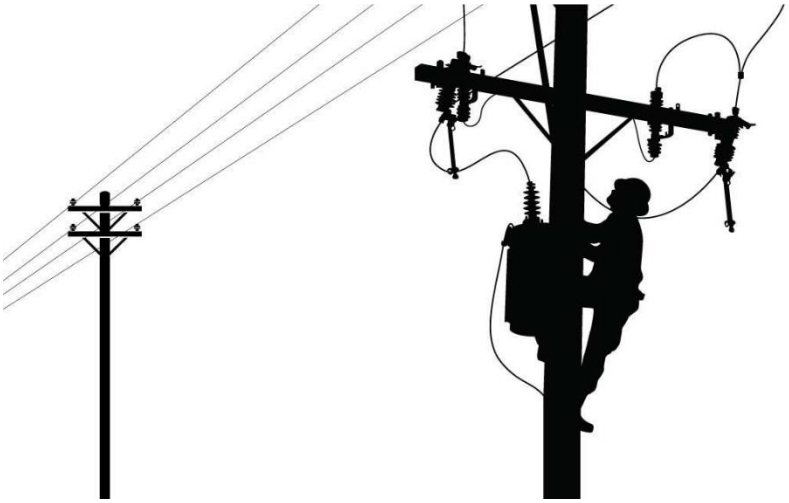

ELECTRIC SYSTEM RELIABILITY ANNUAL REPORT 2023

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

July 15, 2024

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EXECUTIVE SUMMARY

Background:

The Electric System Reliability Annual Report for 2023 has been prepared in response to California Public Utility Commission (CPUC) Decision 16-01-008 (Decision). Effective January 14, 2016, this decision 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 this report, sustained outages are outages that last more than five minutes, while momentary outages are outages that last five minutes or less.

2023 Reliability Indices

Overview:

SDG&E's 2023 System Average Interruption Duration Index (SAIDI), including MED, was significantly lower than the average for the past five years, while the System Average Interruption Frequency Index (SAIFI) was slightly below the five-year average. Contributions to the 2023 year-end results included decreased red flag events, with no Public Safety Power Shutoff events or MED events in the year. 2023 SAIDI, excluding MED, was higher than the average for the past five years. Contributions included 8.54 SAIDI minutes due to significant storm events in January, February, and August, as shown in section 8.

Identified Mitigation/Efforts to Improve System Reliability

SDG&E is dedicated to providing strong electric reliability to its customers. To do so, in 2023, SDG&E focused on the following:

- Continued deployment of a system-wide electric underground connector enhancement program that proactively replaces underground connectors prone to failure and adds sectionalizing capabilities to the electric system, enabling faster customer restoration after an outage.
- Continued adding more system automation, enabling 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 aid in determining when and where to send repair crews.
    - Continued use and analysis of underground de-watering technologies, tools, and processes to improve emergency access to underground facilities and timely response when necessary.
    - Continued development of drone-gathered data to find and fix problems more quickly.
    - Deployed Traveling Wave protective relays to aid in identifying the precise location of faults on long transmission lines to reduce the patrol times and time to restore service on the line.
- Pilot deployment of Transmission Broken Conductor Detection to mitigate wildfire risks from a downed energized transmission conductor.
- SDG&E has made progress in creating metrics and data analytical models to assist in identifying electric infrastructure that is highly likely to fail. These tools help inform maintenance and replacement strategies. SDG&E will continue to develop data analytics to aid with these processes.
- Continued development of systems that detect incipient equipment failure on the underground and overhead distribution system to reduce forced customer outages.
- Continued underground cable enhancement program deployment, replacing aging cable prone to failure and/or past its useful life.

How SDG&E Measures Reliability

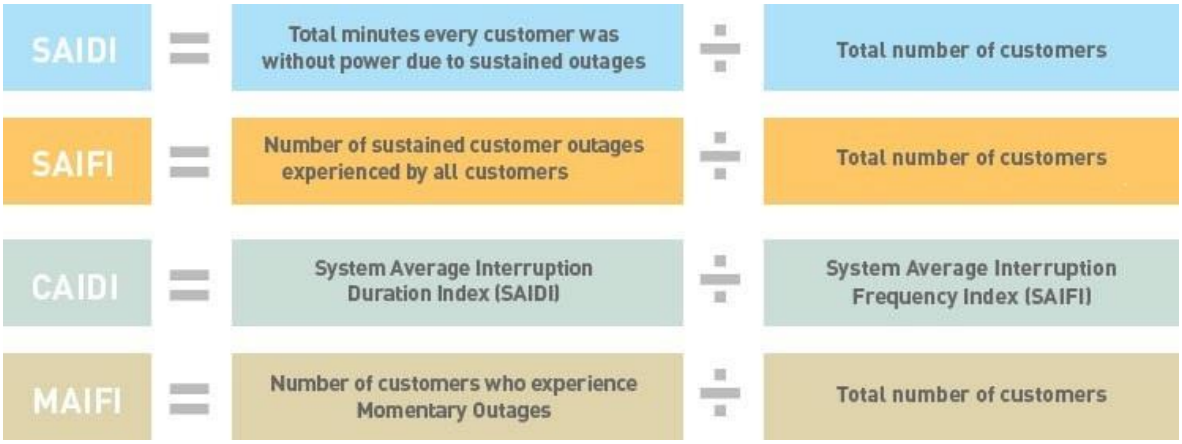
SDG&E uses four metrics commonly used in the electric utility industry to measure reliability. The reliability indicators that are tracked are as follows:

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.



Before 2013, the measurement of each reliability performance indicator excluded CPUC Major Events and events that directly result from 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 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 1366-2022, Section 2, as a day when the daily system SAIDI exceeds a threshold value. These threshold major event days are referred to as "TMED." Thus, any day the total system SAIDI exceeds TMED, it is excluded from SDG&E's reliability results. The applicable TMED value is calculated yearly using SDG&E's daily SAIDI values for the prior five years. However, SDG&E did not experience any days when the TMED threshold was met for 2023. This report does not calculate other reliability indices using methodologies or formulas precisely as described in the IEEE Std 1366.

To understand 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 DAYS (MED) INCLUDED AND EXCLUDED.

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

San Diego Gas & Electric Company **System Reliability Data 2014 - 2023**								
MED Included					MED Excluded			
Year	**SAIDI**	**SAIFI**	**CAIDI**	**MAIFI**	**SAIDI**	**SAIFI**	**CAIDI**	**MAIFI**
2014	75.81	0.632	119.88	0.262	64.60	0.603	107.16	0.244
2015	58.11	0.530	109.68	0.347	57.92	0.526	110.09	0.347
2016	86.01	0.677	126.99	0.443	72.75	0.620	117.43	0.386
2017	117.49	0.585	200.87	0.344	64.51	0.512	125.92	0.311
2018	121.02	0.658	183.88	0.319	77.76	0.628	123.84	0.319
2019	122.96	0.639	192.38	0.299	68.64	0.596	115.23	0.299
2020	198.63	0.745	266.52	0.289	68.95	0.627	109.92	0.275
2021	76.93	0.670	114.84	0.421	71.64	0.665	107.66	0.421
2022	70.39	0.591	119.06	0.327	70.39	0.591	119.06	0.327
2023	70.59	0.587	120.18	0.252	70.59	0.587	120.18	0.252

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

San Diego Gas & Electric Company **Distribution System Reliability Data 2014 - 2023**								
MED Included						MED Excluded		
Year	**SAIDI**	**SAIFI**	**CAIDI**	**MAIFI**	**SAIDI**	**SAIFI**	**CAIDI**	**MAIFI**
2014	74.73	0.613	121.86	0.255	63.52	0.584	108.82	0.237
2015	57.90	0.525	110.28	0.323	57.71	0.521	110.70	0.323
2016	83.93	0.647	129.67	0.438	70.67	0.590	119.88	0.380
2017	115.62	0.576	200.63	0.337	62.66	0.504	124.38	0.304
2018	120.30	0.652	184.51	0.314	77.05	0.622	123.93	0.314
2019	120.72	0.606	199.29	0.289	67.40	0.563	119.73	0.289
2020	180.52	0.678	266.26	0.276	64.26	0.568	113.11	0.265
2021	75.32	0.654	115.11	0.418	70.03	0.650	107.76	0.418
2022	69.48	0.578	120.22	0.285	69.48	0.578	120.22	0.285
2023	70.01	0.572	122.48	0.252	70.01	0.572	122.48	0.252

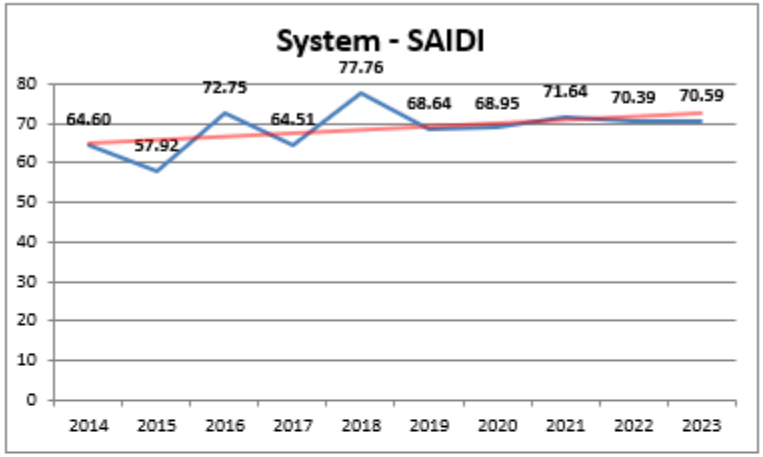
Note: Distribution System Indices include substation distribution.

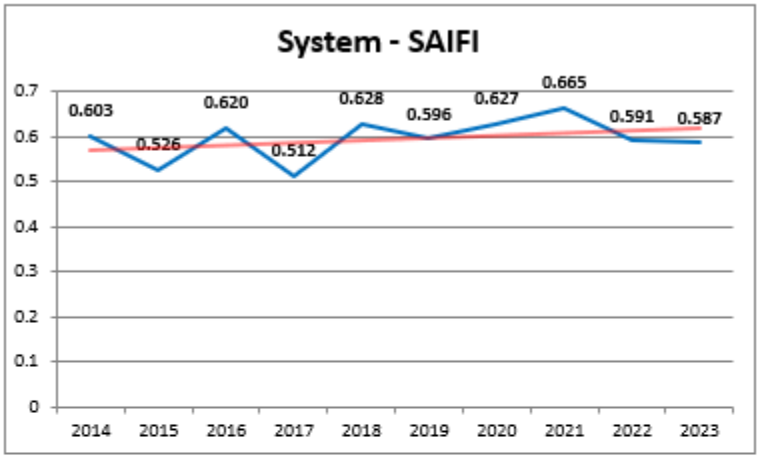
Table 1-3: Transmission System Indices (MED included and excluded)

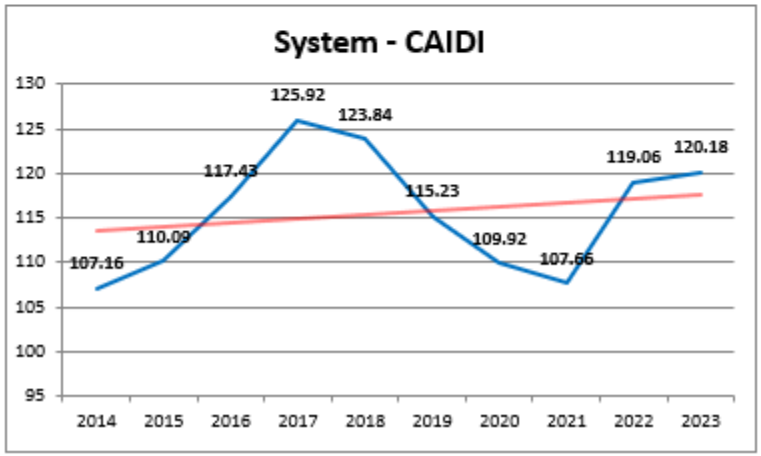
San Diego Gas & Electric Company **Transmission System Reliability Data 2014 - 2023**								
MED Included					MED Excluded			
Year	**SAIDI**	**SAIFI**	**CAIDI**	**MAIFI**	**SAIDI**	**SAIFI**	**CAIDI**	**MAIFI**
2014	1.07	0.019	56.30	0.007	1.07	0.019	56.27	0.007
2015	0.21	0.005	44.08	0.024	0.21	0.005	44.08	0.024
2016	2.08	0.030	69.15	0.006	2.07	0.030	69.09	0.005
2017	1.87	0.009	217.47	0.007	1.86	0.009	216.07	0.007
2018	0.71	0.006	116.55	0.005	0.71	0.006	115.49	0.005
2019	2.24	0.033	67.01	0.009	1.24	0.033	37.82	0.009
2020	18.11	0.067	269.18	0.013	4.70	0.059	79.32	0.010
2021	1.61	0.016	103.34	0.003	1.61	0.016	103.34	0.003
2022	0.90	0.013	68.36	0.041	0.90	0.013	68.36	0.041
2023	0.58	0.016	36.79	0.000	0.58	0.016	36.79	0.000

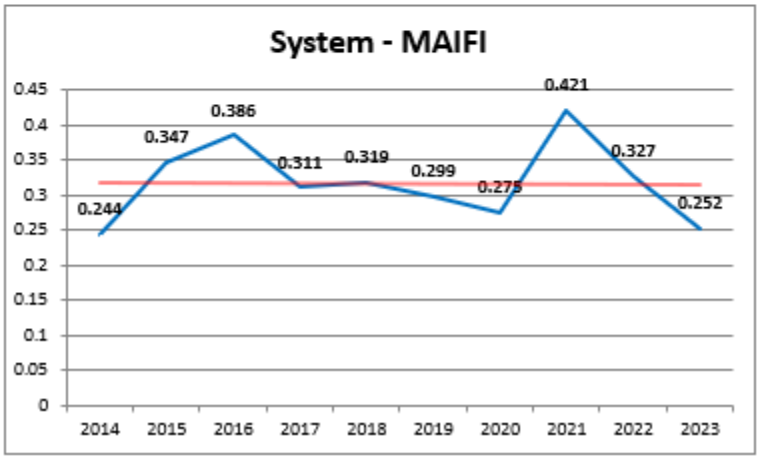
Note: Transmission System Indices include substation transmission.

System Indices (Excludes Planned, ISO and MED)

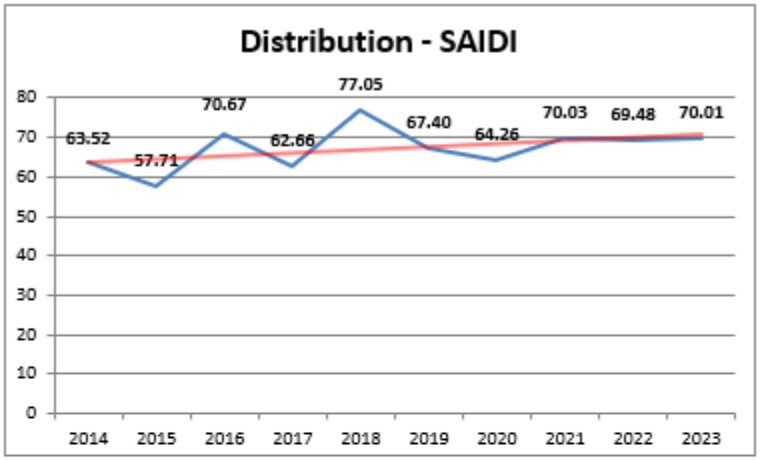


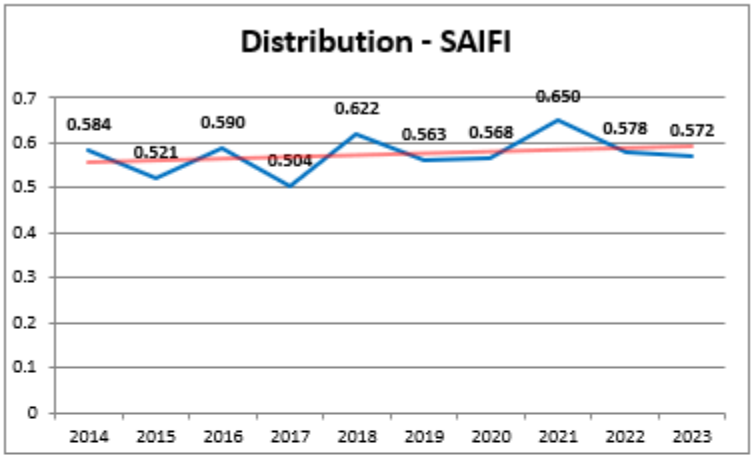


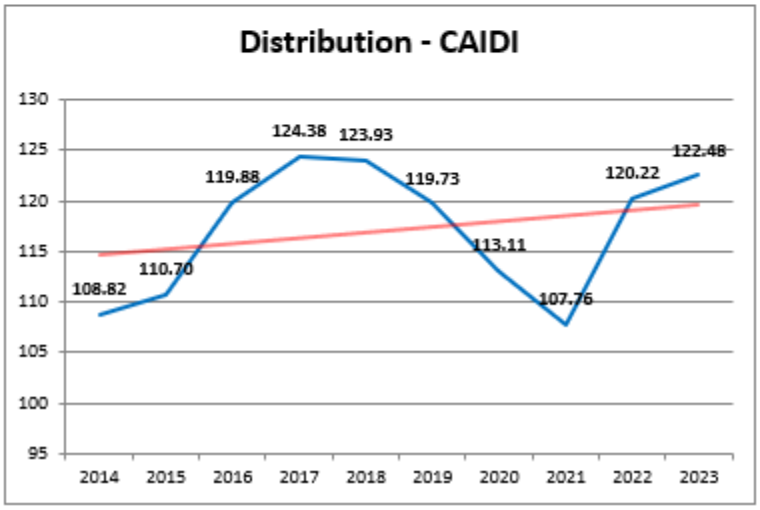


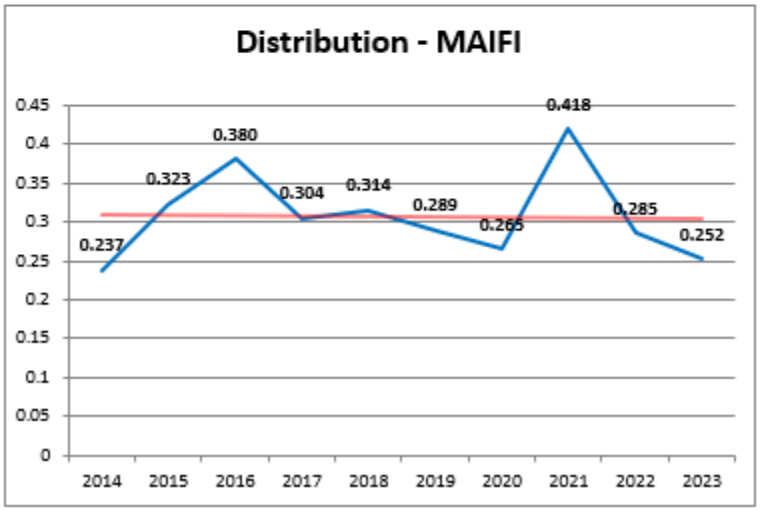


Distribution System Indices (Excludes Planned, ISO and MED)

