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Today's Date (Date of Submittal) 7/15/2020

Name:

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): 2018
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 Annual Electric System Reliability Report 2019
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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

C. Documents Submitted as Requested by Other Requirements

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

D. Document Summary

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.

E. Sender Contact Information

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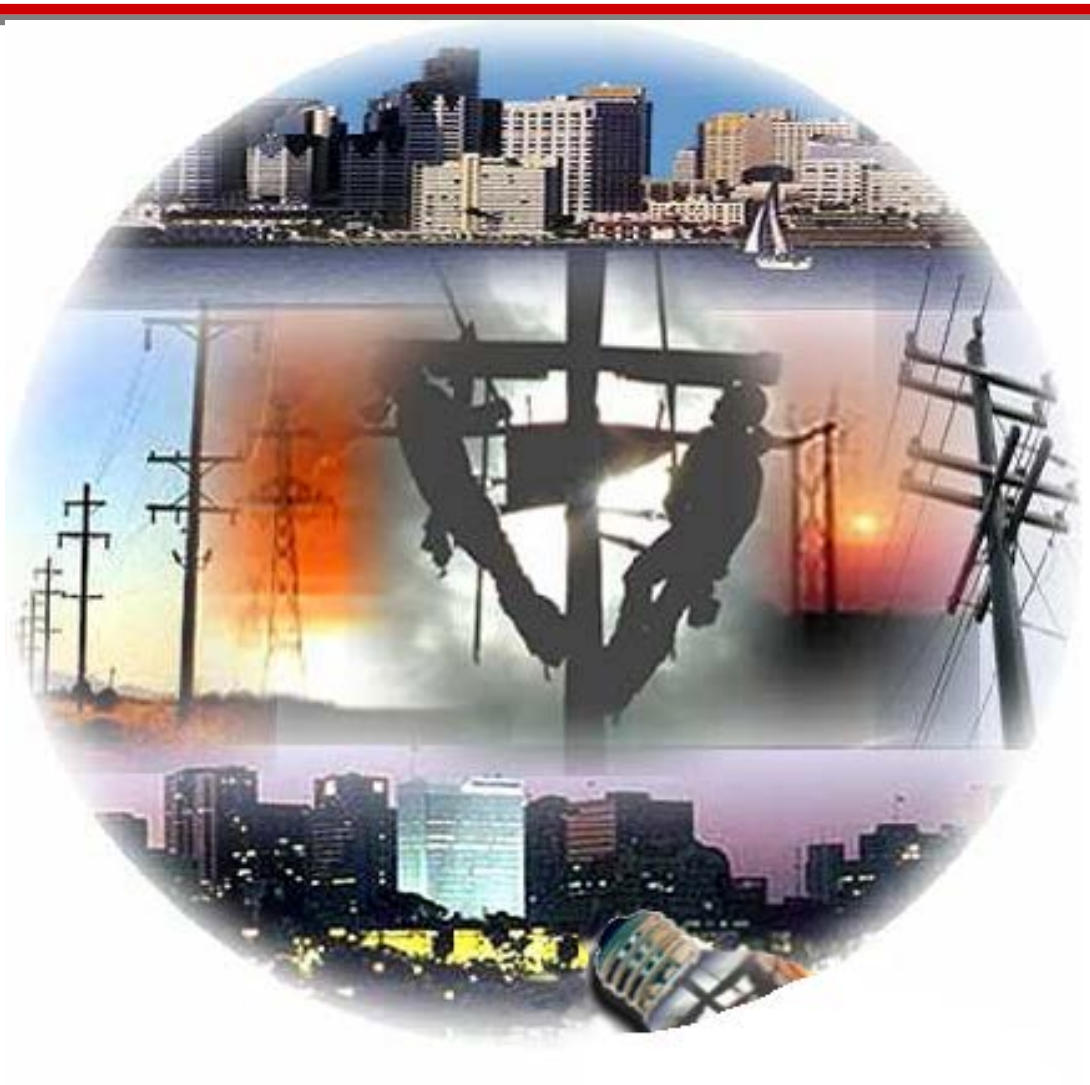
1. Names of Commission staff that sender copied on the submittal of this Document: David Lee, Gabe Petlin



SDGE

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ELECTRIC SYSTEM RELIABILITY ANNUAL REPORT 2019

Prepared for
California Public Utilities Commission
(Per Decision 16-01-008)

July 15, 2020

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EXECUTIVE SUMMARY

Background:

The Electric System Reliability Annual Report for 2019 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.

2019 Reliability Indices

Overview:

SDG&E's 2019 System Average Interruption Duration Index (SAIDI) and System Average Interruption Frequency Index (SAIFI) numbers were slightly above system average for the past five years. Contributions to the 2019 year-end results included an increase in underground connector failures, but also saw a decrease in impacts from substation outages and underground cable. While mostly excluded from SAIDI and SAIFI numbers reported in this report, Public Safety Power Shutoff (PSPS) de-energizations contributed approximately 2.75 SAIDI minutes and 0.002 SAIFI.

SDG&E experienced extremely dry conditions combined with high Santa Ana winds in the 4th quarter of 2019, which triggered PSPS de-energization of lines for community safety in high risk wildfire areas. Outage impacts from PSPS de-energization events in 2019 totaled 53.74 system SAIDI minutes. and 0.034 system SAIFI. Most of these unplanned outage impacts meet Major Event Day exclusion criteria, but as mentioned above, the PSPS impacts that are not excluded in this report represent an additional impact to the annual totals. Additionally, PSPS de-energizations largely contributed to the SAIDI and SAIFI values for five of SDG&E's nine repeat worst performing circuits. SDG&E internally tracks its indices excluding impacts from PSPS de-energization events, to compare performance to past years, since wide-scale PSPS events are relatively new. The totals excluding PSPS de-energization events are listed below for reference.

	MED, Planned and Proactive De-energization Excluded			
Year	**SAIDI**	**SAIFI**	**CAIDI**	**MAIFI**
2019	65.88	0.594	110.93	0.299

Identified Mitigation/Efforts to Improve System Reliability

SDG&E is dedicated to providing strong electric reliability to its customers. To do so, in 2019, 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.
- Developing systems that detect incipient equipment failure on the underground 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.
- Filed the 2019 Risk Assessment and Mitigation Phase (RAMP) report for known risks under the Distribution Electric Infrastructure Integrity Category.
- Increased the deployment of wireless fault indicators in key locations, assisting with reducing duration to locate outages.

How SDG&E Measures Reliability

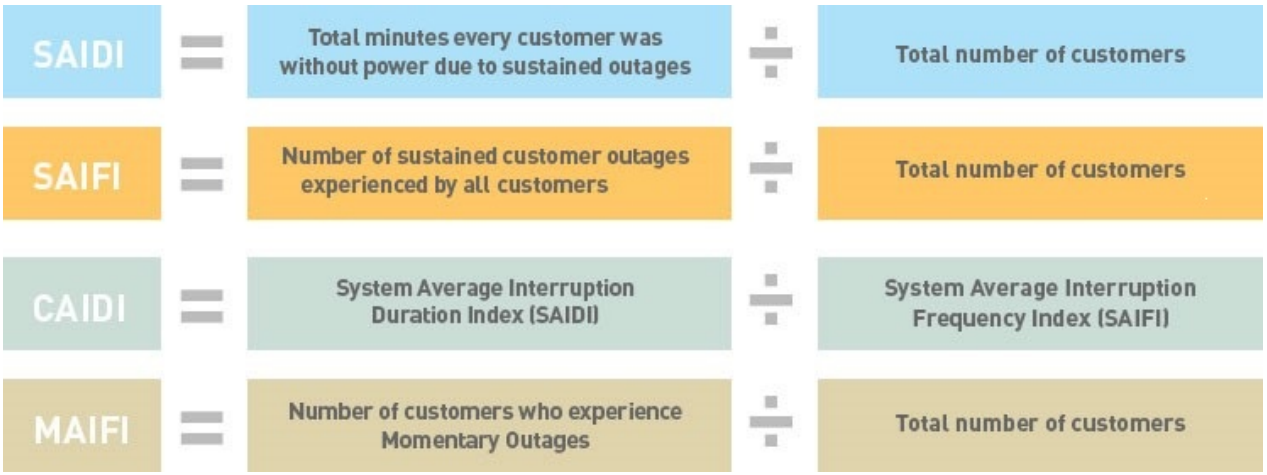
SDG&E uses four metrics commonly used in the electric utility industry to measure reliability. The reliability indicators that are tracked are as follows:

1. **SAIDI** (**S**ystem **A**verage **I**nterruption **D**uration **I**ndex) – minutes of sustained outages per customer per year.

2. **SAIFI** (**S**ystem **A**verage **I**nterruption **F**requency **I**ndex) – number of sustained outages per customer per year.

3. **CAIDI** (**C**ustomer **A**verage **I**nterruption **D**uration **I**ndex) – is the average time required to restore service to a utility customer.

4. **MAIFI** (**M**omentary **A**verage **I**nterruption **F**requency **I**ndex) – 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 2019 was 4.61 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 **System Reliability Data 2010 - 2019**								
MED Included						MED Excluded		
Year	**SAIDI**	**SAIFI**	**CAIDI**	**MAIFI**	**SAIDI**	**SAIFI**	**CAIDI**	**MAIFI**
2010	85.37	0.652	130.99	0.510	63.36	0.520	121.80	0.444
2011	567.59	1.472	385.63	0.239	53.43	0.471	113.44	0.239
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

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

San Diego Gas & Electric **Distribution System Reliability Data 2010 - 2019**								
MED Included					MED Excluded			
Year	**SAIDI**	**SAIFI**	**CAIDI**	**MAIFI**	**SAIDI**	**SAIFI**	**CAIDI**	**MAIFI**
2010	84.49	0.638	132.50	0.468	62.65	0.512	122.25	0.403
2011	52.87	0.435	121.63	0.216	52.11	0.433	120.47	0.216
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

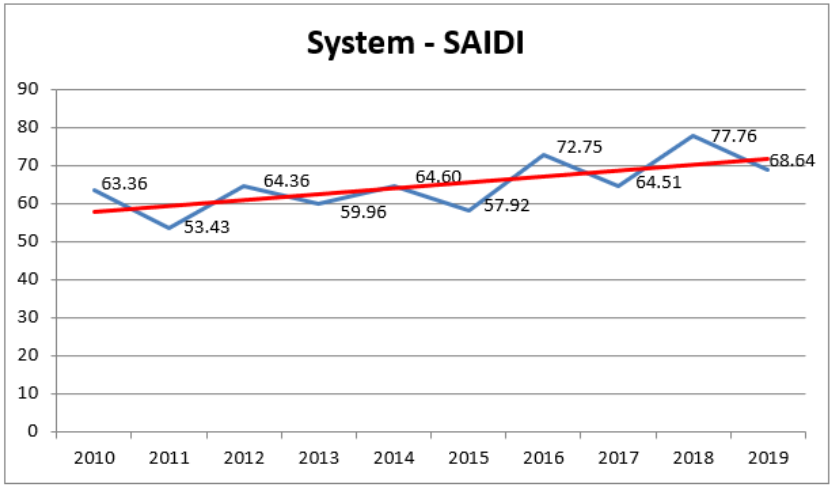
Note: Distribution System Indices includes substation distribution.

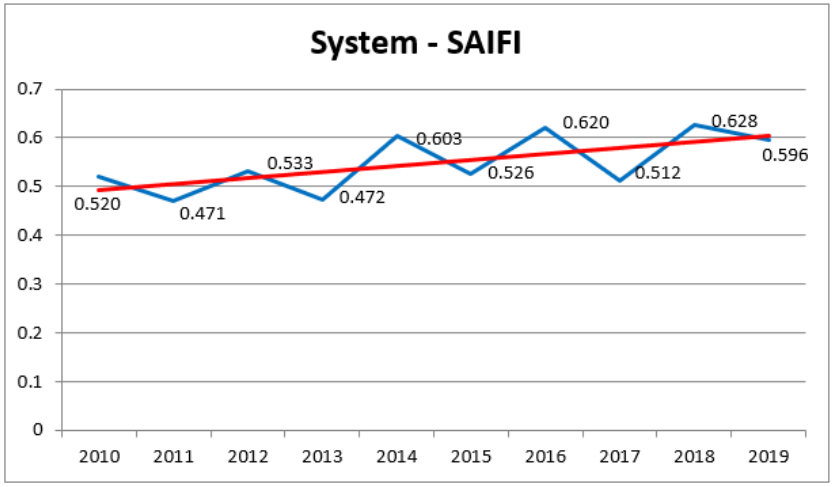
Table 1-3: Transmission System Indices (MED included and excluded)

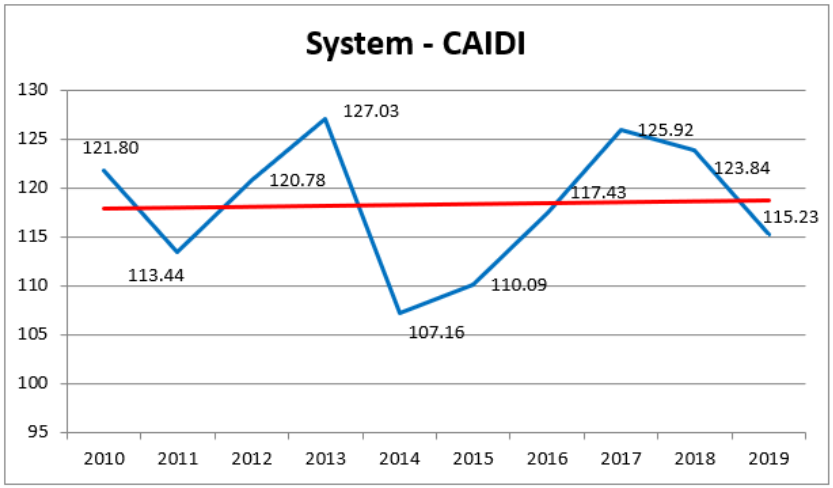
San Diego Gas & Electric **Transmission System Reliability Data 2010 - 2019**								
MED Included					MED Excluded			
Year	**SAIDI**	**SAIFI**	**CAIDI**	**MAIFI**	**SAIDI**	**SAIFI**	**CAIDI**	**MAIFI**
2010	0.88	0.014	62.63	0.042	0.71	0.008	92.30	0.041
2011	514.72	1.037	496.29	0.022	1.32	0.038	34.26	0.022
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

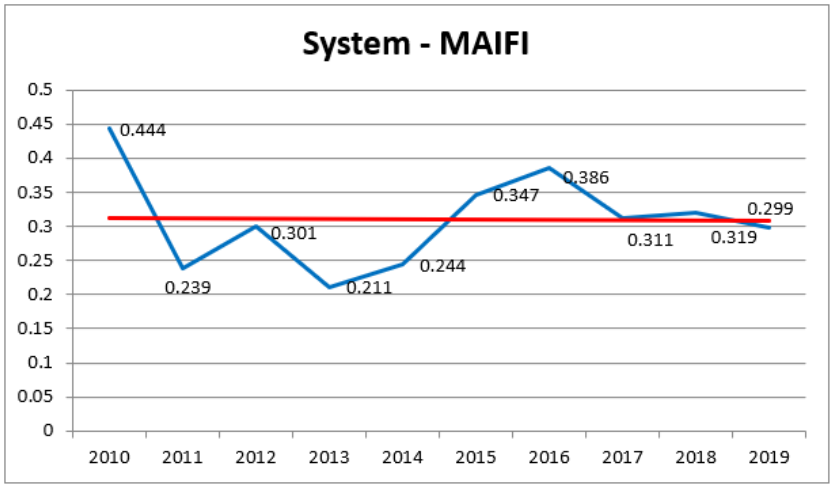
Note: Transmission System Indices includes substation transmission.

System Indices (Excludes Planned, ISO and MED)

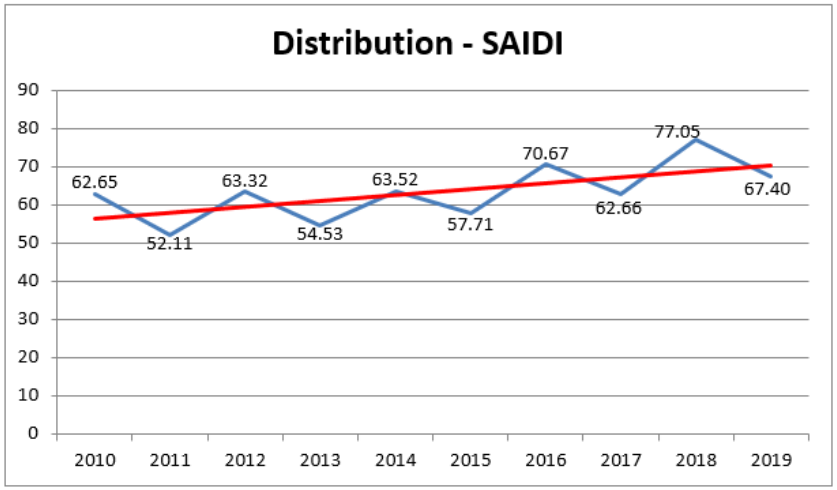


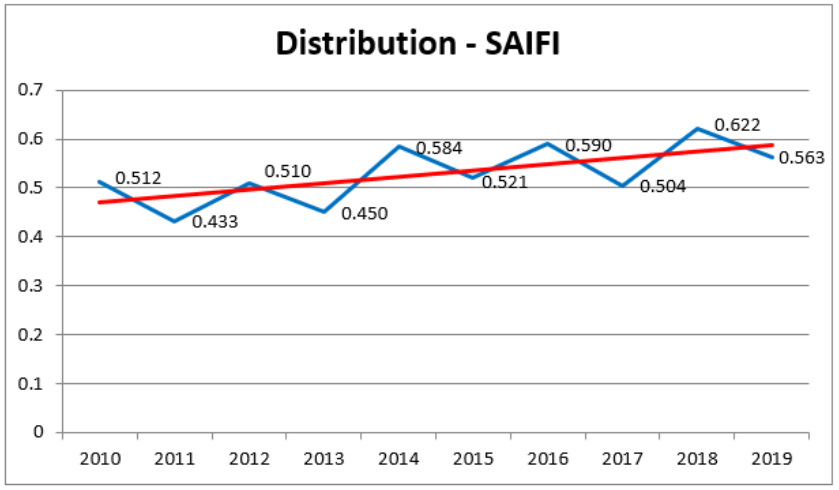


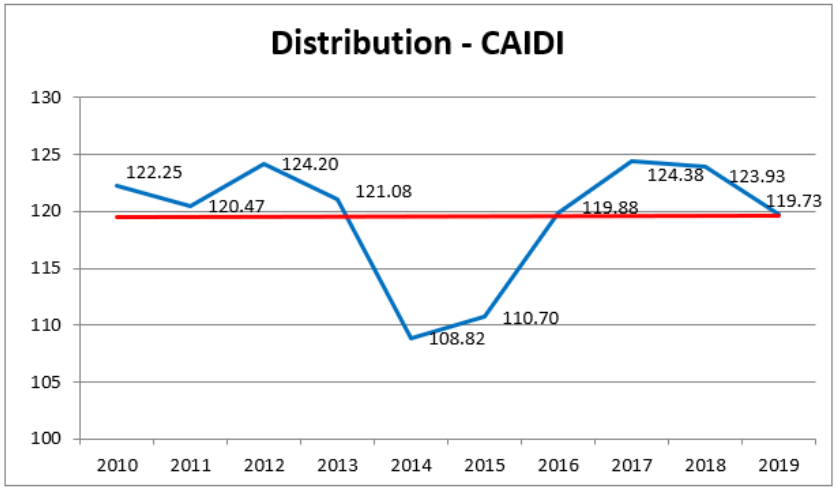


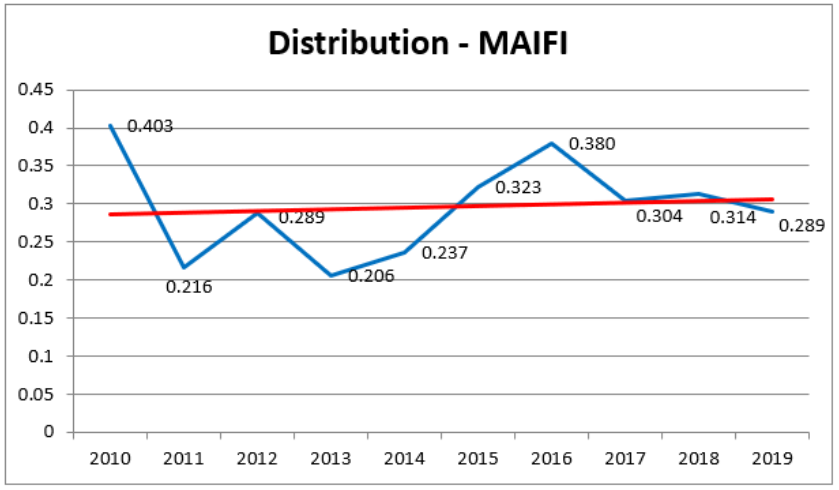


Distribution System Indices (Excludes Planned, ISO and MED)

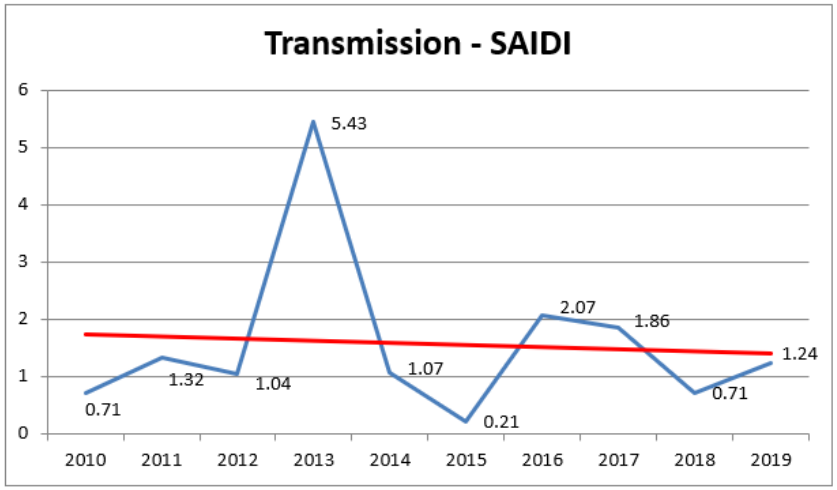


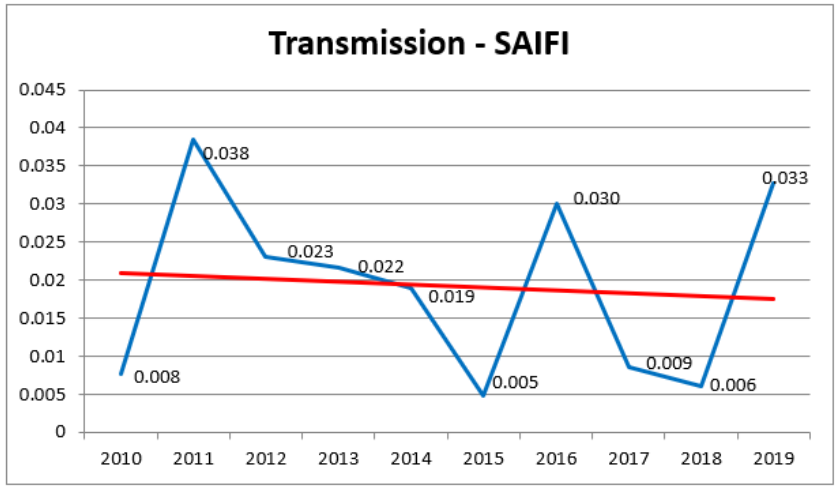


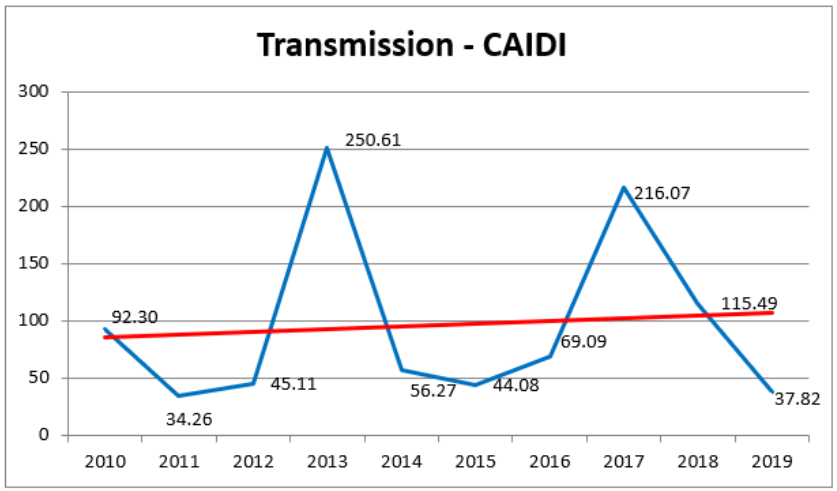


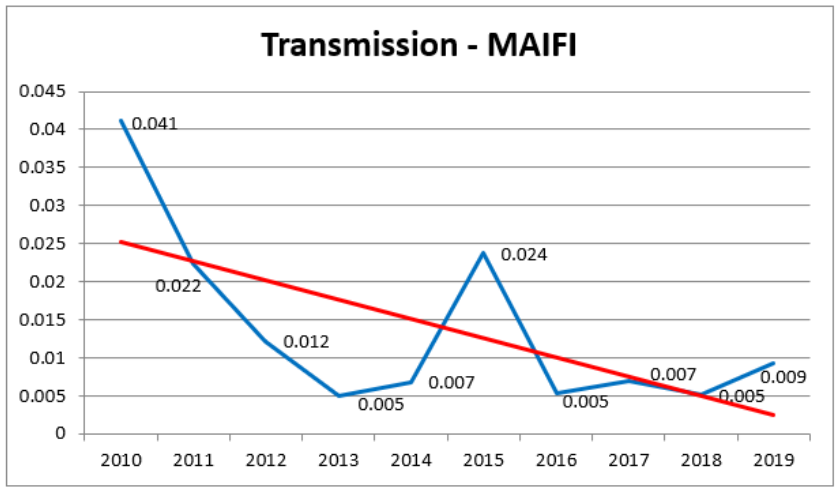


Transmission System Indices (Excludes Planned, ISO and MED)









