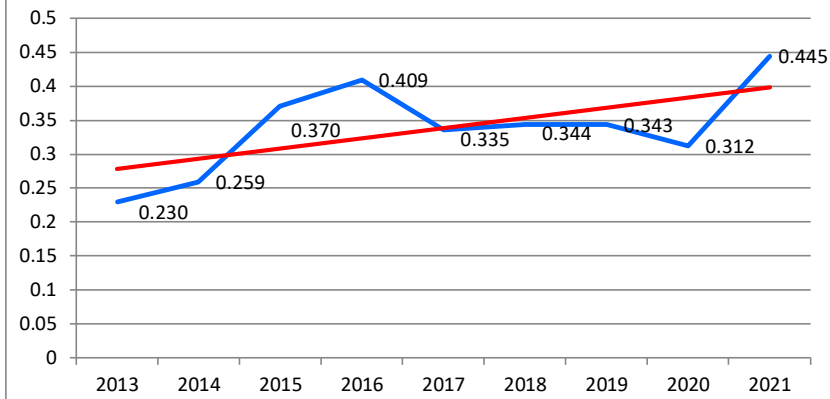
### System - SAIFI



### System - CAIDI

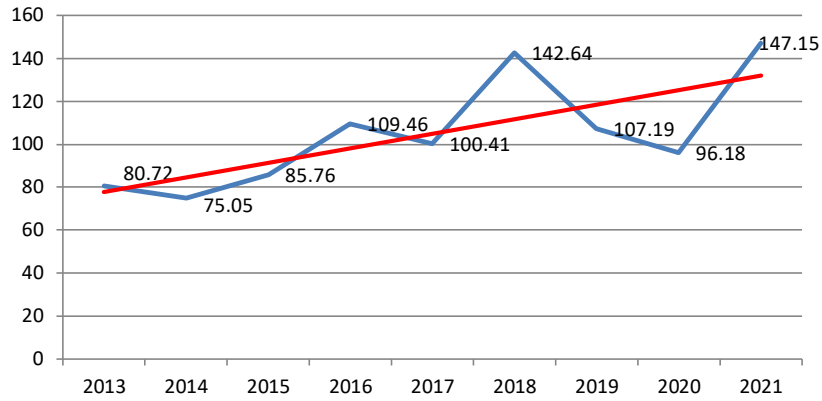


### System - MAIFI

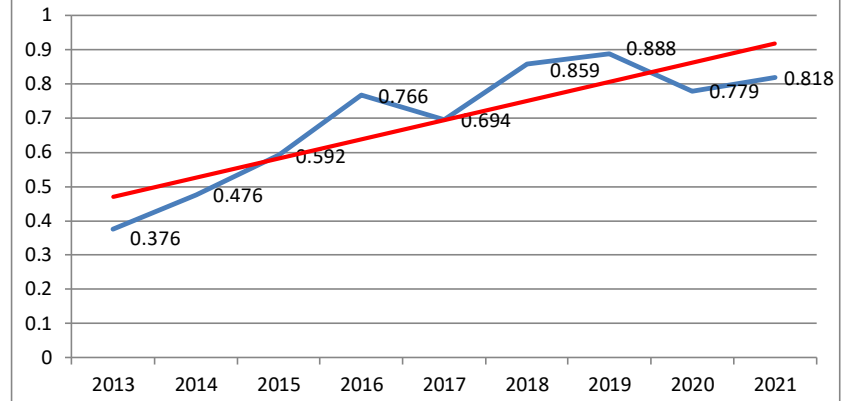


## District Indices - Planned and Unplanned (Excludes ISO; Includes MED)

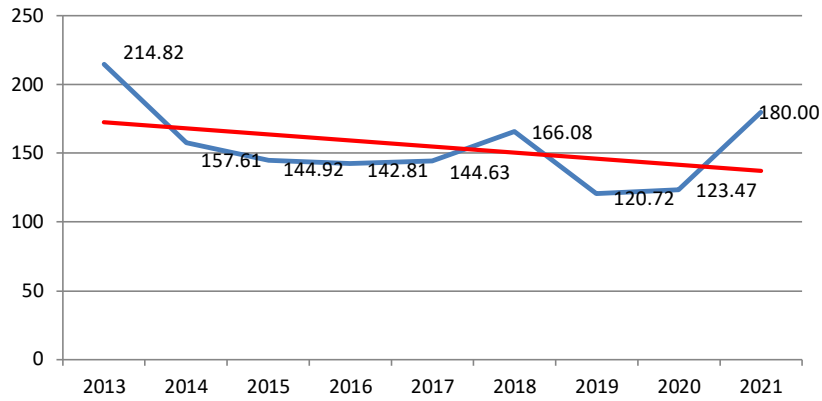
### Beach Cities - SAIDI



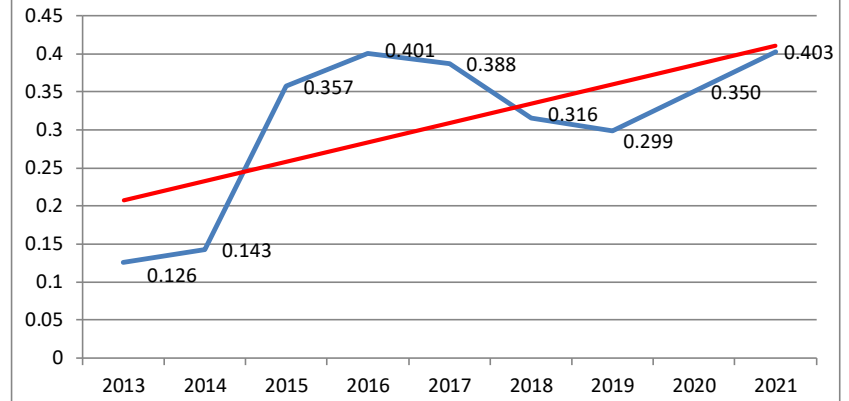
### Beach Cities - SAIFI



### Beach Cities - CAIDI

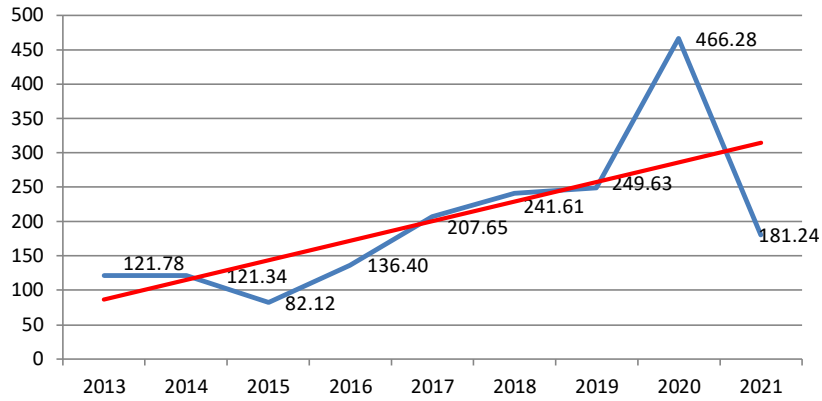


### Beach Cities - MAIFI

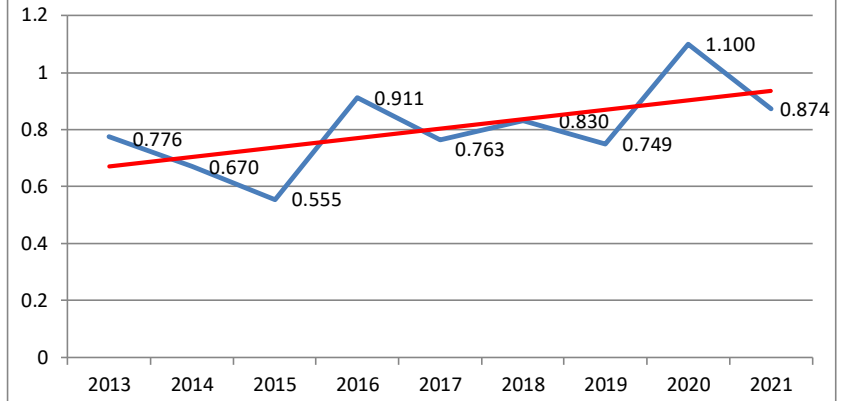


## District Indices - Planned and Unplanned (Excludes ISO; Includes MED)

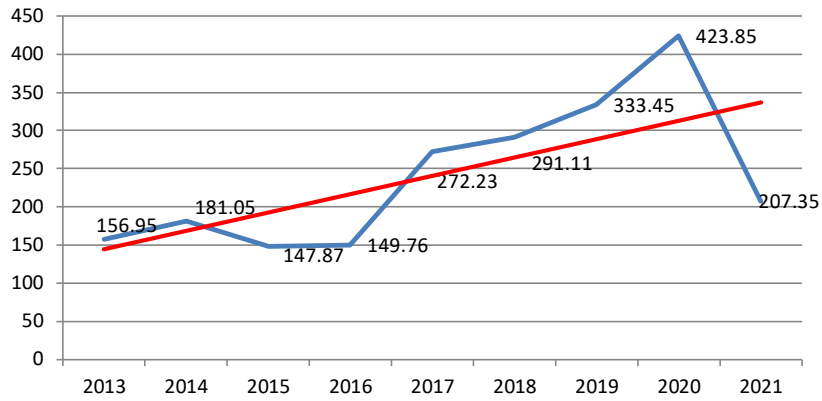
### Eastern - SAIDI



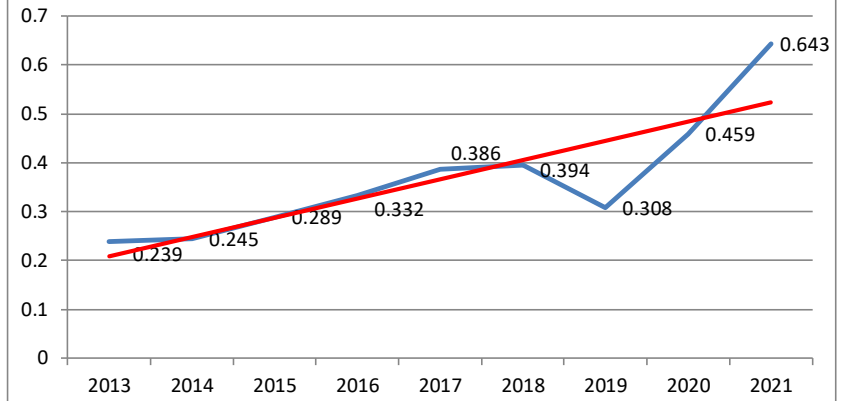
### Eastern - SAIFI



### Eastern - CAIDI

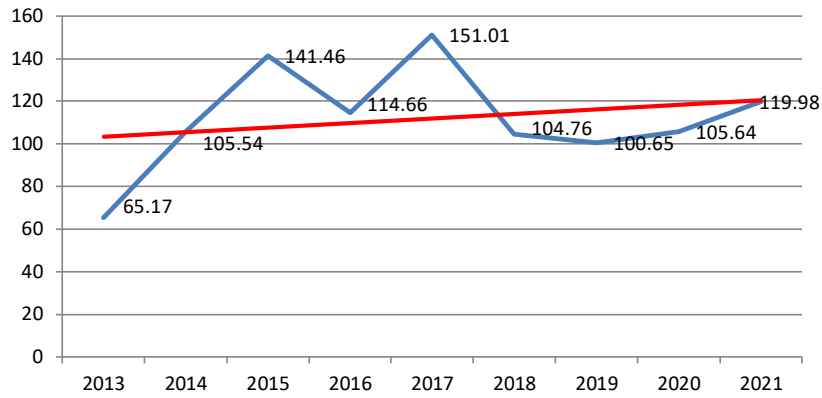