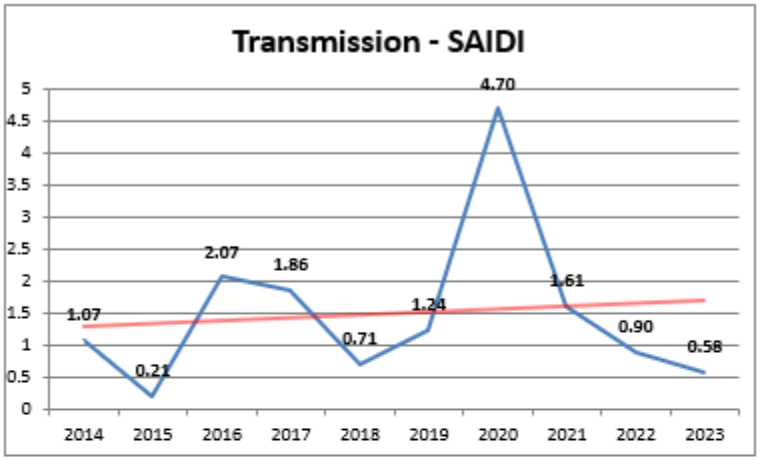


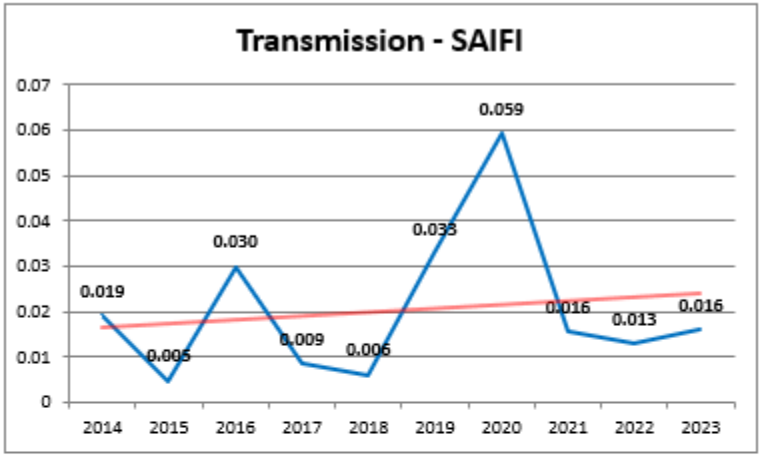


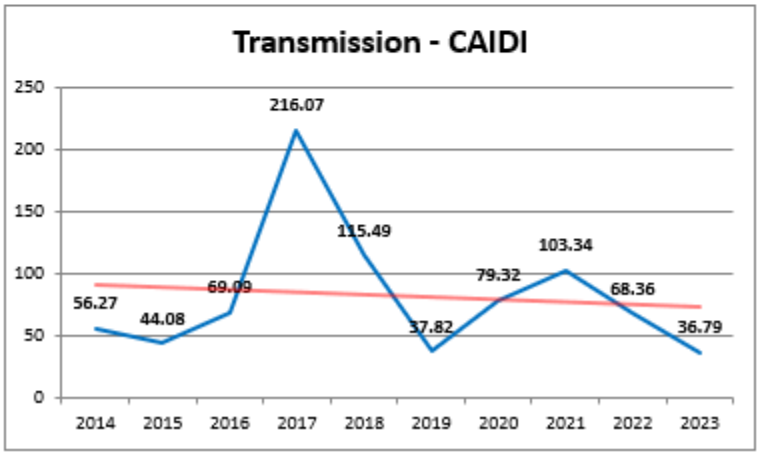


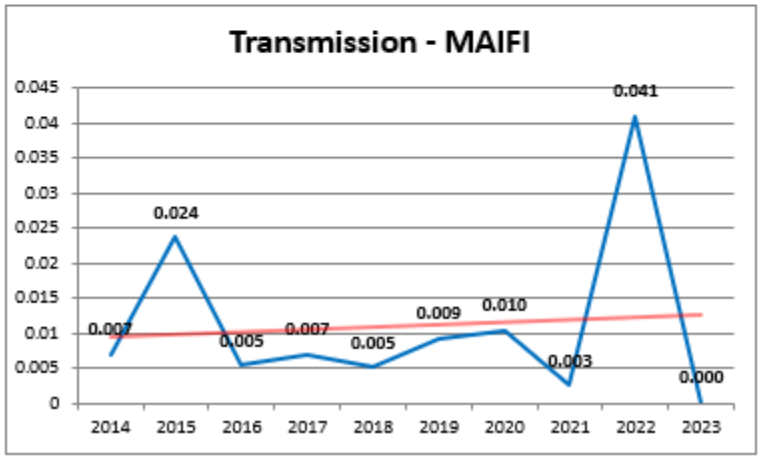


Transmission System Indices (Excludes Planned, ISO and MED)









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 (2014 – 2023)

	MED Included					MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI		SAIDI	SAIFI	CAIDI	MAIFI
2014	41.37	0.366	113.09	0.136		38.78	0.357	108.66	0.113
2015	62.80	0.514	122.18	0.349		62.76	0.513	122.28	0.349
2016	90.55	0.699	129.48	0.385		77.04	0.651	118.31	0.385
2017	55.66	0.552	100.84	0.372		49.11	0.470	104.52	0.338
2018	74.63	0.634	117.74	0.293		74.17	0.626	118.49	0.293
2019	56.82	0.672	84.54	0.252		55.75	0.650	85.73	0.252
2020	58.61	0.602	97.43	0.300		54.52	0.578	94.36	0.300
2021	55.52	0.502	110.61	0.400		55.52	0.502	110.61	0.400
2022	54.94	0.558	98.46	0.125		54.94	0.558	98.46	0.125
2023	55.72	0.425	131.12	0.168		55.72	0.425	131.12	0.168

Table 2-2: Eastern - District Reliability Indices (2014 – 2023)

MED Included						MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI		SAIDI	SAIFI	CAIDI	MAIFI
2014	91.73	0.574	159.75	0.243		77.80	0.528	147.39	0.238
2015	50.17	0.461	108.79	0.263		50.17	0.461	108.79	0.263
2016	108.24	0.820	132.06	0.326		84.93	0.705	120.41	0.292
2017	177.22	0.637	278.38	0.358		83.72	0.529	158.23	0.322
2018	203.88	0.688	296.39	0.362		108.94	0.654	166.62	0.362
2019	208.02	0.599	347.49	0.288		64.70	0.513	126.02	0.288
2020	400.19	0.888	450.66	0.364		103.07	0.695	148.40	0.355
2021	113.30	0.645	175.64	0.585		84.69	0.623	135.86	0.585
2022	83.08	0.710	116.94	0.413		83.08	0.710	116.94	0.413
2023	78.23	0.632	123.80	0.390		78.23	0.632	123.80	0.390

Table 2-3: Metro - District Reliability Indices (2014 – 2023)

MED Included						MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI		SAIDI	SAIFI	CAIDI	MAIFI
2014	72.41	0.654	110.74	0.371		62.03	0.625	99.19	0.326
2015	68.48	0.546	125.41	0.489		68.26	0.538	126.83	0.489
2016	70.79	0.628	112.67	0.615		64.39	0.595	108.26	0.573
2017	96.54	0.524	184.28	0.474		57.48	0.443	129.65	0.414
2018	73.87	0.658	112.29	0.390		71.99	0.645	111.65	0.390
2019	67.08	0.581	115.54	0.308		67.06	0.580	115.53	0.308
2020	64.38	0.600	107.28	0.322		49.66	0.538	92.35	0.303
2021	61.51	0.584	105.38	0.477		61.47	0.583	105.40	0.477
2022	72.77	0.483	150.78	0.579		72.77	0.483	150.78	0.579
2023	68.01	0.548	124.06	0.301		68.01	0.548	124.06	0.301

Table 2-4: North Coast - District Reliability Indices (2014 – 2023)

MED Included					MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI	SAIDI	SAIFI	CAIDI	MAIFI
2014	76.33	0.606	125.92	0.294	59.96	0.590	101.59	0.282
2015	49.79	0.439	113.49	0.275	49.78	0.438	113.78	0.275
2016	78.82	0.501	157.21	0.558	61.31	0.411	149.09	0.412
2017	79.85	0.524	152.48	0.299	64.43	0.483	133.32	0.299
2018	80.59	0.571	141.25	0.399	61.47	0.540	113.75	0.399
2019	82.50	0.624	132.18	0.305	58.58	0.600	97.64	0.305
2020	110.69	0.551	200.88	0.184	58.58	0.463	126.43	0.183
2021	83.36	0.758	109.96	0.420	83.36	0.758	109.96	0.420
2022	60.78	0.512	118.67	0.329	60.78	0.512	118.67	0.329
2023	68.82	0.593	115.99	0.226	68.82	0.593	115.99	0.226

Table 2-5: Northeast - District Reliability Indices (2014 – 2023)

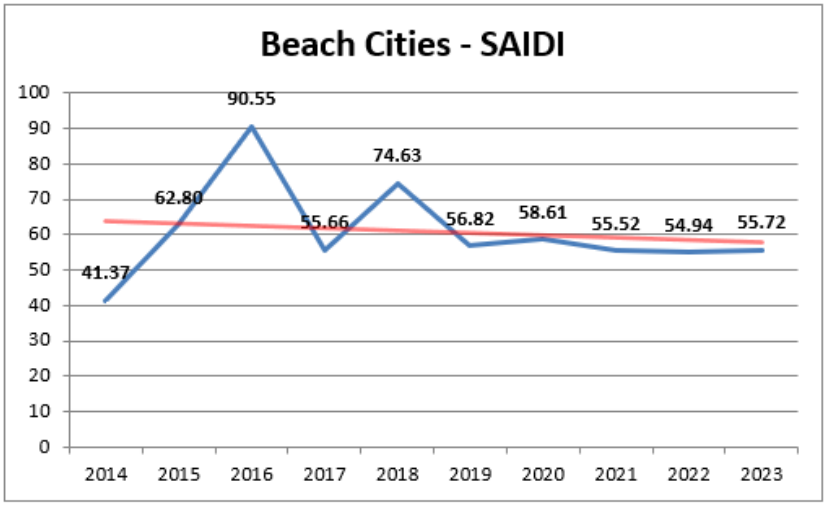
MED Included					MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI	SAIDI	SAIFI	CAIDI	MAIFI
2014	95.74	0.899	106.48	0.174	75.92	0.832	91.22	0.173
2015	63.02	0.764	82.49	0.359	62.25	0.755	82.40	0.359
2016	93.94	0.815	115.27	0.323	82.15	0.779	105.39	0.270
2017	234.23	0.739	316.98	0.203	79.82	0.651	122.59	0.182
2018	244.84	0.788	310.65	0.200	90.33	0.694	130.20	0.200
2019	282.64	0.808	349.68	0.301	108.37	0.683	158.71	0.301
2020	539.87	1.166	463.18	0.251	97.92	0.843	116.14	0.218
2021	95.83	0.881	108.71	0.237	89.61	0.875	102.47	0.237
2022	86.56	0.740	116.94	0.267	86.56	0.740	116.94	0.267
2023	83.84	0.741	113.21	0.205	83.84	0.741	113.21	0.205

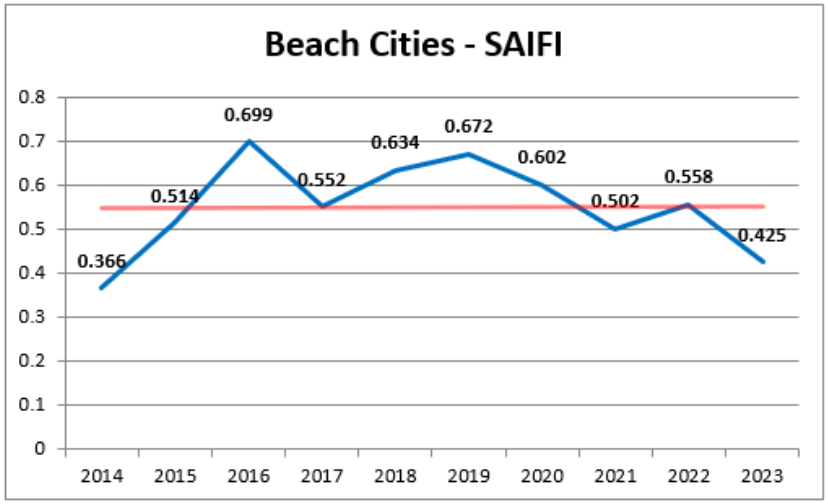
Table 2-6: Orange County - District Reliability Indices (2014 – 2023)

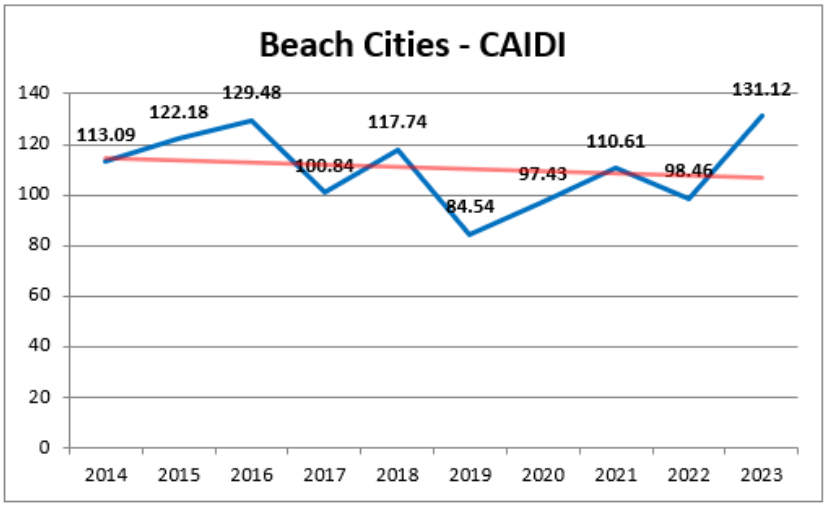
MED Included						MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI		SAIDI	SAIFI	CAIDI	MAIFI
2014	87.79	0.752	116.68	0.334		87.74	0.752	116.63	0.334
2015	39.43	0.372	105.95	0.195		39.43	0.372	105.95	0.195
2016	80.99	0.608	133.21	0.277		71.29	0.579	123.13	0.179
2017	54.82	0.567	96.62	0.242		54.46	0.564	96.61	0.210
2018	56.02	0.585	95.80	0.168		56.02	0.585	95.80	0.168
2019	55.38	0.522	106.00	0.368		52.22	0.497	104.98	0.368
2020	64.61	0.807	80.07	0.311		61.92	0.785	78.92	0.289
2021	55.56	0.738	75.33	0.368		55.56	0.738	75.33	0.368
2022	65.82	0.640	102.90	0.050		65.82	0.640	102.90	0.050
2023	76.87	0.686	112.11	0.212		76.87	0.686	112.11	0.212