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 (2010 – 2019)

	MED Included					MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI		SAIDI	SAIFI	CAIDI	MAIFI
2010	59.00	0.392	150.53	0.233		48.34	0.354	136.56	0.182
2011	617.86	1.396	442.58	0.243		52.01	0.396	131.17	0.243
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

Table 2-2: Eastern - District Reliability Indices (2010 – 2019)

MED Included						MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI		SAIDI	SAIFI	CAIDI	MAIFI
2010	90.81	0.629	144.41	0.562		54.24	0.443	122.41	0.400
2011	588.29	1.506	390.55	0.193		65.26	0.507	128.79	0.193
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

Table 2-3: Metro - District Reliability Indices (2010 – 2019)

MED Included						MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI		SAIDI	SAIFI	CAIDI	MAIFI
2010	64.45	0.506	127.29	0.503		44.03	0.397	111.05	0.440
2011	519.36	1.320	393.52	0.244		36.63	0.314	116.69	0.244
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

Table 2-4: North Coast - District Reliability Indices (2010 – 2019)

MED Included					MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI	SAIDI	SAIFI	CAIDI	MAIFI
2010	117.12	0.771	151.87	0.789	93.47	0.656	142.51	0.738
2011	565.06	1.515	372.88	0.292	66.49	0.516	128.89	0.292
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

Table 2-5: Northeast - District Reliability Indices (2010 – 2019)

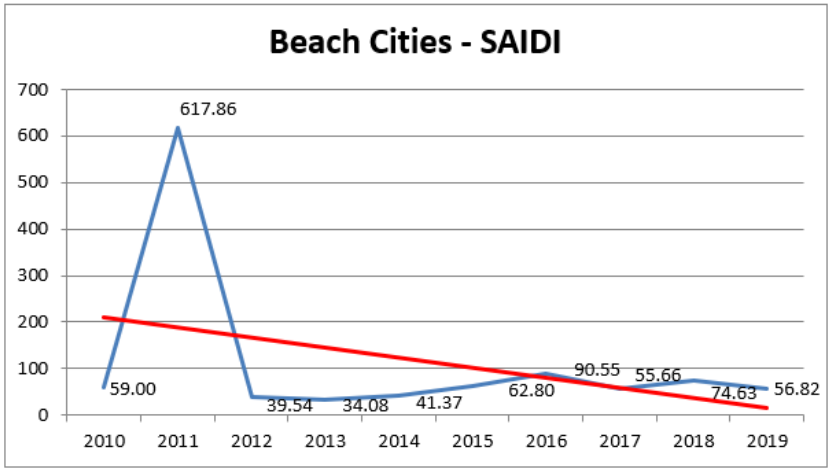
MED Included					MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI	SAIDI	SAIFI	CAIDI	MAIFI
2010	101.96	0.948	107.55	0.544	77.47	0.707	109.64	0.497
2011	612.05	1.694	361.24	0.268	59.18	0.696	84.97	0.268
2012	78.46	0.626	125.32	0.272	78.46	0.626	125.32	0.272
2013	102.07	0.708	144.08	0.213	102.06	0.708	144.09	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

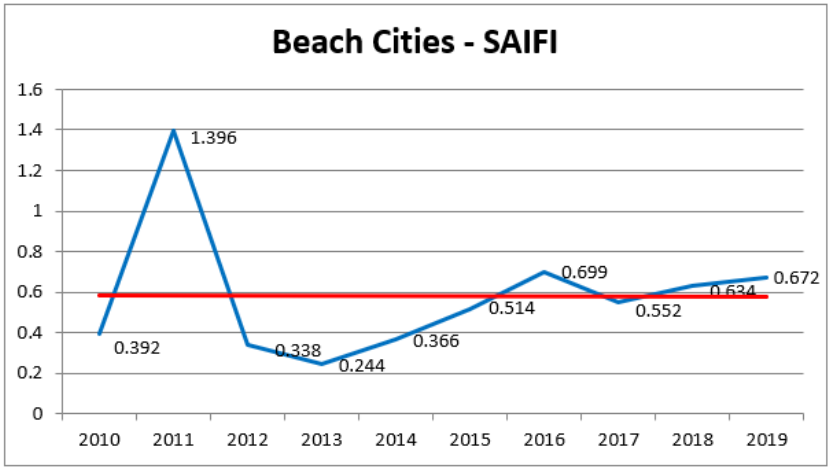
Table 2-6: Orange County - District Reliability Indices (2010 – 2019)

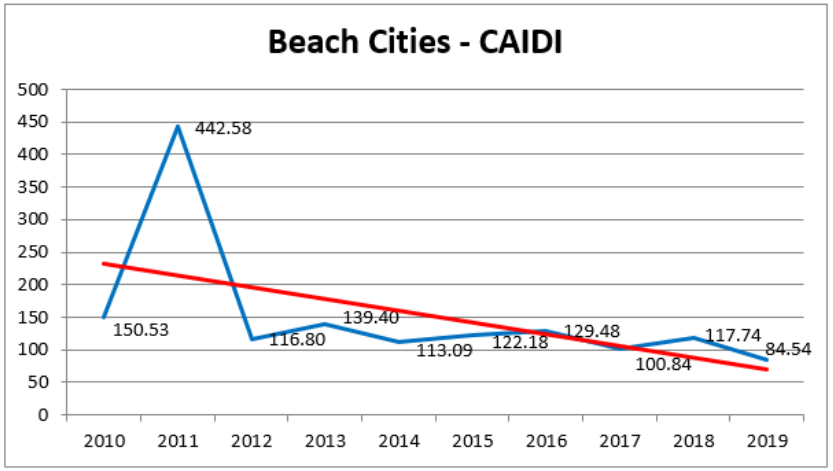
MED Included						MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI		SAIDI	SAIFI	CAIDI	MAIFI
2010	97.15	0.852	114.00	0.395		81.24	0.738	110.05	0.395
2011	494.15	1.506	328.14	0.140		48.39	0.507	95.53	0.140
2012	75.86	0.794	95.52	0.156		75.86	0.794	95.52	0.156
2013	216.07	1.328	162.74	0.183		47.75	0.336	142.19	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

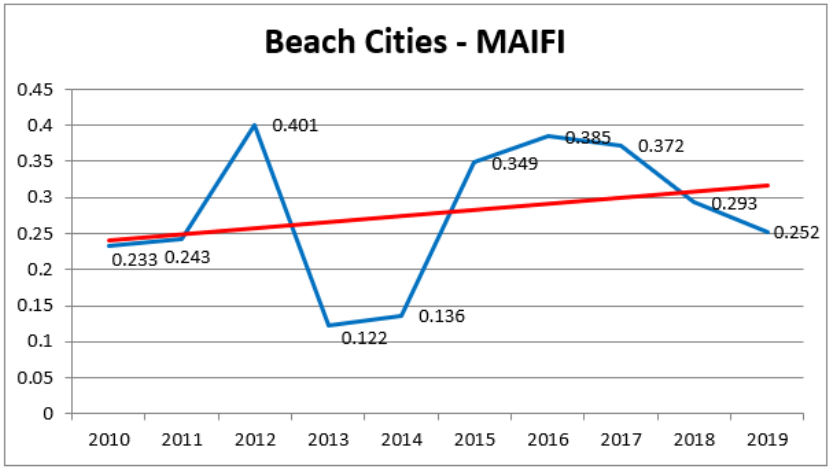
B. CHARTS FOR EACH OF SDG&E'S SIX DISTRICTS WITH LINEAR TREND LINE (EXCLUDES PLANNED AND CAISO OUTAGES; INCLUDES MED)

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



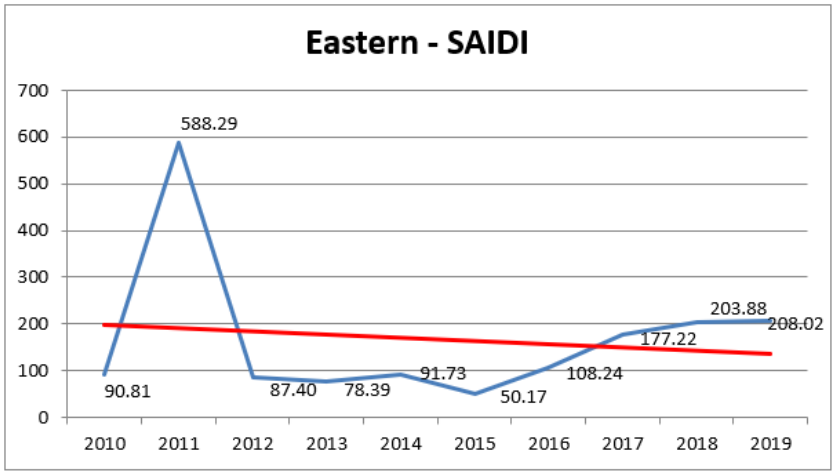


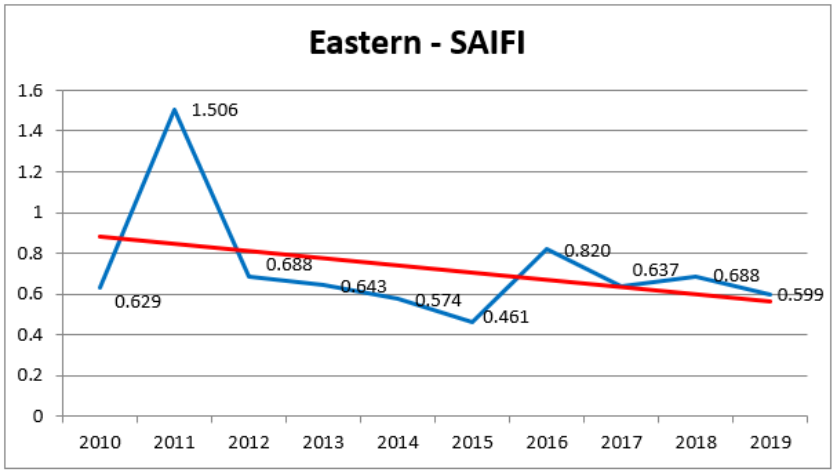


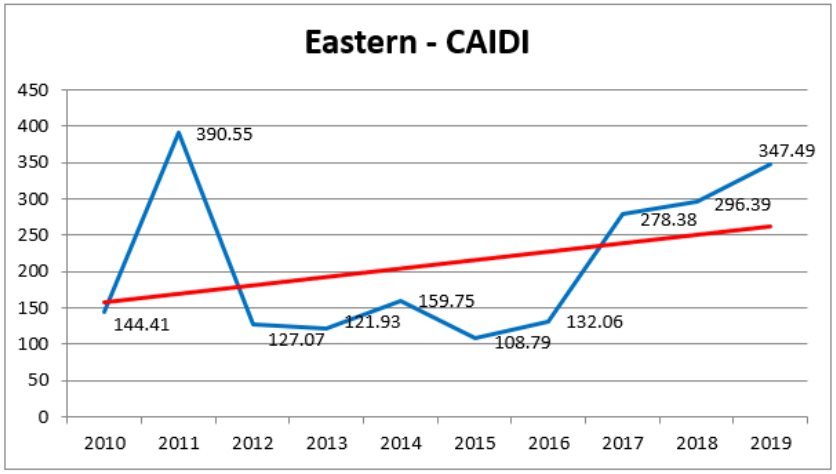


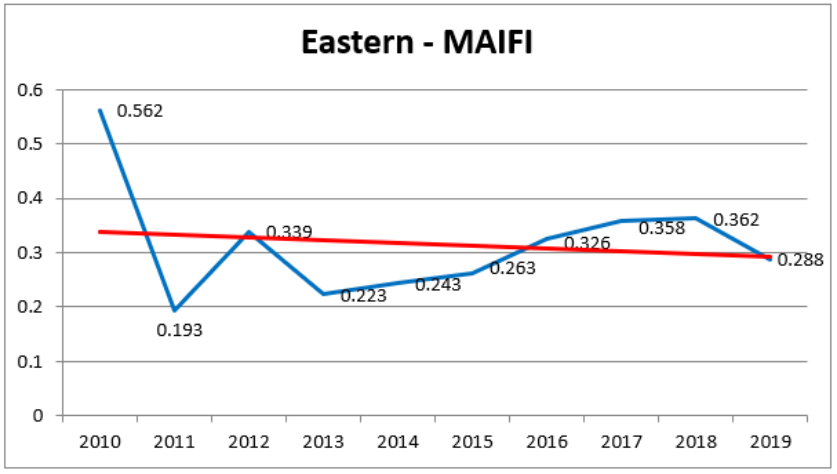
Note: The spike in 2011 was due to the Pacific Southwest Electric Outage (PSEO)

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



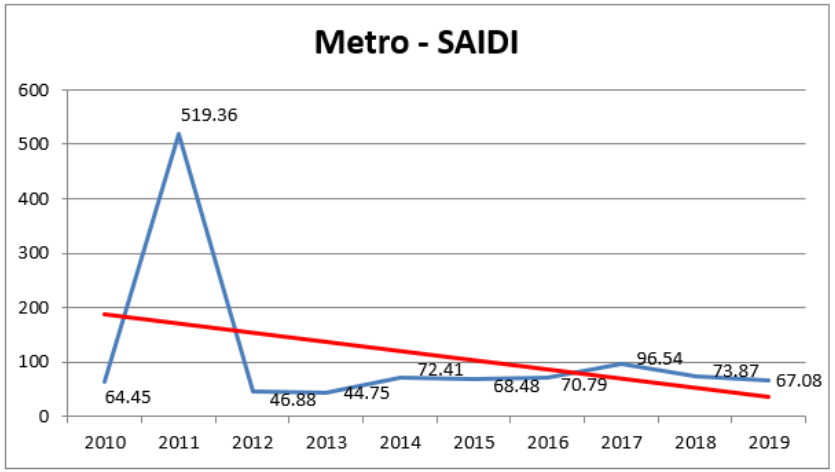


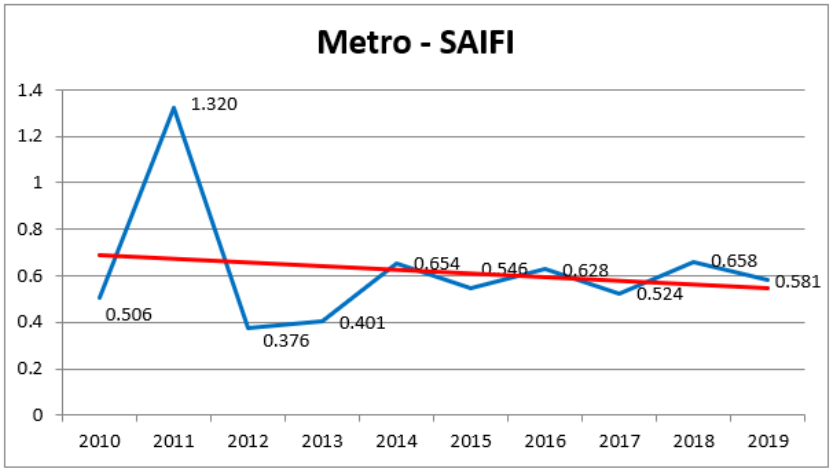


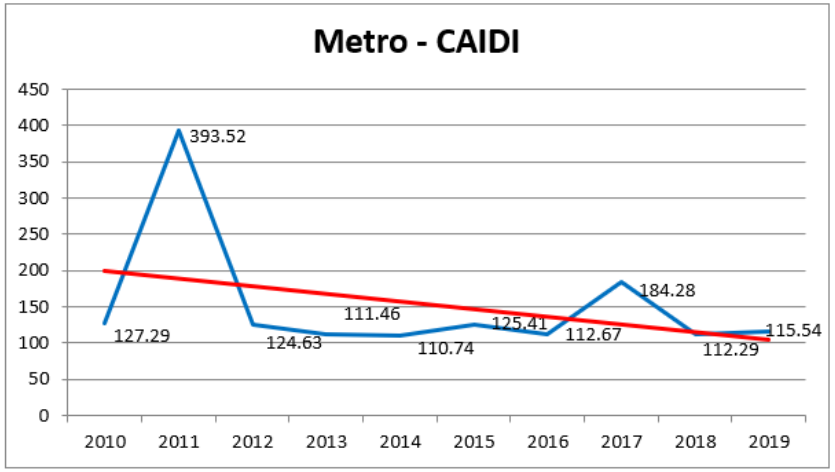


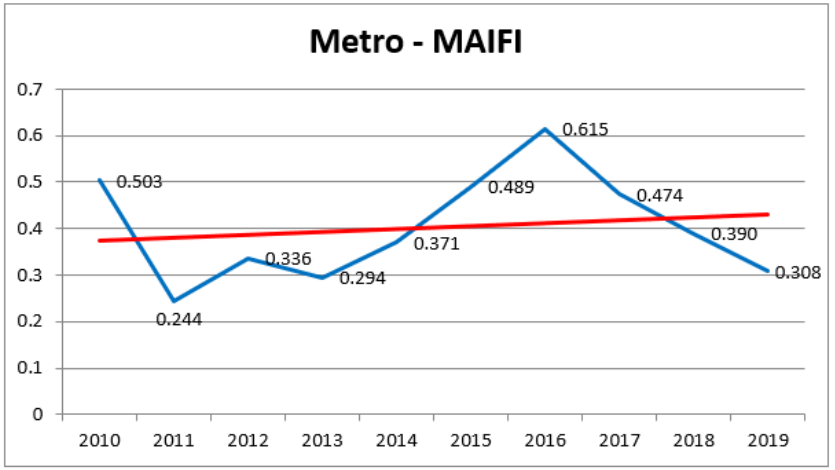
Note: The spike in 2011 was due to the Pacific Southwest Electric Outage (PSEO)

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



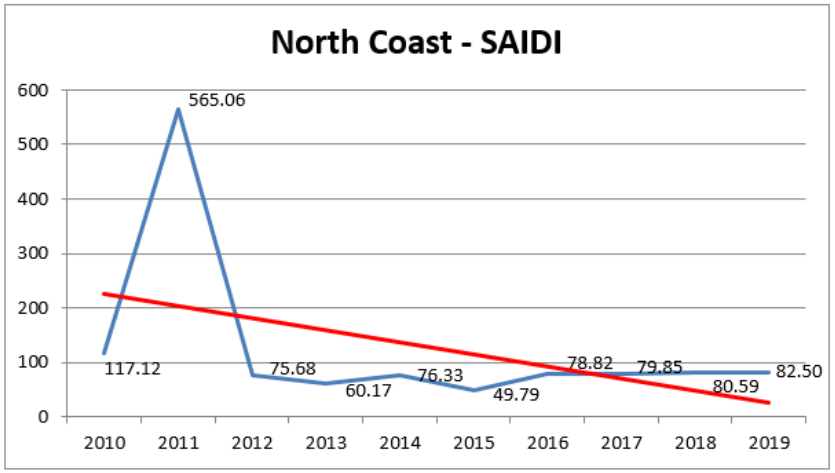


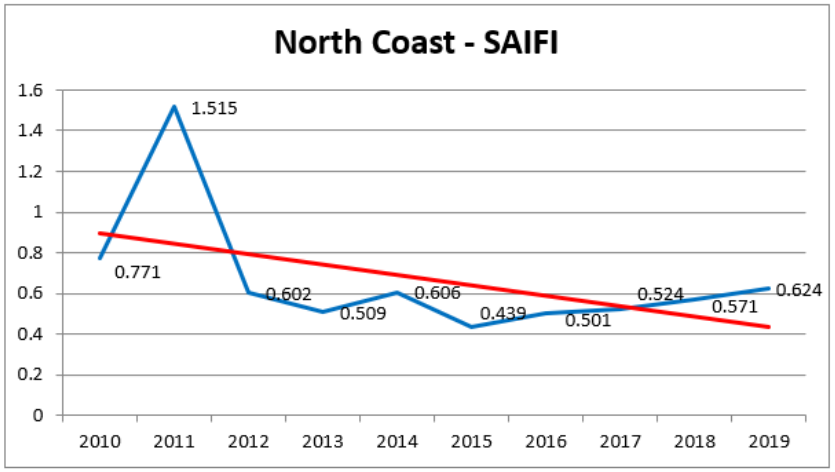


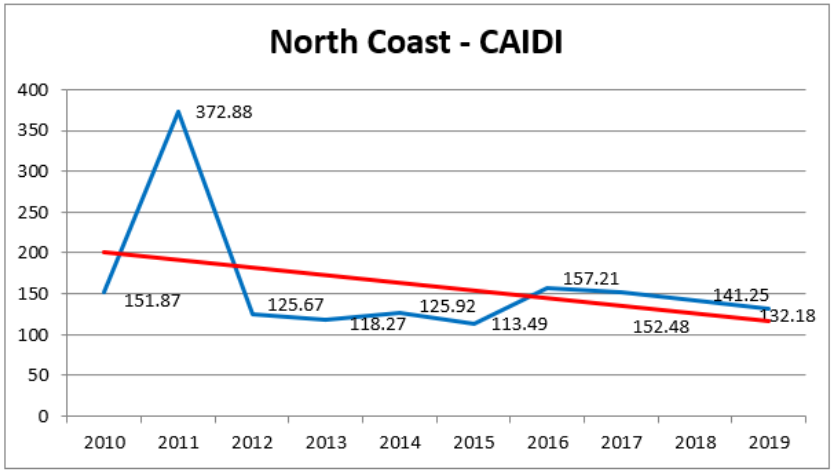


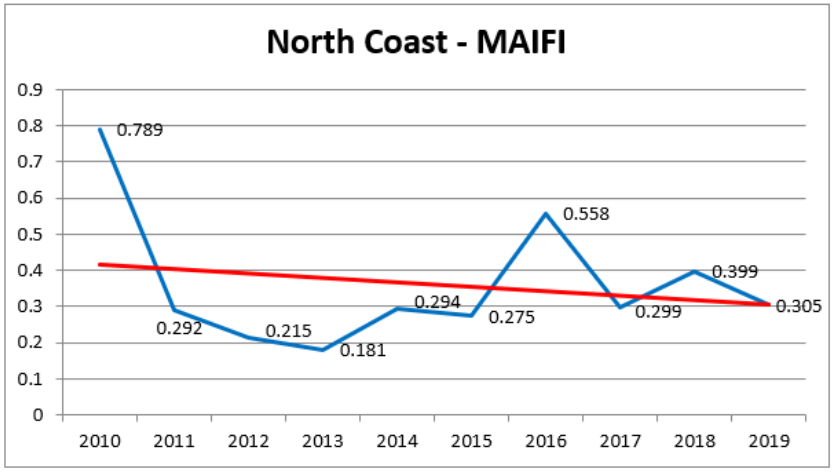
Note: The spike in 2011 was due to the Pacific Southwest Electric Outage (PSEO)