### Eastern - MAIFI

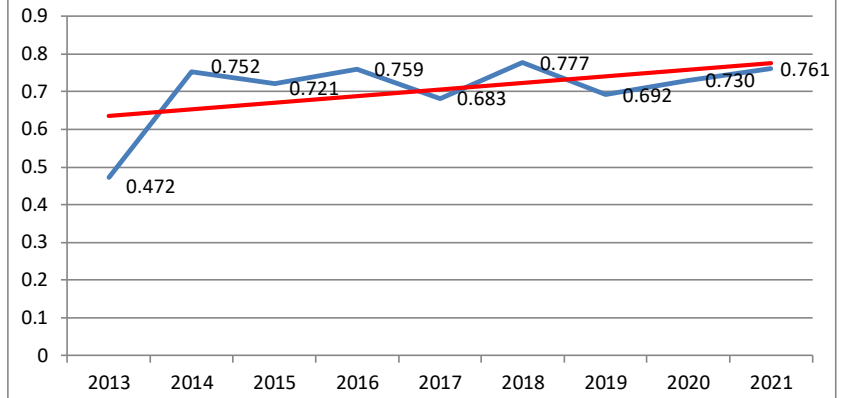


## District Indices - Planned and Unplanned (Excludes ISO; Includes MED)

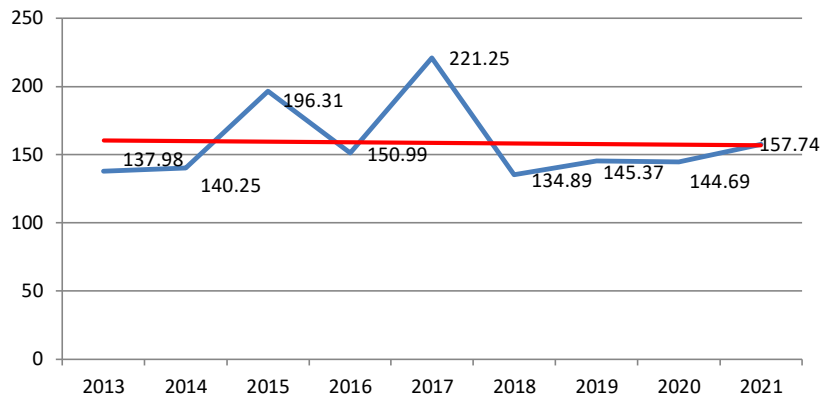
### Metro - SAIDI



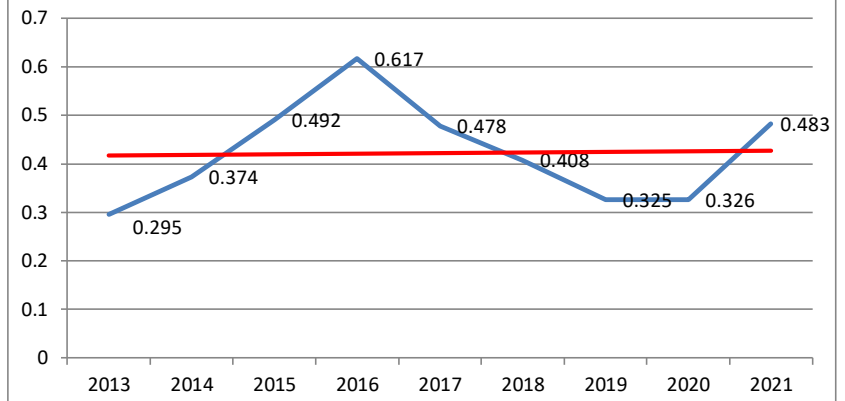
### Metro - SAIFI



### Metro - CAIDI

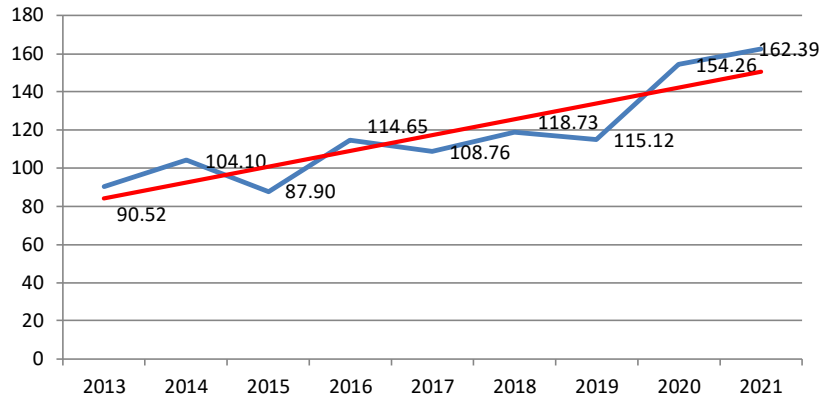


### Metro - MAIFI

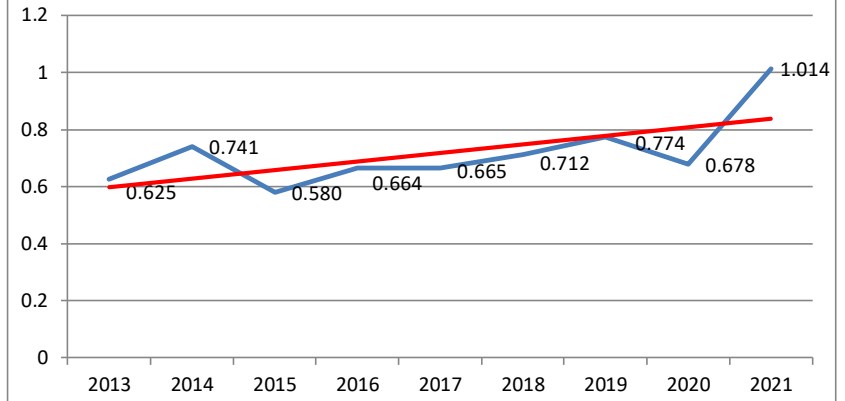


## District Indices - Planned and Unplanned (Excludes ISO; Includes MED)

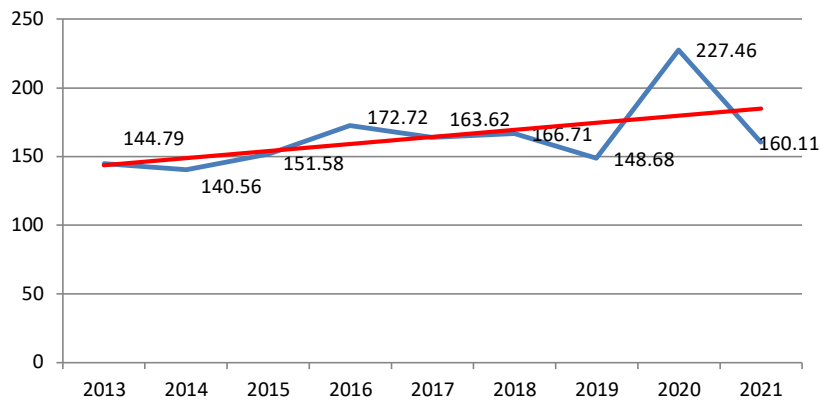
### North Coast - SAIDI



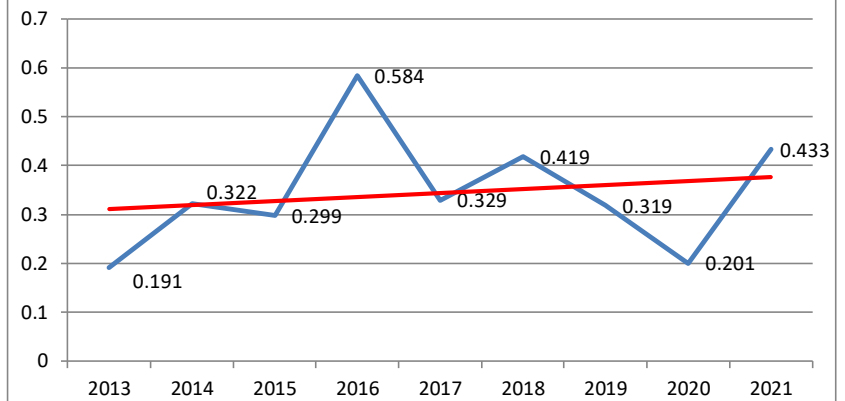
### North Coast - SAIFI



### North Coast - CAIDI

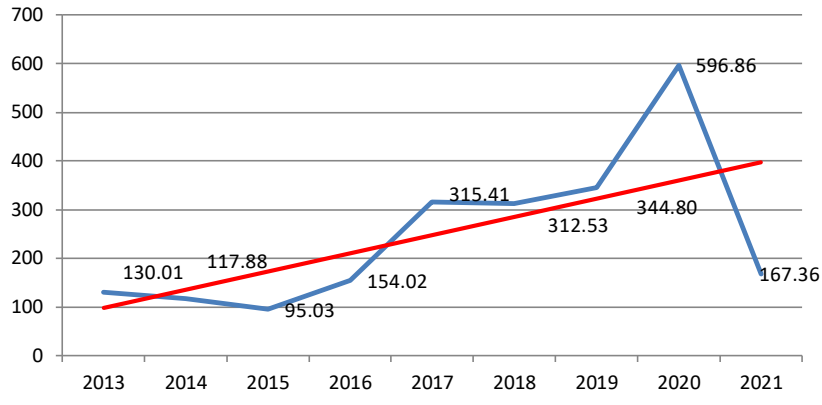


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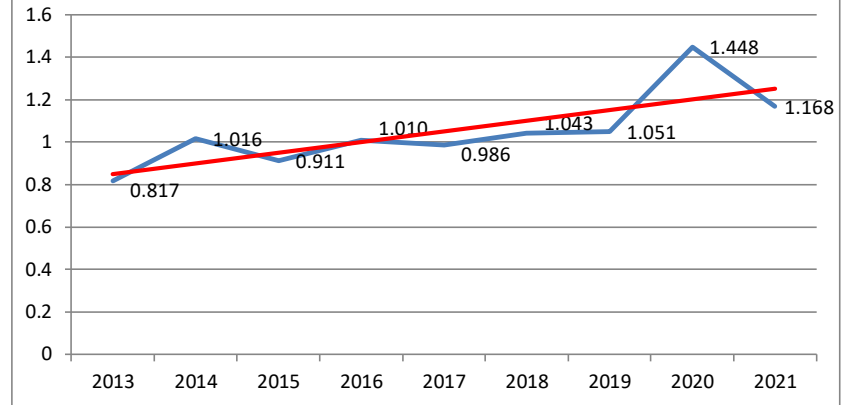