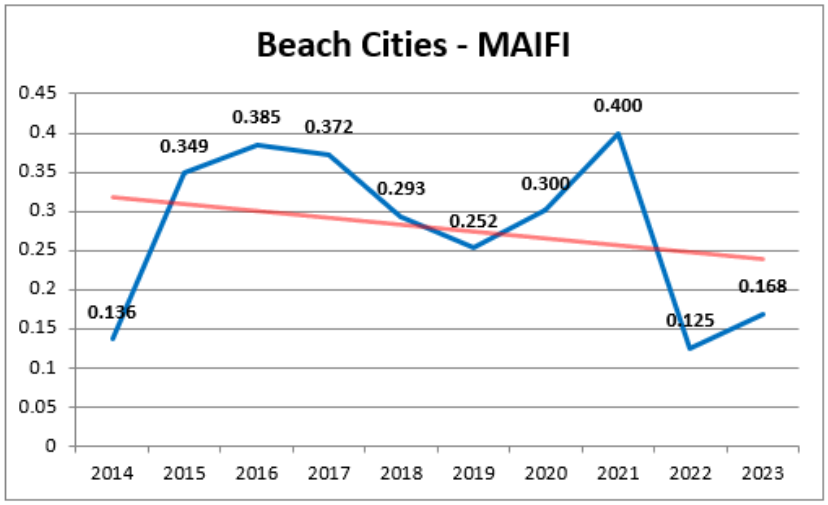
B. CHARTS FOR EACH OF SDG&E'S SIX DISTRICTS WITH LINEAR TREND LINE (EXCLUDES PLANNED AND CAISO OUTAGES; INCLUDES MED)

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

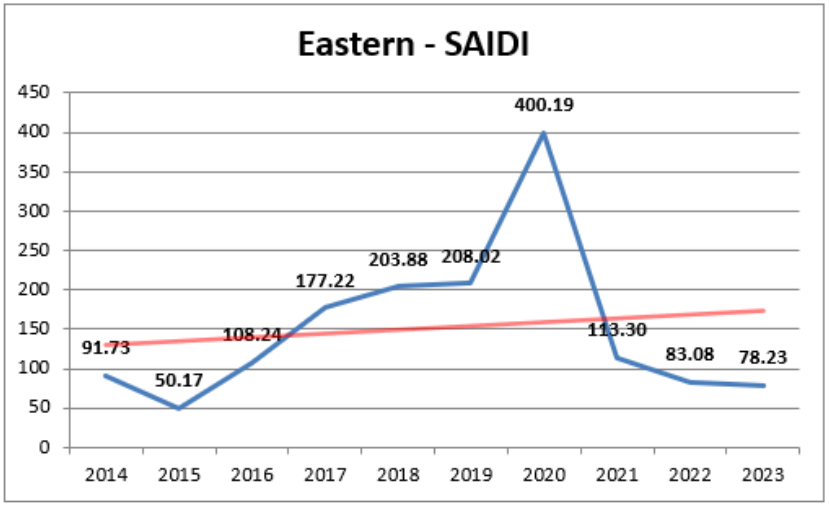


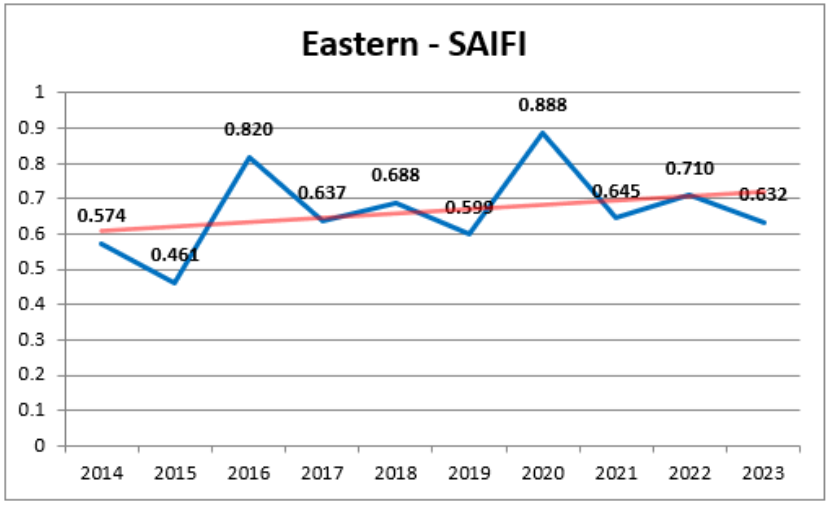


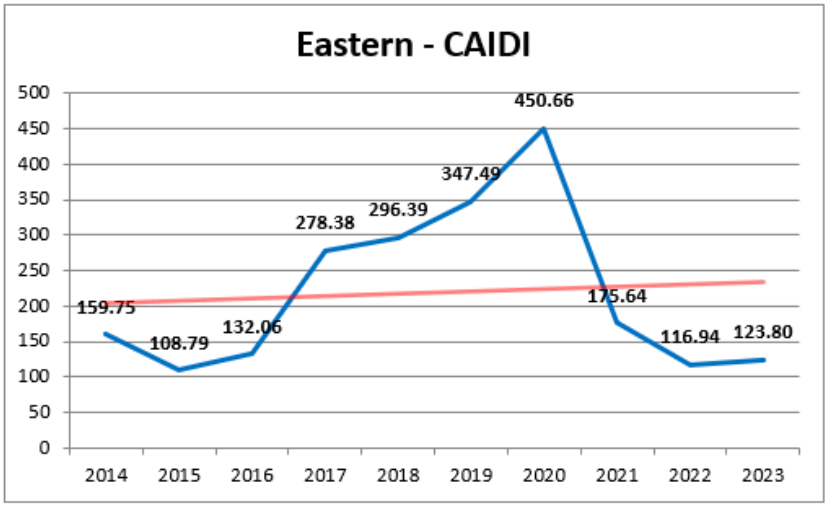


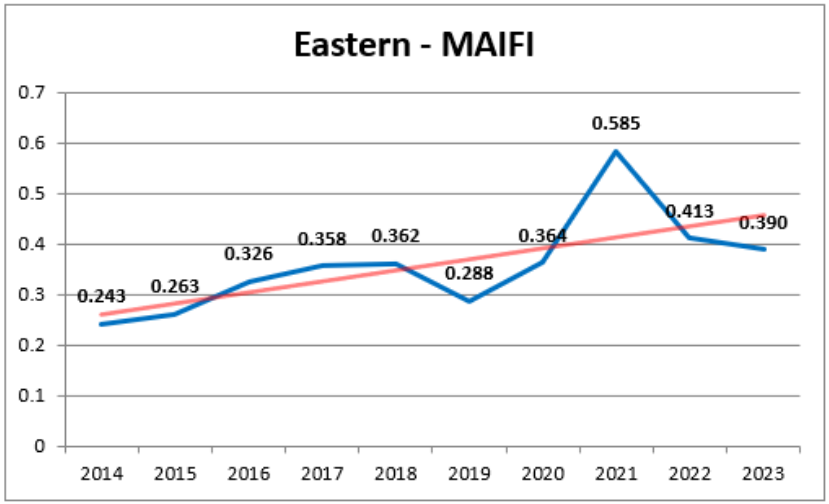


District Reliability Indices (Excludes Planned and ISO; Includes MED)

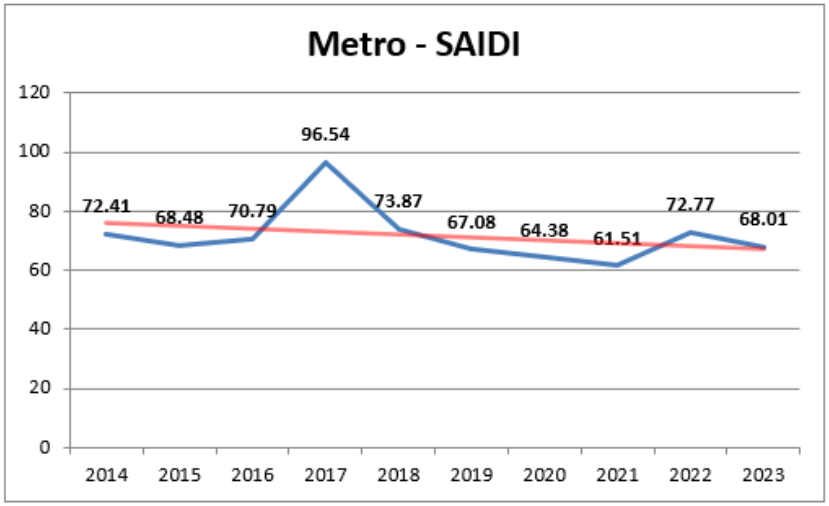


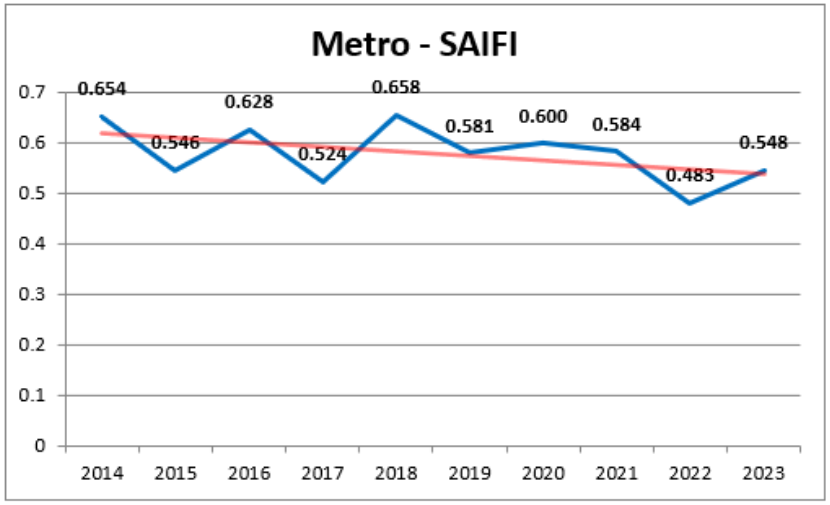


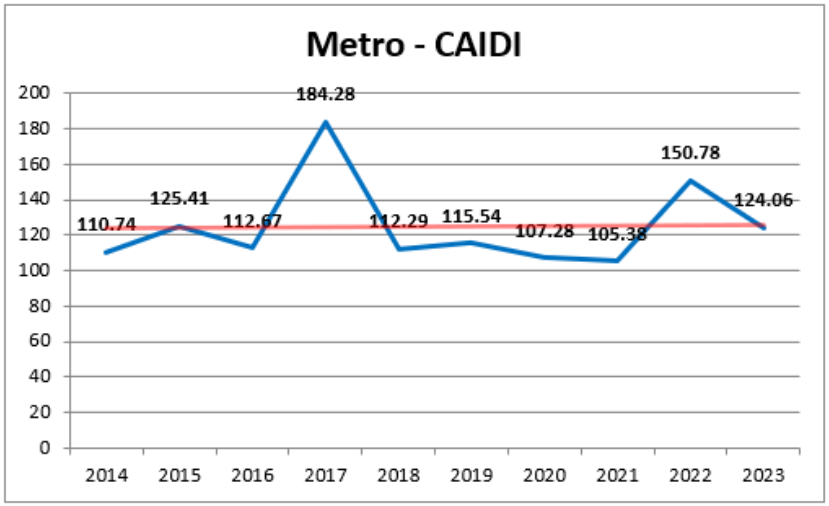


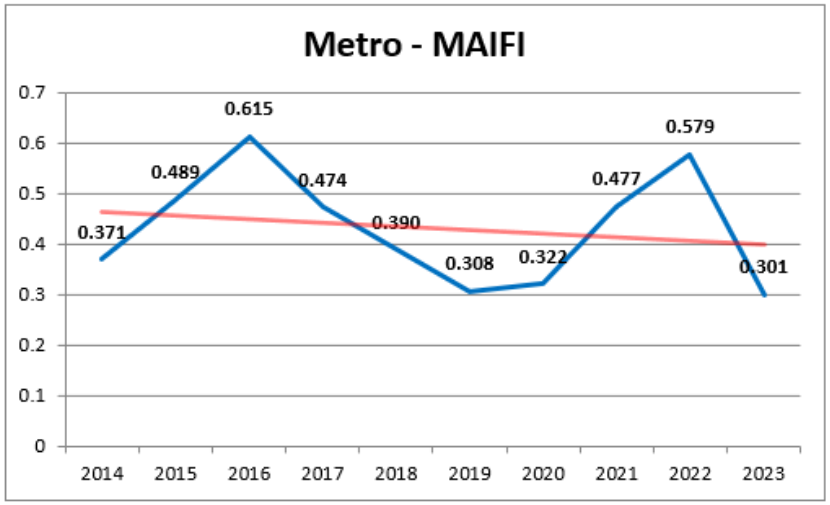


District Reliability Indices (Excludes Planned and ISO; Includes MED)

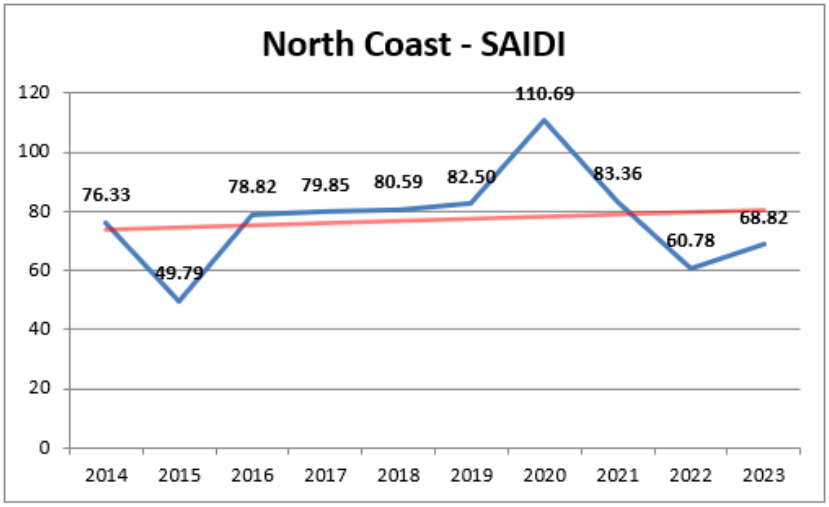


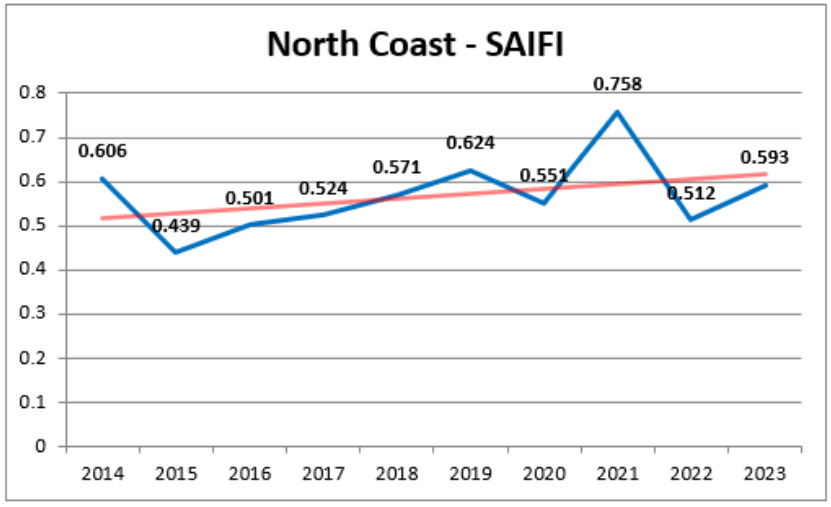


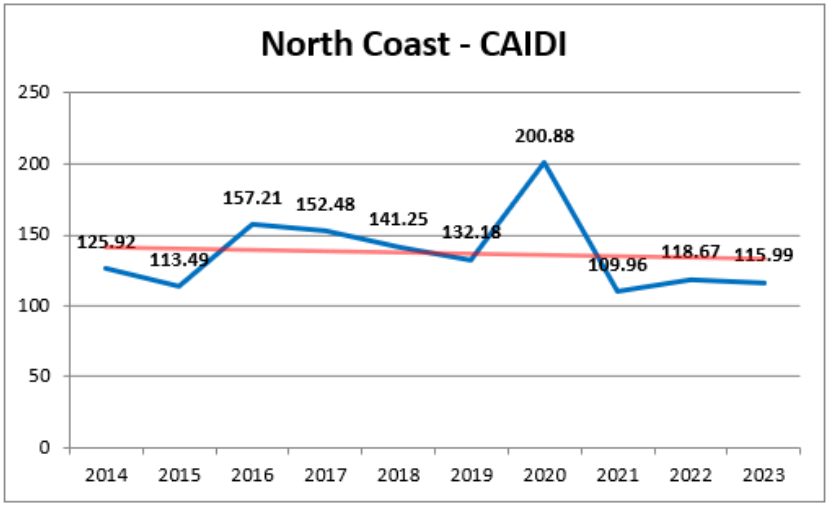


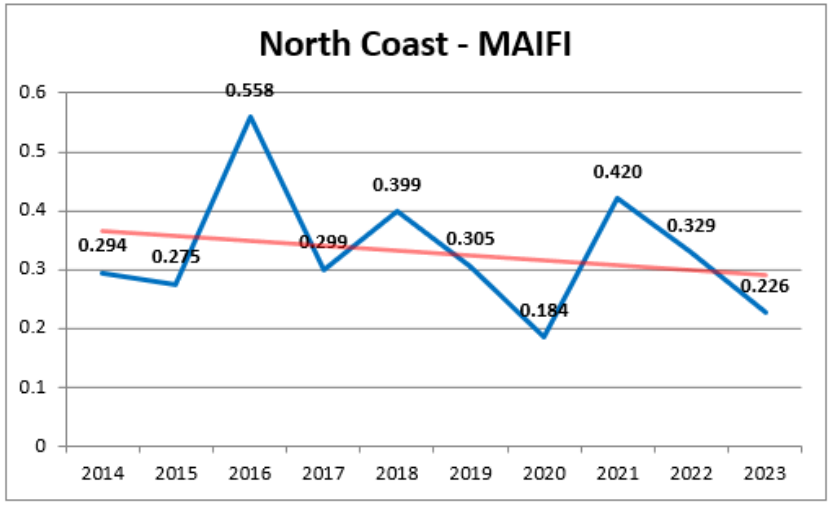


District Reliability Indices (Excludes Planned and ISO; Includes MED)