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



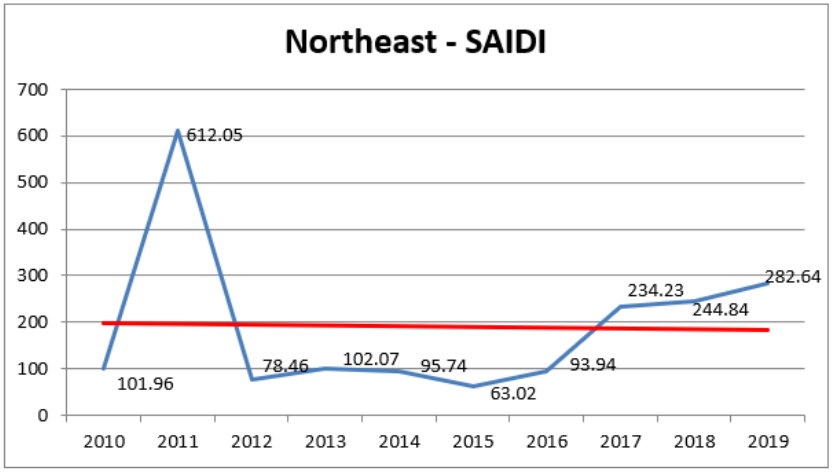


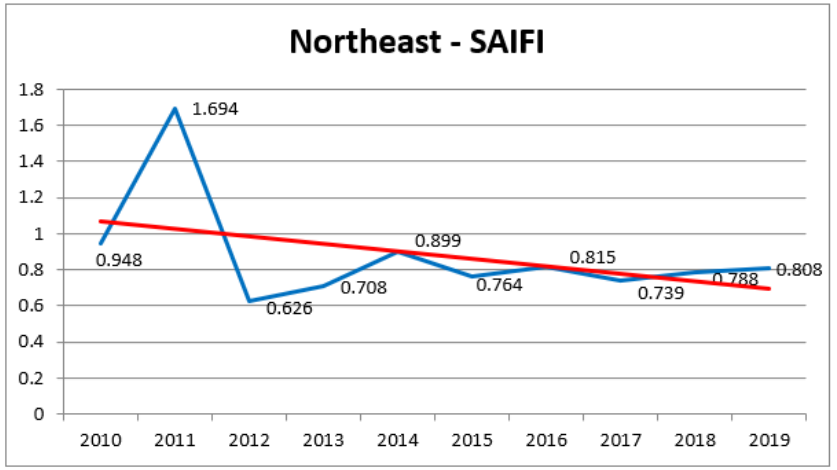


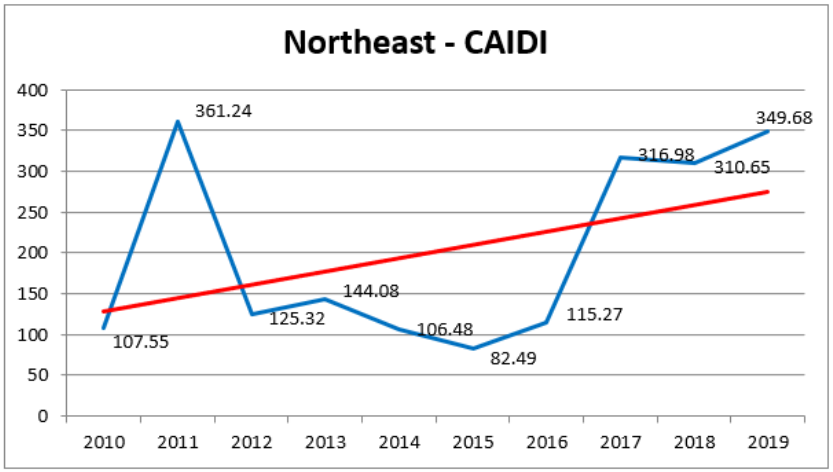


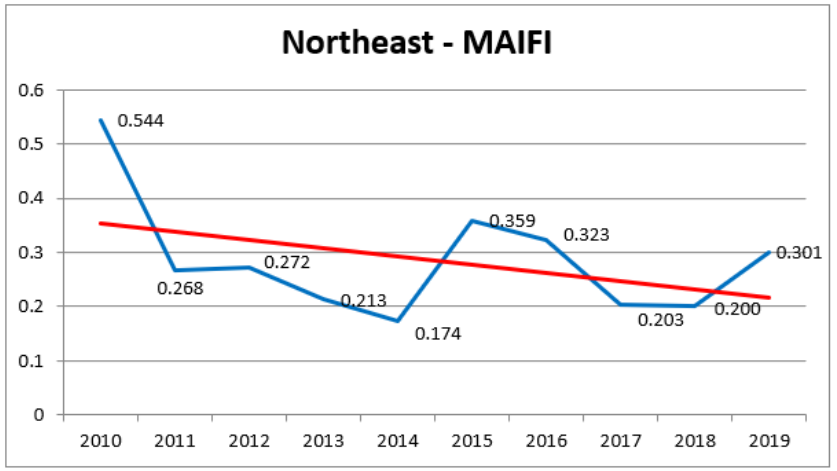
Note: The spike in 2011 was due to the Pacific Southwest Electric Outage (PSEO)

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



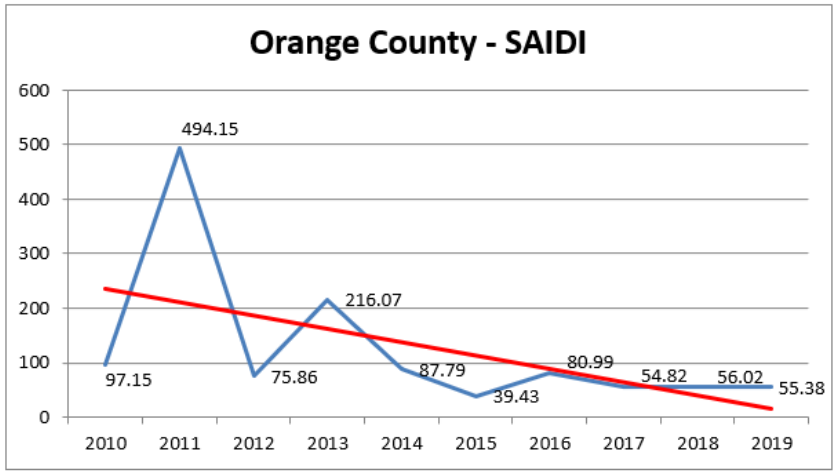


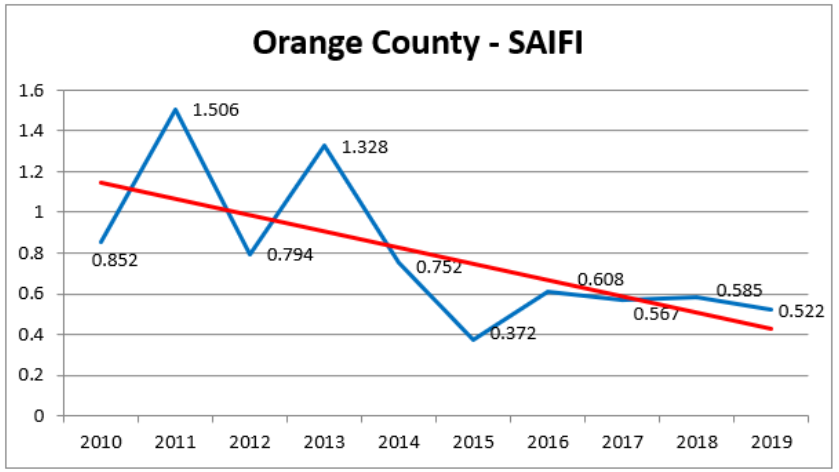


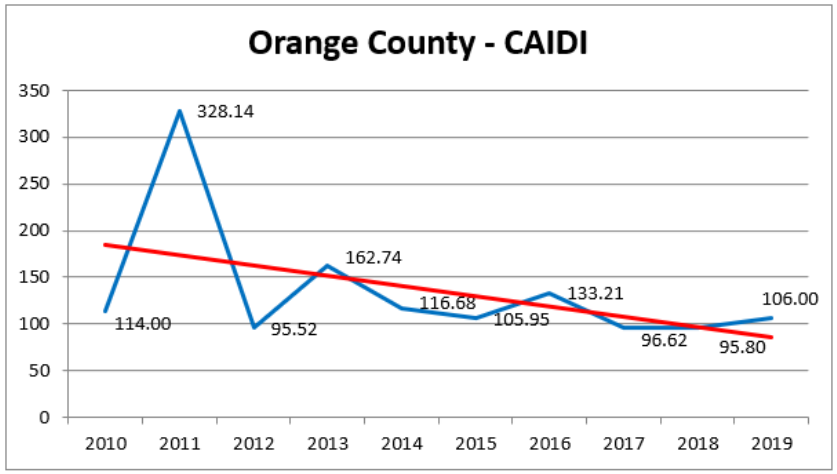


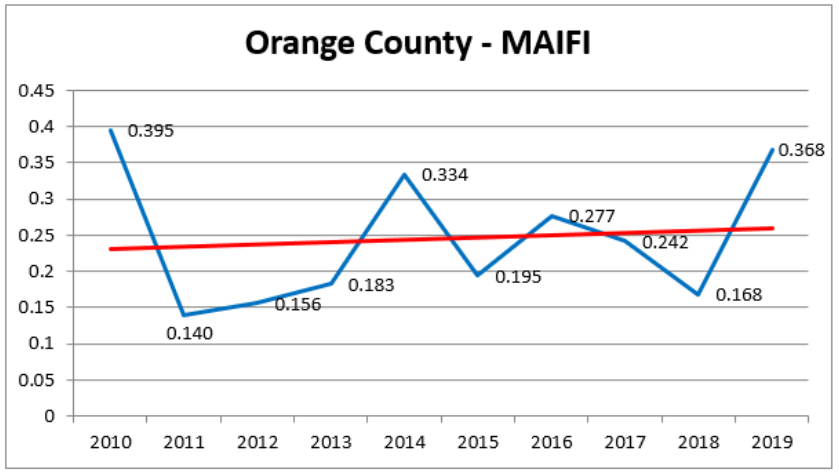
Note: The spike in 2011 was due to the Pacific Southwest Electric Outage (PSEO)

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





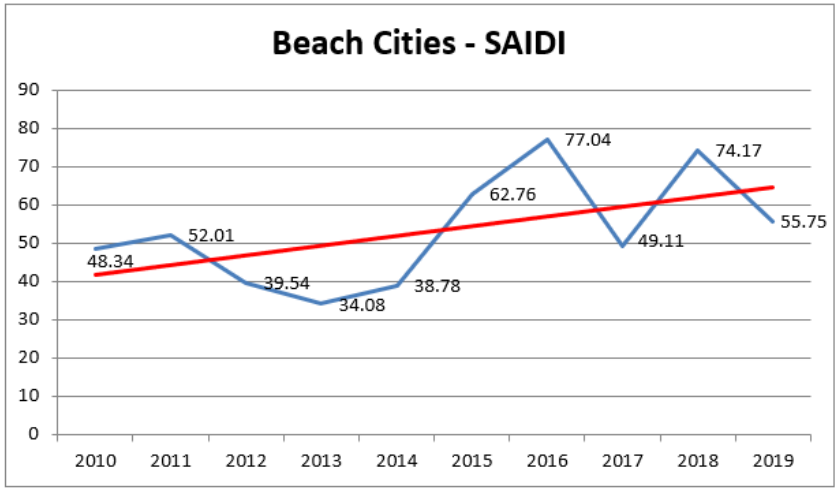


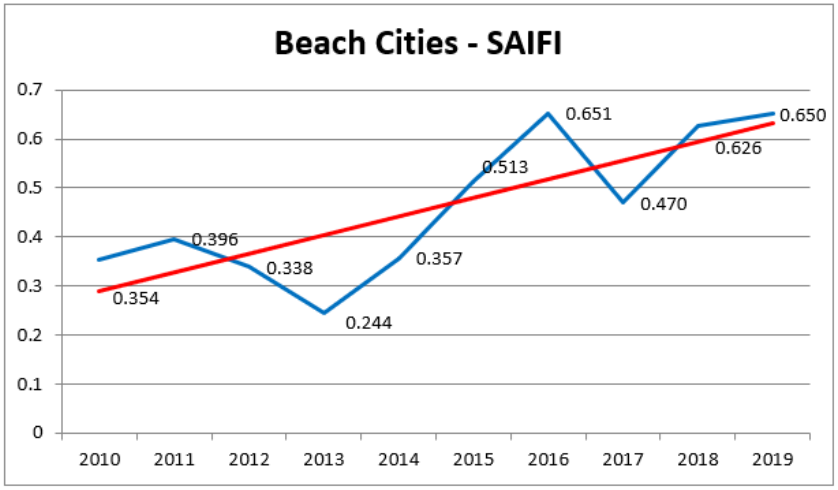


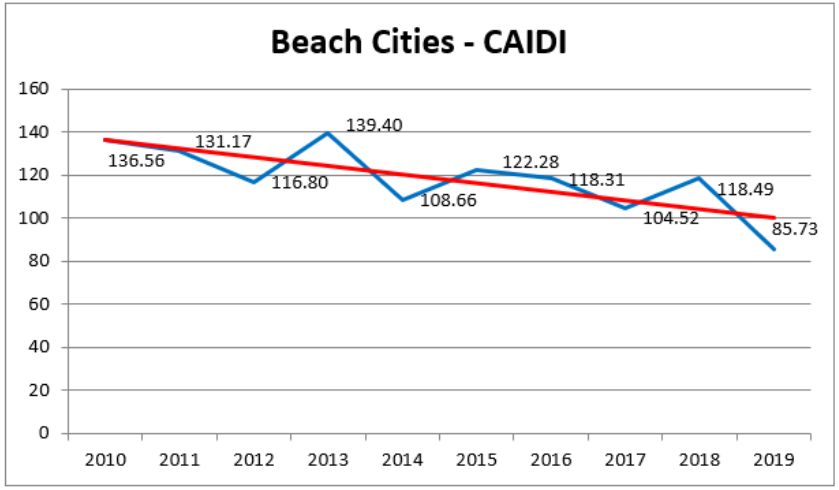
Note: The spike in 2011 was due to the Pacific Southwest Electric Outage (PSEO)

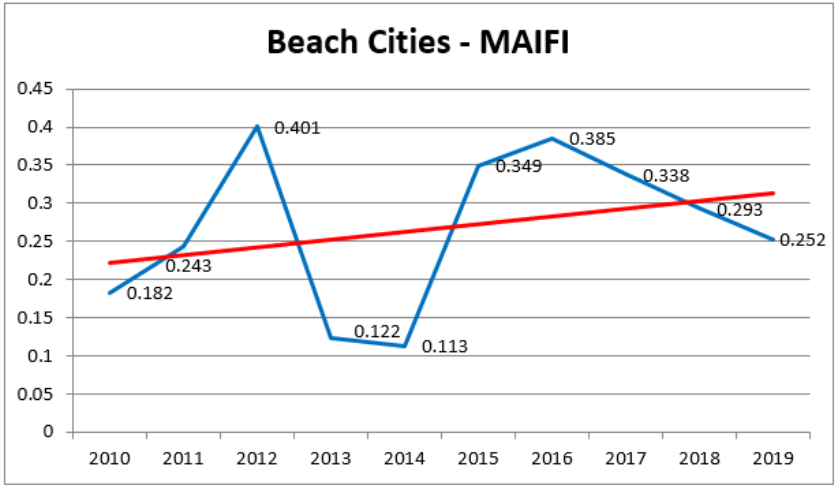
C. CHARTS FOR EACH OF SDG&E'S SIX DISTRICTS WITH LINEAR TREND LINE (EXCLUDES PLANNED, CAISO AND MED)

District Reliability Indices (Excludes Planned, ISO and MED)

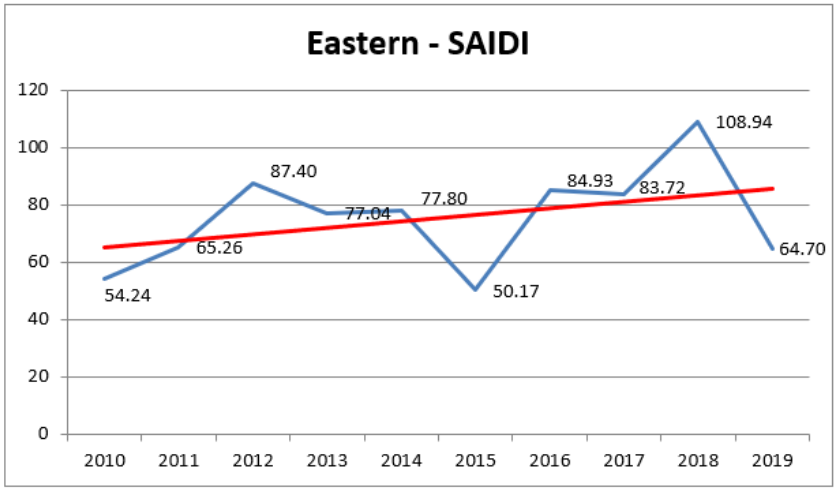


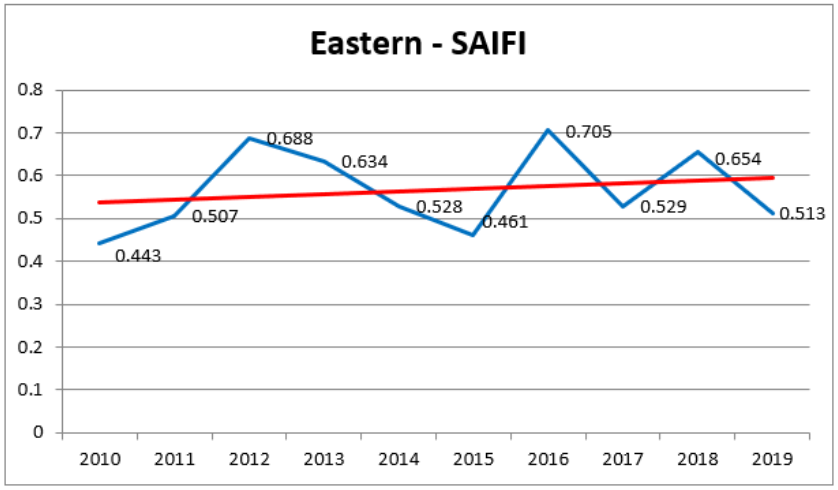


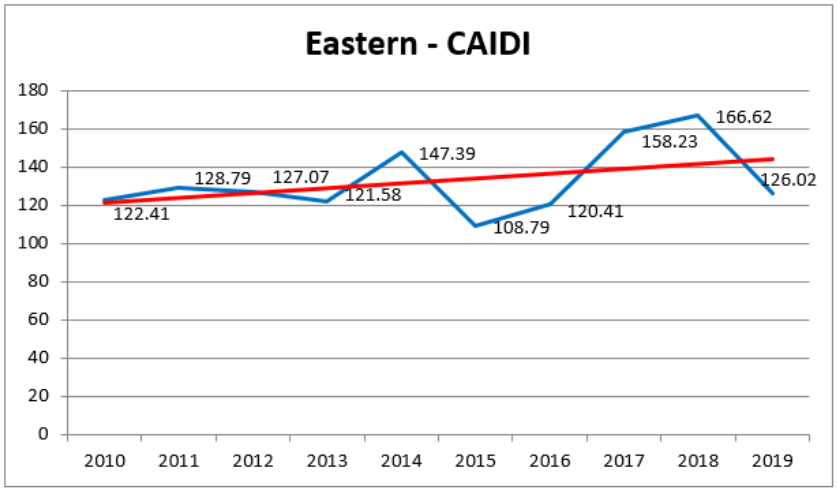


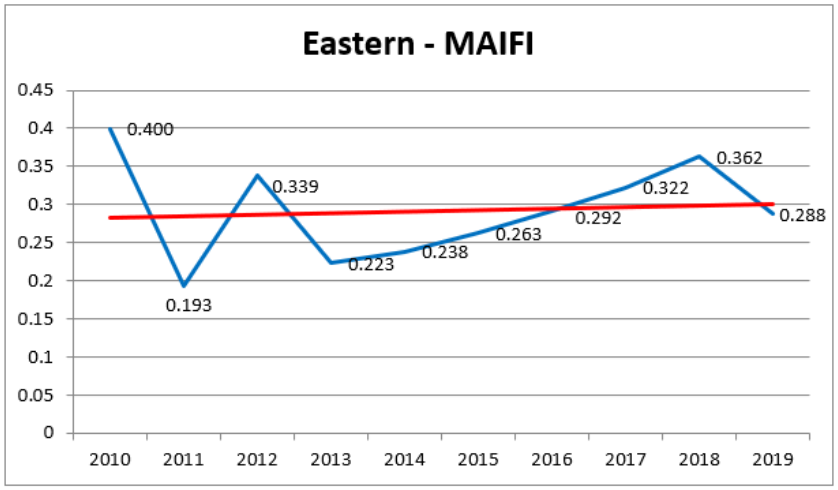


District Reliability Indices (Excludes Planned, ISO and MED)

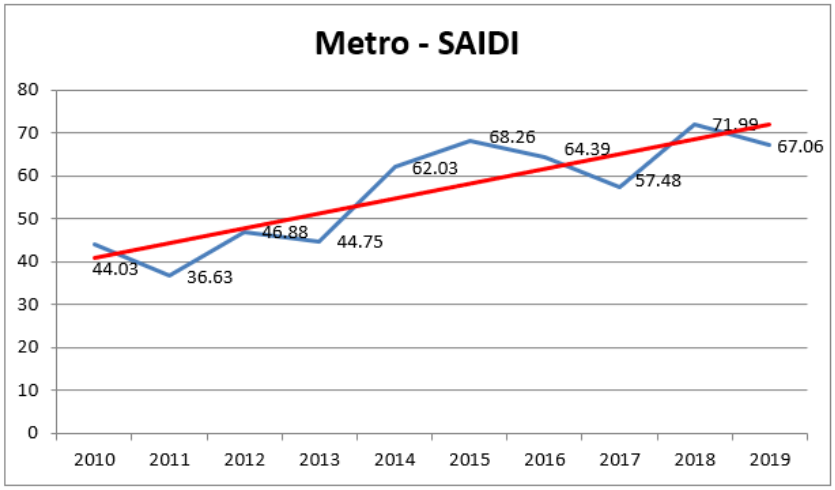


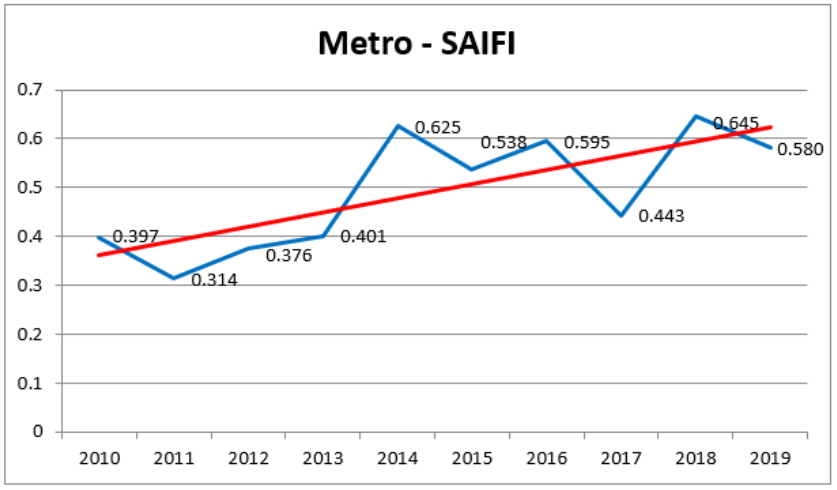


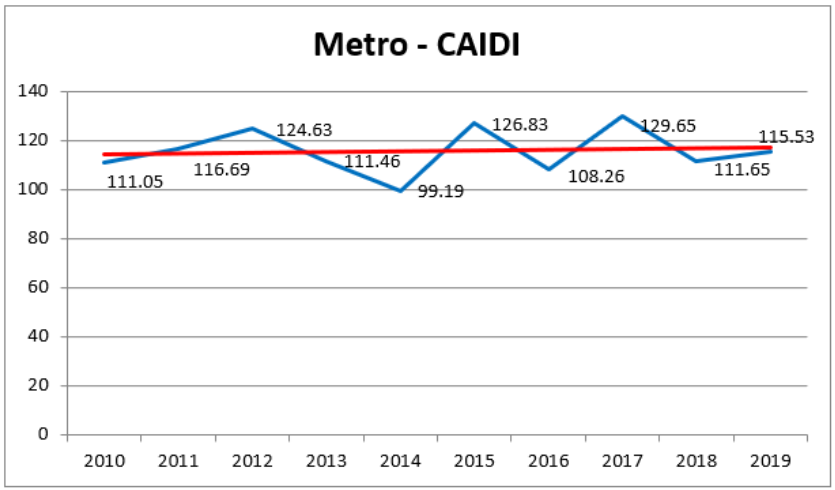


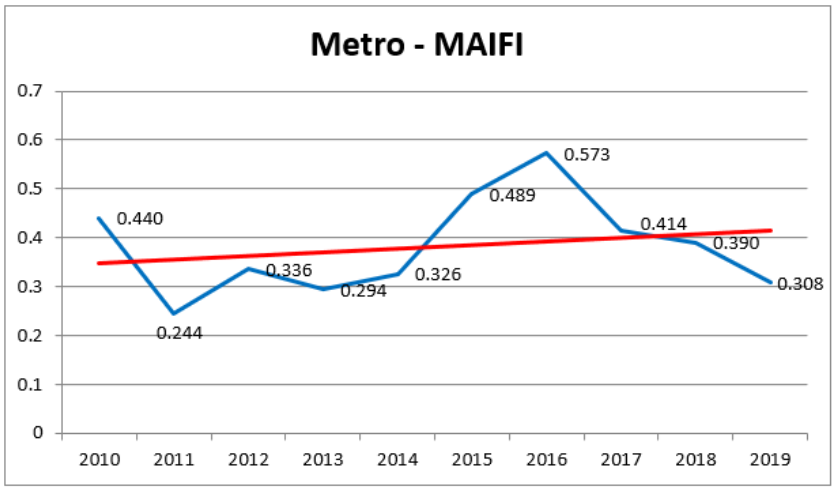


District Reliability Indices (Excludes Planned, ISO and MED)