## District Indices - Planned and Unplanned (Excludes ISO; Includes MED)

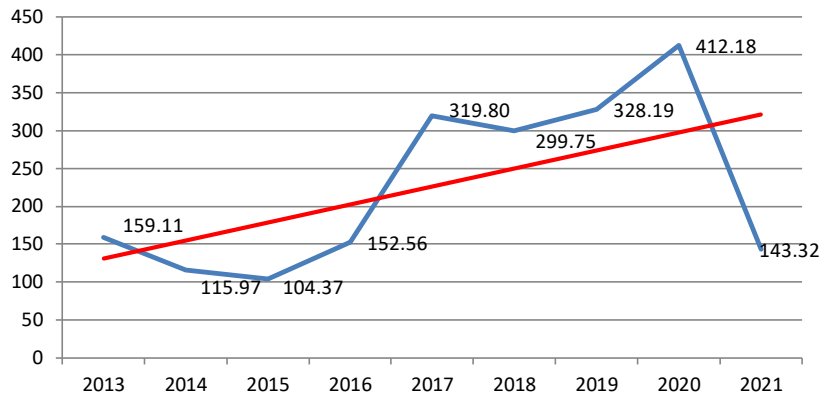
### Northeast - SAIDI



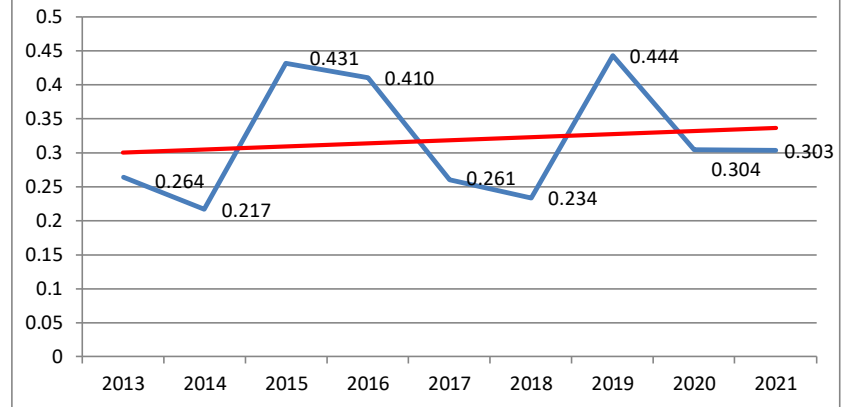
### Northeast - SAIFI



### Northeast - CAIDI



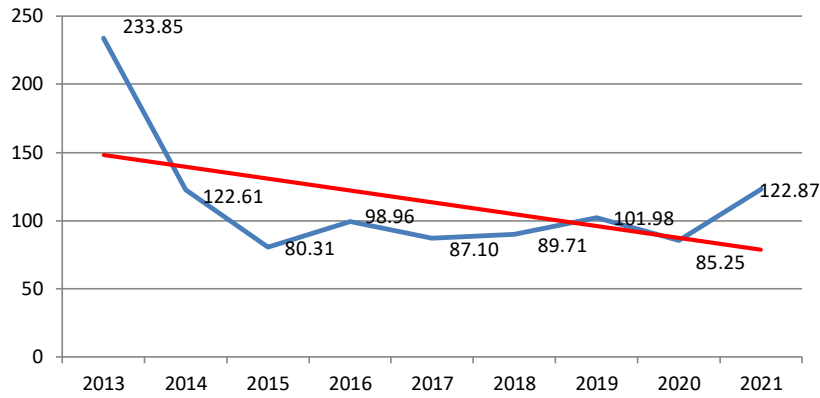
### Northeast - MAIFI



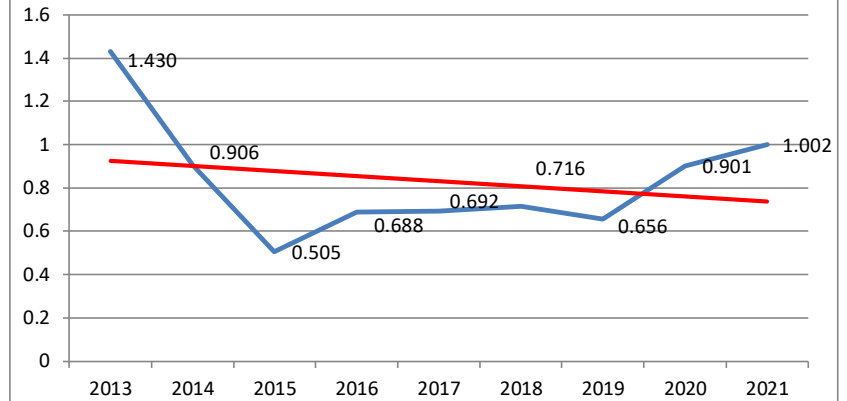


## District Indices - Planned and Unplanned (Excludes ISO; Includes MED)

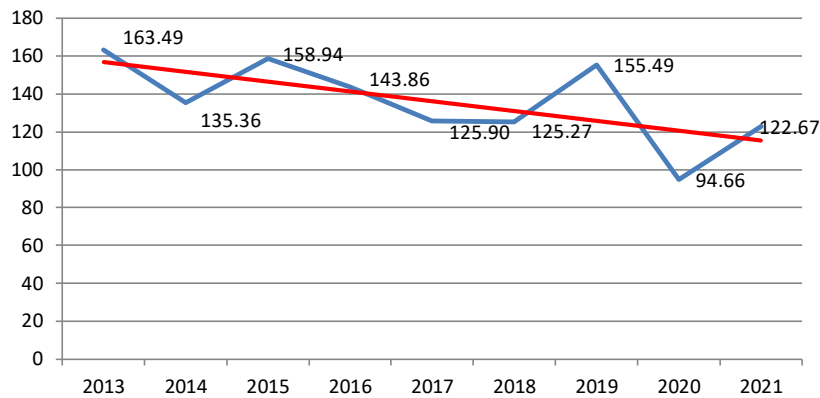
### Orange County - SAIDI



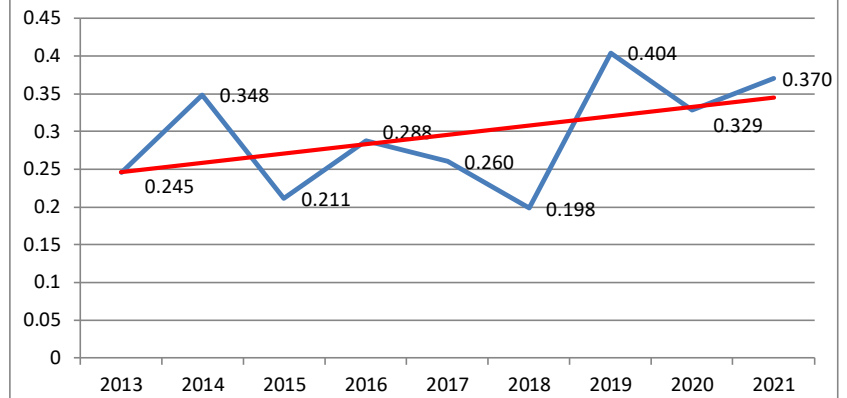
### Orange County - SAIFI



### Orange County - CAIDI

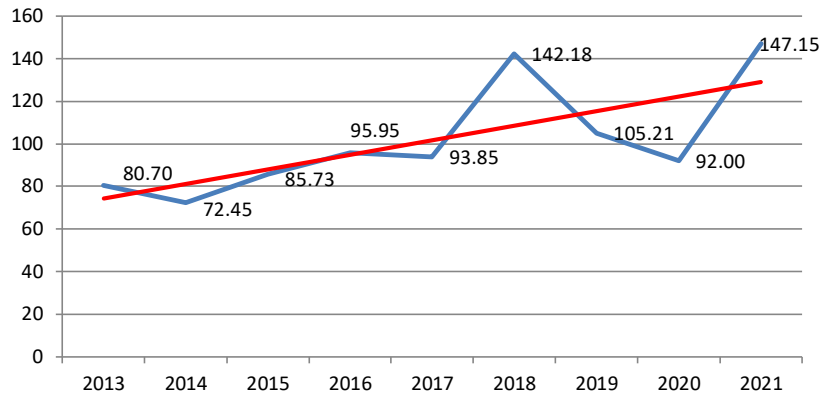


### Orange County - MAIFI

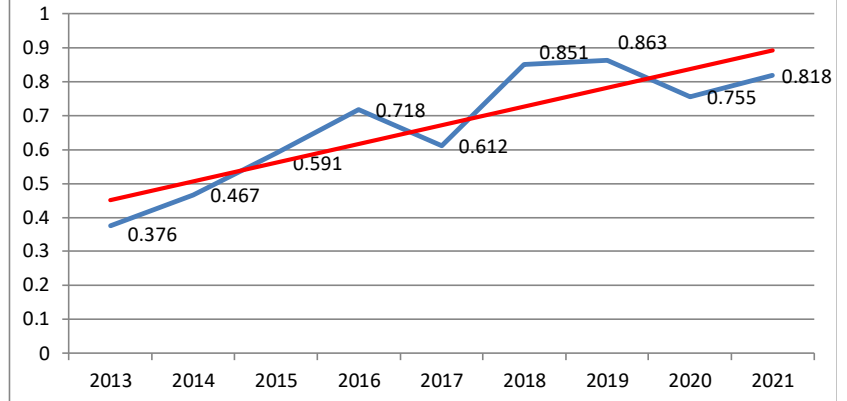


## District Indices - Planned and Unplanned (Excludes ISO and MED)

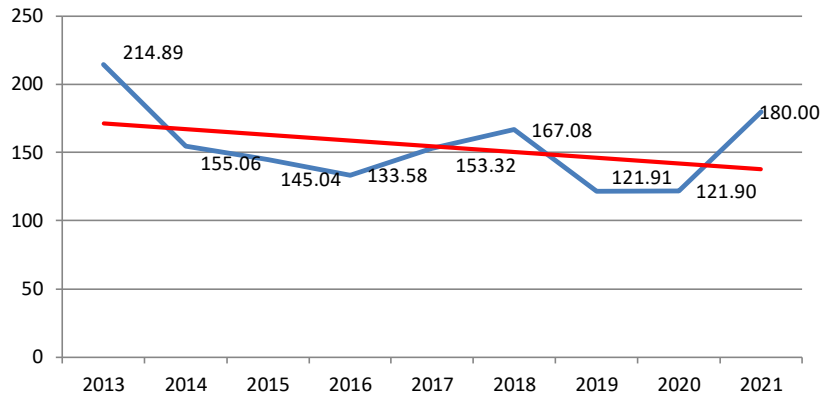
### Beach Cities - SAIDI



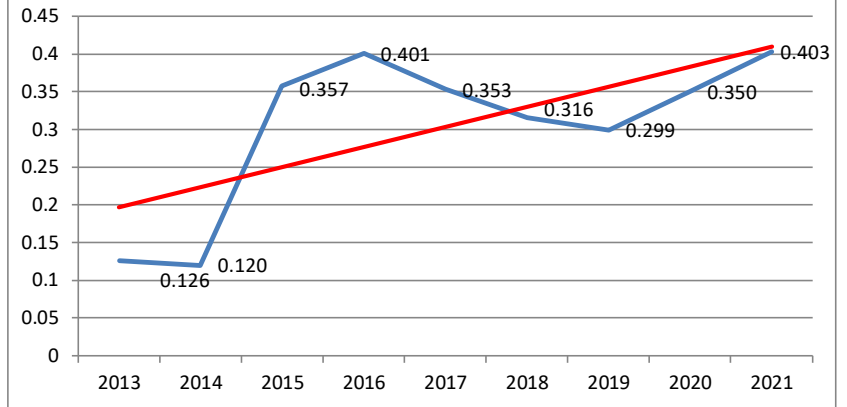
### Beach Cities - SAIFI



### Beach Cities - CAIDI

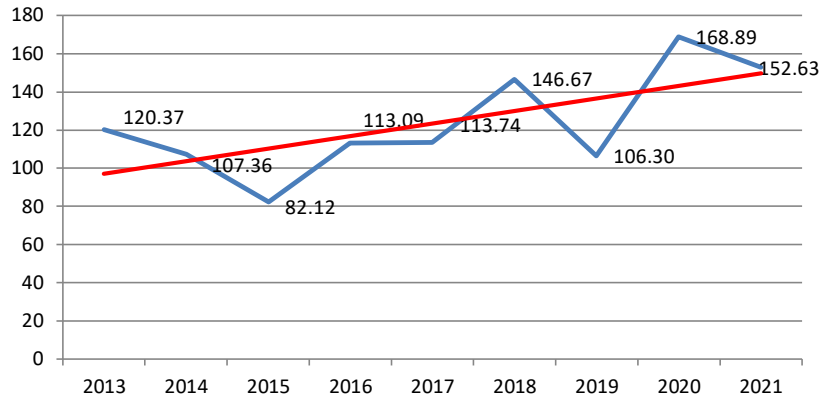


### Beach Cities - MAIFI

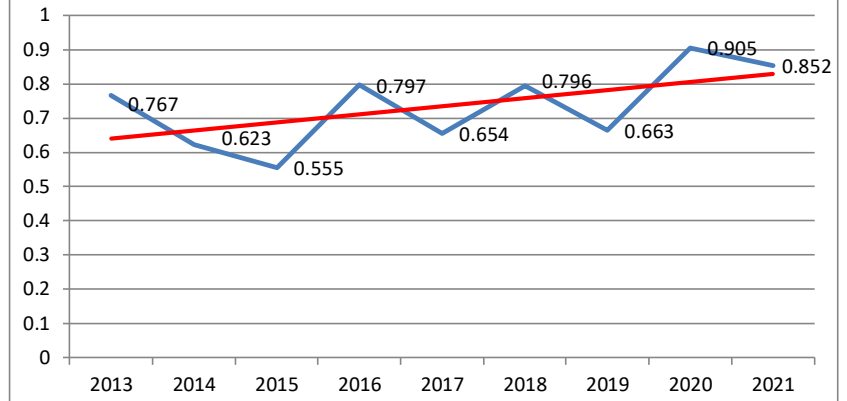


## District Indices - Planned and Unplanned (Excludes ISO and MED)

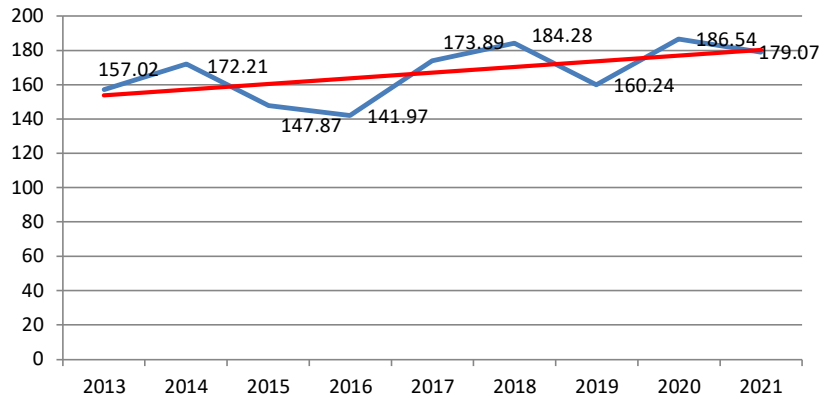
### Eastern - SAIDI



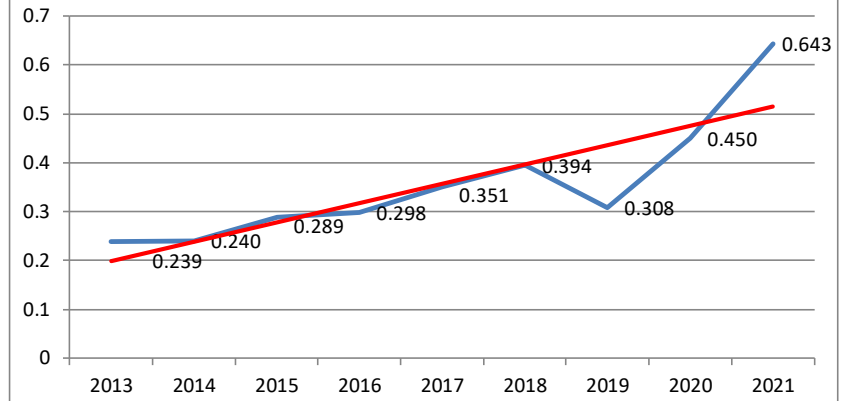
### Eastern - SAIFI



### Eastern - CAIDI

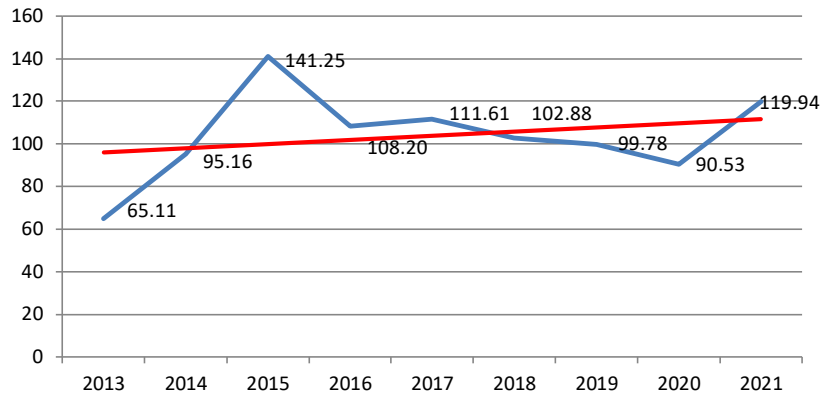


### Eastern - MAIFI

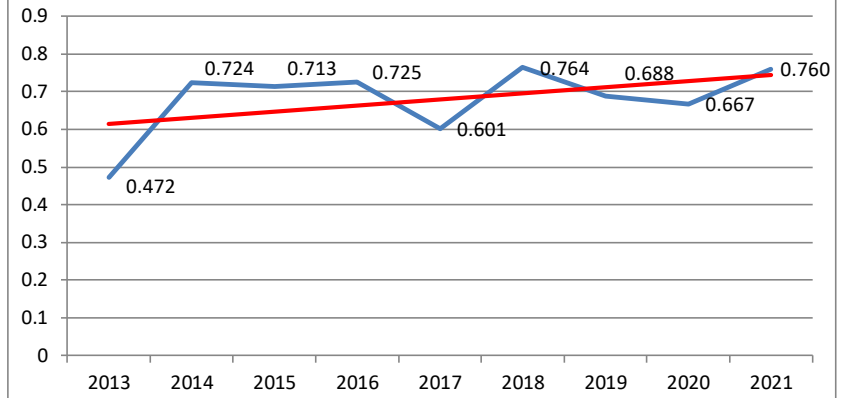


## District Indices - Planned and Unplanned (Excludes ISO and MED)

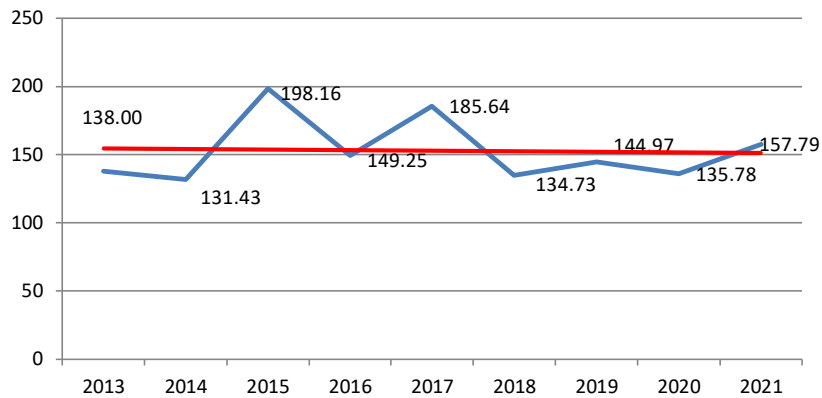
### Metro - SAIDI



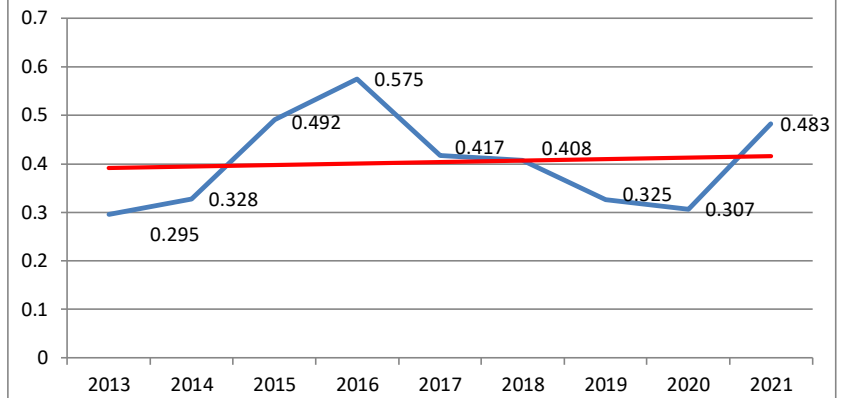
### Metro - SAIFI



### Metro - CAIDI

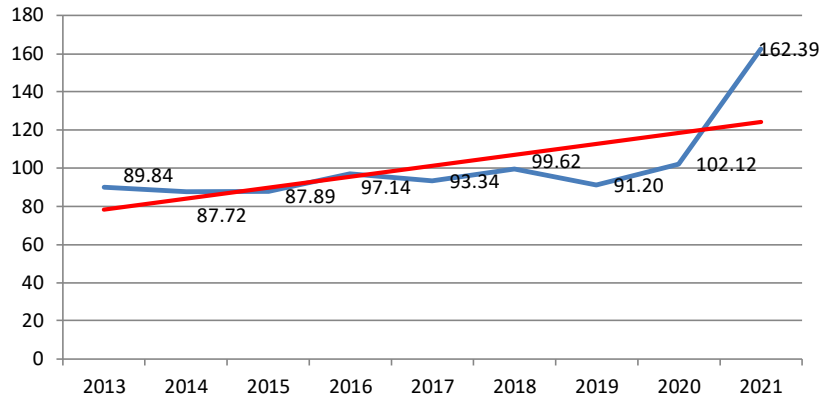


### Metro - MAIFI

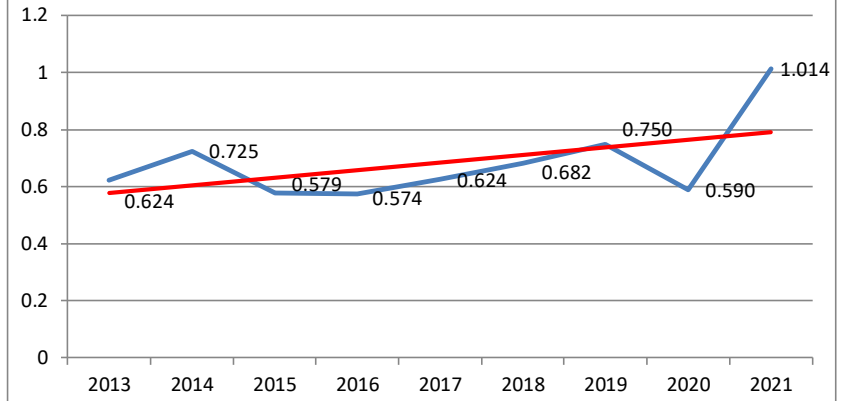


## District Indices - Planned and Unplanned (Excludes ISO and MED)

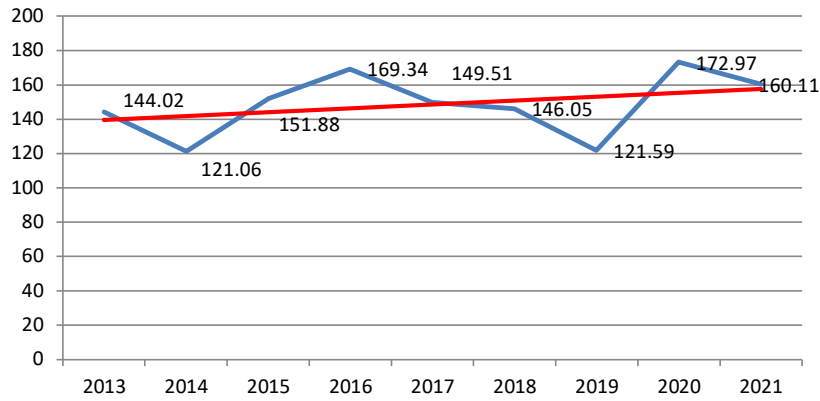
### North Coast - SAIDI



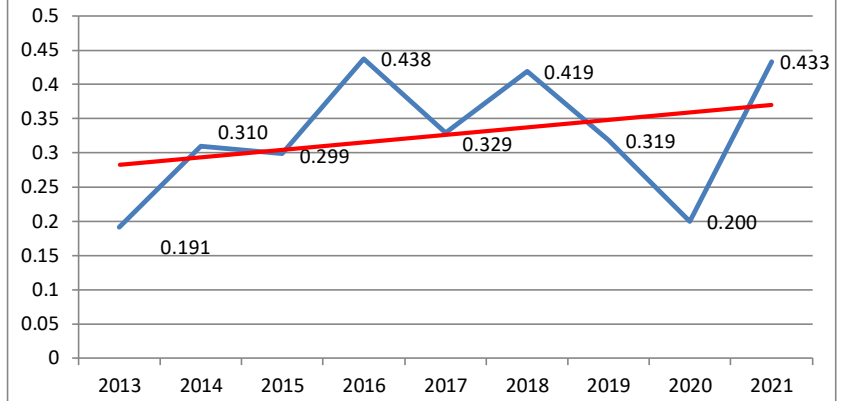
### North Coast - SAIFI



### North Coast - CAIDI

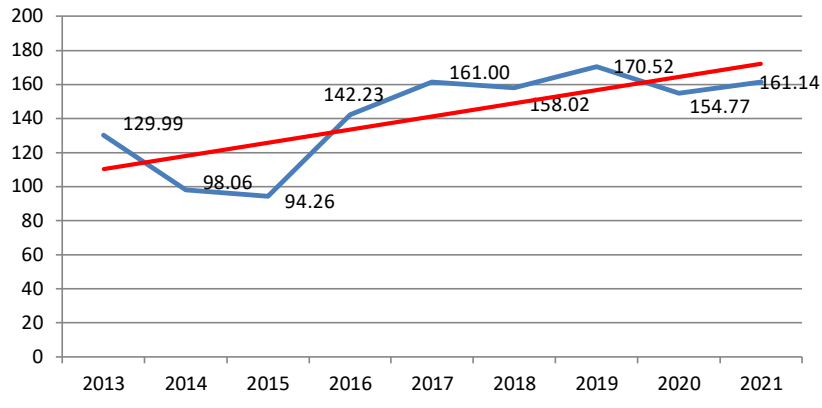


### North Coast - MAIFI

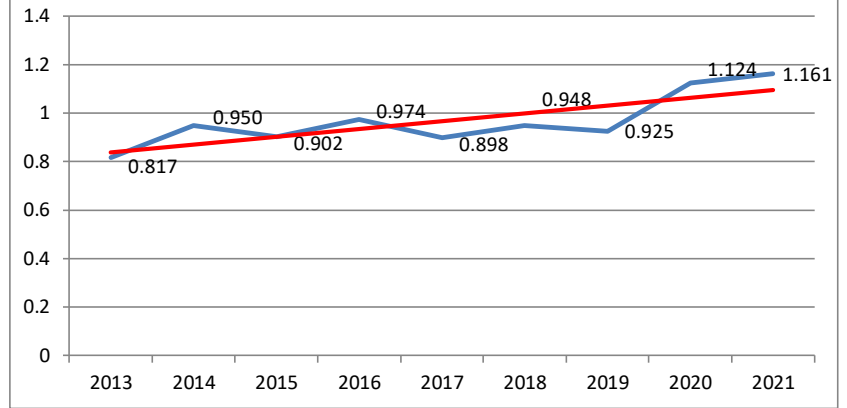


## District Indices - Planned and Unplanned (Excludes ISO and MED)

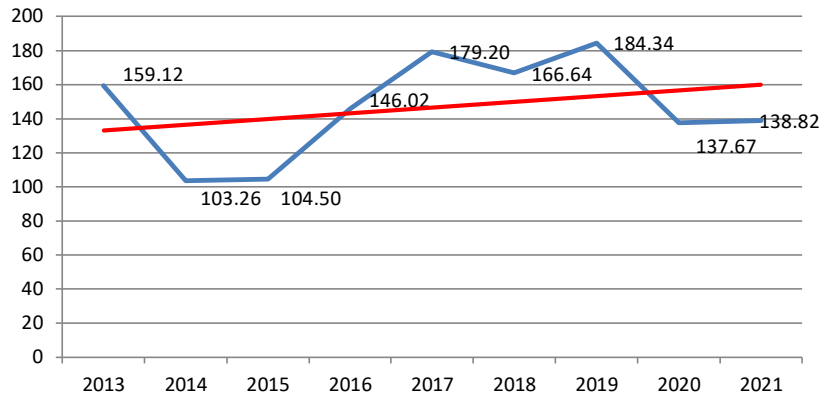
### Northeast - SAIDI



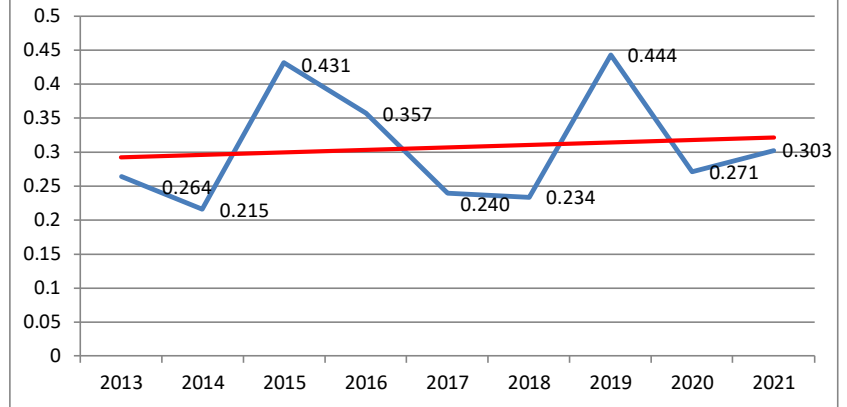
### Northeast - SAIFI



### Northeast - CAIDI

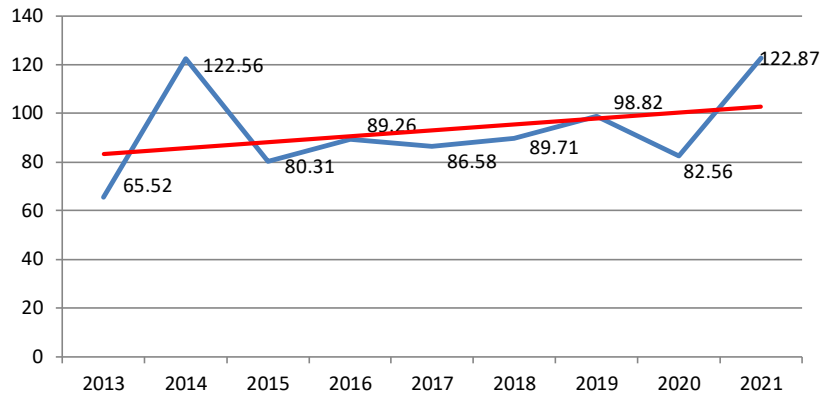


### Northeast - MAIFI

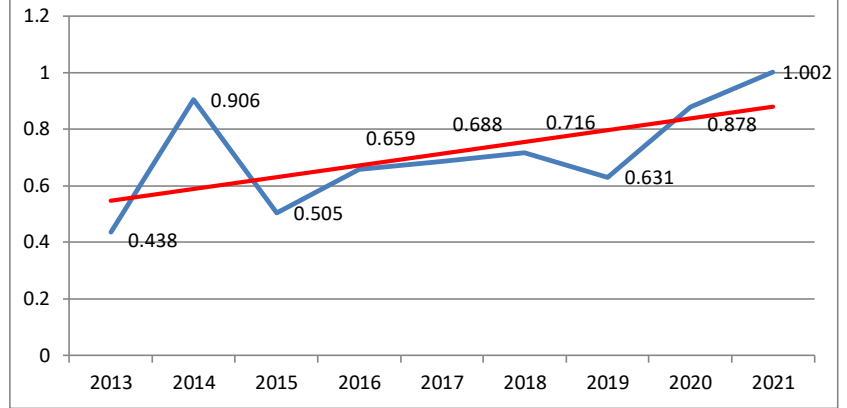


## District Indices - Planned and Unplanned (Excludes ISO and MED)

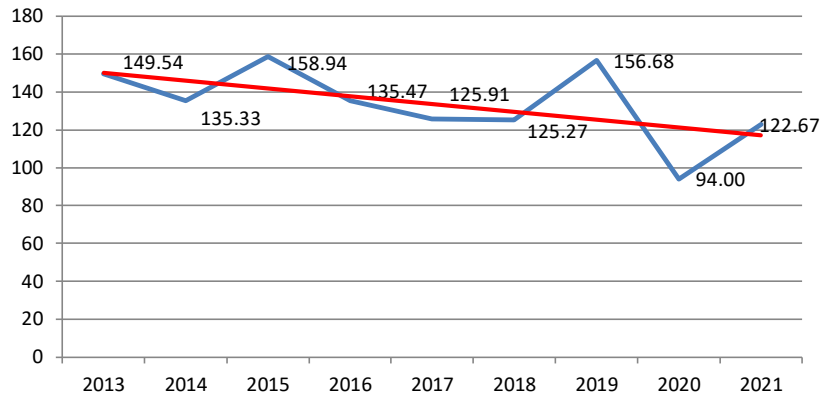