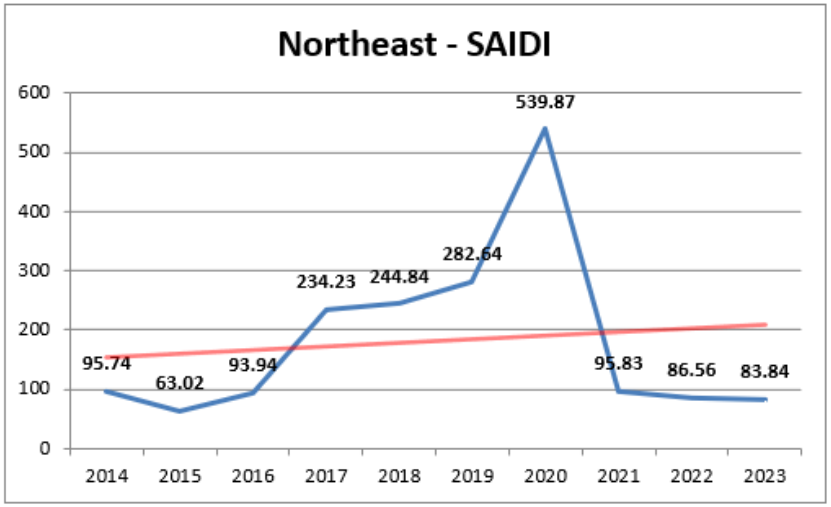


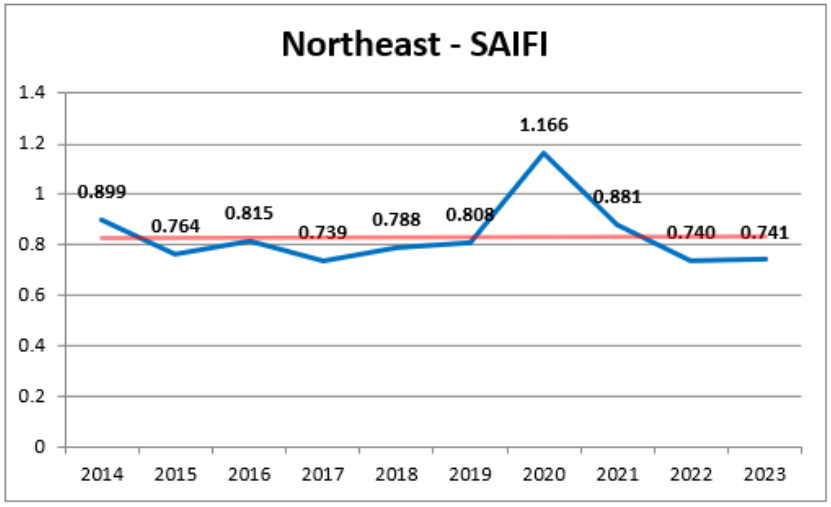


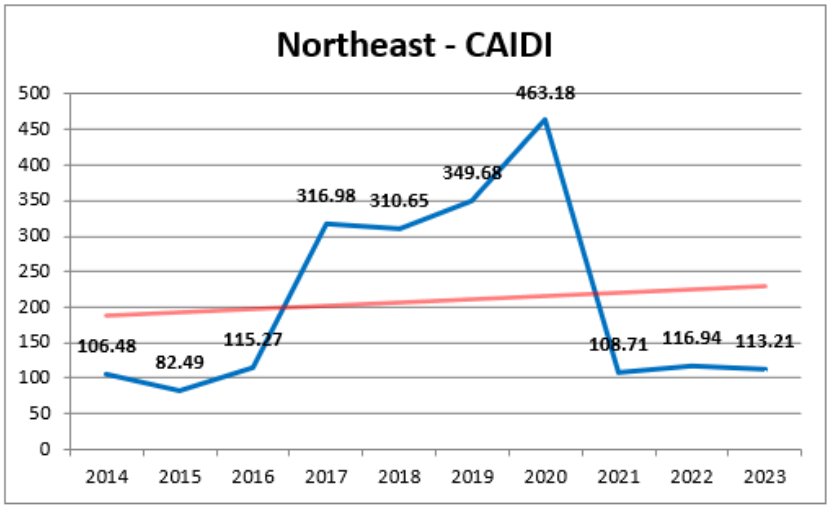


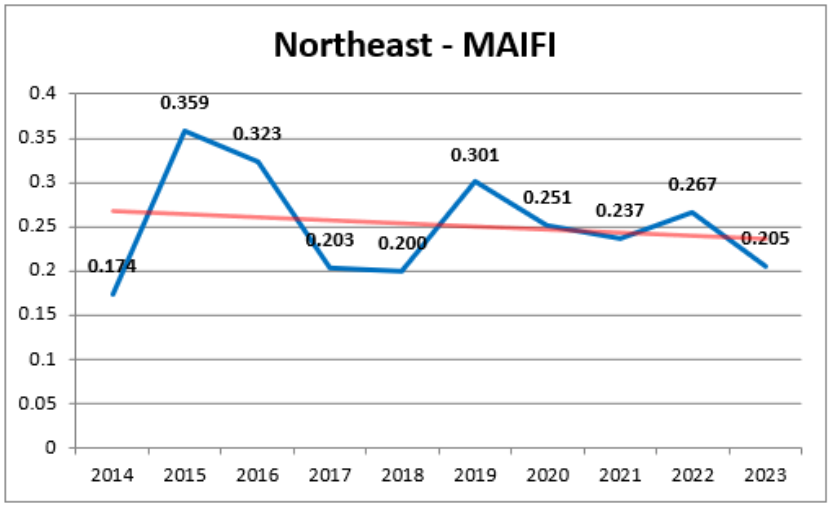


District Reliability Indices (Excludes Planned and ISO; Includes MED)

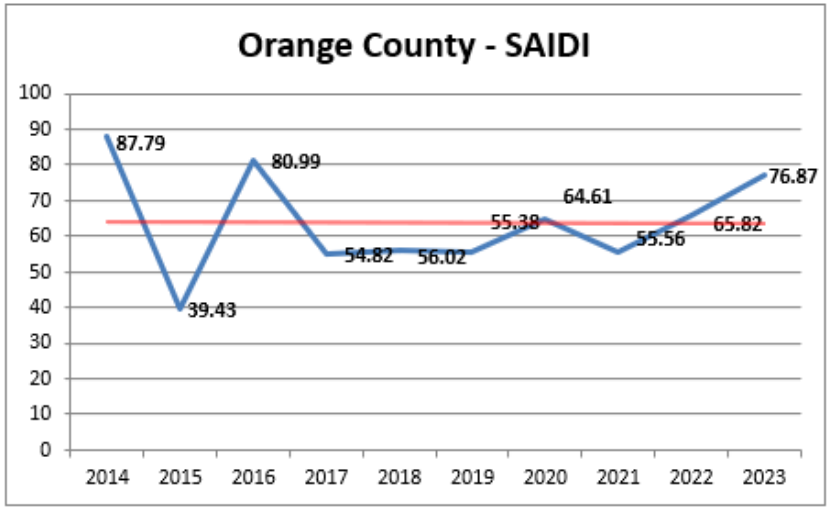


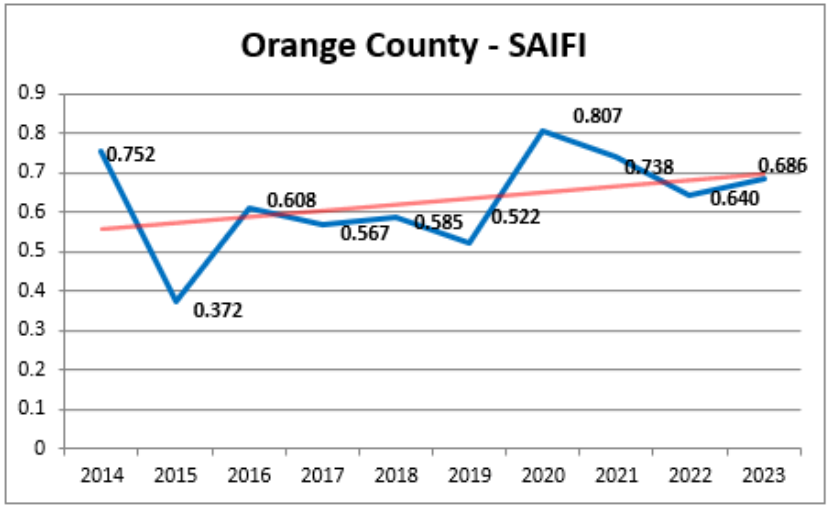


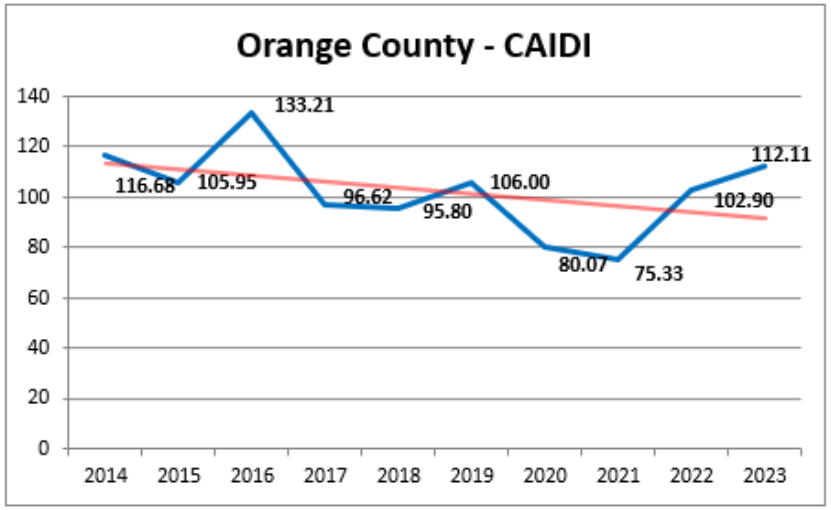


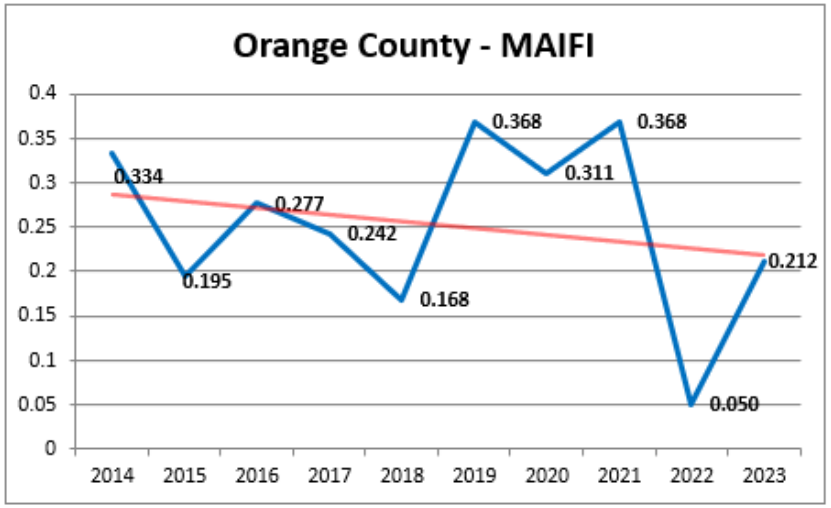


District Reliability Indices (Excludes Planned and ISO; Includes MED)



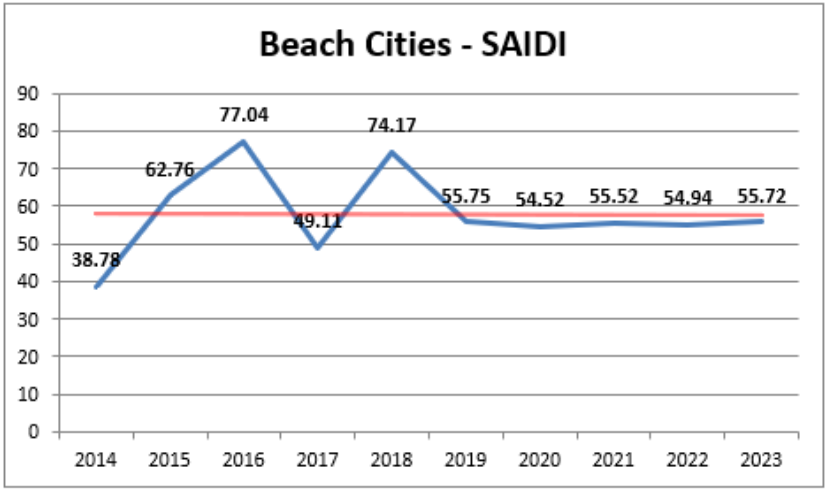


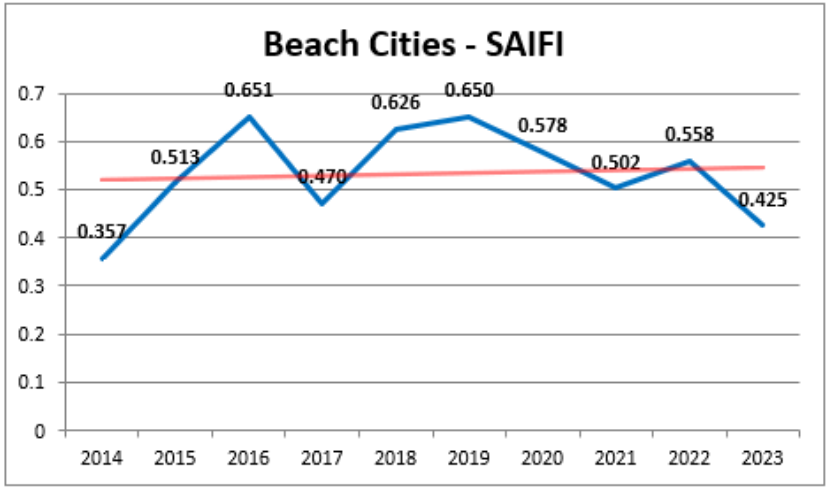


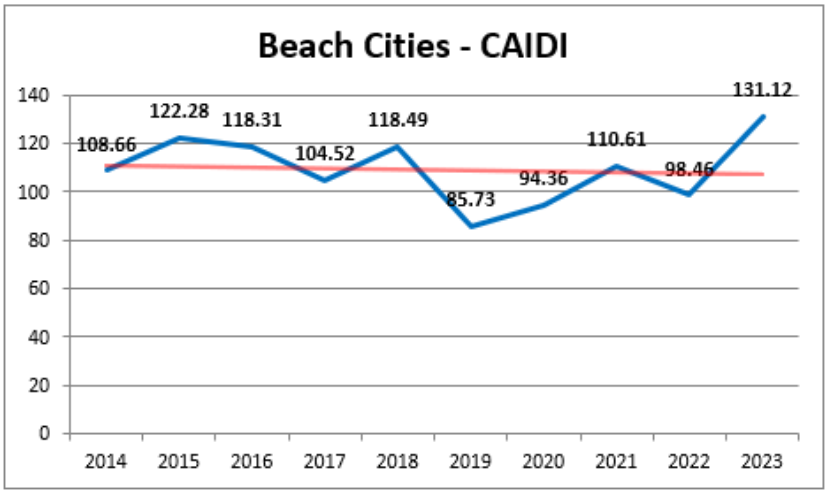


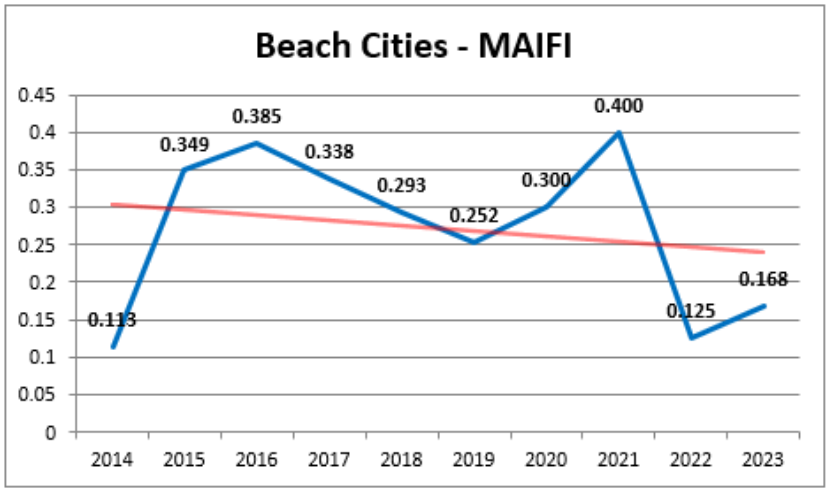
C. CHARTS FOR EACH OF SDG&E'S SIX DISTRICTS WITH LINEAR TREND LINE (EXCLUDES PLANNED, CAISO, AND MED)