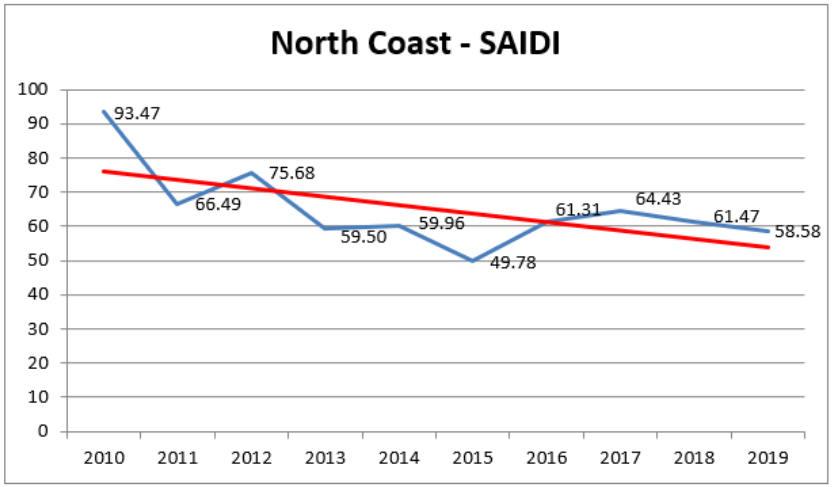


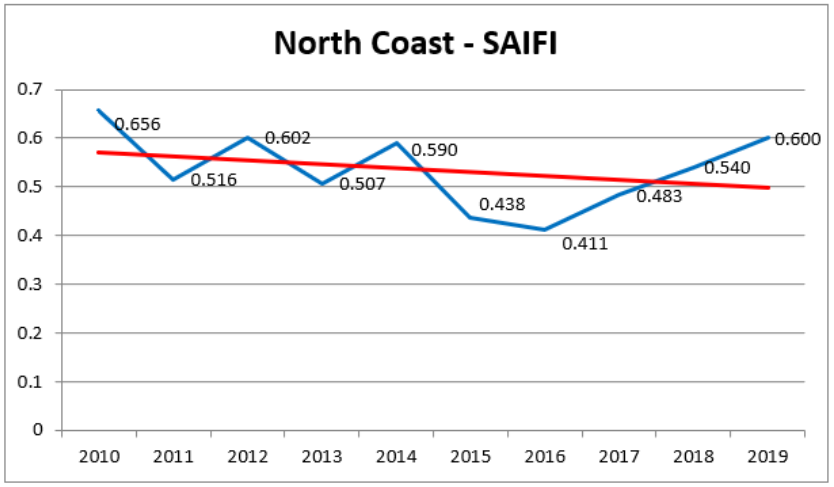


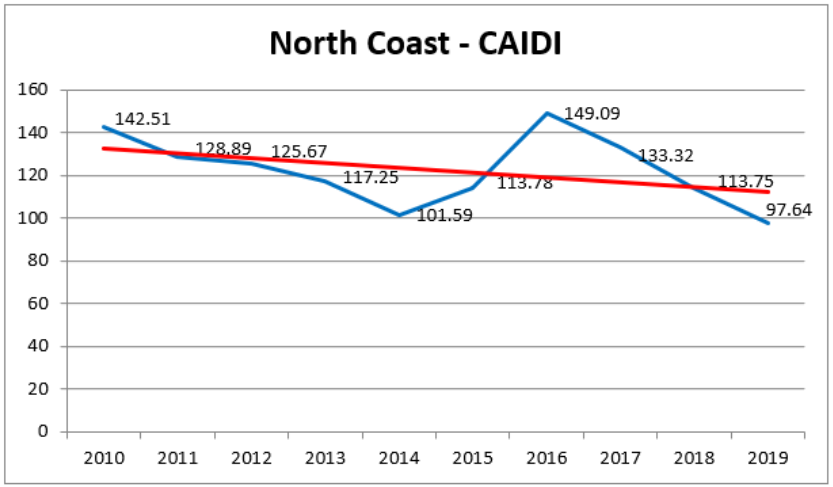


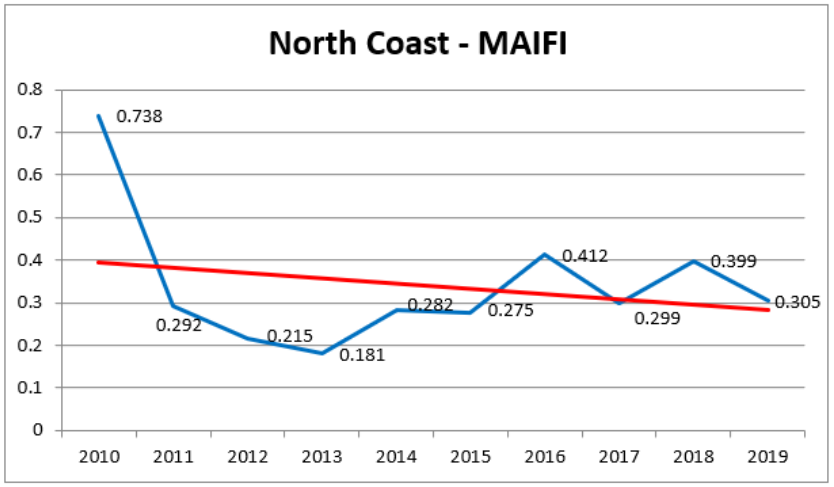


District Reliability Indices (Excludes Planned, ISO and MED)

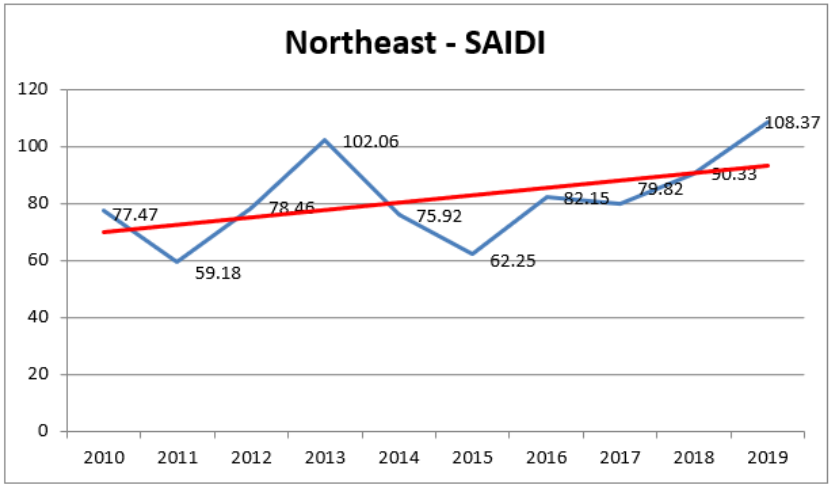


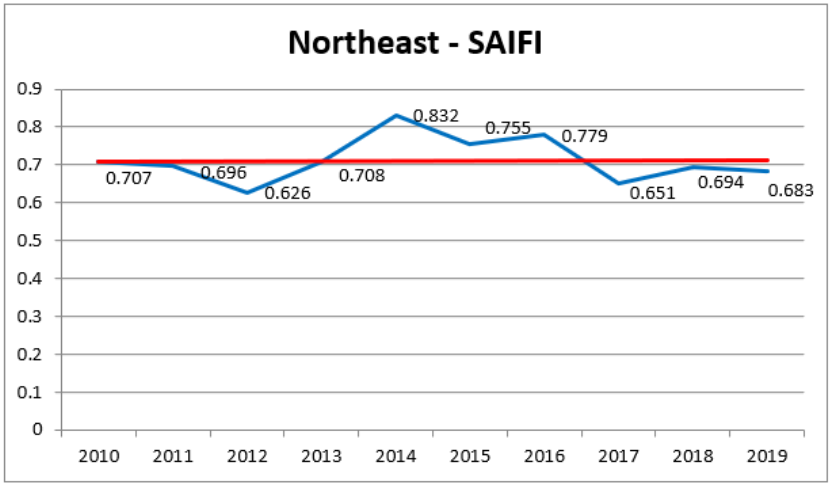


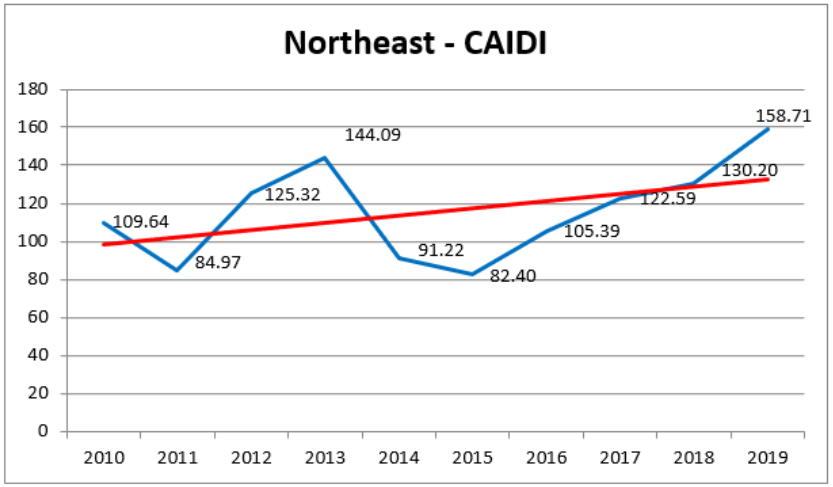


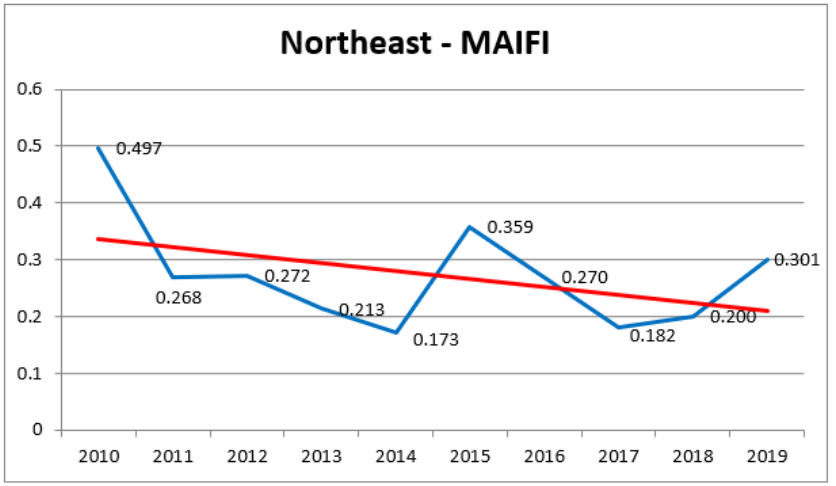


District Reliability Indices (Excludes Planned, ISO and MED)

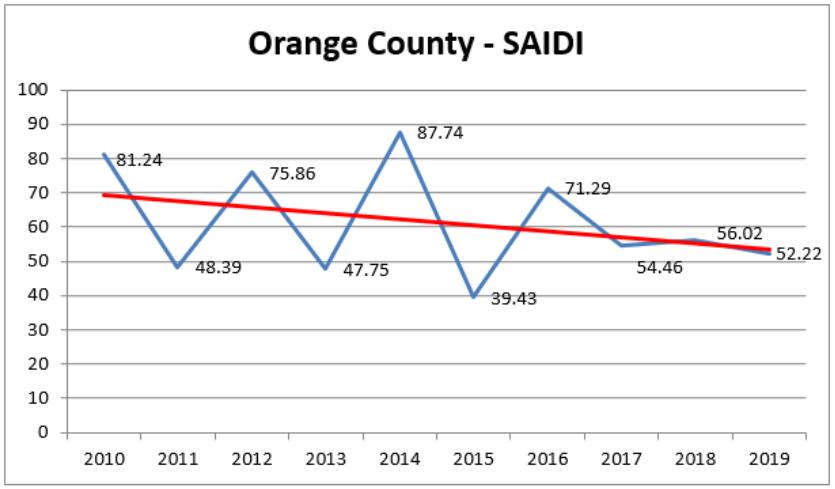


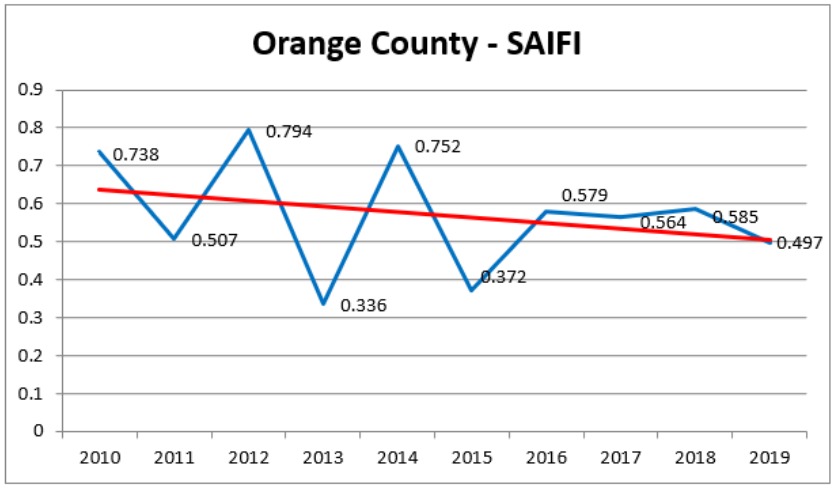


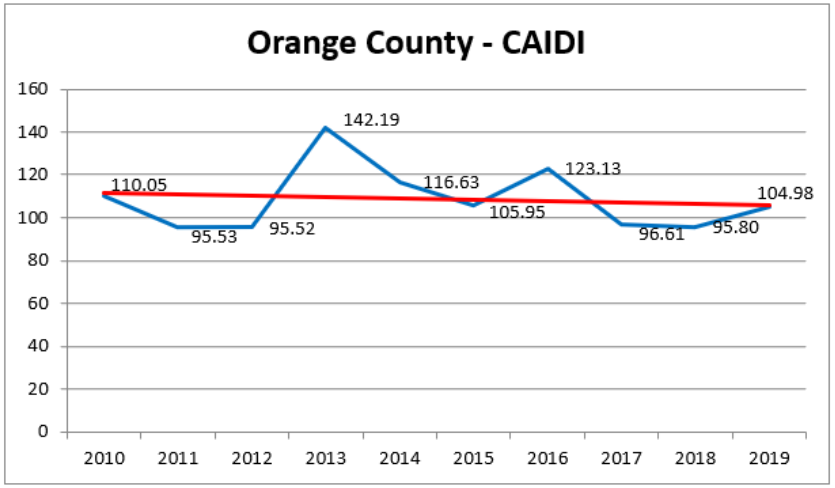


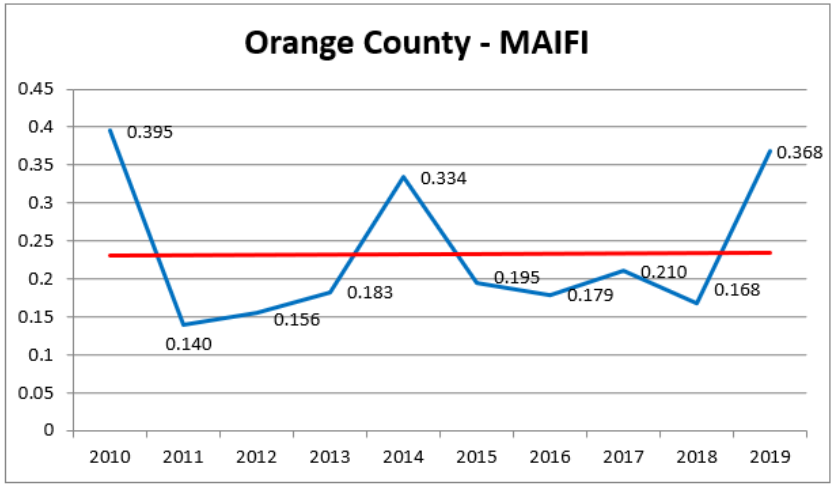


District Reliability Indices (Excludes Planned, ISO and MED)









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. Since the data for 2013-2015 was recorded for purposes other than as required per the Decision, the extracted data for those three years has not been reviewed and has not gone through a formal quality control process to assure accuracy of the indices in this Reliability Report.

The indices for years 2016 onward reflect an improved level of accuracy associated with using data that was recorded subject to a quality control program that was designed and implemented in 2016 to meet the Decision's reporting requirements. 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 2022 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 – 2019) 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	106.48	0.746	142.65	0.277	95.26	0.717	132.88	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	166.37	0.805	206.77	0.343	111.67	0.760	147.02	0.343

Beach Cites - District Indices (2013 – 2019) Planned and Unplanned								
MED Included					MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI	SAIDI	SAIFI	CAIDI	MAIFI
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

Eastern - District Indices (2013 – 2019) Planned and Unplanned								
MED Included					MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI	SAIDI	SAIFI	CAIDI	MAIFI
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	249.56	0.748	333.54	0.308	106.24	0.663	160.24	0.308

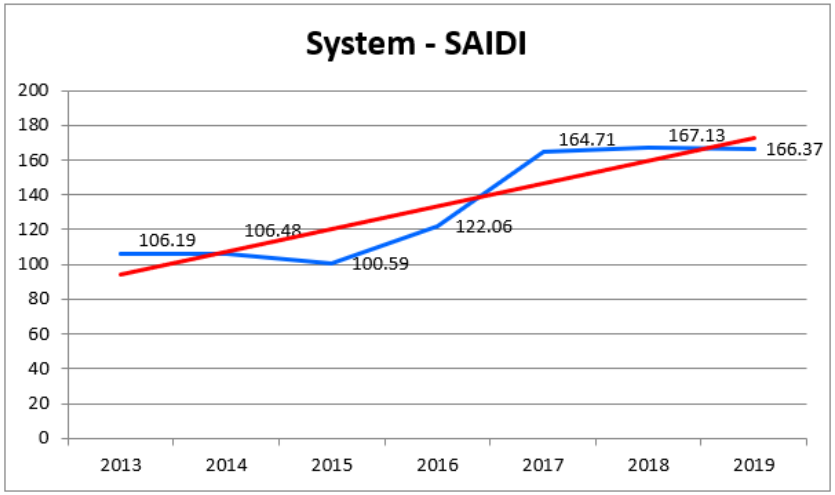
Metro - District Indices (2013 – 2019) Planned and Unplanned								
MED Included					MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI	SAIDI	SAIFI	CAIDI	MAIFI
2013	65.17	0.472	137.98	0.295	65.11	0.472	138.00	0.295
2014	105.54	0.752	140.25	0.374	95.16	0.724	131.43	0.328
2015	141.46	0.721	196.31	0.492	141.25	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	134.74	0.408
2019	100.65	0.692	145.37	0.325	99.78	0.688	144.97	0.325

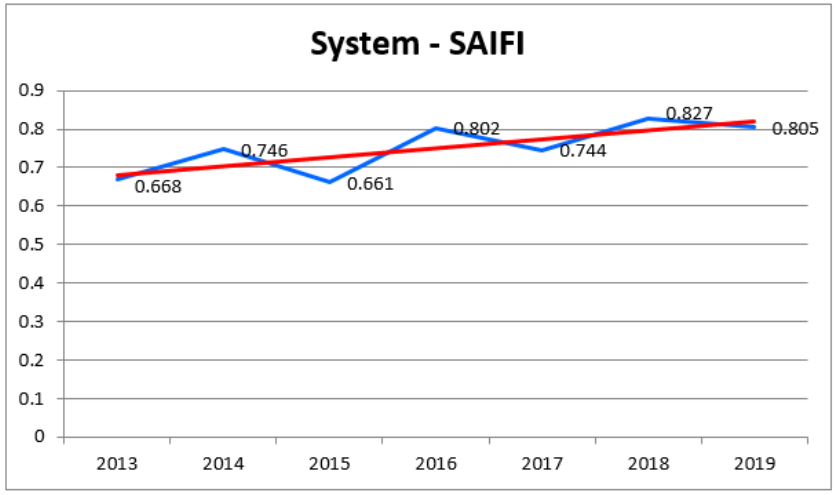
North Coast - District Indices (2013 – 2019) Planned and Unplanned								
MED Included					MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI	SAIDI	SAIFI	CAIDI	MAIFI
2013	90.52	0.625	144.79	0.191	89.84	0.624	144.02	0.191
2014	104.10	0.741	140.56	0.322	87.72	0.725	121.06	0.310
2015	87.90	0.580	151.58	0.299	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	115.08	0.772	148.99	0.319	91.16	0.748	121.84	0.319

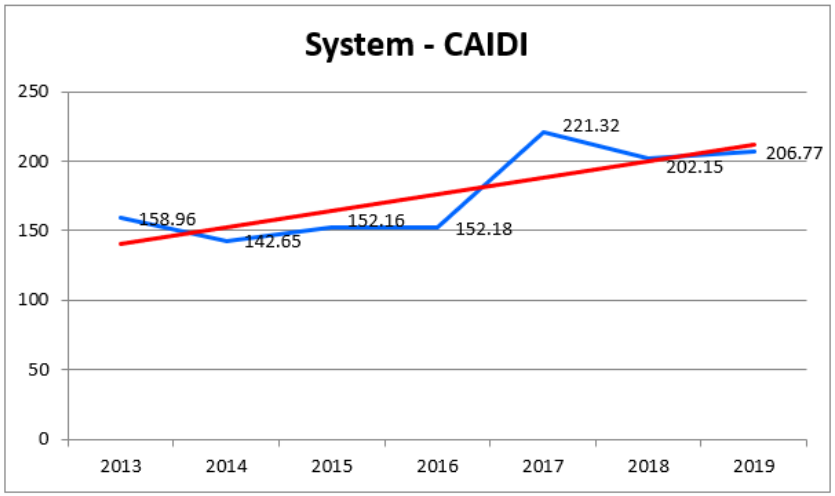
Northeast - District Indices (2013 – 2019) Planned and Unplanned								
MED Included					MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI	SAIDI	SAIFI	CAIDI	MAIFI
2013	130.01	0.817	159.11	0.264	129.99	0.817	159.12	0.264
2014	121.17	1.016	119.20	0.217	101.35	0.950	106.72	0.215
2015	95.03	0.911	104.37	0.431	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	312.52	1.043	299.76	0.234	158.01	0.948	166.64	0.234
2019	344.60	1.050	328.21	0.444	170.31	0.924	184.26	0.444