### Orange County - SAIDI



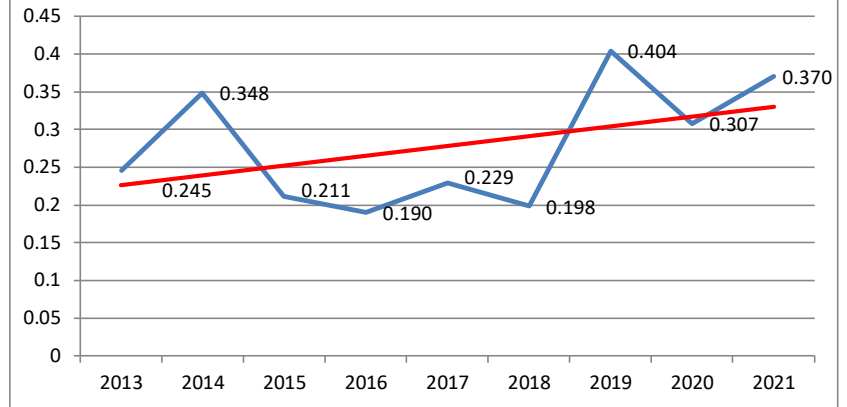
### Orange County - SAIFI



### Orange County - CAIDI



### Orange County - MAIFI



**NUMBER, DATE AND LOCATION OF PLANNED OUTAGES IN EACH DISTRICT (2021)**

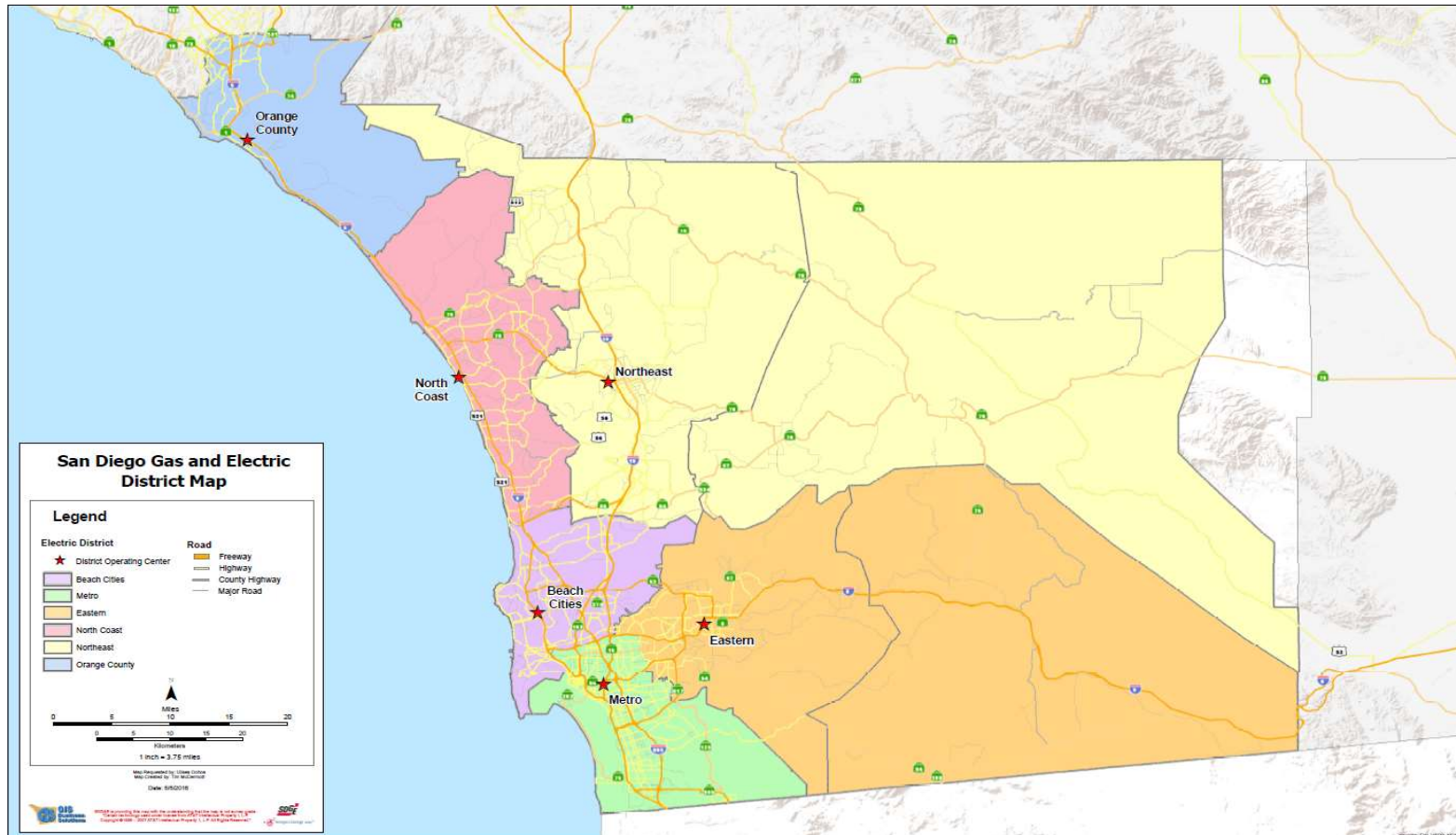
<b>Planned Outages - 2021</b>						
<b>Month</b>	<b>Beach Cities</b>	<b>Eastern</b>	<b>Metro</b>	<b>North Coast</b>	<b>Northeast</b>	<b>Orange County</b>
<b>January</b>	45	80	34	45	90	9
<b>February</b>	31	85	54	75	140	19
<b>March</b>	50	84	48	49	119	18
<b>April</b>	29	113	47	43	106	11
<b>May</b>	31	88	42	35	97	17
<b>June</b>	62	79	52	44	115	24
<b>July</b>	45	88	42	52	137	44
<b>August</b>	48	89	46	54	154	37
<b>September</b>	42	67	29	41	100	17
<b>October</b>	34	69	22	54	154	12
<b>November</b>	28	53	22	34	123	12
<b>December</b>	16	68	31	23	112	10
<b>Totals</b>	<b>461</b>	<b>963</b>	<b>469</b>	<b>549</b>	<b>1,447</b>	<b>230</b>

**In 2021 there were 4,119 primary planned outages.**



## SECTION 4 – SERVICE TERRITORY MAP INCLUDING DIVISIONS OF DISTRICTS

### MAP OF SERVICE TERRITORY WITH DIVISIONS OF DISTRICTS



SDG&E is providing this map with the understanding that the map is not survey grade.  
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## **SECTION 5 – TOP 1% OF WORST-PERFORMING CIRCUITS (WPC) EXCLUDING MED**

### **TOP 1% OF WORST PERFORMING CIRCUITS (2020-2021)**

- a. Per the Decision, each utility shall include the following information in its annual report for each WPC: 1) Circuit Name; 2) District/Division; 3) Customer Count; 4) Substation name; 5) Circuit-miles; 6) Percentage underground, or “% UG”; 7) Percentage overhead or “% OH”; 8) Number of mainline/feeder/backbone outages resulting in the operation of either a circuit breaker (“CB”) or automatic re-closer (“AR”); and, 9) its preferred reliability metric.

As required per the Decision, SDG&E is providing a table of WPCs based on the Circuit SAIDI indices (Table 5.1) and based upon the Circuit SAIFI indices (Table 5.2). Each of these indices is based on a two-year historical period<sup>1</sup>.

#### **Preferred Metric is Circuit SAIDI**

**Table 5.1: 2021 Worst SAIDI Circuits List based upon 2020-2021 data (Excludes Planned, MED and Load Curtailment)**

Circuit	District	Circuit Customers	Substation Name	Circuit Miles	% OH	% UG	Annualized Feeder Outage Count	Annualized Total Circuit SAIDI **
*445	Eastern	969	BOULEVARD	110.1	93%	7%	10	2584
*220	Northeast	322	SANTA YSABEL	54.2	95%	5%	3	1432