District Reliability Indices (Excludes Planned, ISO and MED)

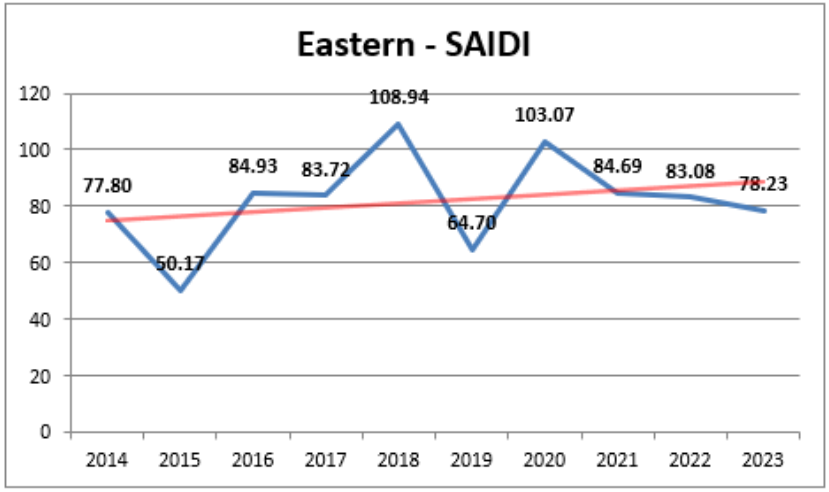


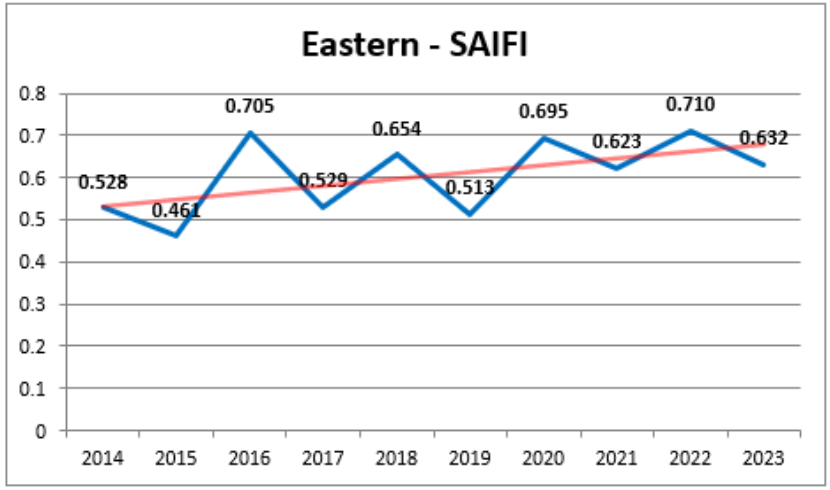


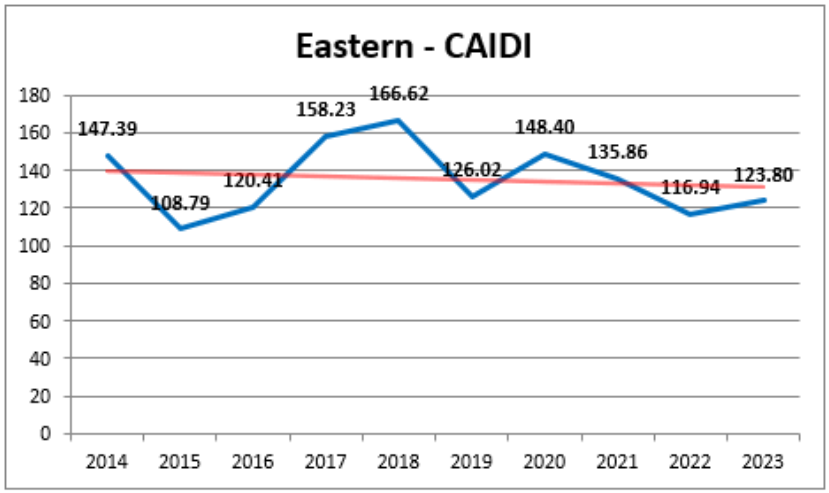


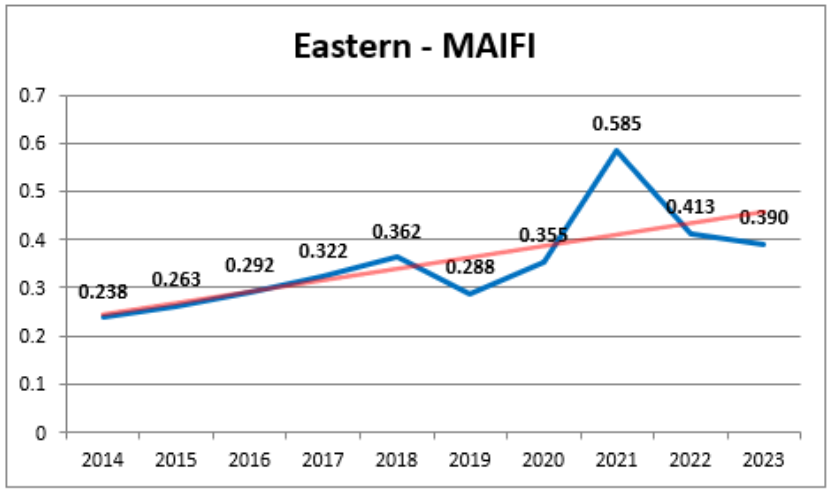


District Reliability Indices (Excludes Planned, ISO and MED)

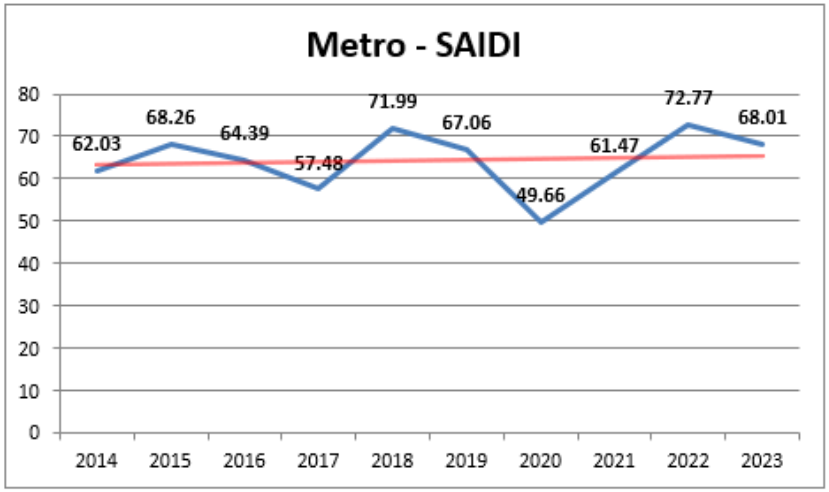


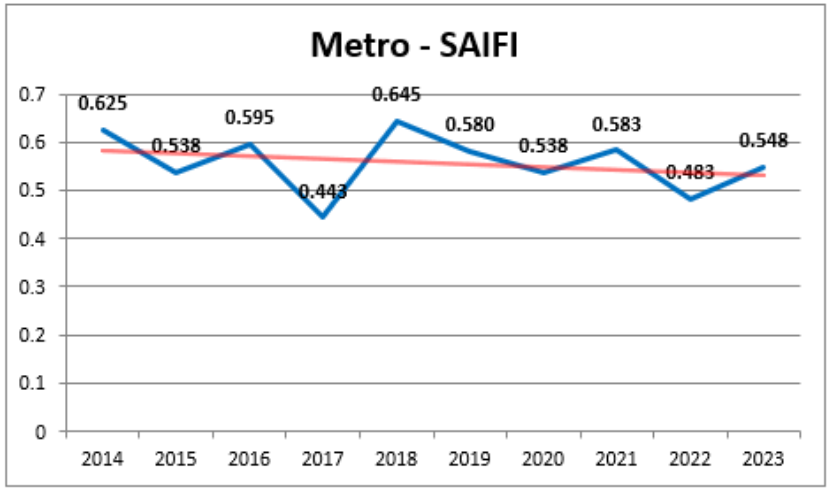


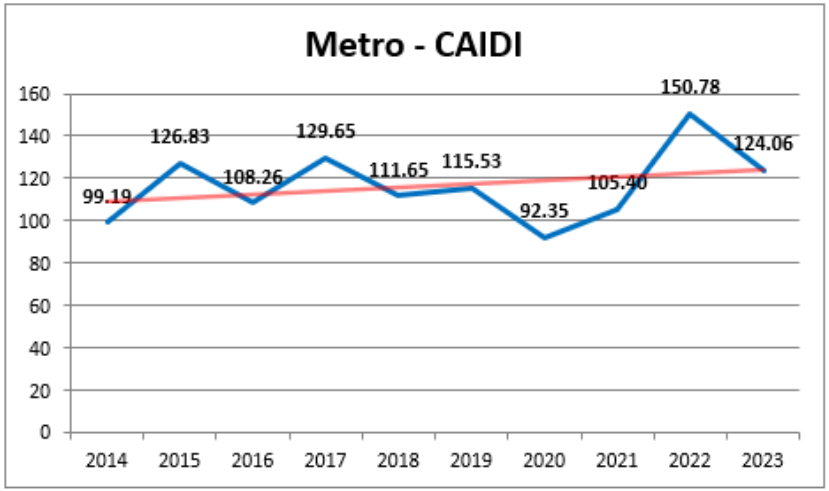


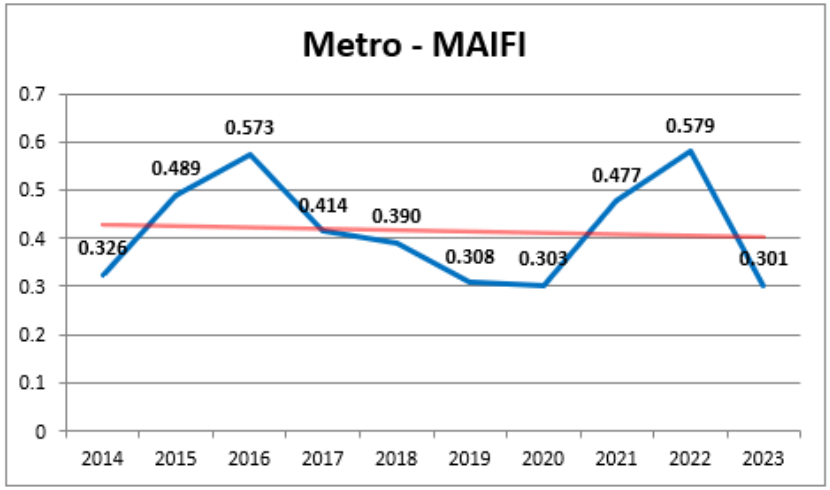


District Reliability Indices (Excludes Planned, ISO and MED)

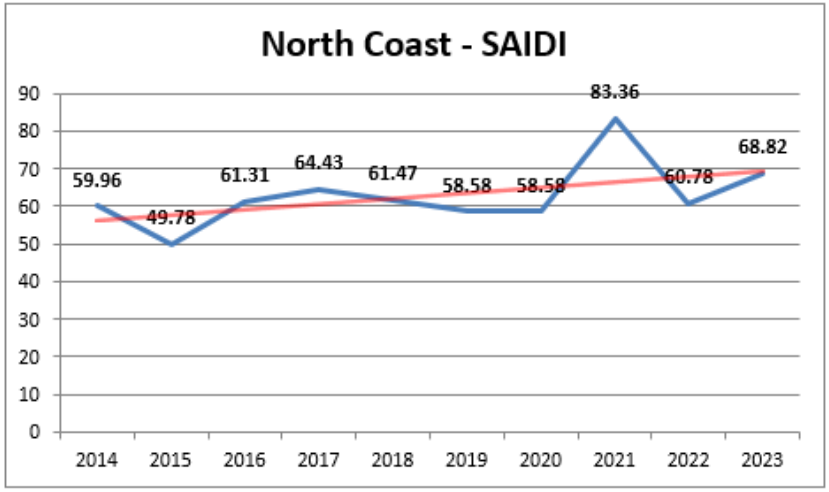


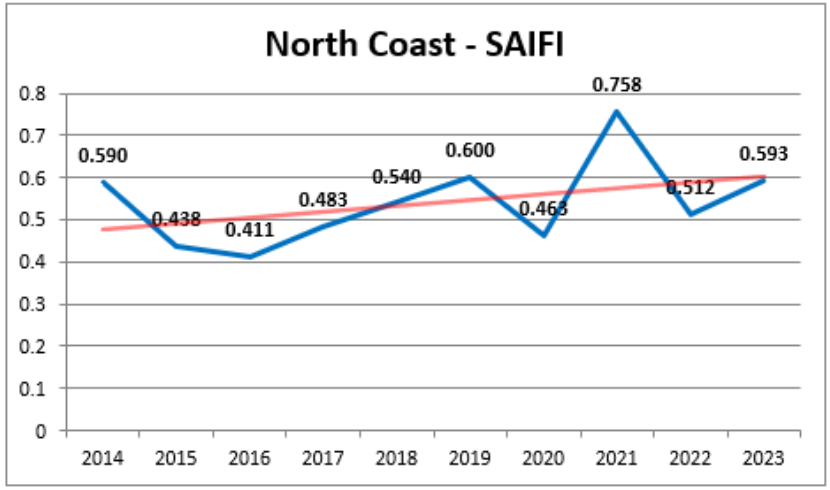


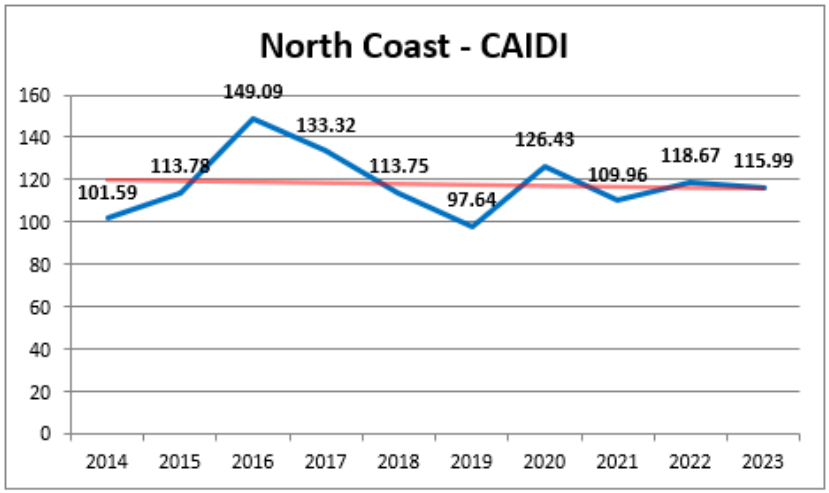


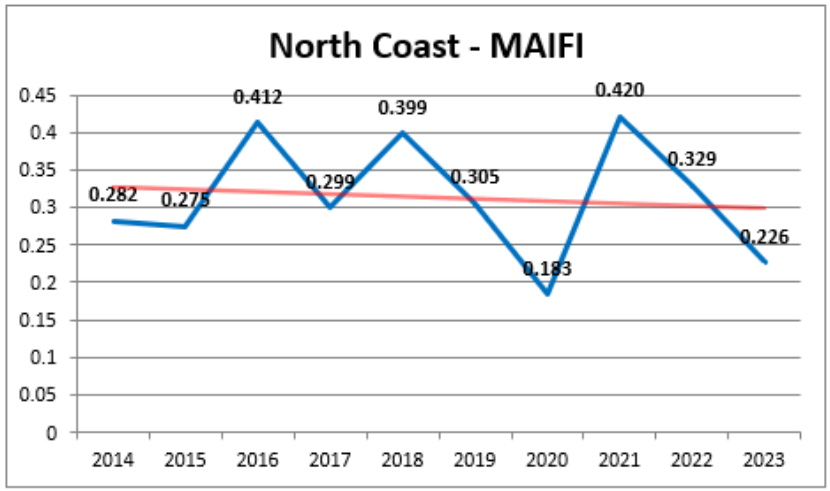


District Reliability Indices (Excludes Planned, ISO and MED)