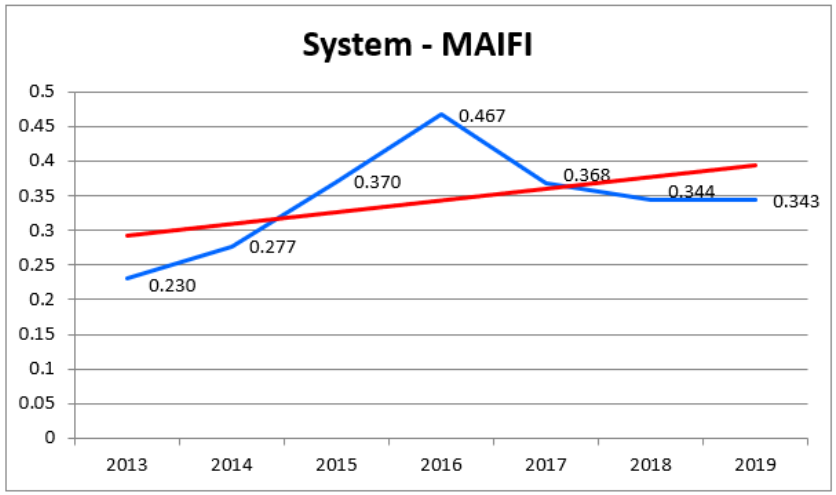
Orange County - District Indices (2013 – 2019) Planned and Unplanned								
MED Included					MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI	SAIDI	SAIFI	CAIDI	MAIFI
2013	233.85	1.430	163.49	0.245	65.52	0.438	149.54	0.245
2014	122.61	0.906	135.36	0.348	122.56	0.906	135.33	0.348
2015	80.31	0.505	158.94	0.211	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

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

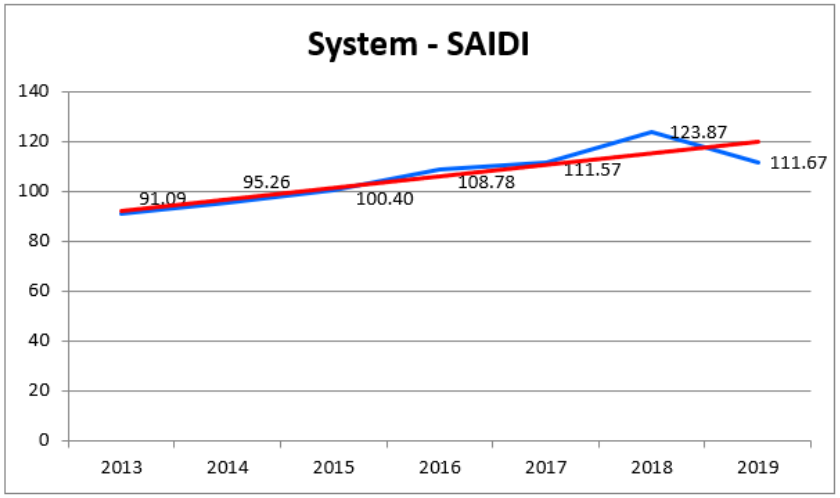


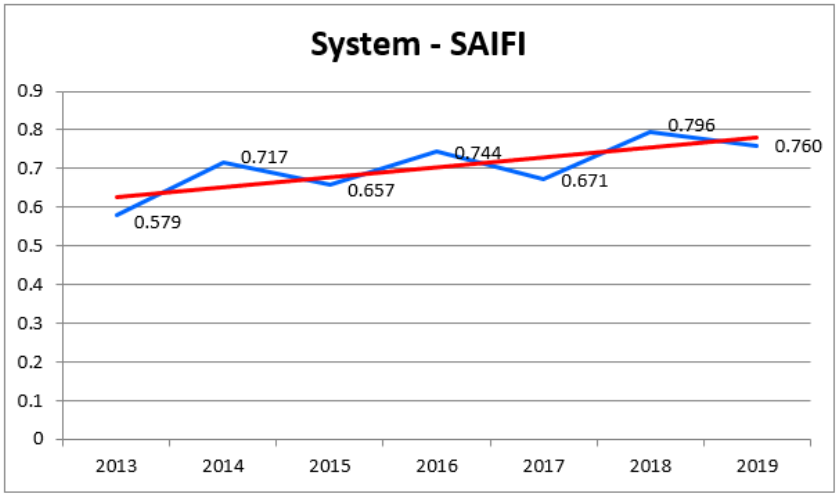


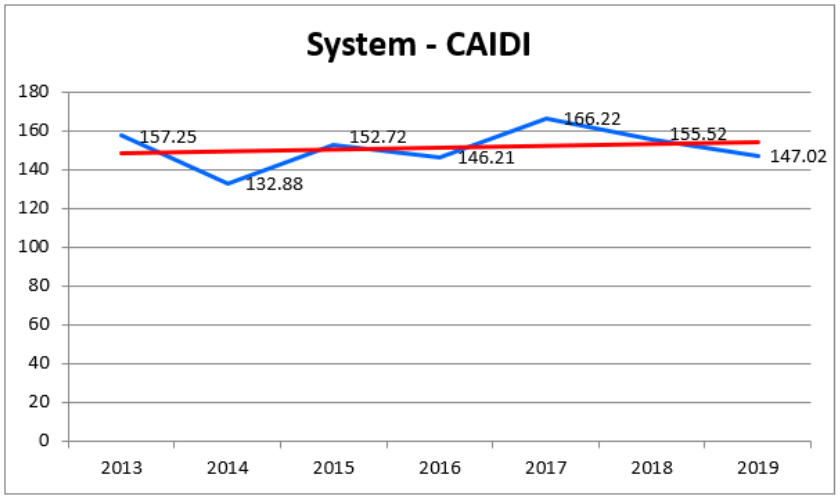


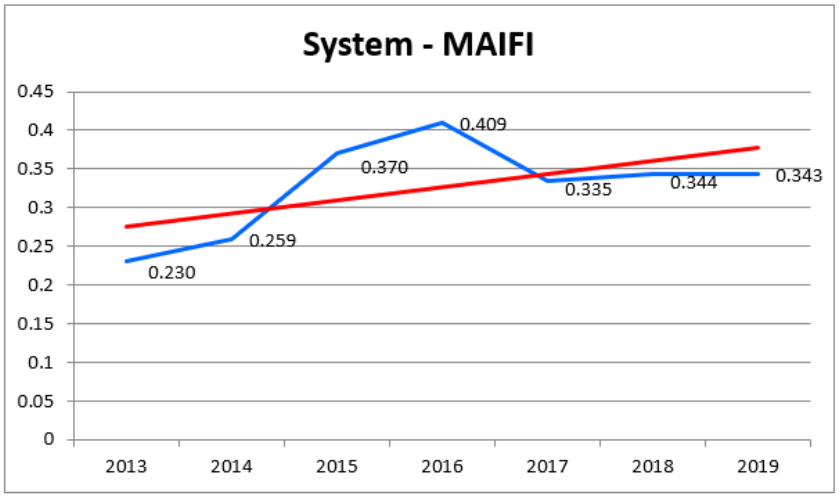


System Indices - Planned and Unplanned (Excludes ISO and MED)

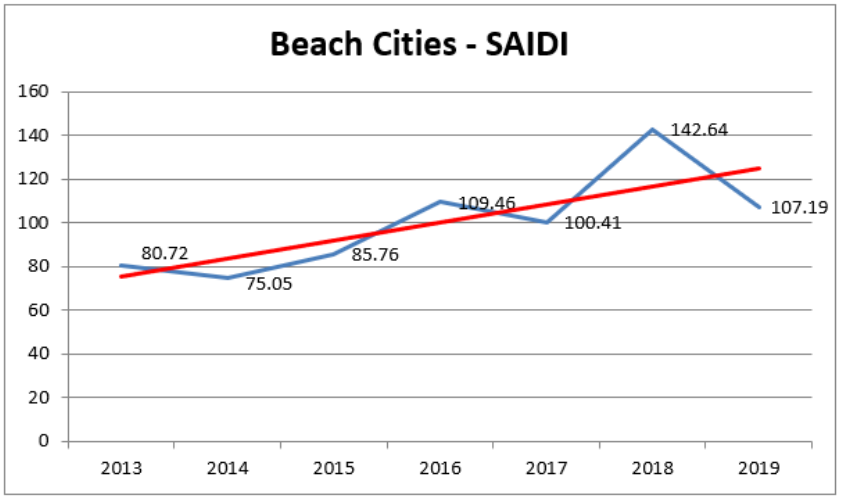


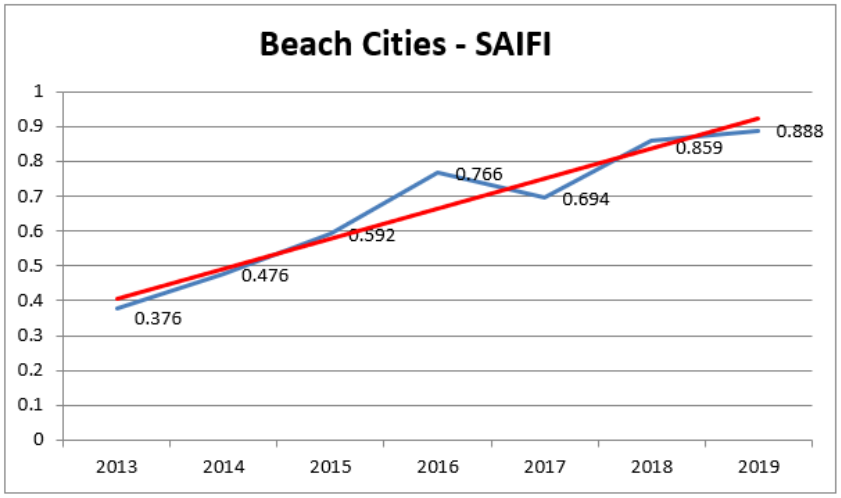


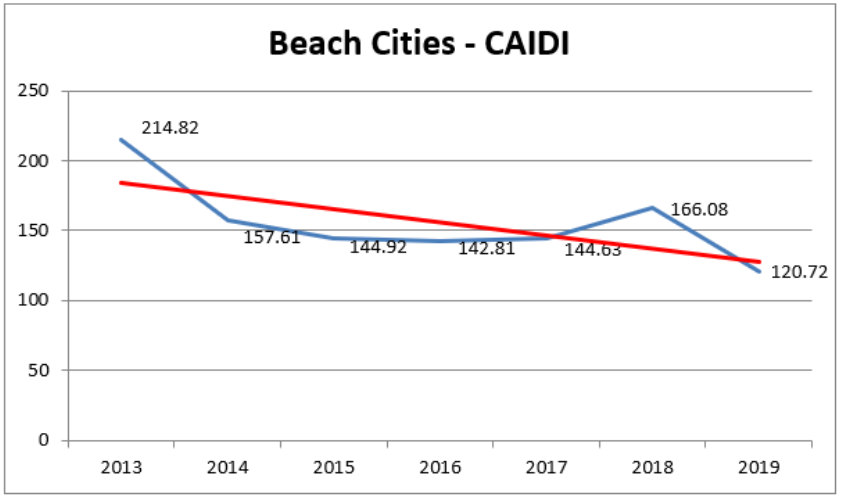


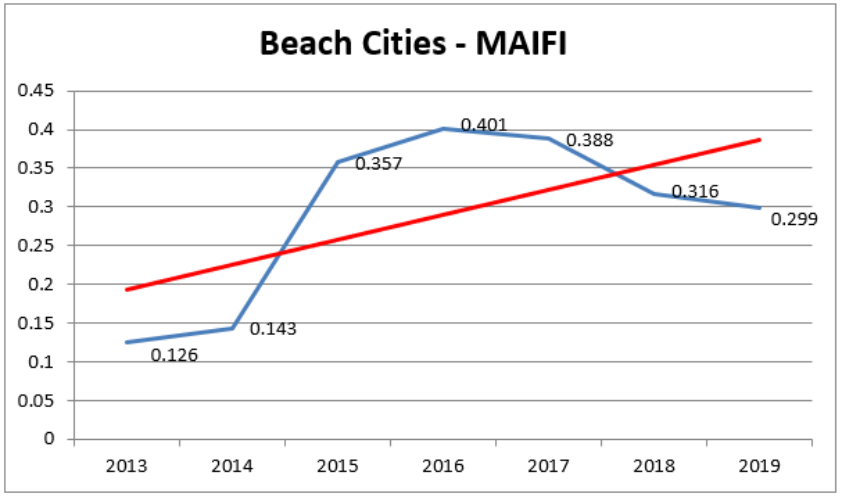


District Indices - Planned and Unplanned (Excludes ISO; Includes MED)

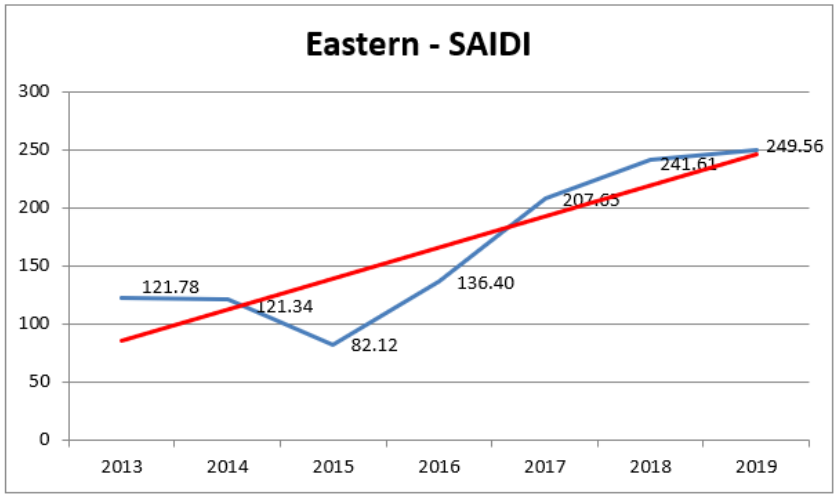


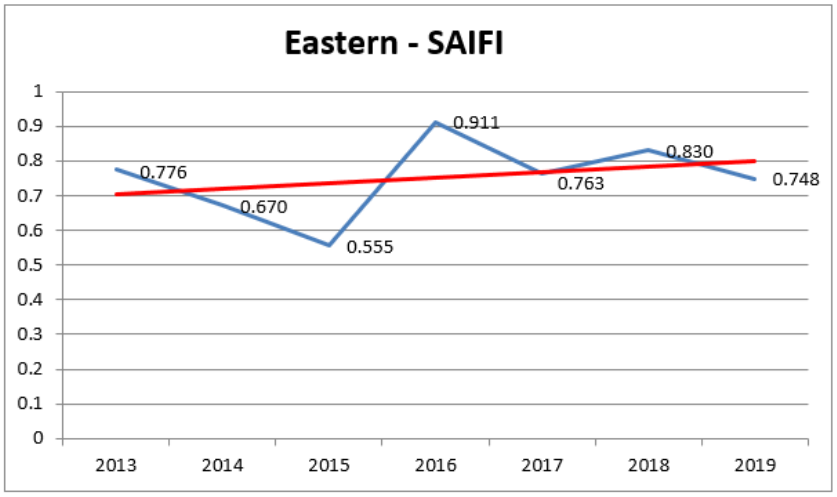


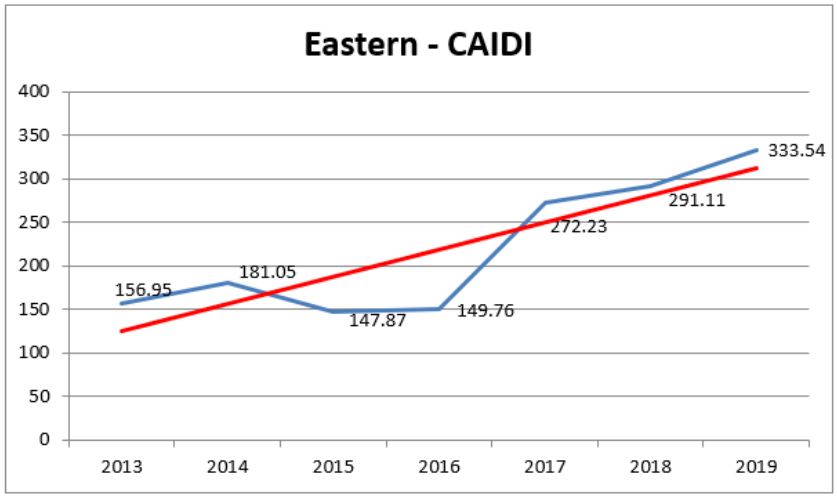


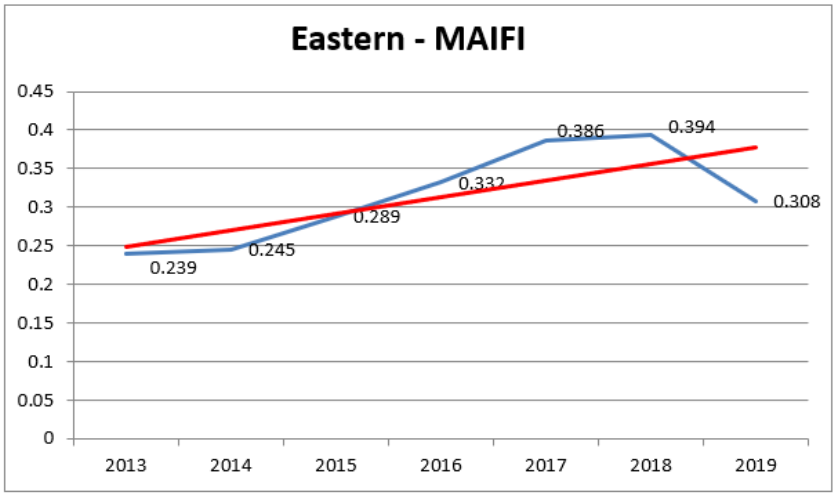


District Indices - Planned and Unplanned (Excludes ISO; Includes MED)

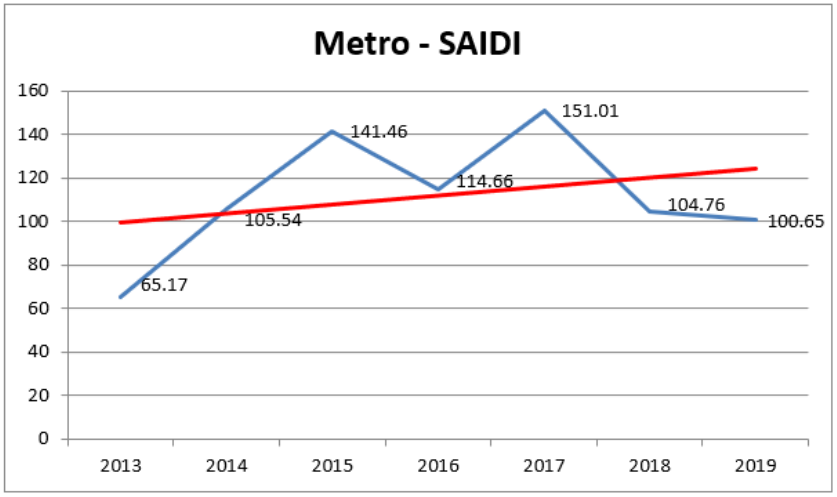


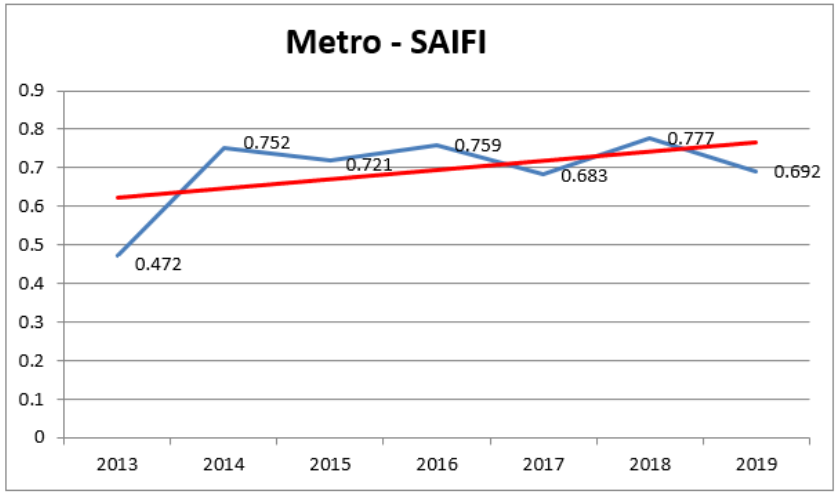


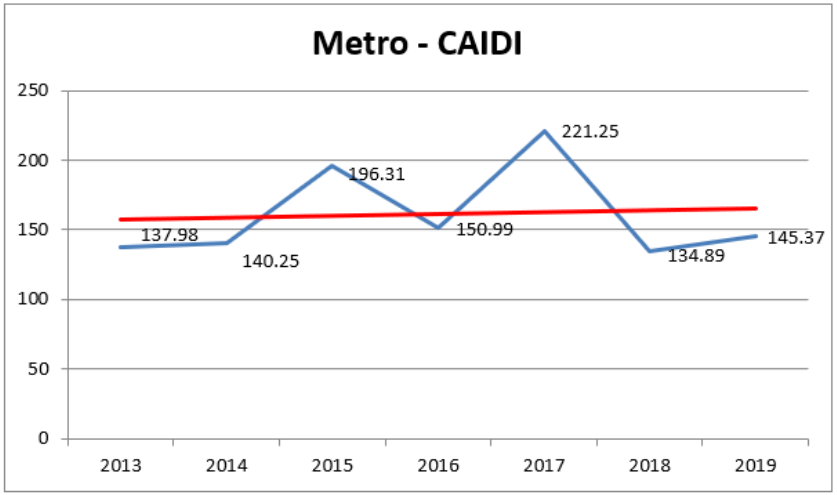


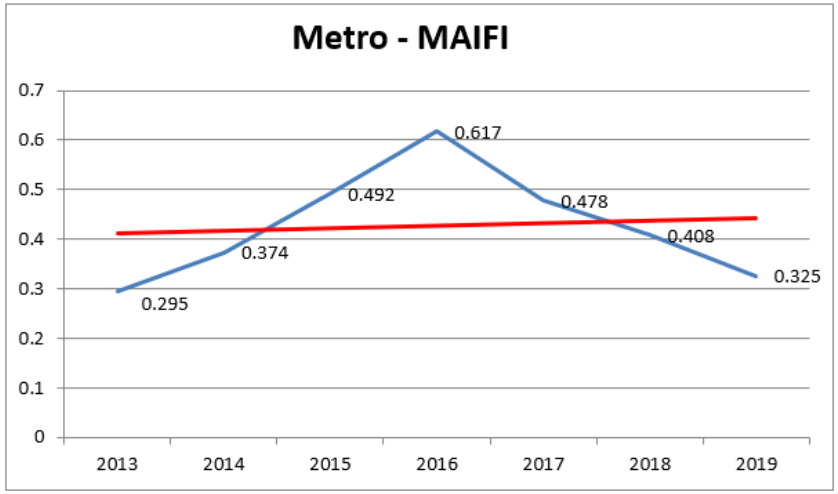


District Indices - Planned and Unplanned (Excludes ISO; Includes MED)