RB1	Northeast	264	RAINBOW 1	17.2	91%	9%	7	1060
*79	Eastern	891	DESCANSO	80.6	86%	14%	8	879
78	Eastern	277	DESCANSO	15.0	83%	17%	3	804
157	Eastern	1,026	BARRETT	114.8	97%	3%	8	761
PE1	Northeast	115	PINE HILLS	5.2	95%	5%	5	710
215	Northeast	514	RINCON	30.2	78%	22%	3	709
222	Northeast	1,358	SANTA YSABEL	132.0	88%	12%	7	706
217	Northeast	1,168	RINCON	84.7	83%	17%	2	643

\* Circuit appeared on the previous worst performance list

\*\* Circuit SAIDI represents the two-year average (2020-2021) of all outages: Mainline, Feeder, Backbone, and Branch

<sup>1</sup> As stated in Section 3.2 of D.16-01-008, each utility shall use two or three years of data, at its discretion, to flag a grouping of worst performing circuits.

**Preferred Metric is Circuit SAIDI.** Based upon two years of annualized data.

**Table 5.2: 2021 Worst SAIFI Circuits List based upon 2020-2021 data (Excludes Planned, MED and Load Curtailment)**

Circuit	District	Circuit Customers	Substation Name	Circuit Miles	% OH	% UG	Annualized Feeder Outage Count	Annualized Total Circuit SAIFI **
*RB1	Northeast	264	RAINBOW 1	17.2	91%	9%	7	7.0
*445	Eastern	969	BOULEVARD	110.1	93%	7%	10	5.8
*PE1	Northeast	115	PINE HILLS	5.2	95%	5%	5	4.9
*442	Eastern	1,111	GLENCLIFF	58.7	66%	34%	9	4.8
239	Northeast	1,066	PALA	41.6	78%	22%	6	4.3
*222	Northeast	1,358	SANTA YSABEL	132.0	88%	12%	7	4.1
WT1	Metro	106	WHITNEY	0.6	100%	0%	4	4.0
171	Northeast	1,194	BORREGO	45.8	64%	36%	3	3.8
172	Northeast	995	BORREGO	58.2	67%	33%	2	3.6
210	Northeast	212	WARNERS	23.4	96%	4%	4	3.5

\* Circuit appeared on the previous worst performance list

\*\* Circuit SAIFI represents the two-year average (2020-2021) of all outages: Mainline, Feeder, Backbone, and Branch

**Preferred Metric is Circuit SAIDI.** Based upon two years data annualized.

- 
- b. Any circuit appearing on either list of “deficient” WPC circuits that also appeared on the previous year's list would be marked by an asterisk. For each asterisked circuit, each utility shall provide the following information:

## **Circuit 445**

- i. **An explanation of why it was ranked as a "deficient" circuit, i.e., the value of the metric used to indicate its performance;**

C445 was listed as a worst circuit due to circuit SAIDI and SAIFI performance.

- ii. **A historical record of the metric:**

**C445: 2 Year Circuit SAIDI and SAIFI Data**

<b>Cir</b>	<b>Metric</b>	<b>2020</b>	<b>2021</b>
445	Circuit SAIDI	1946	3222
445	Circuit SAIFI	5.8	5.7