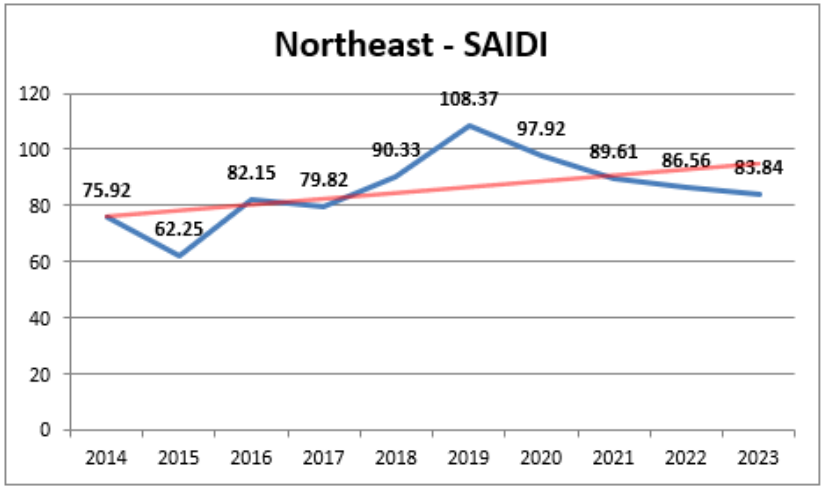


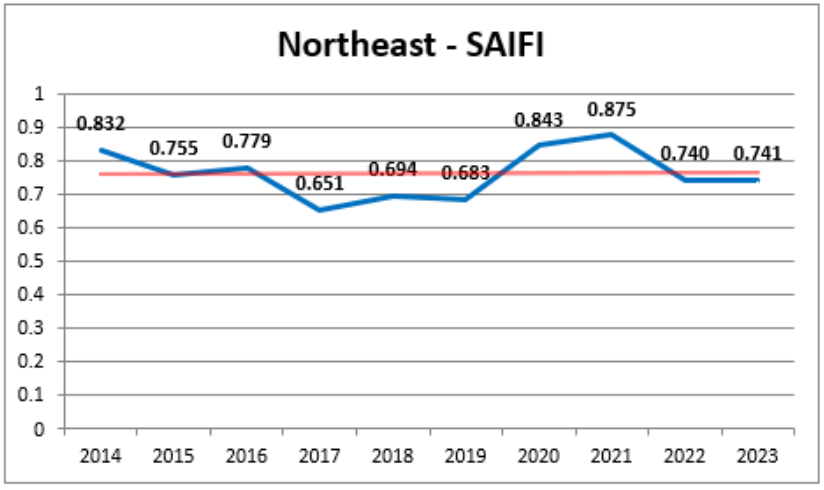


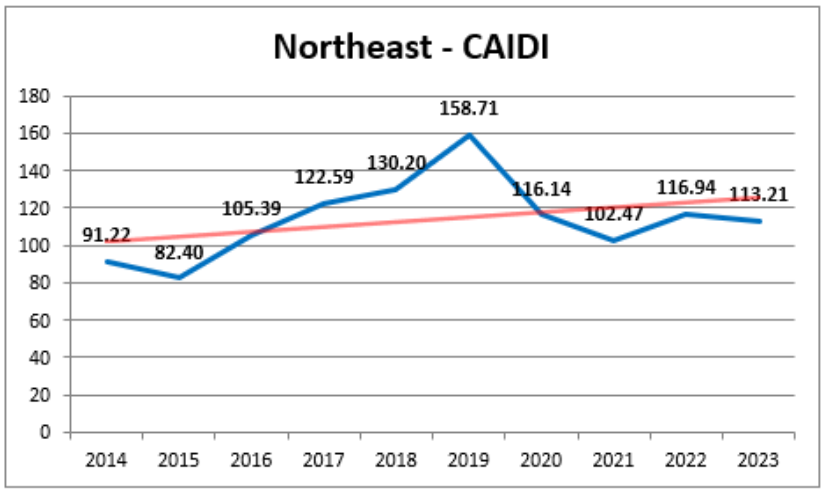


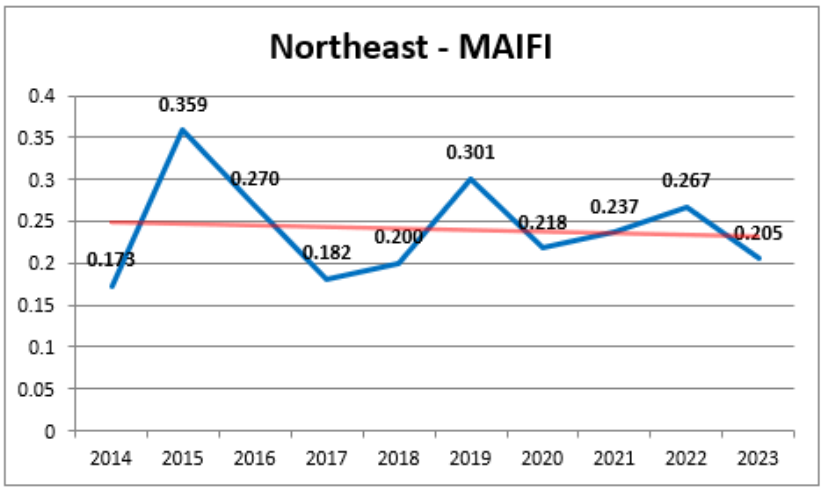


District Reliability Indices (Excludes Planned, ISO and MED)

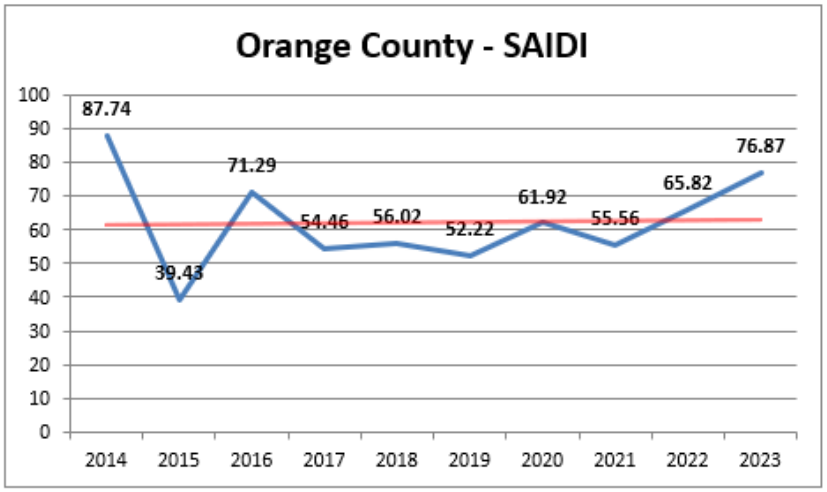


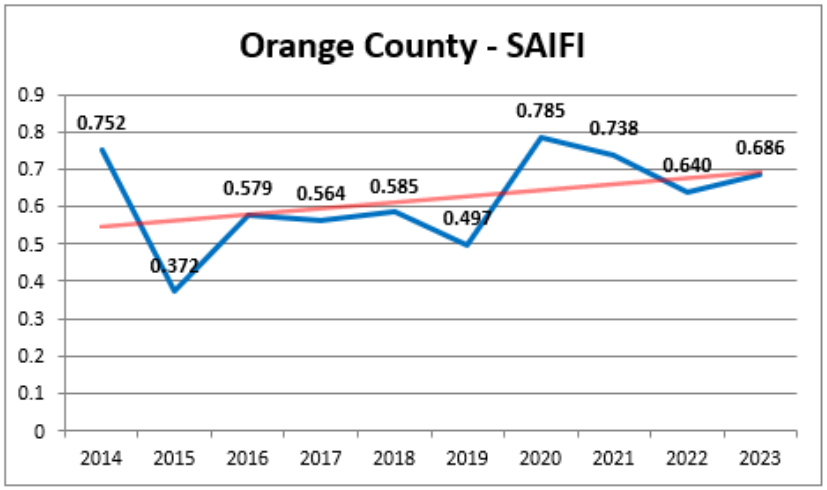


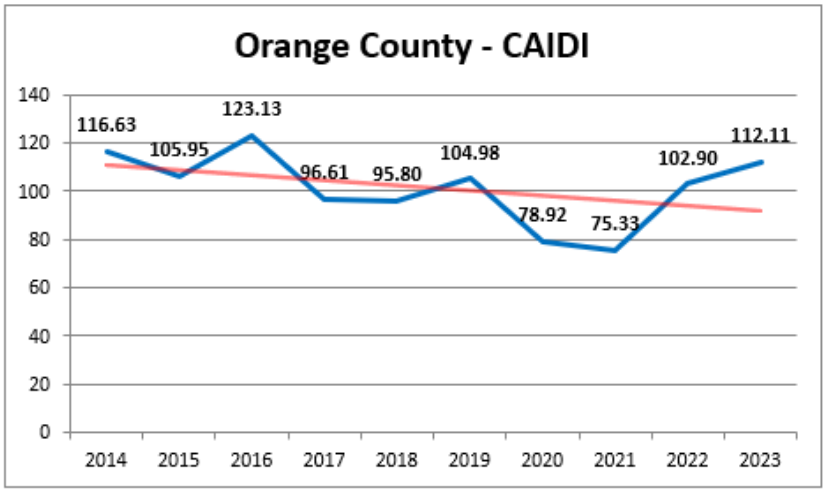


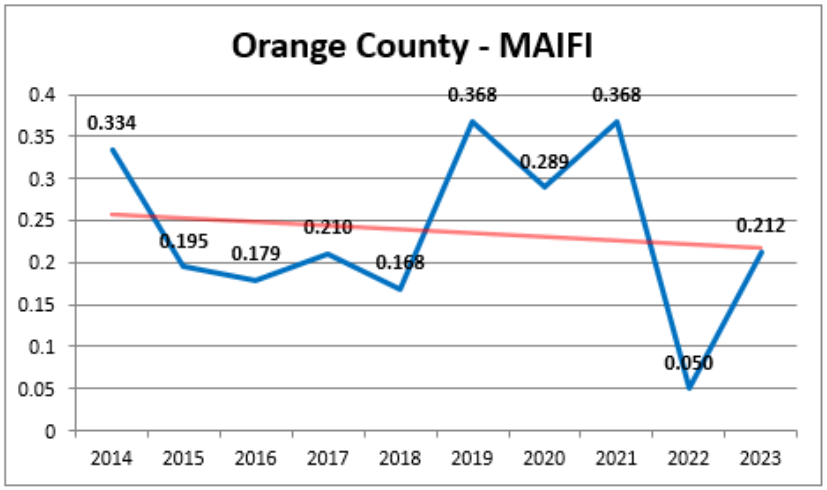


District Reliability Indices (Excludes Planned, ISO and MED)









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

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

System Indices (2014 – 2023) Planned and Unplanned									
	MED Included					MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI		SAIDI	SAIFI	CAIDI	MAIFI
2014	105.94	0.746	141.92	0.277		94.72	0.717	132.13	0.259
2015	100.59	0.661	152.16	0.370		100.40	0.657	152.72	0.370
2016	122.06	0.802	152.18	0.467		108.78	0.744	146.21	0.409
2017	164.71	0.744	221.32	0.368		111.57	0.671	166.22	0.335
2018	167.13	0.827	202.15	0.344		123.87	0.796	155.52	0.344
2019	166.42	0.805	206.71	0.343		111.72	0.760	146.99	0.343
2020	244.05	0.917	266.09	0.326		114.19	0.798	143.02	0.312
2021	149.14	0.918	162.39	0.445		143.85	0.914	157.40	0.445
2022	137.61	0.806	170.73	0.339		137.61	0.806	170.73	0.339
2023	132.30	0.789	167.59	0.257		132.30	0.789	167.59	0.257

Beach Cities - District Indices (2014 – 2023) Planned and Unplanned								
MED Included					MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI	SAIDI	SAIFI	CAIDI	MAIFI
2014	75.05	0.476	157.55	0.143	72.46	0.467	155.04	0.120
2015	85.76	0.592	144.92	0.358	85.72	0.591	145.10	0.358
2016	109.46	0.766	142.88	0.401	95.95	0.718	133.61	0.401
2017	100.40	0.694	144.62	0.388	93.85	0.612	153.29	0.354
2018	142.64	0.859	166.05	0.316	142.18	0.851	167.07	0.316
2019	107.19	0.888	120.74	0.299	106.12	0.866	122.57	0.299
2020	96.19	0.779	123.40	0.350	92.10	0.755	121.91	0.350
2021	147.16	0.818	179.99	0.403	147.16	0.818	179.99	0.403
2022	118.82	0.791	150.21	0.153	118.82	0.791	150.21	0.153
2023	134.13	0.673	199.22	0.178	134.13	0.670	199.22	0.178

Eastern - District Indices (2014 – 2023) Planned and Unplanned								
MED Included					MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI	SAIDI	SAIFI	CAIDI	MAIFI
2014	121.34	0.670	181.10	0.245	107.41	0.624	172.13	0.240
2015	82.12	0.555	147.91	0.289	82.12	0.555	147.91	0.289
2016	136.40	0.911	149.69	0.332	113.09	0.796	142.03	0.298
2017	207.65	0.763	272.09	0.386	114.15	0.655	174.23	0.350
2018	241.61	0.830	291.06	0.394	146.67	0.796	184.23	0.394
2019	249.63	0.749	333.28	0.308	106.31	0.663	160.34	0.308
2020	466.29	1.100	423.85	0.459	169.17	0.907	186.49	0.450
2021	181.24	0.874	207.36	0.643	152.63	0.852	179.14	0.643
2022	140.04	0.922	151.89	0.431	140.04	0.922	151.89	0.431
2023	143.60	0.846	169.83	0.395	143.60	0.846	169.83	0.395

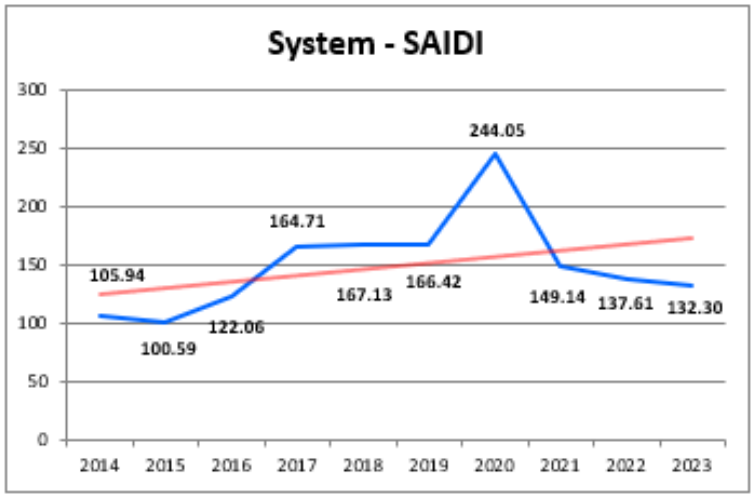
Metro - District Indices (2014 – 2023) Planned and Unplanned								
MED Included					MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI	SAIDI	SAIFI	CAIDI	MAIFI
2014	105.54	0.753	140.23	0.374	95.16	0.724	131.50	0.329
2015	141.46	0.721	196.33	0.491	141.24	0.713	198.22	0.491
2016	114.66	0.759	151.04	0.617	108.26	0.726	149.09	0.575
2017	151.01	0.683	221.21	0.478	111.95	0.602	186.07	0.418
2018	104.76	0.777	134.86	0.408	102.88	0.764	134.70	0.408
2019	100.65	0.693	145.28	0.325	100.63	0.692	145.47	0.325
2020	105.64	0.730	144.72	0.325	90.92	0.668	136.11	0.306
2021	119.98	0.761	157.67	0.484	119.94	0.760	157.83	0.484
2022	155.78	0.682	228.42	0.593	155.78	0.682	228.42	0.593
2023	123.63	0.728	169.93	0.306	123.63	0.728	169.93	0.306

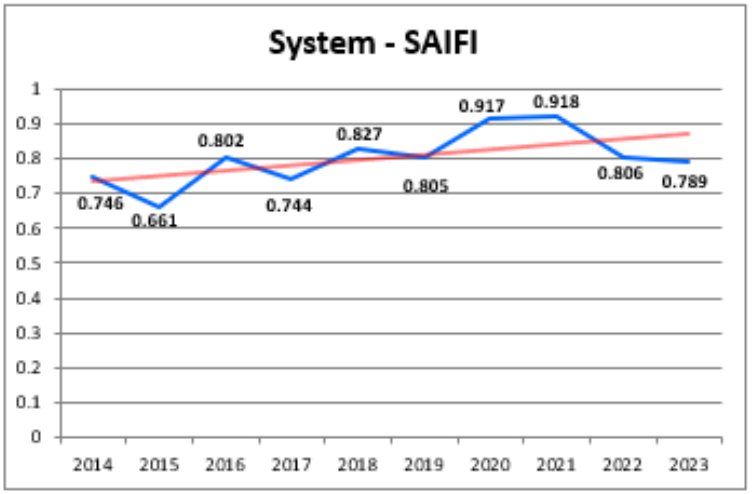
North Coast - District Indices (2014 – 2023) Planned and Unplanned								
MED Included					MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI	SAIDI	SAIFI	CAIDI	MAIFI
2014	104.10	0.740	140.59	0.321	87.73	0.724	121.10	0.309
2015	87.90	0.580	151.50	0.299	87.89	0.579	151.75	0.299
2016	114.65	0.663	172.82	0.583	97.14	0.573	169.41	0.437
2017	108.76	0.665	163.54	0.329	93.34	0.624	149.58	0.329
2018	118.74	0.713	166.60	0.419	99.62	0.682	146.13	0.419
2019	115.12	0.774	148.71	0.319	91.20	0.750	121.58	0.319
2020	154.26	0.678	227.46	0.200	102.15	0.590	173.09	0.199
2021	162.39	1.014	160.11	0.433	162.39	1.014	160.13	0.433
2022	106.40	0.675	157.63	0.330	106.40	0.675	157.63	0.330
2023	112.09	0.715	156.83	0.226	112.09	0.715	156.83	0.226