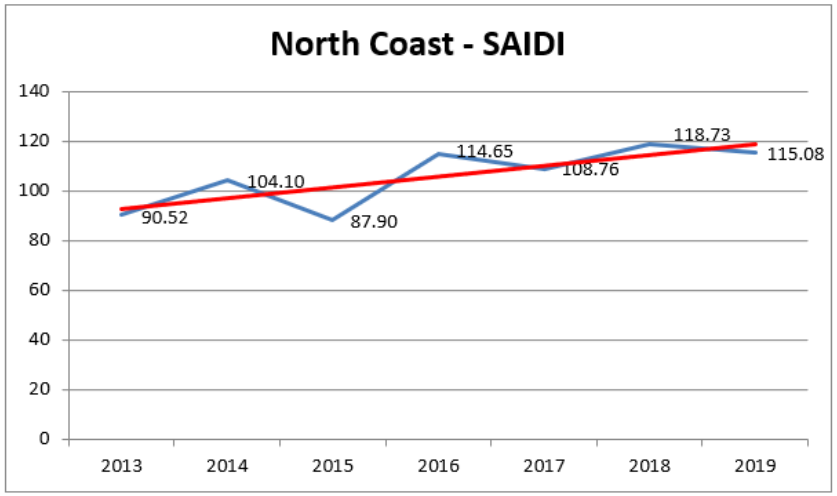


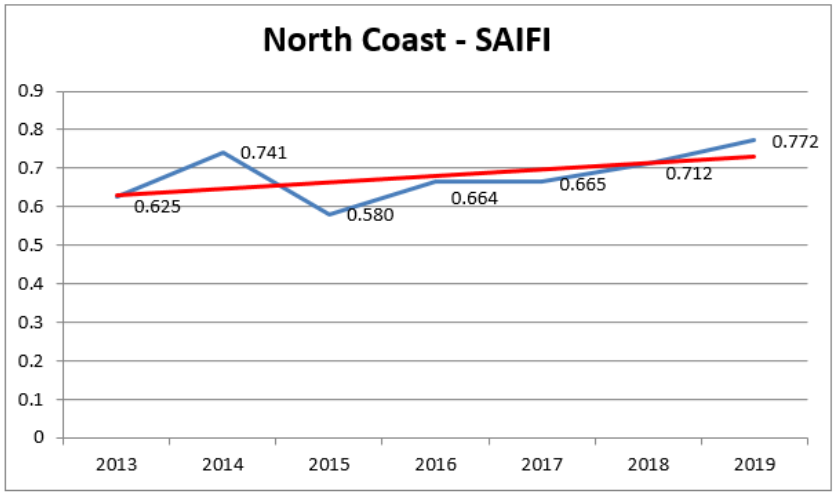


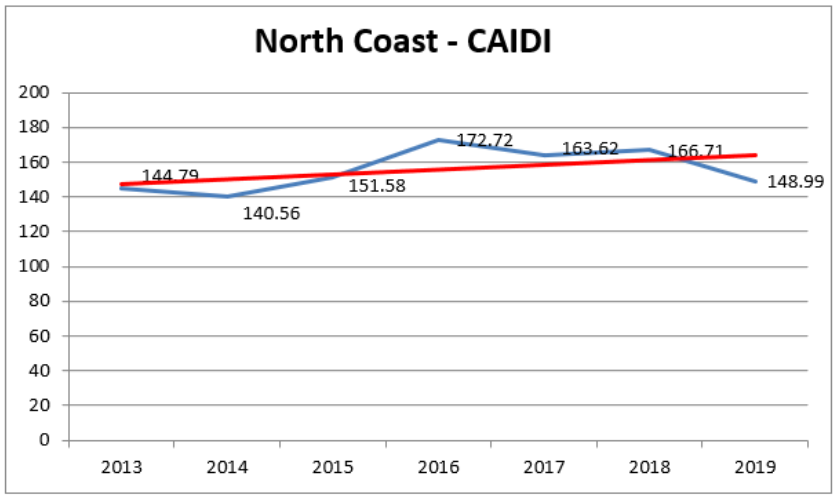


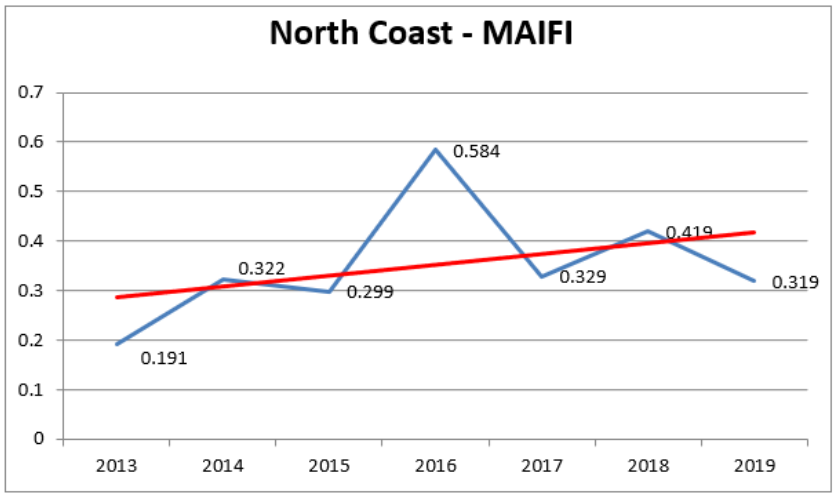


District Indices - Planned and Unplanned (Excludes ISO; Includes MED)

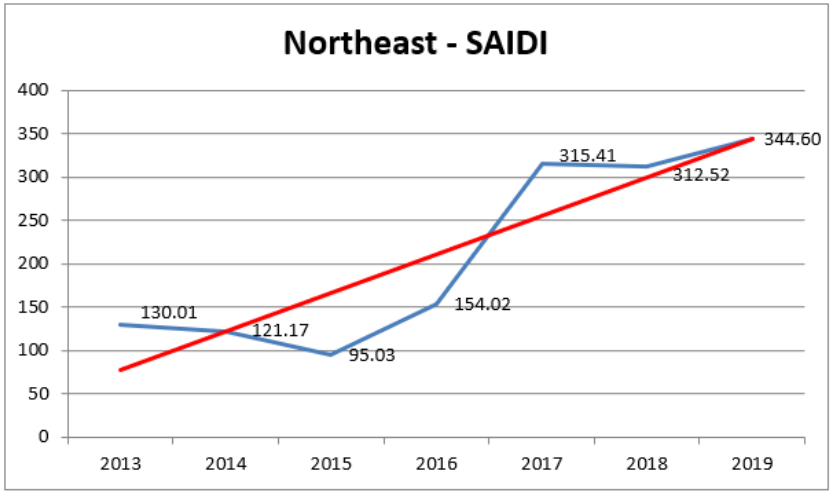


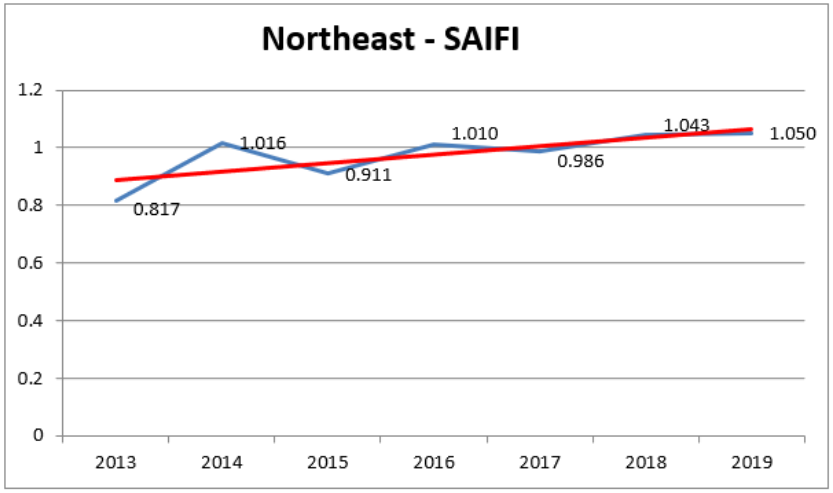


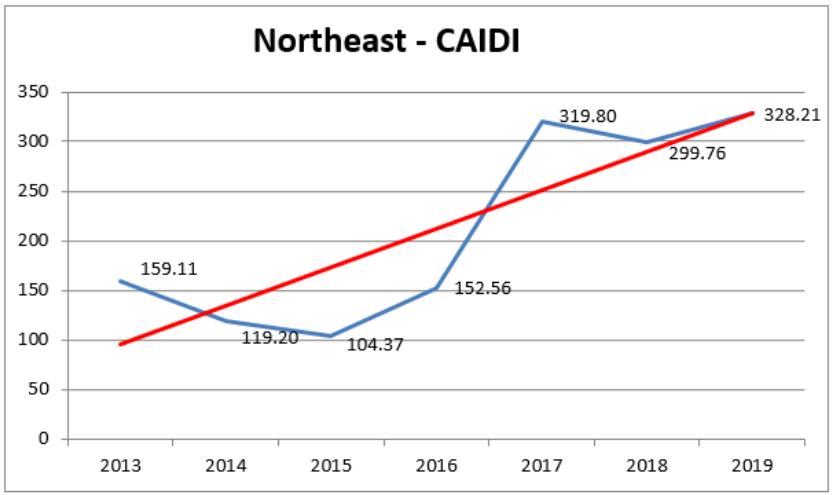


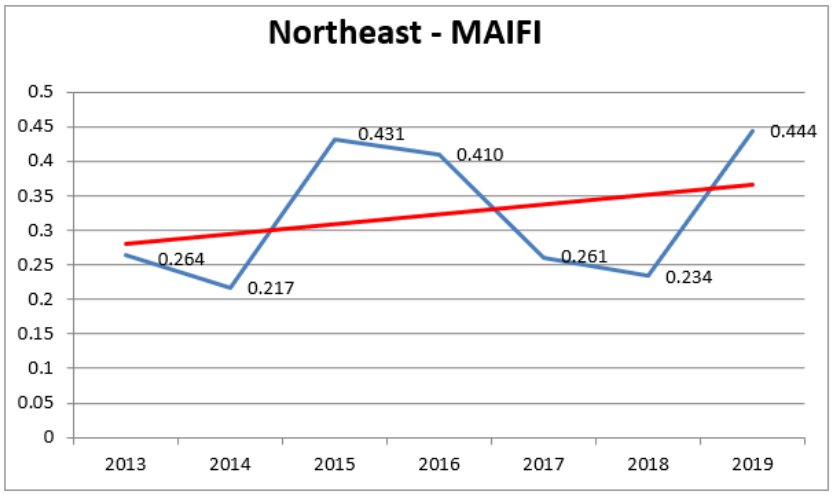


District Indices - Planned and Unplanned (Excludes ISO; Includes MED)

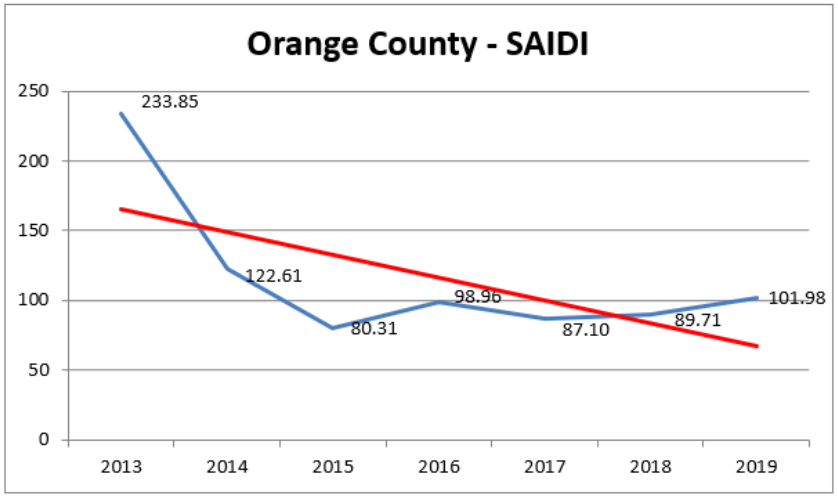


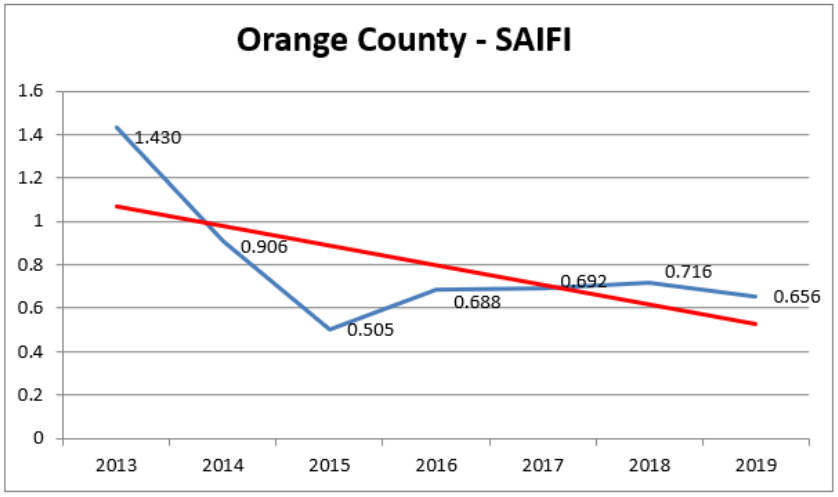


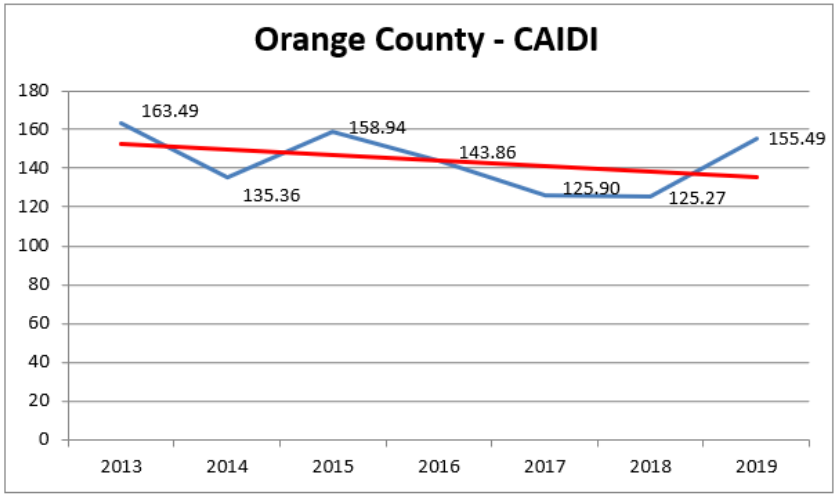


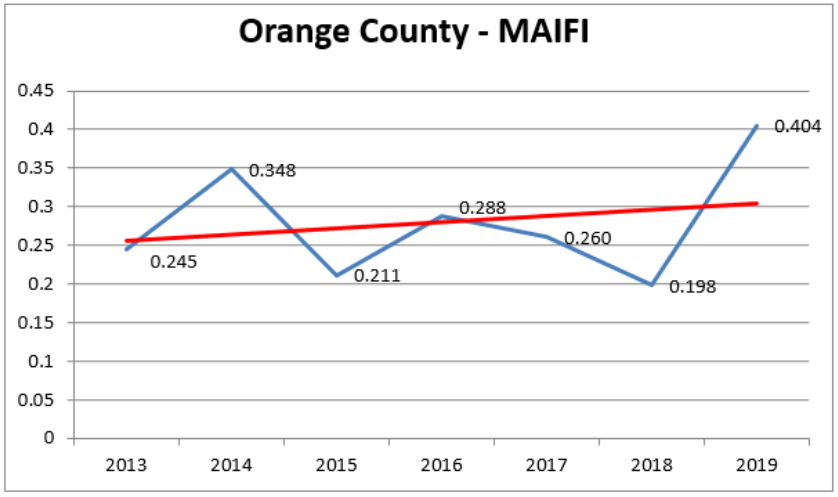


District Indices - Planned and Unplanned (Excludes ISO; Includes MED)

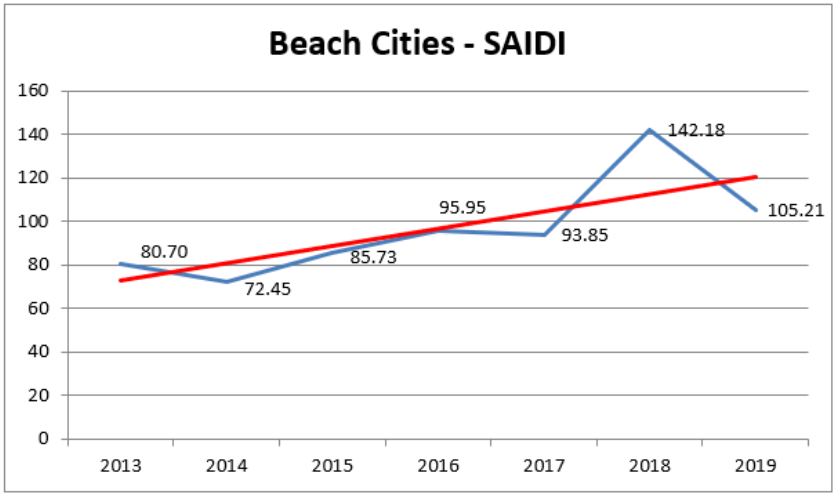


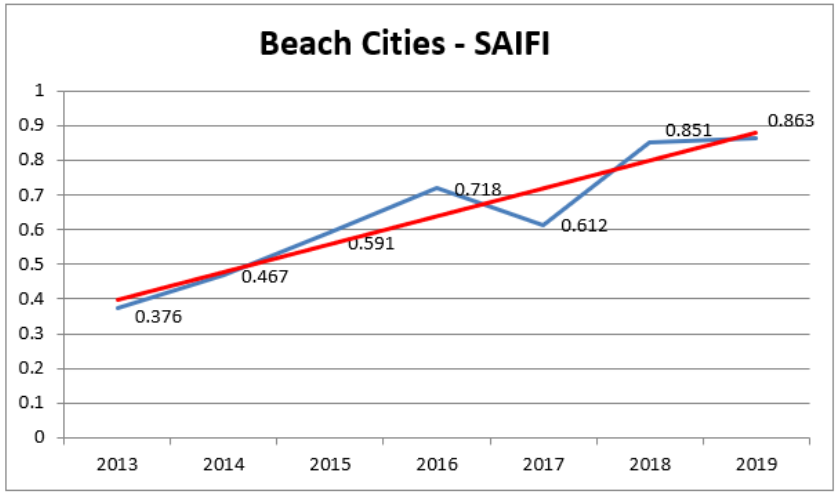


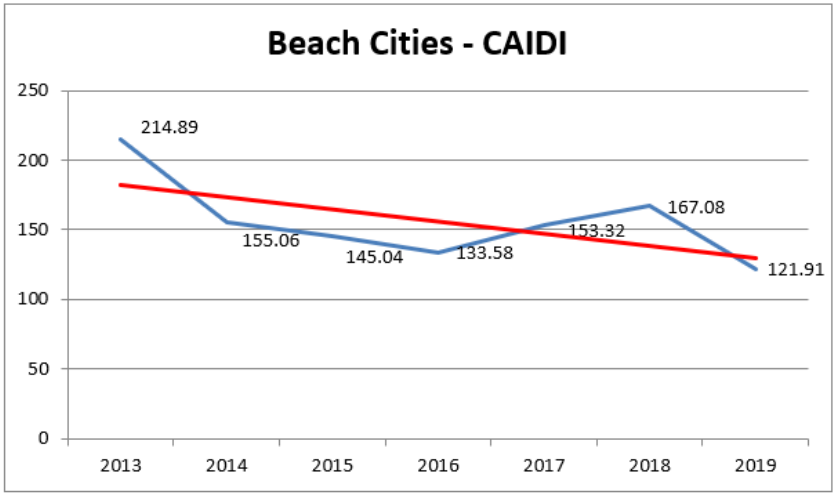


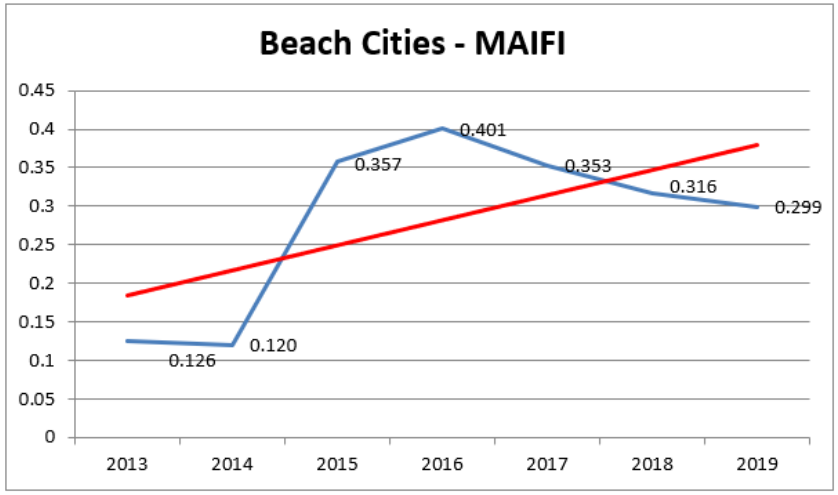


District Indices - Planned and Unplanned (Excludes ISO and MED)

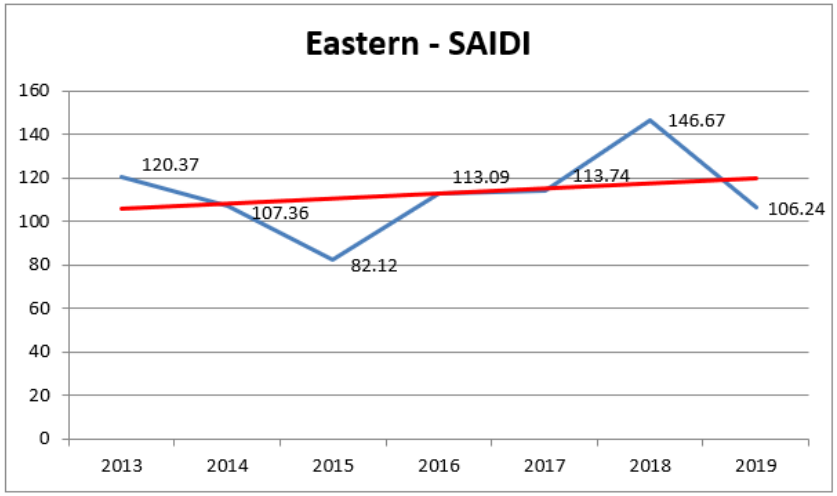


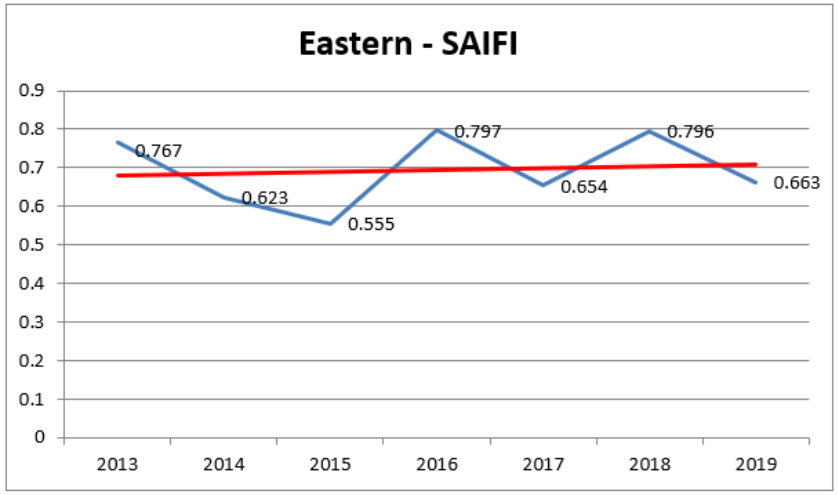


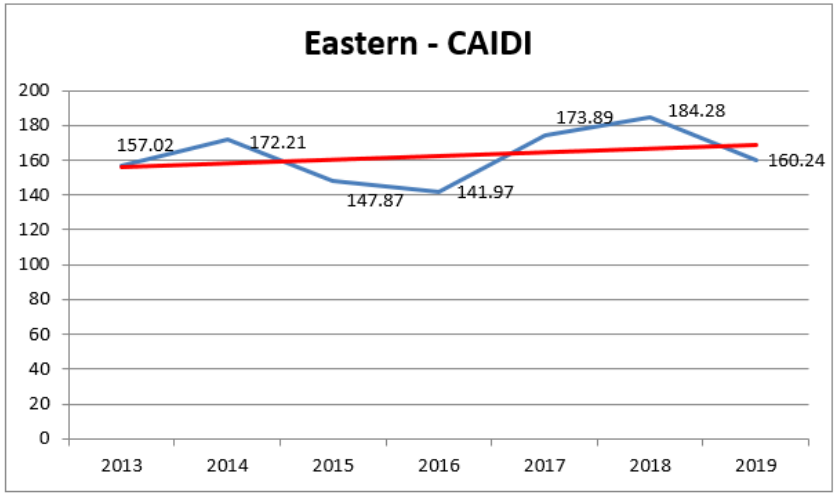


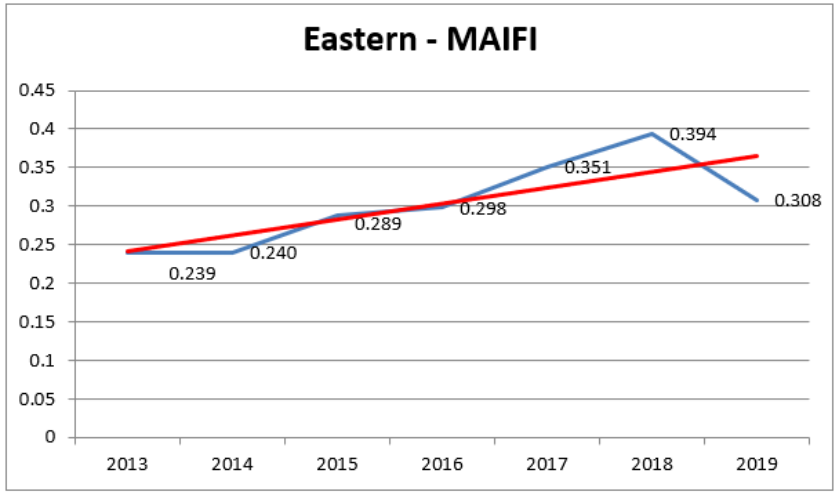


District Indices - Planned and Unplanned (Excludes ISO and MED)