Note: See methodology in section 5c

- iii. **An explanation of why it was on the deficiency list again;**

Circuit 445 was on the worst circuit SAIDI and SAIFI list largely due to the effects of a single PSPS event which contributed to 77% of the circuit SAIDI in 2021. A wide variety of causes contributed to the balance of circuit SAIDI.

- iv. **An explanation of what is being done to improve the circuit's future performance and the anticipated timeline for completing those activities (or an explanation why remediation is not being planned); and**

Since 2020, 16 miles of traditional hardening, 3 miles of undergrounding and 2.3 miles of covered conductor have been installed on circuit 445.

In subsequent years there are over 50 miles of additional hardening planned for this circuit using both covered conductor and underground strategies. Additionally, there is avian protection, wireless fault indicator, early fault detection, tee modernization, fuse upgrade, and lightning arrester projects planned for this circuit.

- v. **A quantitative description of the utility's expectation for that circuit's future performance.**

Circuit 445 was assessed from a fire risk perspective to mitigate using the most appropriate mix of underground and covered conductor. These efforts are anticipated to improve the SAIDI/SAIFI when these projects are completed.

## **Circuit 220**

- i. **An explanation of why it was ranked as a "deficient" circuit, i.e., the value of the metric used to indicate its performance;**

C220 was listed as a worst circuit due to circuit SAIDI performance.

- ii. **A historical record of the metric:**

**C220: 2 Year Circuit SAIDI Data**

<b>Cir</b>	<b>Metric</b>	<b>2020</b>	<b>2021</b>
220	Circuit SAIDI	1485	1379

Note: See methodology in section 5c

- iii. **An explanation of why it was on the deficiency list again;**

Circuit 220 was on the worst circuit SAIDI list largely due to the effects of a single storm outage, which contributed to 67% of the circuit SAIDI in 2021. The balance of SAIDI impacts were due to a wide variety of outage causes.

- iv. **An explanation of what is being done to improve the circuit's future performance and the anticipated timeline for completing those activities (or an explanation why remediation is not being planned); and**

There are approximately 50 additional miles of hardening planned for this circuit using both overhead and underground strategies. Construction is targeted to start in 2023.