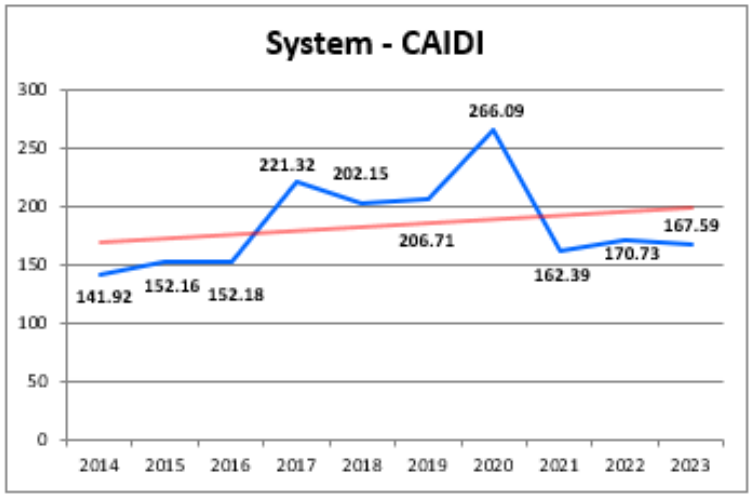
Northeast - District Indices (2014 – 2023) Planned and Unplanned								
MED Included					MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI	SAIDI	SAIFI	CAIDI	MAIFI
2014	117.88	1.016	115.97	0.217	98.05	0.949	103.29	0.216
2015	95.03	0.911	104.37	0.431	94.26	0.902	104.56	0.432
2016	154.02	1.010	152.56	0.410	142.23	0.974	146.09	0.357
2017	315.41	0.986	319.80	0.261	161.00	0.898	179.22	0.240
2018	312.53	1.043	299.75	0.234	158.01	0.948	166.60	0.234
2019	344.80	1.051	328.19	0.444	170.54	0.925	184.30	0.444
2020	596.86	1.448	412.18	0.304	154.91	1.125	137.64	0.271
2021	167.36	1.168	143.32	0.303	161.14	1.161	138.76	0.303
2022	167.38	1.000	167.38	0.269	167.38	1.000	167.38	0.269
2023	156.72	0.995	157.53	0.205	156.72	0.995	157.53	0.205

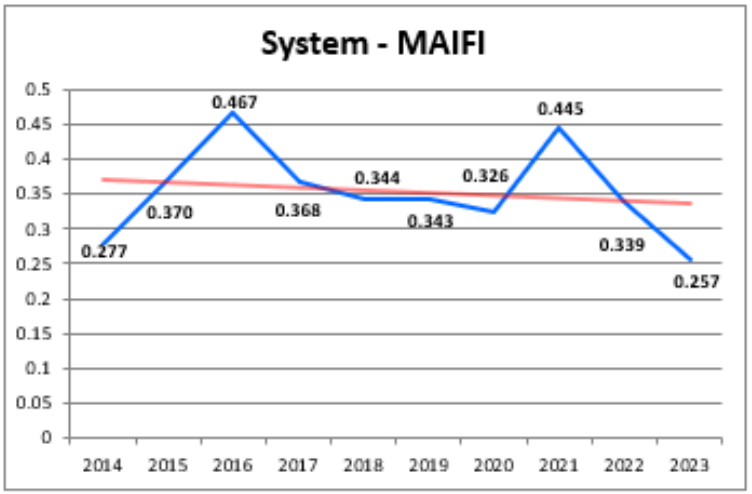
Orange County - District Indices (2014 – 2023) Planned and Unplanned								
MED Included					MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI	SAIDI	SAIFI	CAIDI	MAIFI
2014	122.61	0.906	135.36	0.348	122.56	0.905	135.37	0.348
2015	80.31	0.505	158.94	0.211	80.31	0.505	158.99	0.212
2016	98.96	0.688	143.86	0.288	89.26	0.659	135.47	0.190
2017	87.10	0.692	125.90	0.260	86.74	0.688	126.00	0.228
2018	89.71	0.716	125.27	0.198	89.70	0.716	125.22	0.198
2019	101.98	0.656	155.49	0.404	98.82	0.630	156.75	0.404
2020	85.25	0.901	94.66	0.329	82.56	0.879	93.96	0.307
2021	122.87	1.002	122.67	0.370	122.87	1.002	122.62	0.370
2022	131.05	0.880	148.92	0.051	131.05	0.880	148.92	0.051
2023	127.17	0.891	142.67	0.216	127.17	0.891	142.67	0.216

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

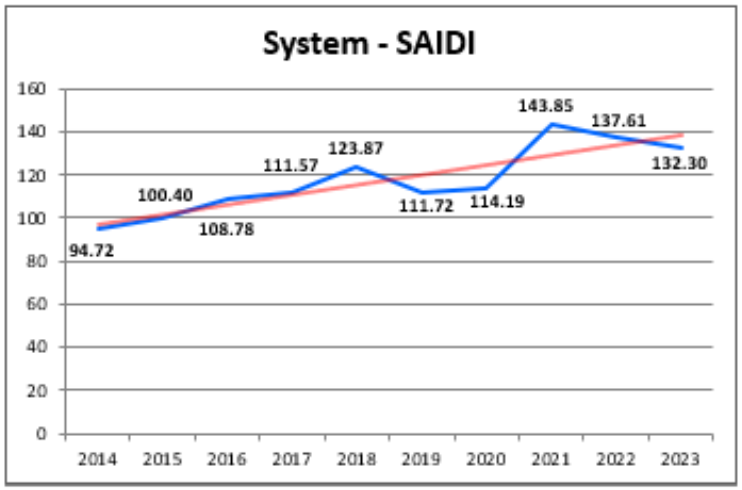


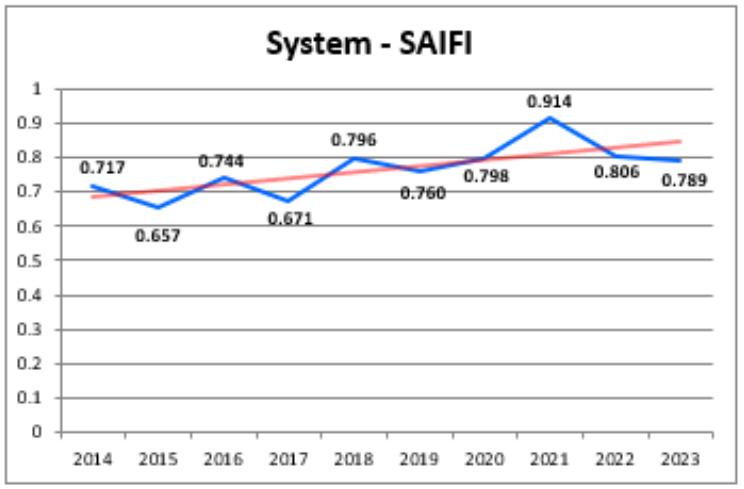


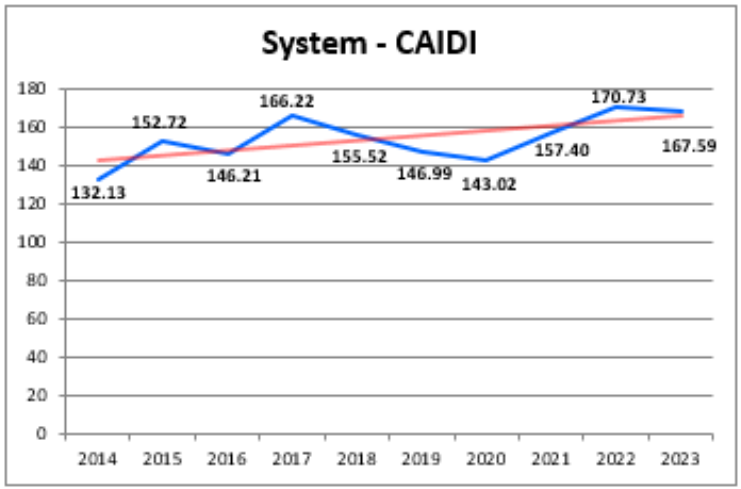


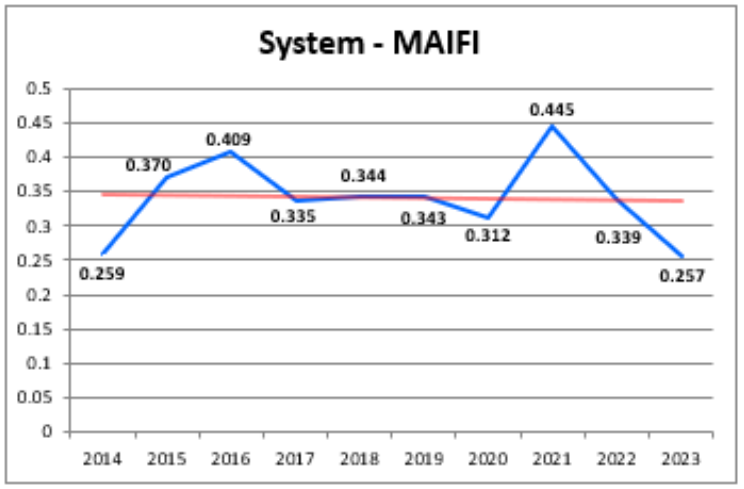


System Indices - Planned and Unplanned (Excludes ISO and MED)

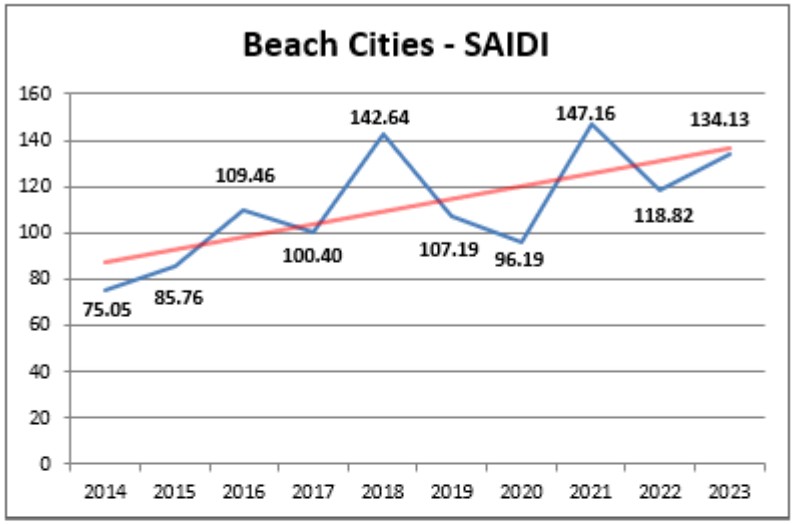


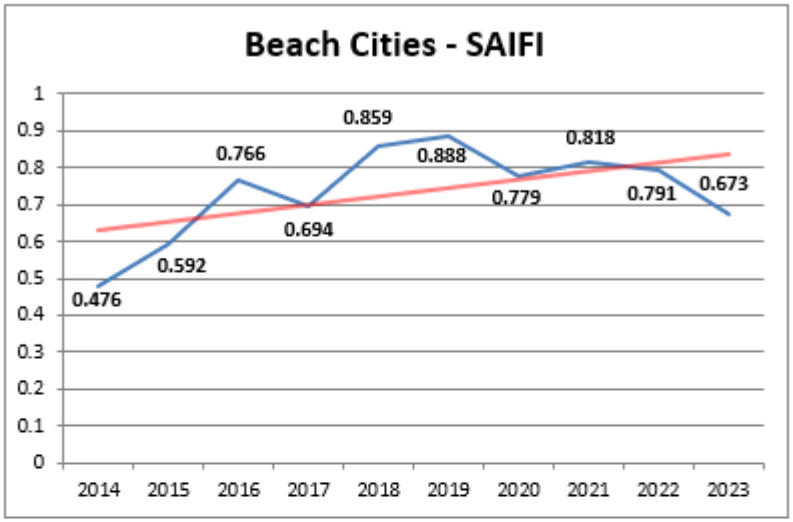


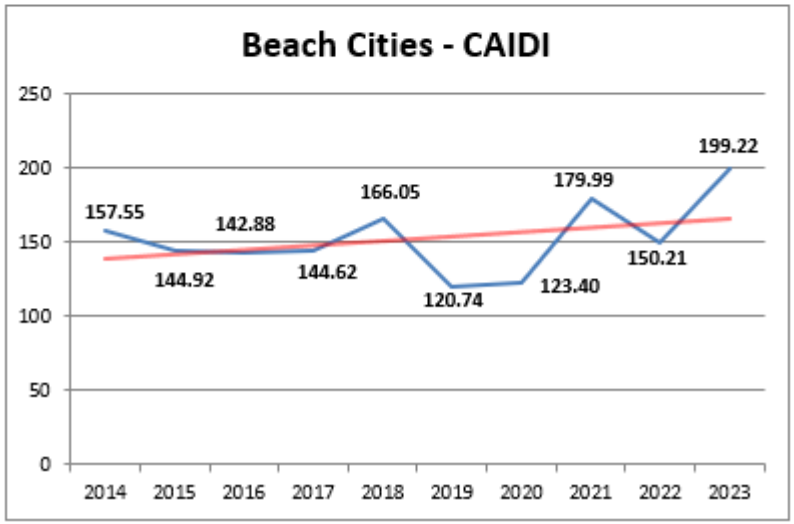


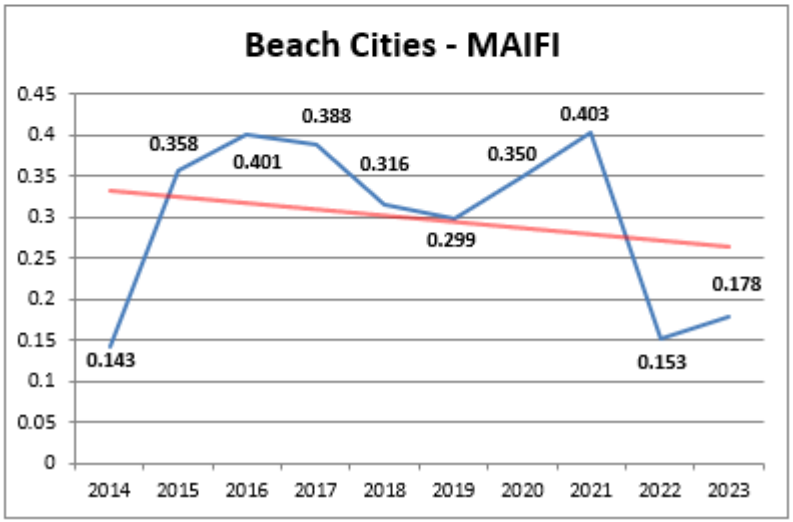


District Indices - Planned and Unplanned (Excludes ISO; Includes MED)

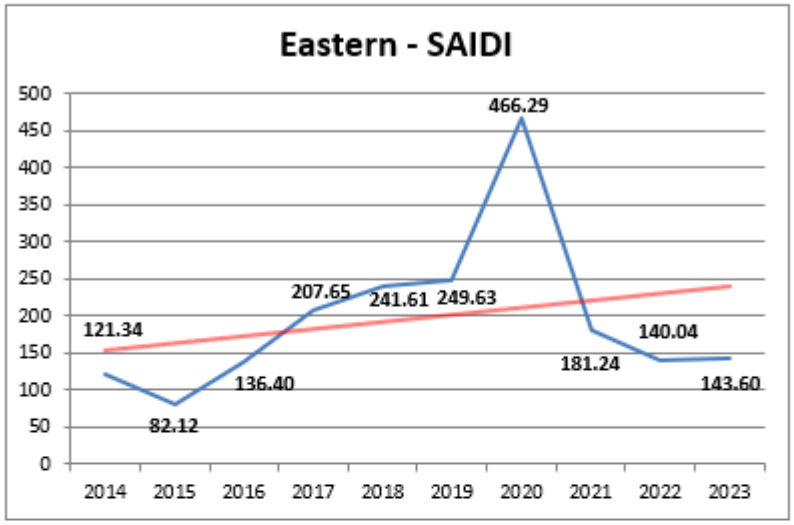


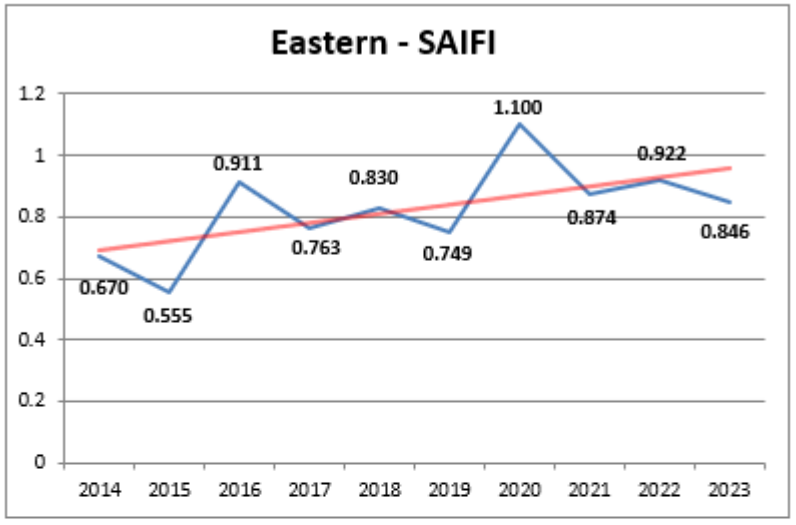


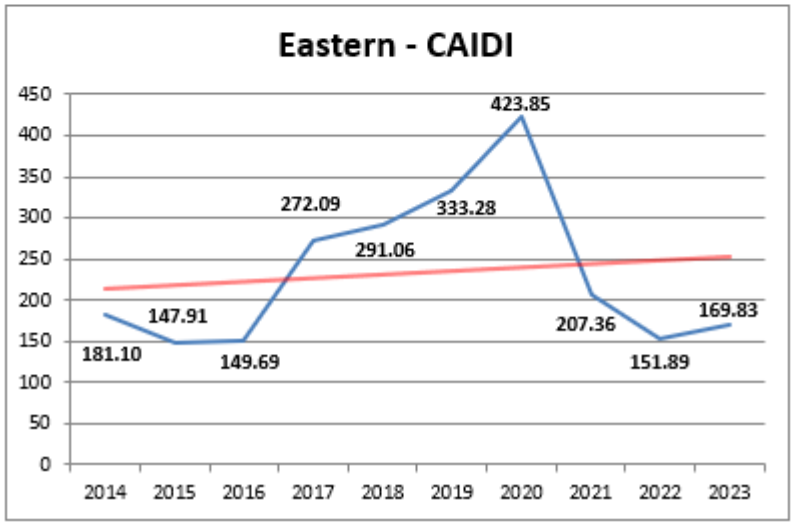


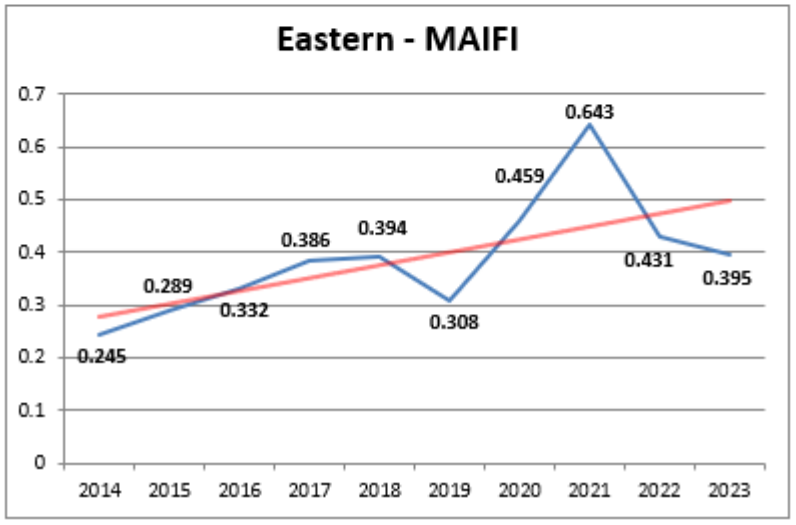


District Indices - Planned and Unplanned (Excludes ISO; Includes MED)