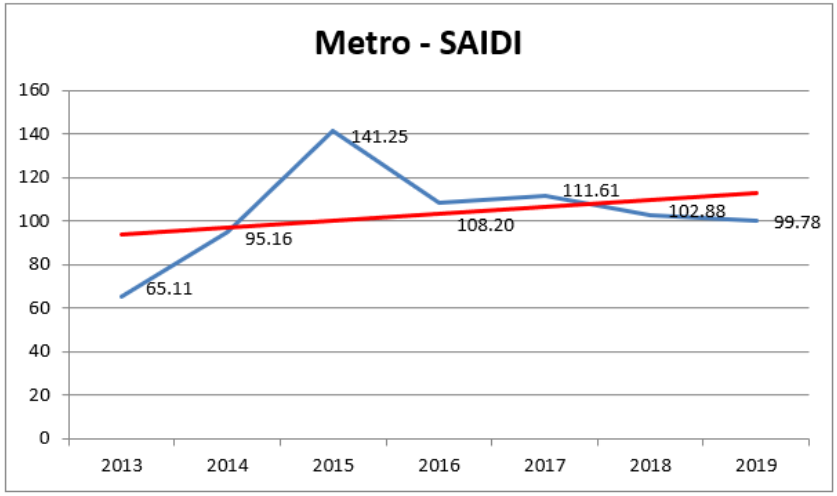


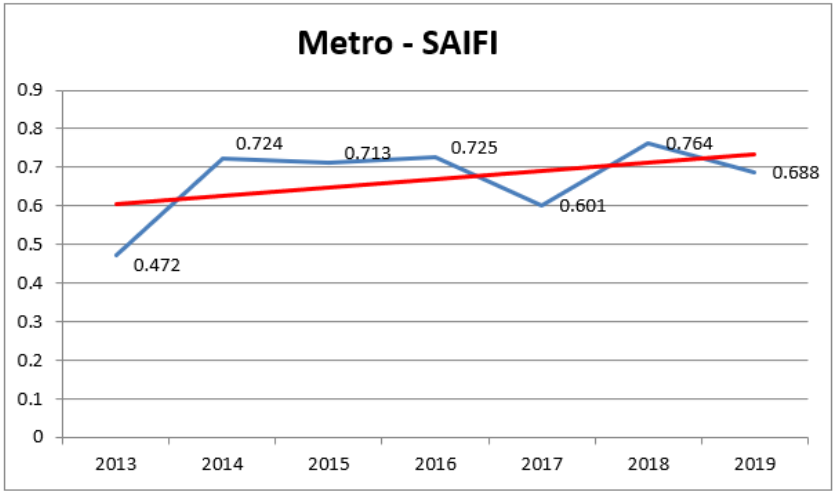


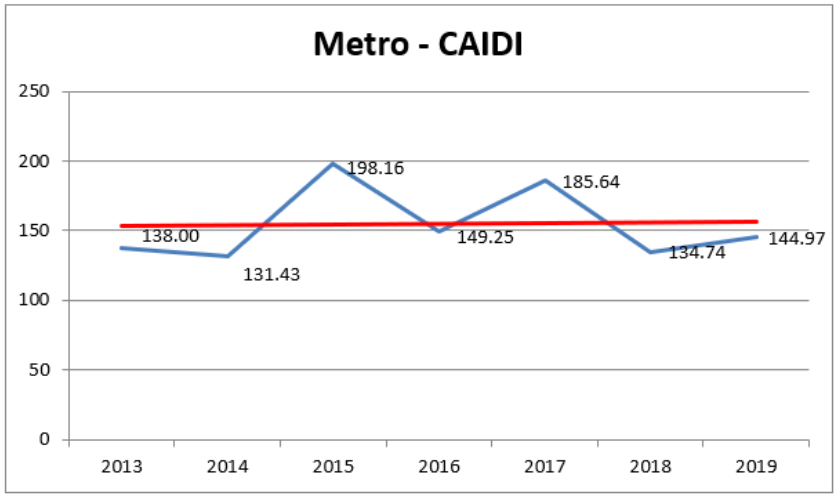


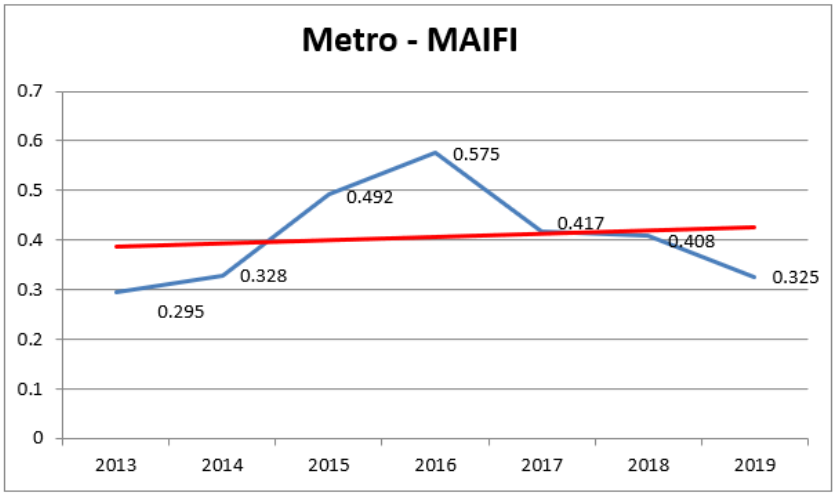


District Indices - Planned and Unplanned (Excludes ISO and MED)

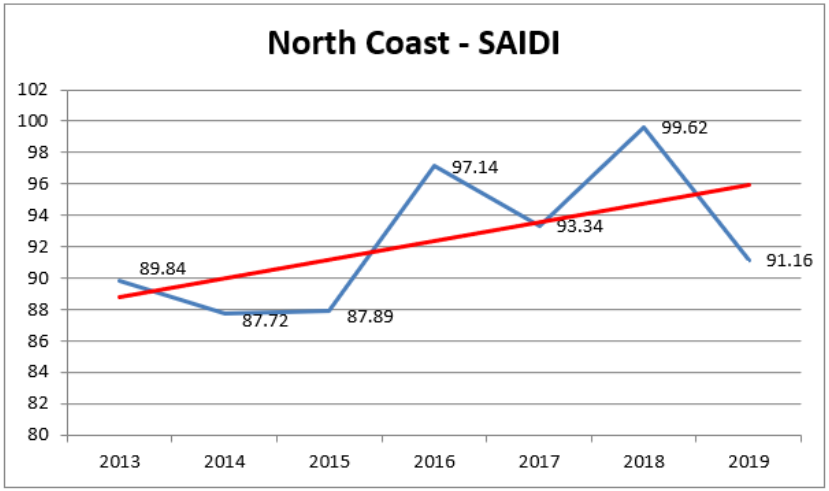


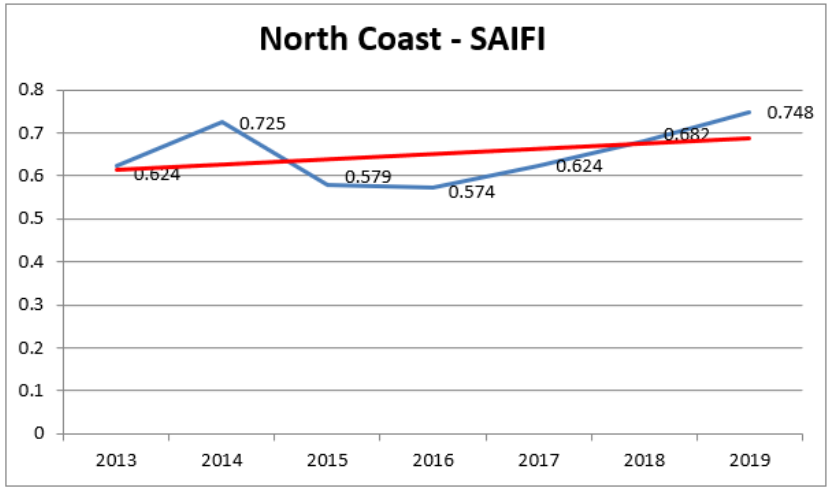


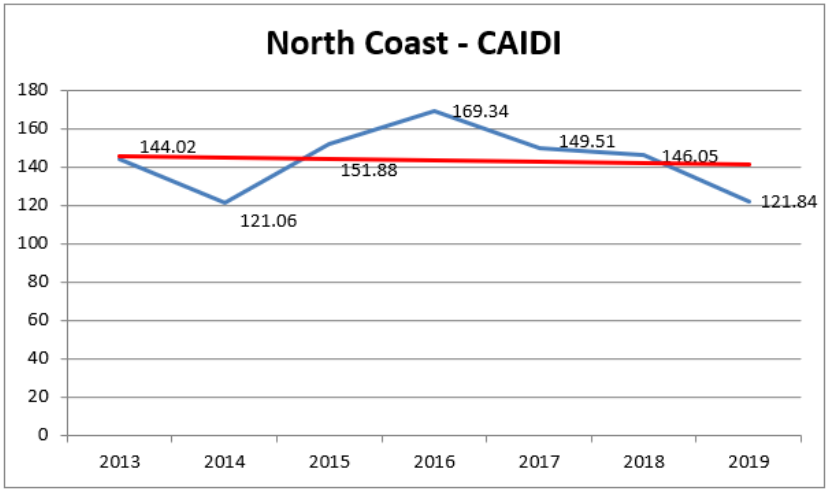


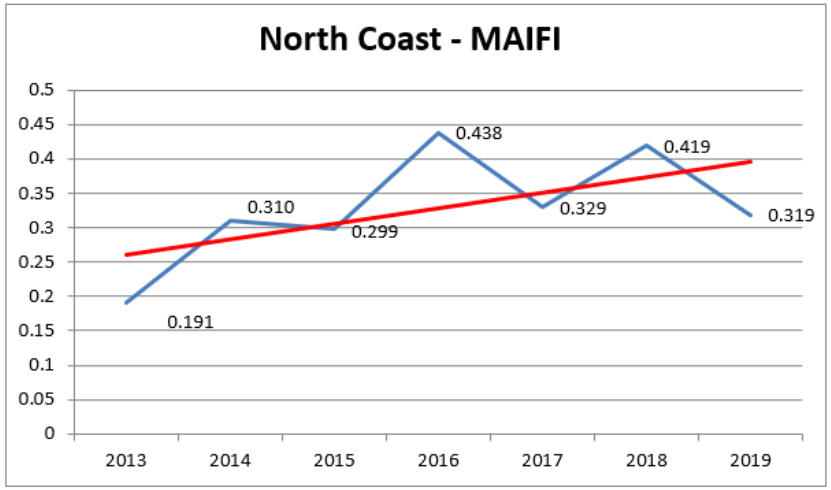


District Indices - Planned and Unplanned (Excludes ISO and MED)

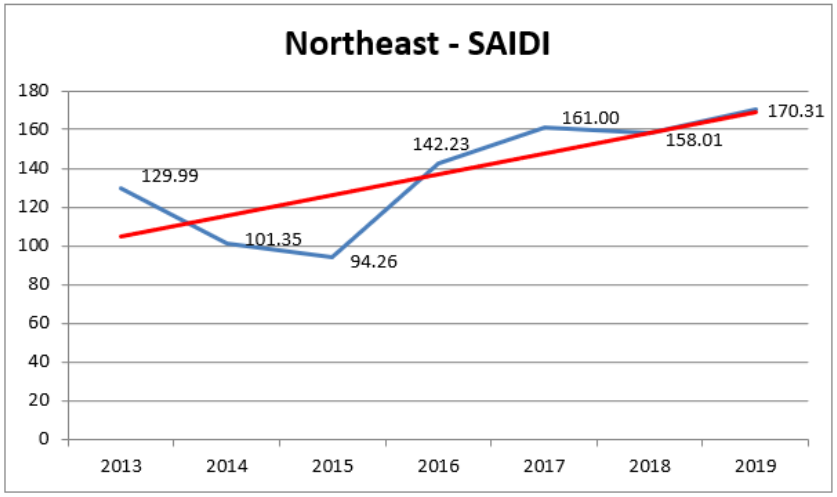


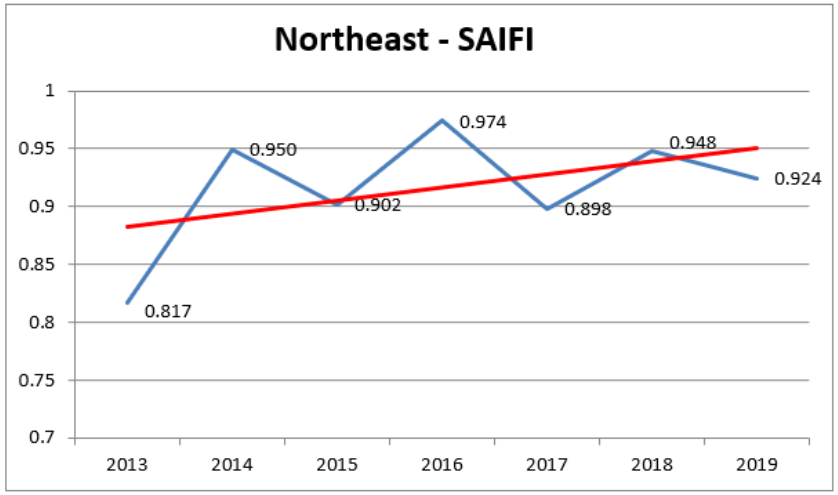


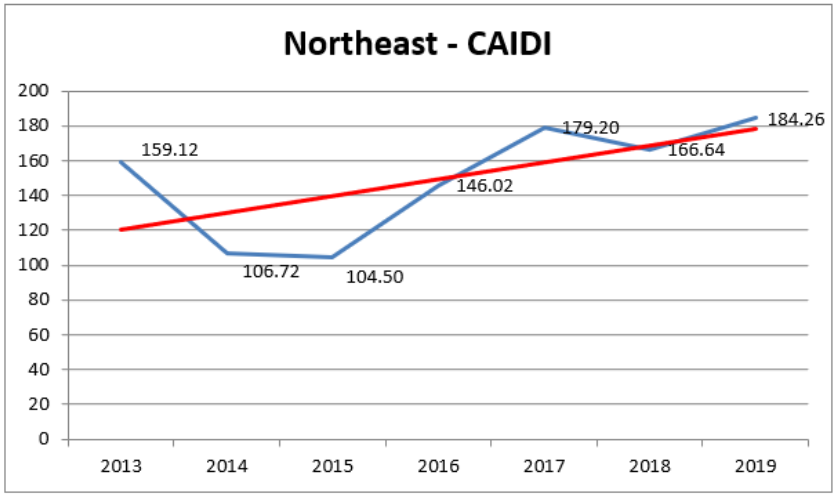


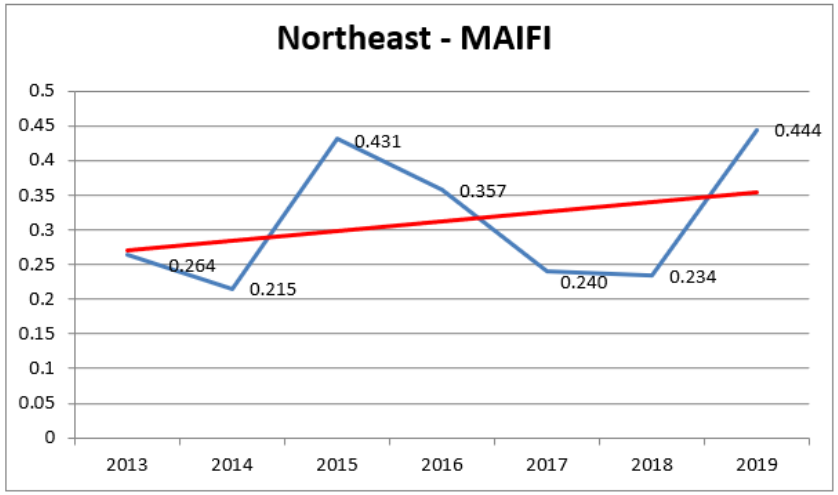


District Indices - Planned and Unplanned (Excludes ISO and MED)

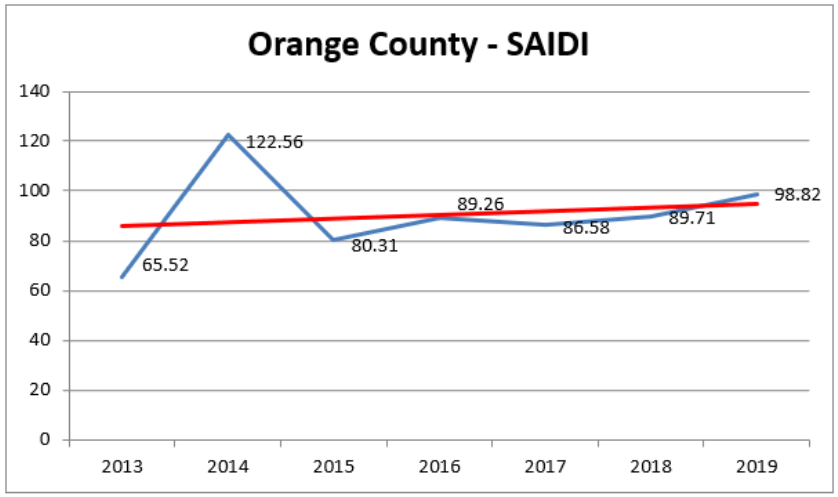


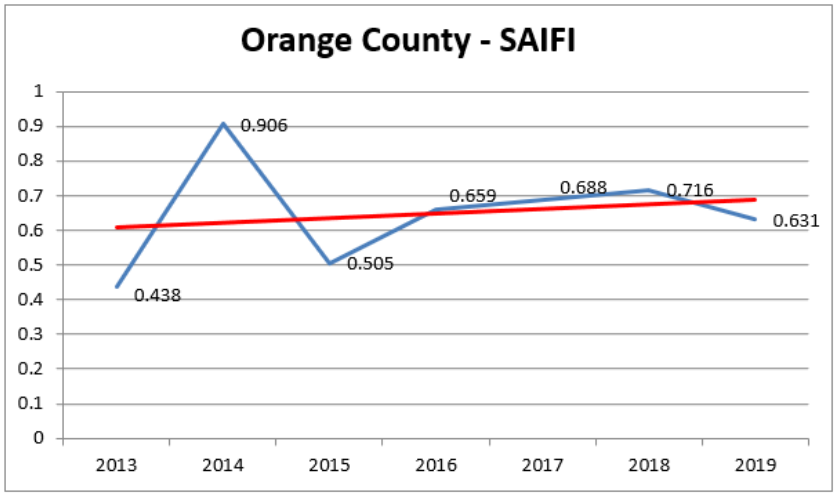


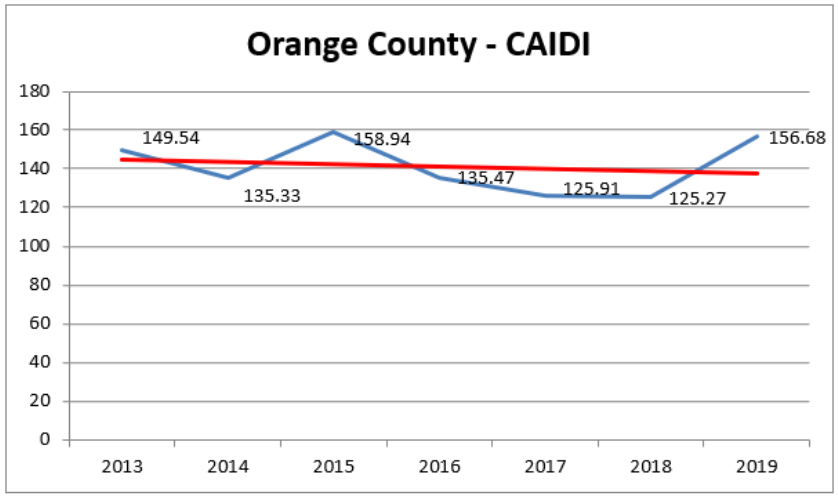


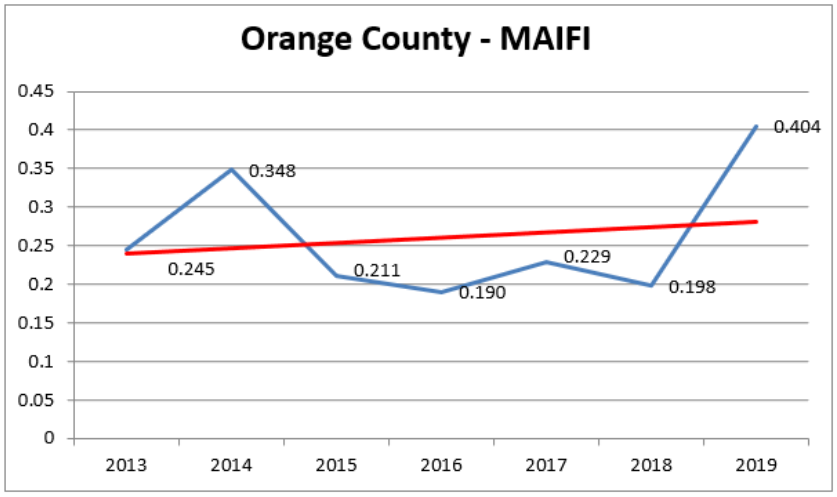


District Indices - Planned and Unplanned (Excludes ISO and MED)









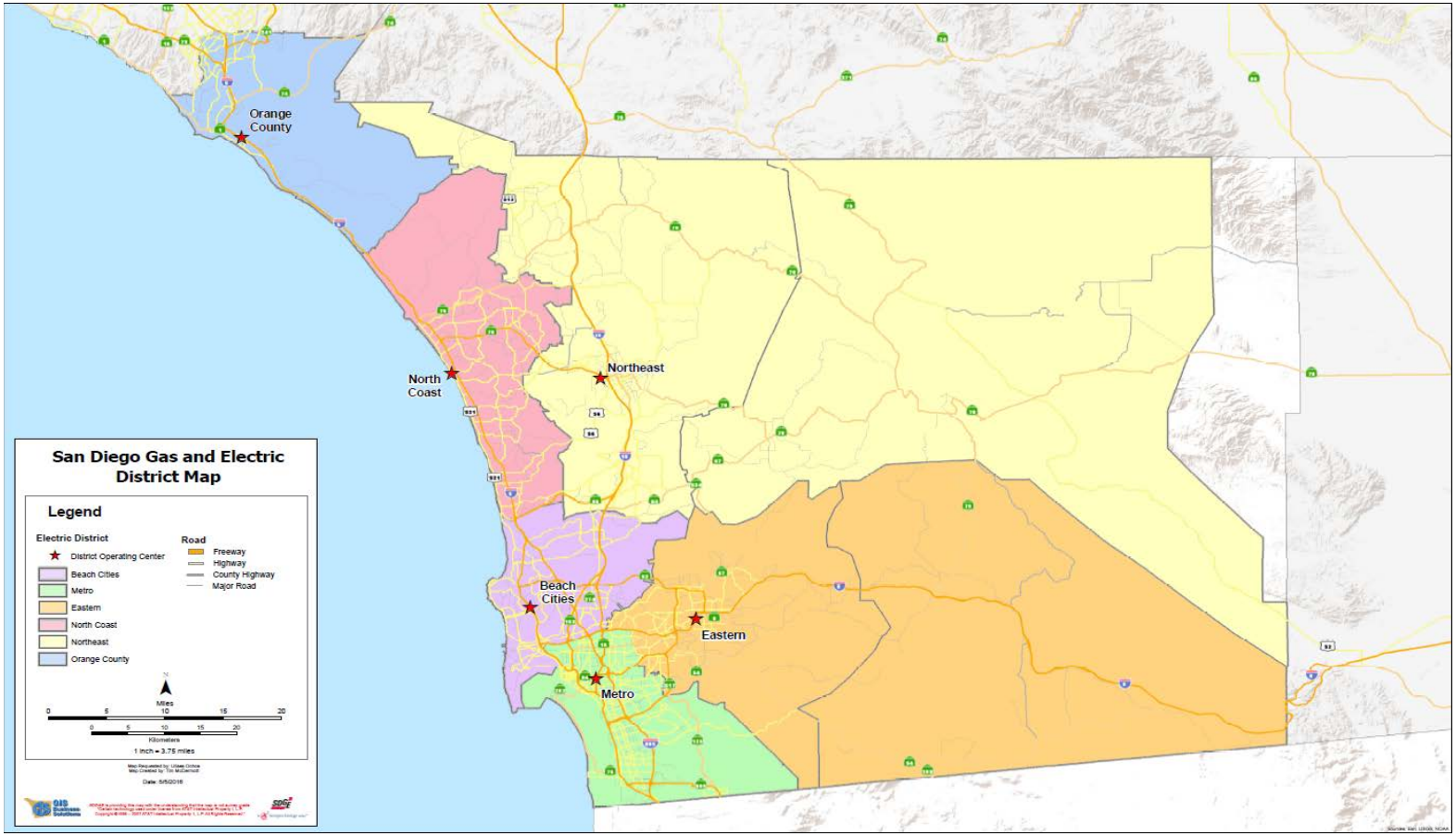
NUMBER, DATE AND LOCATION OF PLANNED OUTAGES IN EACH DISTRICT (2019)

Planned Outages – 2019						
Month	**Beach Cities**	**Eastern**	**Metro**	**North Coast**	**Northeast**	**Orange County**
January	22	74	27	38	68	10
February	28	44	22	32	61	18
March	27	45	26	45	104	22
April	30	76	37	41	123	13
May	28	39	22	39	97	19
June	35	33	20	32	97	17
July	38	43	18	55	114	12
August	21	49	22	33	113	16
September	27	91	16	23	130	4
October	35	58	21	13	92	16
November	31	94	14	20	157	13
December	16	95	19	27	125	10
Totals	**338**	**741**	**264**	**398**	**1281**	**170**

In 2019 there were 3192 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.
"Certain technology used under license from AT&T Intellectual Property I, L.P.
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SECTION 5 – TOP 1% OF WORST-PERFORMING CIRCUITS (WPC) EXCLUDING MED

TOP 1% OF WORST PERFORMING CIRCUITS (2018-2019)

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[1].