- v. **A quantitative description of the utility's expectation for that circuit's future performance.**

As the hardening projects are completed, this circuit anticipates a decrease in SAIDI from both a PSPS perspective and outages relating to overhead impacts.

## **Circuit 79**

- i. **An explanation of why it was ranked as a "deficient" circuit, i.e., the value of the metric used to indicate its performance;**

C79 was listed as a worst circuit due to circuit SAIDI performance.

- ii. **A historical record of the metric:**

**C79: 2 Year Circuit SAIDI Data**

<b>Cir</b>	<b>Metric</b>	<b>2020</b>	<b>2021</b>
79	Circuit SAIDI	1202	556

Note: See methodology in section 5c

- iii. **An explanation of why it was on the deficiency list again;**

Circuit 79 was on the worst circuit SAIDI list largely due to the effects of a single PSPS event and consistent storm weather in the area throughout 2021. These combined for a contribution to circuit SAIDI of 84% this year. The balance of SAIDI was due to a wide variety of outage causes. Furthermore, circuit 79 serves an area that is consistently subject to the highest winds in our service territory, during the Santa Ana wind events, increasing the chances for PSPS implementation.

- iv. **An explanation of what is being done to improve the circuit's future performance and the anticipated timeline for completing those activities (or an explanation why remediation is not being planned); and**

Since 2020, SDG&E has completed approximately 18 miles of traditional hardening, 3 miles of covered conductor, installed one additional weather station and installed 3.4 miles of strategic undergrounding.

In subsequent years there are approximately 5 miles of additional hardening projects planned for this circuit using both covered conductor and undergrounding strategies. There are also avian protection and lightning arrester projects planned for this circuit.

- v. **A quantitative description of the utility's expectation for that circuit's future performance.**

This circuit is prone to long PSPS outages for a limited number of customers which has been improved with increased sectionalizing and weather stations. A significant percentage of this circuit is now traditionally hardened. This circuit's SAIDI is anticipated to continue to improve as additional projects are completed.

**Circuit RB1**

- i. An explanation of why it was ranked as a "deficient" circuit, i.e., the value of the metric used to indicate its performance;**

RB1 was listed as a worst circuit due to circuit SAIFI performance.

- ii. A historical record of the metric:**

**RB1: 2 Year Circuit SAIFI Data**

<b>Cir</b>	<b>Metric</b>	<b>2020</b>	<b>2021</b>
RB1	Circuit SAIFI	9.1	5.0

Note: See methodology in section 5c

- iii. An explanation of why it was on the deficiency list again;**

Circuit RB1 was on the worst circuit SAIFI list largely due to outages of undetermined origin and OH connector failures, accounting for 49%. The balance was due to a variety of causes.

- iv. An explanation of what is being done to improve the circuit's future performance and the anticipated timeline for completing those activities (or an explanation why remediation is not being planned); and**

Since 2020, 1.5 miles of traditional hardening and an additional weather station has been installed. There are hotline clamp and advanced protection projects planned for installation on this circuit.

- v. A quantitative description of the utility's expectation for that circuit's future performance.**

This circuit has been targeted for hot line clamp projects which decreases the chances of the OH connector failures therefore, this circuit is anticipated to have continued improved SAIFI and SAIDI.

## **Circuit PE1**

- i. **An explanation of why it was ranked as a "deficient" circuit, i.e., the value of the metric used to indicate its performance;**

PE1 was listed as a worst circuit due to circuit SAIFI performance.

- ii. **A historical record of the metric:**

**PE1: 2 Year Circuit SAIFI Data**

<b>Cir</b>	<b>Metric</b>	<b>2020</b>	<b>2021</b>
PE1	Circuit SAIFI	9.9	0.0

Note: See methodology in section 5c

- iii. **An explanation of why it was on the deficiency list again;**

Circuit PE1 was on the worst circuit SAIFI list due to outages in 2020 of undetermined origin and a variety of other causes. PE1 registered a vast improvement in 2021 experiencing just a single momentary outage.

- iv. **An explanation of what is being done to improve the circuit's future performance and the anticipated timeline for completing those activities (or an explanation why remediation is not being planned); and**

Circuit PE1 was traditionally hardened prior to 2020 and no additional projects are planned at this time.

- v. **A quantitative description of the utility's expectation for that circuit's future performance.**

This circuit is expected to be removed from the worst performing list based on the completion of prior projects.



## **Circuit 442**

- i. **An explanation of why it was ranked as a "deficient" circuit, i.e., the value of the metric used to indicate its performance;**

C442 was listed as a worst circuit due to circuit SAIFI performance.

- ii. **A historical record of the metric:**

**C442: 2 Year Circuit SAIFI Data**

<b>Cir</b>	<b>Metric</b>	<b>2020</b>	<b>2021</b>
442	Circuit SAIFI	3.8	5.8

Note: See methodology in section 5c

- iii. **An explanation of why it was on the deficiency list again;**

Circuit 442 was on the worst circuit SAIFI list largely due to outages caused by cable and transformer failures, lightning weather events and a bird contact, accounting for 57% of SAIFI, with the balance being due to a wide variety of outage causes.

- iv. **An explanation of what is being done to improve the circuit's future performance and the anticipated timeline for completing those activities (or an explanation why remediation is not being planned); and**

Since 2020 approximately 3 miles of traditional hardening have been installed. There are PSPS engineering enhancement, avian protection, wireless fault indicator, fuse upgrade, hotline clamp, booster removal, and lightning arrester projects planned for this circuit. Additionally, over the next several years SDG&E plans to construct multiple undergrounding projects on this circuit.

- v. **A quantitative description of the utility's expectation for that circuit's future performance.**

Fire-hardening and PSPS mitigation efforts will renew infrastructure and reduce the likelihood of outages, leading to improved circuit performance.

## **Circuit 222**

- i. **An explanation of why it was ranked as a "deficient" circuit, i.e., the value of the metric used to indicate its performance;**

C222 was listed as a worst circuit due to circuit SAIFI performance.

- ii. **A historical record of the metric:**

**C222: 2 Year Circuit SAIFI Data**

<b>Cir</b>	<b>Metric</b>	<b>2020</b>	<b>2021</b>
222	Circuit SAIFI	7.2	0.9

Note: See methodology in section 5c

- iii. **An explanation of why it was on the deficiency list again;**

Circuit 222 was on the worst circuit SAIFI list largely due to outages of undetermined origin, accounting for 51% of SAIFI, with the balance being due to a wide variety of outage causes.

- iv. **An explanation of what is being done to improve the circuit's future performance and the anticipated timeline for completing those activities (or an explanation why remediation is not being planned); and**

Since 2022, 32 miles of traditional hardening and 0.8 miles of covered conductor have been installed on circuit 222. Over 50 miles of overhead to underground conversion is expected to start in the next few years. There are PSPS engineering enhancement, avian protection, wireless fault indicator, fuse upgrade, hotline clamp, regulator installation, and lightning arrester projects planned for this circuit.

- v. **A quantitative description of the utility's expectation for that circuit's future performance.**

Fire-hardening and PSPS mitigation efforts will renew infrastructure and reduce the likelihood of outages, leading to improved circuit performance.

**Language to explain how the IOUs' include a cost effectiveness review as part of their respective internal review processes for circuit remediation projects.**

**i. Definitions of terms, acronyms, limitations, and assumptions;**

Definitions:

SRET – Strategic Reliability Enhancement Team (formerly referred to as the Reliability Assessment Team)

WPC – Worst Performing Circuits

Assumptions

Our analysis excludes planned outages, MED outages, and circuits with less than 100 customers for WPC calculation.

**ii. A clear explanation of the utility's process to determine the worst performing circuits:**

Methodology used in the Annual Reliability Report

The Worst Performing Circuits identified in this Report are determined by first calculating the SAIDI for each circuit based upon the previous two years of unplanned outage data, ranking those circuits highest to lowest based upon the SAIDI value, and then selecting the 1% of the circuits with the highest SAIDI value. Planned and MED events are excluded, and circuits with less than 100 customers are also excluded. SDG&E had 1026 circuits in 2021 serving at least one customer, so this report reflects the ten WPCs.

**iii. A clear explanation of the utility's process to determine cost-effective remediation projects. This shall include why the utility may decide to implement a project to address one worst performing circuit issue while deciding to not implement a project to address a different worst performing circuit.**

SDG&E established an internal Reliability Assessment Team (RAT) in 1997 with the charge to identify ways to improve the service reliability of our distribution system. This team, now referred to as the Strategic Reliability Enhancement Team (SRET), is comprised of technical leaders from Distribution Operations, Engineering Standards, Regional Operations, System Protection, and Distribution Asset Management. The Strategic Reliability Enhancement Team meets regularly to evaluate and authorize reliability improvement projects for areas with low circuit reliability and where customer satisfaction issues arise. The team provides strategy and guidance for continuous improvements to system reliability, integrated planning support, and budget management.

District engineers present proposals for reliability improvement projects along with a circuit analysis, cost-benefit analysis, and details on customer impact. SDG&E has implemented a practice to identify projects to be reviewed and approved by an

engineering committee, and then prioritized based on the largest benefit to cost ratio to ensure the projects that create the largest proportional system benefit are realized first. During project execution, project managers will notify the team of execution risks such as scheduling and system impacts to determine which projects will be constructed in the current year.

In 2019 SDG&E also established the Electric System Hardening group which manages and executes the reliability projects identified by the SRET.

The Strategic Reliability Enhancement Team and the Electric System Hardening Group coordinate activities with various stakeholders to optimize capital investment risk reduction activities.

**SECTION 6 – TOP 10 MAJOR UNPLANNED POWER OUTAGE EVENTS WITHIN A REPORTING YEAR**

**TOP 10 MAJOR UNPLANNED OUTAGE EVENTS (2021)**

The table below captures the top 10 major unplanned outage events for 2021 including the cause and the location of the outage.

<b>Top 10 Major Unplanned Power Outage Events</b>						
<b>Rank</b>	<b>Outage Date</b>	<b>Cause</b>	<b>Location</b>	<b>Customer Impact</b>	<b>SAIDI</b>	<b>SAIFI</b>
1	12/13/2021	Cap Bank Bus Disconnect	NC	32,211	2.18	0.022
2	10/4/2021	Severe Weather / Lightning	BC, CM, EA, NC, NE	27,286	2.29	0.018
3	12/14/2021	Severe Weather / High Winds	All Districts	25,588	2.11	0.017
4	1/25/2021	Severe Weather / High Winds	All Districts	16,909	1.21	0.011
5	8/31/2021	Severe Weather / Lightning	NE	13,973	0.85	0.009
6	9/4/2021	Substation Bus Disconnect	OC	12,845	0.64	0.009
7	9/26/2021	Tee Connector	CM	9,588	0.30	0.006
8	3/7/2021	Pothead Equipment	OC	8,956	0.43	0.006
9	1/25/2021	Tee Connector	OC	7,890	0.36	0.005
10	1/21/2021	Undetermined Cause	NE	7,088	0.03	0.005

Based upon customer impact.

**SECTION 7 – SUMMARY LIST OF MED PER IEEE 1366**

**2021 SUMMARY LIST OF MED (2021)**

The tables below summarize the MED event occurring in 2021. The information includes the number of customers without services at periodic intervals, the cause and the location of the Major Event.