Preferred Metric is Circuit SAIDI

[1] 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.

Table 5.1:
2019 Worst SAIDI Circuits List based upon 2018-2019 data (Excludes Planned and MED)

Circuit	District	Circuit Customers	Substation Name	Circuit Miles	% OH	% UG	Annualized Feeder Outage Count	Annualized Total Circuit SAIDI **
*440	Eastern	266	GLENCLIFF	23.5	84%	16%	7	3645
*1215	Eastern	151	CRESTWOOD	23.7	97%	3%	6	3146
*441	Eastern	123	GLENCLIFF	30.9	85%	15%	6	2664
1233	Northeast	350	PALA	31.1	95%	5%	4	1539
176	Northeast	1,408	POWAY	87.5	67%	33%	4	1528
*445	Eastern	965	BOULEVARD	108.4	95%	5%	5	1415
*79	Eastern	882	DESCANSO	76.9	93%	7%	10	1327
*CE1	Metro	142	CENTRAL	1.4	0%	100%	3	1215
214	Northeast	684	RINCON	65.4	94%	6%	5	1053
OS4	North Coast	555	OCEANSIDE 4	1.4	90%	10%	1	921

* Circuit appeared on the previous worst performance list

** Circuit SAIDI represents the two-year average (2018-2019) of all outages: Mainline, Feeder, Backbone, and Branch

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

Table 5.2:
2019 Worst SAIFI Circuits List based upon 2018-2019 data (Excludes Planned and MED)

Circuit	District	Circuit Customers	Substation Name	Circuit Miles	% OH	% UG	Annualized Feeder Outage Count	Annualized Total Circuit SAIFI **
*442	Eastern	864	GLENCLIFF	33.1	86%	14%	8	5.3
*440	Eastern	266	GLENCLIFF	23.5	84%	16%	7	5.2
*1215	Eastern	151	CRESTWOOD	23.7	97%	3%	6	4.3
*441	Eastern	123	GLENCLIFF	30.9	85%	15%	6	3.7
79	Eastern	882	DESCANSO	76.9	93%	7%	10	3.6
S1	Metro	710	SAMPSON 1	6.3	75%	25%	1	3.6
*SL1	Northeast	229	SALTON	5.0	98%	2%	4	3.5
237	Northeast	1,606	CREELMAN	96.7	78%	22%	4	3.3
*310	Orange County	4,732	LAGUNA NIGUEL	33.0	22%	78%	3	3.2
RB1	Northeast	269	RAINBOW 1	17.2	91%	9%	3	3.2

* Circuit appeared on the previous worst performance list

** Circuit SAIFI represents the two-year average (2018-2019) of all outages: Mainline, Feeder, Backbone, and Branch

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

b. Any circuit appearing on this 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 440

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

C440 was listed as a worst circuit due to circuit SAIDI and SAIFI performance.

ii. A historical record of the metric:

C440: 2 Year Circuit SAIDI and SAIFI Data

Cir	Metric	2018	2019
440	Circuit SAIDI	6835	455
440	Circuit SAIFI	5.2	5.2

Note: See methodology in section 5c

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

Circuit 440 was on the worst circuit SAIDI and SAIFI list, largely due to the effects of PSPS, which contributed to 71% of the circuit SAIDI over the last two years. Of the remaining non-PSPS Circuit SAIDI, weather related outages accounts for 38% of impacts followed by equipment failure at 29%.

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

The Cleveland National Forest project (CNF) project will rebuild most of C440 with fire hardened structures and a large section will be undergrounded. The project is ongoing through 2020.

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

Fire-hardening efforts will renew infrastructure and reduce the likelihood of wire down caused outages, leading to improved circuit performance. Since wire down events are still relatively rare, reliability modeling and quantitative reliability analysis provides marginal benefits for this failure mode. Replacement of aging infrastructure will reduce the instances of equipment caused failures, but these benefits were not quantified as the projects were predicated on public health and safety improvements. Additionally, undergrounding of overhead power lines will eliminate instances of storm and animal contact driven outages in the portions of the circuit planned for undergrounding.

Circuit 1215

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

C1215 was listed as a worst circuit due to circuit SAIDI and SAIFI performance.

ii. A historical record of the metric:

C1215: 2 Year Circuit SAIDI and SAIFI Data

Cir	Metric	2018	2019
1215	Circuit SAIDI	6057	234
1215	Circuit SAIFI	5.9	2.7

Note: See methodology in section 5c

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

Circuit 1215 was on the worst circuit SAIDI and SAIFI list largely due to the effects of PSPS, which contributed to 83% of the circuit SAIDI over the last two years. Of the remaining non-PSPS circuit SAIDI, weather related outages accounts for 58% of impacts followed by equipment failure at 27%.

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

SDG&E's Wildfire Mitigation programs targeted small conductor infrastructure and mitigated pole risk on this circuit. The work increased spacing to reduce the chance of incidental foreign object contact with the energized lines and also reduce the instances of downed wires due to infrastructure failure. The Cleveland National Forest project (CNF) project has rebuilt distribution under-build with fire hardened structures. A PSPS impact analysis of circuit 1215 is being conducted and specific mitigation efforts will be recommended that can reduce the impacts of PSPS shutoffs. In coordination with the hardening of the distribution under-build completed by the Cleveland National Forest project (CNF), additional covered conductor and underground work are being considered.

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 wire down caused outages, leading to improved circuit performance. Since wire down events are still relatively rare, reliability modeling and quantitative reliability analysis provides marginal benefits for this failure mode. Replacement of aging infrastructure will reduce the instances of equipment caused failures, but these benefits were not quantified as the projects were predicated on public health and safety improvements. Additionally, undergrounding of overhead power lines will eliminate instances of storm and animal contact driven outages in the portions of the circuit planned for undergrounding.

Circuit 441

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

C441 was listed as a worst circuit due to circuit SAIDI and SAIFI performance.

ii. A historical record of the metric:

C441: 2 Year Circuit SAIDI and SAIFI Data

Cir	Metric	2018	2019
441	Circuit SAIDI	5000	328
441	Circuit SAIFI	2.6	4.9

Note: See methodology in section 5c

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

Circuit 441 was on the worst circuit SAIDI and SAIFI list largely due to the effects of PSPS, which contributed to 88% of the circuit SAIDI over the last two years. Of the remaining non-PSPS circuit SAIDI, equipment failure accounts for 47% of impacts followed by foreign objects at 7%.

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

SDG&E's Wildfire Mitigation programs targeted small conductor infrastructure and mitigated pole risk on this circuit. The work increased spacing to reduce the chance of incidental foreign object contact with the energized lines and also reduce the instances of downed wires due to infrastructure failure. The program is also constructing a direct underground feed to mitigate PSPS impact to critical customers/facilities. A PSPS impact analysis of circuit 441 is being conducted and additional mitigation efforts will be recommended that can further reduce the impacts of shutoffs. In coordination with the hardening of distribution under-build completed by the Cleveland National Forest project (CNF), hardened poles/spans, and direct underground project, additional covered conductor and underground work are being considered.

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 wire down caused outages, leading to improved circuit performance. Since wire down events are still relatively rare, reliability modeling and quantitative reliability analysis provides marginal benefits for this failure mode. Replacement of aging infrastructure will reduce the instances of equipment caused failures, but these benefits were not quantified as the projects were predicated on public health and safety improvements. Additionally, undergrounding of overhead power lines will eliminate instances of storm and animal contact driven outages in the portions of the circuit planned for undergrounding.

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 performance.

ii. A historical record of the metric:

C445: 2 Year Circuit SAIDI Data

Cir	Metric	2018	2019
445	Circuit SAIDI	2298	533

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 list largely due to the effects of PSPS, which contributed to 87% of the circuit SAIDI over the last two years. Of the remaining non-PSPS circuit SAIDI, weather related outages accounts for 26% of impacts followed by foreign object contacts at 23%, vehicle contacts at 23%, and equipment failures at 20%.

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

SDG&E's Wildfire Mitigation programs targeted small conductor infrastructure and mitigated pole risk on this circuit. The work increased spacing to reduce the chance of incidental foreign object contact with the energized lines and also reduce the instances of downed wires due to infrastructure failure. The program is also constructing a direct underground feed to mitigate PSPS impact to critical customers/facilities and adding an additional sectionalizing device. A PSPS impact analysis of circuit 445 is being conducted and additional mitigation efforts will be recommended which identifies targeted areas to install covered conductor that can further reduce the impacts of wildfire risk.

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 wire down caused outages, leading to improved circuit performance. Since wire down events are still relatively rare, reliability modeling and quantitative reliability analysis provides marginal benefits for this failure mode. Replacement of aging infrastructure will reduce the instances of equipment caused failures, but these benefits were not quantified as the projects were predicated on public health and safety improvements. Additionally, undergrounding of overhead power lines will eliminate instances of storm and animal contact driven outages in the portions of the circuit planned for undergrounding.

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

Cir	Metric	2018	2019
79	Circuit SAIDI	1167	1488

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 PSPS, which contributed to 59% of the circuit SAIDI over the last two years. Of the remaining non-PSPS circuit SAIDI, weather related outages accounts for 41% of impacts followed by equipment failure at 35%.

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

SDG&E's Wildfire Mitigation programs targeted small conductor infrastructure and mitigated pole risk on this circuit. The work increased spacing to reduce the chance of incidental foreign object contact with the energized lines and also reduce the instances of downed wires due to infrastructure failure. The program is also constructing a direct underground feed to mitigate PSPS impact to critical customers/facilities. The Cleveland National Forest project (CNF) project will rebuild the backbone of C79 with fire hardened structures and a section of overhead will be removed with customers cut over to a new underground feed. A PSPS impact analysis of C79 is being conducted and additional mitigation efforts will be recommended that can further reduce the impacts of shutoffs.

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 wire down caused outages, leading to improved circuit performance. Since wire down events are still relatively rare, reliability modeling and quantitative reliability analysis provides marginal benefits for this failure mode. Replacement of aging infrastructure will reduce the instances of equipment caused failures, but these benefits were not quantified as the projects were predicated on public health and safety improvements. Additionally, undergrounding of overhead power lines will eliminate instances of storm and animal contact driven outages in the portions of the circuit planned for undergrounding.

Circuit CE1

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

CE1 was listed as a worst circuit due to circuit SAIDI performance.

ii. A historical record of the metric:

CE1: 2 Year Circuit SAIDI Data

Cir	Metric	2018	2019
CE1	Circuit SAIDI	2430	0

Note: See methodology in section 5c

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

Circuit CE1 was on the worst circuit SAIDI list largely due to 2018 equipment failure, which contributed to 92% of the circuit SAIDI over the last two years, with weather related outages accounting for the remaining 8% of impacts.

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 CE1 will have one DOE switch replaced in 2021 with two additional locations being scoped for a future date.

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

Replacing the DOE switches can decrease the outage time and number of customers impacted by increasing the ability to sectionalize customers or transfer load to neighboring circuits.

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

Cir	Metric	2018	2019
442	Circuit SAIFI	3.4	7.2

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 equipment failure, which contributed to 37% of the circuit SAIFI over the last two years, with foreign object contacts accounting for 19% of impacts and weather related outages accounting for 13% of impacts.

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

SDG&E's Wildfire Mitigation programs targeted small conductor infrastructure and mitigated pole risk on this circuit. The work increased spacing to reduce the chance of incidental foreign object contact with the energized lines and also reduce the instances of downed wires due to infrastructure failure. The program is also constructing a direct underground feed to mitigate PSPS impact to critical customers/facilities. A PSPS impact analysis of circuit 442 is being conducted and additional mitigation efforts will be recommended that can further reduce the impacts of shutoffs. In coordination with the hardening of distribution under-build completed by the Cleveland National Forest project (CNF), hardened poles/spans, and direct underground project, additional covered conductor and underground work are being considered.

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

Fire-hardening efforts will decrease the need for operational mitigation necessary to prevent wildfire ignitions. We expect some PSPS reduction based on the planned direct underground feed.

Circuit SL1

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

SL1 was listed as a worst circuit due to circuit SAIFI performance.

ii. A historical record of the metric:

SL1: 2 Year Circuit SAIFI Data

Cir	Metric	2018	2019
SL1	Circuit SAIFI	4.0	3.0

Note: See methodology in section 5c

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

Circuit SL1 was on the worst circuit SAIFI list largely due to equipment failure, which contributed to 57% of the circuit SAIFI over the last two years.

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

SDG&E's Wildfire Mitigation programs targeted small conductor infrastructure and mitigated pole risk on this circuit. The work increased spacing to reduce the chance of incidental foreign object contact with the energized lines and also reduce the instances of downed wires due to infrastructure failure. A PSPS impact analysis of circuit 221, which includes child 4-kV circuit SL1, is being conducted and additional mitigation efforts will be recommended that can further reduce the impacts of shutoffs.

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 wire down caused outages, leading to improved circuit performance. Since wire down events are still relatively rare, reliability modeling and quantitative reliability analysis provides marginal benefits for this failure mode. Replacement of aging infrastructure will reduce the instances of equipment caused failures, but these benefits were not quantified as the projects were predicated on public health and safety improvements.

Circuit 310

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

C310 was listed as a worst circuit due to circuit SAIFI performance.

ii. A historical record of the metric:

C310: 2 Year Circuit SAIFI Data

CIR	Metric	2018	2019
310	Circuit SAIFI	5.3	1.0

Note: See methodology in section 5c

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

Circuit 310 was on the worst circuit SAIFI list largely due to equipment failure, which contributed to 65% of the circuit SAIFI over the last two years, with vehicle contact accounting for 16% of impacts.

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

C310 will have one switch upgraded to reduce the customer impact during an unplanned outage. Planned to be installed in 2020. No additional mitigations are planned at this time.

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

The circuit will continue to perform consistent with past 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:

RAT - 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 1033 circuits in 2019 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 is comprised of technical leaders from Distribution Operations, Engineering Standards, Regional Operations, System Protection, and Distribution Asset Management. The Reliability Assessment 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.

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

In 2019, the Reliability Assessment Team approved a number of circuit improvement projects in addition to monitoring budgets, reviewing new equipment and assisting various work groups with operational issues. Ongoing RAT initiatives include:

- Reduction in the number of customers between sectionalizing devices
- SCADA automation expansion initiatives for 12-kV circuits
- Utilization of Branch Cable Replacement Analysis Model and Circuit Reliability Analysis Model

The Reliability Assessment Team and the Electric System Hardening Group coordinate activities with various stakeholders in order 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 (2019)

The table below captures the top 10 major unplanned outage events for 2019 including the cause and the location of the outage.

Top 10 Major Unplanned Power Outage Events						
Rank	**Outage Date**	**Cause**	**Location**	**Customer Impact**	**SAIDI**	**SAIFI**
1	10/20/2019	High Winds / RFW spanning multiple days	EA, NC, NE, OC	40976	47.09	0.028
2	11/12/2019	Substation - Bird Contact	CM, EA	26541	3.45	0.018
3	2/14/2019	Rain Storm	All Districts	19491	1.20	0.013
4	10/1/2019	Substation - Balloon Contact	NC	18602	0.51	0.013
5	3/21/2019	Substation - Disconnect	BC	10597	0.20	0.007
6	10/15/2019	Deenergized for Safety - Fire	CM	9987	0.62	0.007
7	1/21/2019	Tee Failure	CM	7733	0.64	0.005
8	6/19/2019	Substation - Vegetation Contact	NC	7540	0.18	0.005
9	10/25/2019	High Winds / RFW	EA, NE	6465	4.92	0.004
10	12/16/2019	Substation - Balloon Contact	EA	6292	0.13	0.004

Based upon customer impact.

SECTION 7 – SUMMARY LIST OF MED PER IEEE 1366

2019 SUMMARY LIST OF MED (2019)

The tables below summarize the three MED events occurring in 2019. The information includes the number of customers without services at periodic intervals, the cause and the location of the Major Event.

Table 7-1 2019 Summary List of 10/24/19 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
October 24	Winds / RFW	CM, EA, NC, NE	14,885	0	248	248	108	108	129	129	320	1495
				Customers Interrupted - Hours Into the Event Day (continued)								
				9	10	11	12	13	14	15	16	17
				3648	4783	4667	6629	6888	7931	8779	8165	8779
				Customers Interrupted - Hours Into the Event Day (continued)								
				18	19	20	21	22	23	24	25	26
				8734	8734	8734	9254	9540	9903	12302	12196	12196
				Customers Interrupted - Hours Into the Event Day (continued)								
				27	28	29	30	31	32	33	34	35
				11993	11993	11993	11993	11993	11993	11993	11993	11993
				Customers Interrupted - Hours Into the Event Day (continued)								
				36	37	38	39	40	41	42	43	44
				11993	11993	11512	11125	11125	10426	7236	6504	5846
				Customers Interrupted - Hours Into the Event Day (continued)								
				45	46	47	48	49	50	51	52	53
				5846	5846	5846	5846	5846	5846	5846	5846	5846
				Customers Interrupted - Hours Into the Event Day (continued)								
				54	55	56	57	58	59	60	61	62
				5846	5846	5846	5345	4973	3017	2625	1751	113
				Customers Interrupted - Hours Into the Event Day (continued)								
				63	64	65	66					
				44	44	44	0					

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

Table 7-2 2019 Summary List of 10/25/19 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
October 25	Winds / RFW	EA, NC, NE	12,557	0	1221	4040	4717	9541	9610	10532	10824	10936
				Customers Interrupted - Hours Into the Event Day (continued)								
				9	10	11	12	13	14	15	16	17
				11468	11468	11804	12252	12252	9409	9074	7709	7231
				Customers Interrupted - Hours Into the Event Day (continued)								
				18	19	20	21	22	23	24	25	26
				5080	2693	2693	2693	2971	2971	2970	2970	2693
				Customers Interrupted - Hours Into the Event Day (continued)								
				27	28	29	30	31	32	33	34	35
				2245	2245	2245	2245	2245	2245	2245	2021	1741
				Customers Interrupted - Hours Into the Event Day (continued)								
				36	37	38	39	40				
				1635	1430	508	150	0				

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

Table 7-3 2019 Summary List of 10/30/19 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
October 30	Winds / RFW	BC, EA, NC, NE, OC	36,830	0	103	583	4074	5622	7188	7770	11673	23929
				Customers Interrupted - Hours Into the Event Day (continued)								
				9	10	11	12	13	14	15	16	17
				23559	25158	26183	26183	26181	26221	26355	26308	25671
				Customers Interrupted - Hours Into the Event Day (continued)								
				18	19	20	21	22	23	24	25	26
				24077	20240	20288	20251	20164	20164	20164	20164	20162
				Customers Interrupted - Hours Into the Event Day (continued)								
				27	28	29	30	31	32	33	34	35
				20162	20151	20151	20151	20151	20151	19952	17160	15438
				Customers Interrupted - Hours Into the Event Day (continued)								
				36	37	38	39	40	41	42		
				11071	9228	8101	7141	5805	3210	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 (2010-2019)

The tables below capture the ten largest unplanned outage events for each of the years from 2019 – 2010 based upon SAIDI values

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

Historical 10 Largest Unplanned Outage Events				
Rank	**Date**	**SAIDI**	**SAIFI**	**Description**
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

Historical 10 Largest Unplanned Outage Events				
Rank	**Date**	**SAIDI**	**SAIFI**	**Description**
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

Historical 10 Largest Unplanned Outage Events				
Rank	**Date**	**SAIDI**	**SAIFI**	**Description**
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

2011

Historical 10 Largest Unplanned Outage Events				
Rank	**Date**	**SAIDI**	**SAIFI**	**Description**
1	9/8/2011	513.40	0.999	Pacific Southwest Electrical Outage
2	6/28/2011	1.52	0.004	Circuits 486 & 487 - Multiple 12-kV Outage
3	10/16/2011	0.68	0.002	Circuit 81 - Outage Exceeding 500,000 customer minutes
4	3/15/2011	0.64	0.004	Circuit 497 - Outage Exceeding 500,000 customer minutes
5	8/4/2011	0.57	0.004	Circuit 497 - Outage Exceeding 500,000 customer minutes
6	8/28/2011	0.51	0.003	August 28 - Storm
7	10/22/2011	0.48	0.004	Circuit 152 - Outage Exceeding 500,000 customer minutes
8	12/23/2011	0.45	0.001	Circuit 243 - Outage Exceeding 500,000 customer minutes
9	6/29/2011	0.44	0.002	Circuit 38 - Outage Exceeding 500,000 customer minutes
10	11/4/2011	0.43	0.006	Capistrano Substation Outage

2010

Historical 10 Largest Unplanned Outage Events				
Rank	**Date**	**SAIDI**	**SAIFI**	**Description**
1	1/18/2010	12.61	0.085	January 18 - Heavy Rain Storm - CPUC Event
2	12/20/2010	4.93	0.023	December 20 - Heavy Rain Storm - CPUC Event
3	4/1/2010	4.40	0.211	Load Curtailment
4	9/30/2010	2.88	0.036	September 30 - Heavy Rain Storm
5	1/5/2010	1.57	0.004	Circuits 703 & 1297 - Multiple 12-kV Outage
6	9/26/2010	1.42	0.010	September 26 - Heat Storm
7	9/30/2010	1.34	0.004	Circuits 900 & 904 - Multiple 12-kV Outage
8	10/21/2010	1.33	0.002	Circuits 222, 221 & 79 - Outage over 500,000 customer min
9	4/4/2010	1.22	0.003	Circuits 794, 170 & SW2 - Earthquake w/over customer 500,000 Min
10	10/19/2010	1.12	0.014	October 19 - Heavy Rain and Lightning Storm

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

CUSTOMER INQUIRIES ON RELIABILITY DATA (2019)

SDG&E received 417 customer inquiries for reliability data in 2019.

The average response time was 6 calendar days.

The higher number of outage-related customer inquiries in 2019 (2019: 417, 2018: 264, 2017: zero, 2016: one) is due to the local Air Pollution Control Division (APCD) enforcement regulation on emergency generator usage. The regulation requires an entity running an electric generator for backup electric service purposes to provide documentation regarding the electric outage that initiated each such use. SDG&E's commercial, industrial, and residential customers who own and operate permitted emergency generators began requesting outage history to fulfill this requirement starting in March of 2018.