Table 7-1 2021 Summary List of 11/25/21 MED

Date of Event	Description of Event	Location	Number of Customers Out of Service	Customers Interrupted - Hours Into the Event Day										
				0	1	2	3	4	5	6	7	8		
November 25	High Winds / RFW	NE, EA, CM	6,694	0	219	0	196	449	748	2076	2373	3888		
				Customers Interrupted - Hours Into the Event Day (continued)										
				9	10	11	12	13	14	15	16	17		
				4333	4525	4333	4333	4256	3466	3671	3821	4205		
				Customers Interrupted - Hours Into the Event Day (continued)										
				18	19	20	21	22	23	24	25	26		
				4205	4205	4205	4759	4759	4759	4759	4759	4759		
				Customers Interrupted - Hours Into the Event Day (continued)										
				27	28	29	30	31	32	33	34	35		
				4759	4759	4759	4759	4759	4759	4471	3224	3042		
				Customers Interrupted - Hours Into the Event Day (continued)										
				36	37	38	39	40	41	42	43	44		
				1537	1527	521	521	152	0	0	0	0		
				Customers Interrupted - Hours Into the Event Day (continued)										
				45	46	47	48	49	50	51	52	53		
				0	0	0	0	0	0	0	0	0		
				Customers Interrupted - Hours Into the Event Day (continued)										
54	55	56	57	58	59	60								
0	0	0	0	0	0	0								

Customers reflected in the time increments include all customers experiencing sustained outages at that point in time. The event day begins at midnight.

**SECTION 8 – HISTORICAL 10 LARGEST UNPLANNED OUTAGES EVENTS FOR THE PAST 10 YEARS**

**HISTORICAL LARGEST UNPLANNED OUTAGE EVENTS (2012-2021)**

The tables below capture the ten largest unplanned outage events for each of the years from 2021 – 2012 based upon SAIDI values

**2021**

<b>Historical 10 Largest Unplanned Outage Events</b>				
<b>Rank</b>	<b>Date</b>	<b>SAIDI</b>	<b>SAIFI</b>	<b>Description</b>
1	11/24/2021	5.96	0.004	High Winds / RFW
2	10/4/2021	2.29	0.018	Severe Weather / Lightning
3	12/13/2021	2.18	0.022	Cap Bank Bus Disconnect
4	12/14/2021	2.11	0.017	Severe Weather / High Winds
5	1/19/2021	1.56	0.003	Severe Weather / High Winds
6	1/25/2021	1.21	0.011	Severe Weather / High Winds
7	12/14/2021	1.04	0.004	Fuse Cutout
8	8/12/2021	0.86	0.004	Tee Connector
9	8/31/2021	0.85	0.009	Severe Weather / Lightning
10	2/10/2021	0.77	0.002	Tee Connector

**2020**

<b>Historical 10 Largest Unplanned Outage Events</b>				
<b>Rank</b>	<b>Date</b>	<b>SAIDI</b>	<b>SAIFI</b>	<b>Description</b>
1	12/2/2020	81.94	0.047	High Winds / RFW spanning multiple days
2	12/7/2020	16.05	0.010	High Winds / RFW spanning multiple days
3	9/5/2020	13.35	0.006	Valley Fire
4	12/23/2020	2.89	0.004	High Winds / RFW spanning multiple days
5	12/2/2020	1.97	0.006	Vehicle Contact

Historical 10 Largest Unplanned Outage Events				
Rank	Date	SAIDI	SAIFI	Description
6	8/14/2020	1.77	0.051	ISO Load Curtailment
7	5/26/2020	1.36	0.020	Foreign Object
8	10/22/2020	1.33	0.016	Load Imbalance
9	10/26/2020	1.23	0.003	High Winds / RFW spanning multiple days
10	2/25/2020	1.06	0.001	Severe Weather / Lightning

**2019**

Historical 10 Largest Unplanned Outage Events				
Rank	Date	SAIDI	SAIFI	Description
1	10/20/2019	47.09	0.028	High Winds / RFW spanning multiple days
2	10/25/2019	4.92	0.004	High Winds / RFW
3	11/12/2019	3.45	0.018	Substation - Bird Contact
4	10/22/2019	1.44	0.001	Undetermined Cause
5	10/25/2019	1.21	0.002	Pothead Failure
6	2/14/2019	1.20	0.013	Rain Storm
7	8/9/2019	0.90	0.003	Vehicle Contact
8	3/2/2019	0.78	0.004	Mylar Balloon Contact
9	10/24/2019	0.72	0.001	Vegetation Contact
10	11/25/2019	0.70	0.001	UG Cable Contact / Dig in



## 2018

Historical 10 Largest Unplanned Outage Events				
Rank	Date	SAIDI	SAIFI	Description
1	11/11/2018	43.98	0.024	High Winds / RFW spanning multiple days
2	1/28/2018	3.87	0.003	High Wind Event
3	1/31/2018	2.55	0.020	Substation - Bushings
4	7/6/2018	1.66	0.002	Brush Fire
5	11/12/2018	1.37	0.001	Substation - Undetermined Cause
6	12/6/2018	1.27	0.008	Faulted Recloser
7	10/12/2018	1.23	0.014	Lightning Storm
8	7/7/2018	1.12	0.003	Vehicle Contact
9	2/25/2018	1.06	0.004	Tee Failure
10	9/13/2018	0.96	0.004	Switch Failure

## 2017

Historical 10 Largest Unplanned Outage Events				
Rank	Date	SAIDI	SAIFI	Description
1	12/7/2017	18.32	0.023	High Wind Event
2	1/20/2017	11.48	0.030	Rain Storm Event
3	12/7/2017	9.65	0.003	Lilac FIRE
4	12/9/2017	6.82	0.004	High Wind Event
5	12/6/2017	4.86	0.002	High Wind Event
6	12/5/2017	4.77	0.010	High Wind Event (over multiple days)
7	7/25/2017	1.93	0.031	STATION F outage - squirrel
8	2/27/2017	1.12	0.003	Rain Storm Event
9	1/20/2017	1.07	0.001	C941 - Deenergized for safety/transformer
10	2/17/2017	1.07	0.009	Rain Storm Event

## 2016

Historical 10 Largest Unplanned Outage Events				
Rank	Date	SAIDI	SAIFI	Description
1	1/31/2016	13.35	0.061	1/31-2/1 El Niño Storm
2	7/21/2016	1.15	0.012	Station F – Mylar Balloon on Circuit 366
3	1/31/2016	0.99	0.003	Circuit 486 – Tree in primary
4	8/9/2016	0.93	0.002	Genesee Sub – Circuits 268 & 65
5	7/26/2016	0.88	0.002	Circuit 582 – Wire Down, faulted cable, blown switch
6	6/19/2016	0.87	0.001	Border Fire – Circuits 448 & 157
7	8/23/2016	0.84	0.003	Transmission Lines 6926 & 681 – car contact
8	11/12/2016	0.83	0.001	Circuit 198 – Pendleton Aircraft Contact
9	1/5/2016	0.80	0.011	El Niño Storm – 1/5-1/7
10	6/26/2016	0.77	0.001	Circuit RD@ - Vehicle contact w/ Trayer switch

## 2015

Historical 10 Largest Unplanned Outage Events				
Rank	Date	SAIDI	SAIFI	Description
1	9/20/2015	5.15	0.089	9/20 Load Curtailment
2	7/18/2015	2.26	0.016	July 18-20 Rain Storm
3	11/25/2015	1.75	0.010	Transmission Lines 641 & 642 - Montgomery Sub Outage
4	7/3/2015	1.00	0.006	Circuits 366 & BRM1 Outage
5	8/13/2015	0.67	0.001	Circuit 438 - Faulted Tee
6	4/18/2015	0.64	0.002	Circuit 821 - Tee Failure
7	9/15/2015	0.60	0.006	Circuits 1049 & 167 - Car contact w/ fuse cab
8	9/12/2015	0.59	0.003	Circuit 255 - Wire Down
9	9/9/2015	0.49	0.004	Circuit 287 - Blowing tees
10	5/12/2015	0.47	0.003	Circuit 952 - Vehicle Contact

## 2014

<b>Historical 10 Largest Unplanned Outage Events</b>				
<b>Rank</b>	<b>Date</b>	<b>SAIDI</b>	<b>SAIFI</b>	<b>Description</b>
1	5/13/2014	9.73	0.036	May 13 through May 18 Wind and Fire Storm
2	9/14/2014	5.30	0.018	September 14 through September 17 Heat/Rain Storm
3	4/29/2014	3.59	0.014	April 29 through May 1 Wind Storm
4	11/15/2014	2.16	0.033	Station F Substation Outage - Bank 30, 31 & 32
5	2/28/2014	1.23	0.008	February 28, 2014 Rain Storm
6	5/31/2014	0.95	0.004	Circuits 792 & 795 Exceeding 500,000 Customer Minutes
7	6/15/2014	0.90	0.004	Circuits 545 and BP1 Exceeding 500,000 Customer Minutes
8	3/9/2014	0.80	0.004	Circuit 460 Exceeding 500,000 Customer Minutes
9	11/22/2014	0.68	0.003	Circuits 362 - Cable Failure
10	1/12/2014	0.66	0.003	Circuit 163 - Exceeding 500,000 Customer Minutes

## 2013

<b>Historical 10 Largest Unplanned Outage Events</b>				
<b>Rank</b>	<b>Date</b>	<b>SAIDI</b>	<b>SAIFI</b>	<b>Description</b>
1	7/18/2013	14.85	0.087	Orange County Transmission Outage
2	9/3/2013	3.26	0.018	Heat and Rain Storm - Sept 3 through Sept 8
3	4/8/2013	1.76	0.002	Transmission Line 687 - De-energized for safety, poles down
4	12/26/2013	1.11	0.006	Circuits 1435, 363, & GH2 - Contractor Error/Label Error
5	6/4/2013	0.78	0.002	Transmission Line 687 Borrego Substation Outage
6	12/3/2013	0.69	0.003	Circuit 166 - Exceeding 500,000 Customer Minutes
7	11/7/2013	0.60	0.005	Circuits 209 & 205 - Exceeding 500,000 Customer Minutes
8	1/7/2013	0.57	0.001	Circuits 368 & 431 - Exceeding 500,000 Customer Minutes
9	1/10/2013	0.56	0.003	Circuits 792 & SE4- Exceeding 500,000 Customer Minutes
10	3/12/2013	0.51	0.001	Circuits 715 & 706 - Damaged Tee's and Low Gas

## 2012

<b>Historical 10 Largest Unplanned Outage Events</b>				
<b>Rank</b>	<b>Date</b>	<b>SAIDI</b>	<b>SAIFI</b>	<b>Description</b>
1	9/9/2012	1.64	0.019	September 9th - Storm
2	6/23/2012	1.48	0.003	Circuits 166 & 397 Exceeding 500,000 Customer Minutes
3	7/12/2012	1.45	0.014	Circuit 329 - San Mateo Substation Outage
4	5/28/2012	1.27	0.002	Circuit 166 - Outage Exceeding 500,000 Customer Minutes
5	5/6/2012	0.79	0.003	Circuit 323 - Outage Exceeding 500,000 customer minutes
6	2/27/2012	0.76	0.004	February 27 - Storm
7	4/28/2012	0.67	0.002	Circuit 582 - Outage Exceeding 500,000 customer minutes
8	3/26/2012	0.64	0.003	Point Loma Substation Bank 10 Outage
9	8/12/2012	0.63	0.003	Circuit 57 - Outage Exceeding 500,000 customer minutes
10	3/17/2012	0.62	0.004	March 17 - Storm

### **SECTION 9 – NUMBER OF CUSTOMER INQUIRIES ON RELIABILITY DATA AND THE NUMBER OF DAYS PER RESPONSE**

#### **CUSTOMER INQUIRIES ON RELIABILITY DATA (2021)**

SDG&E received 1,053 customer inquiries for reliability data in 2021.

The average response time was 2 business days.