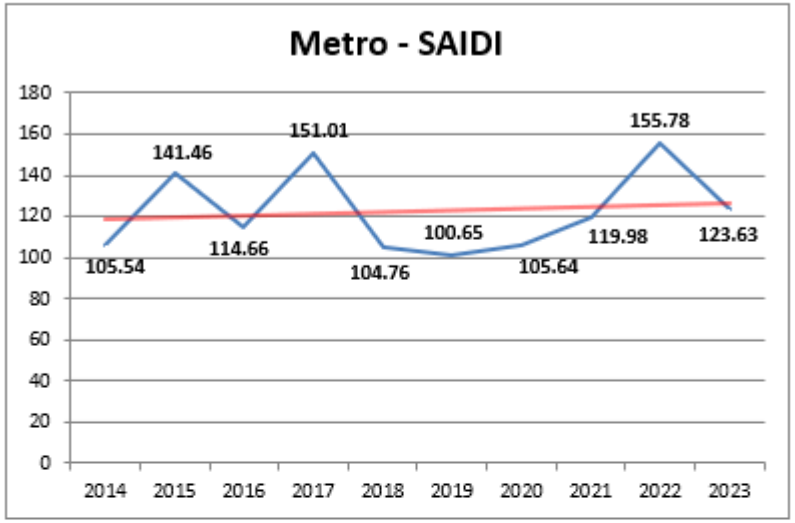


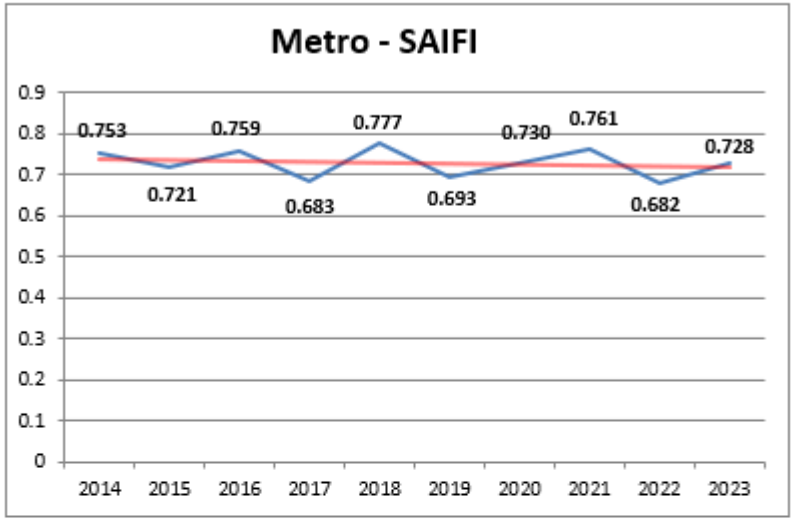


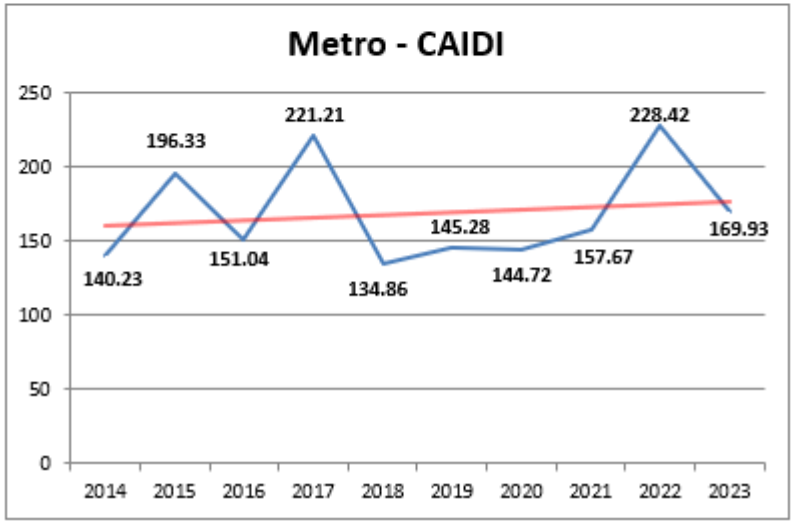


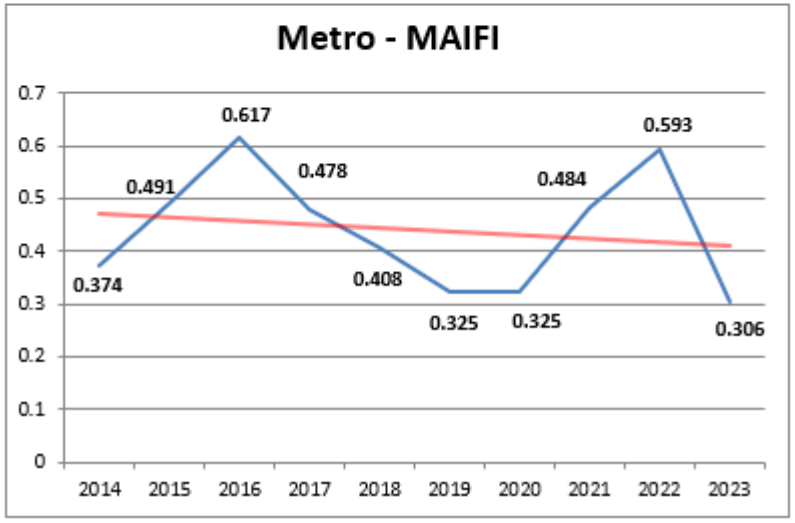


District Indices - Planned and Unplanned (Excludes ISO; Includes MED)

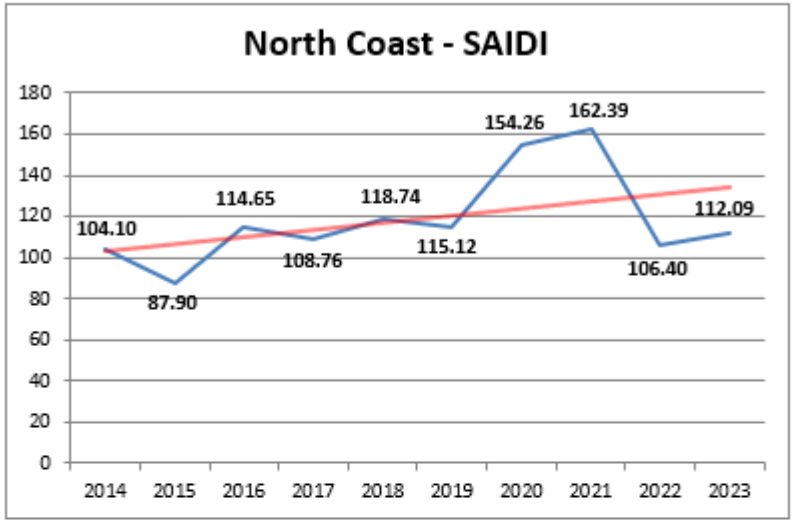


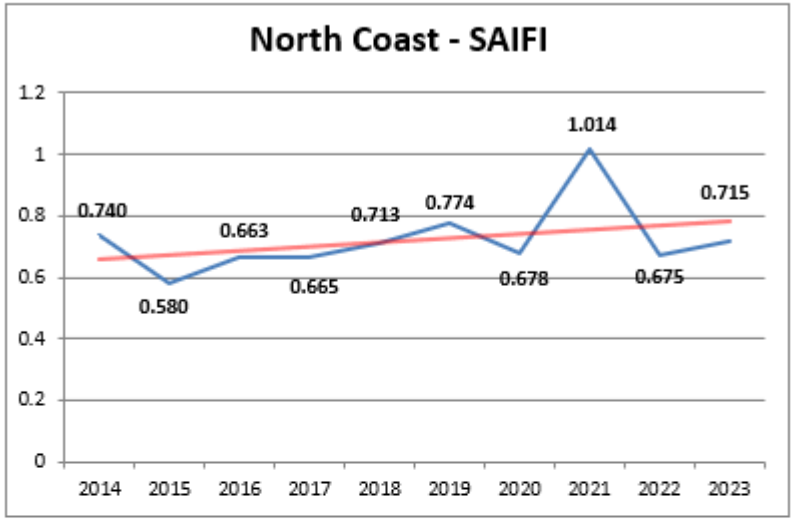


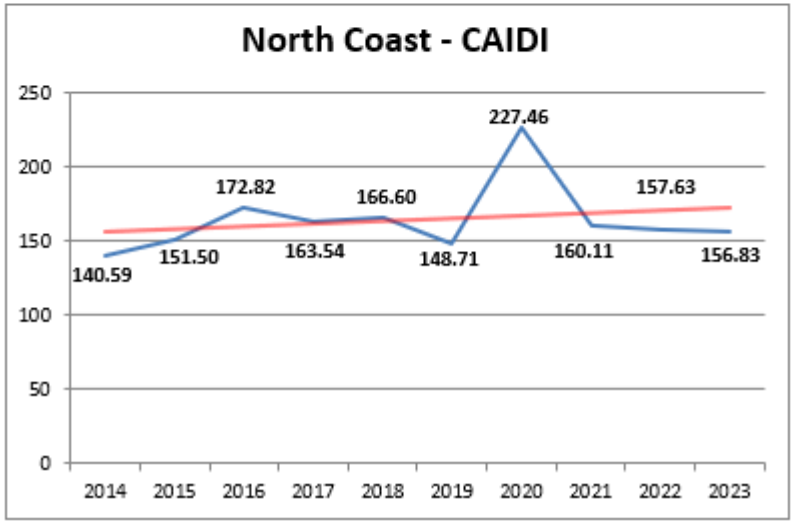


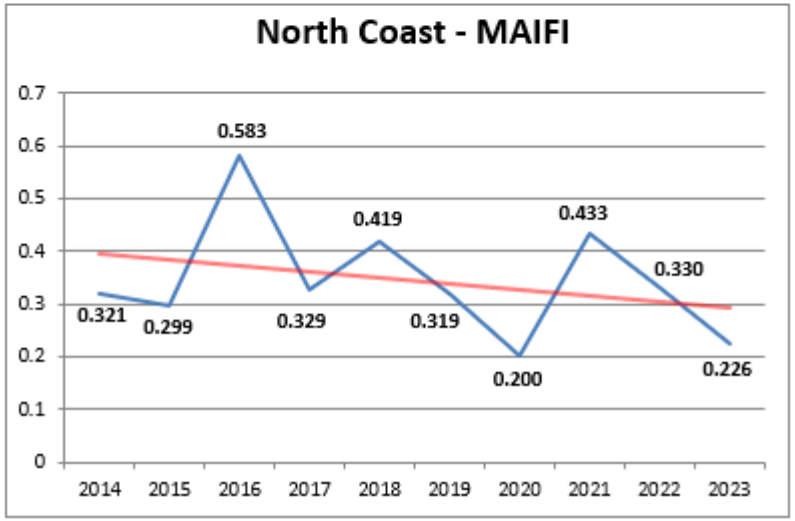


District Indices - Planned and Unplanned (Excludes ISO; Includes MED)

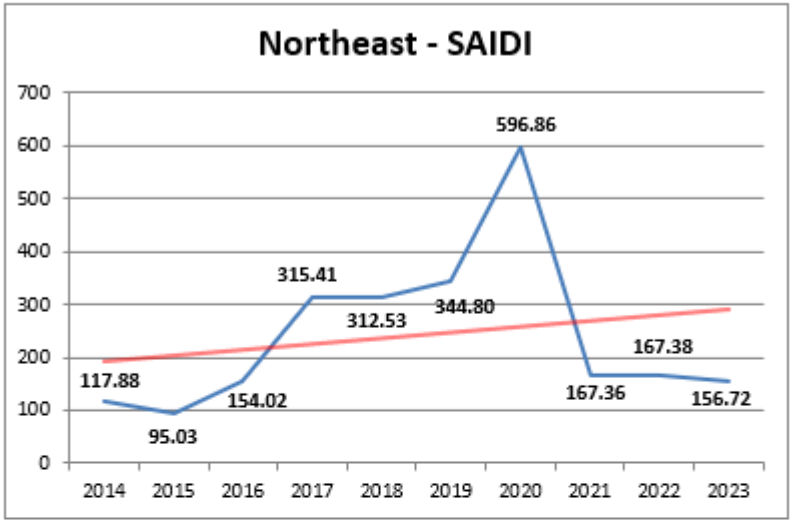


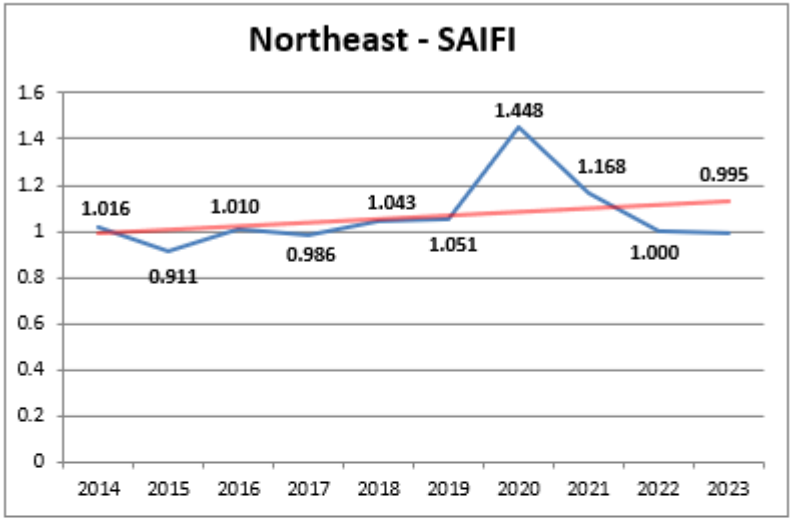


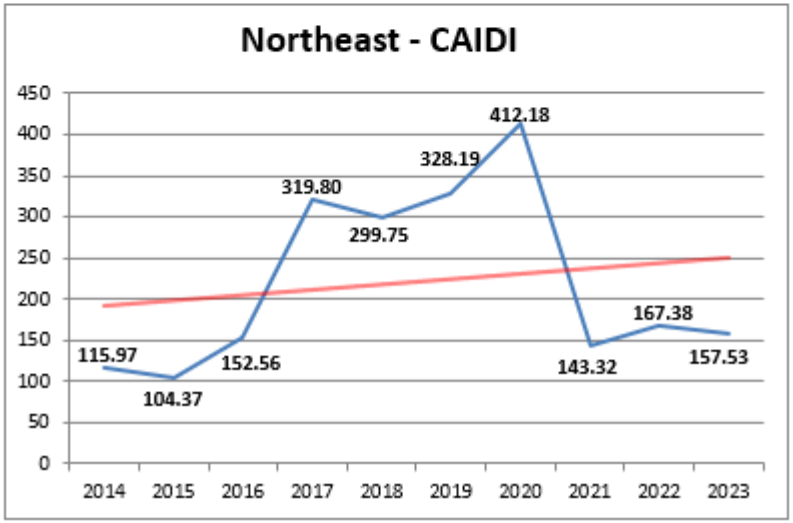


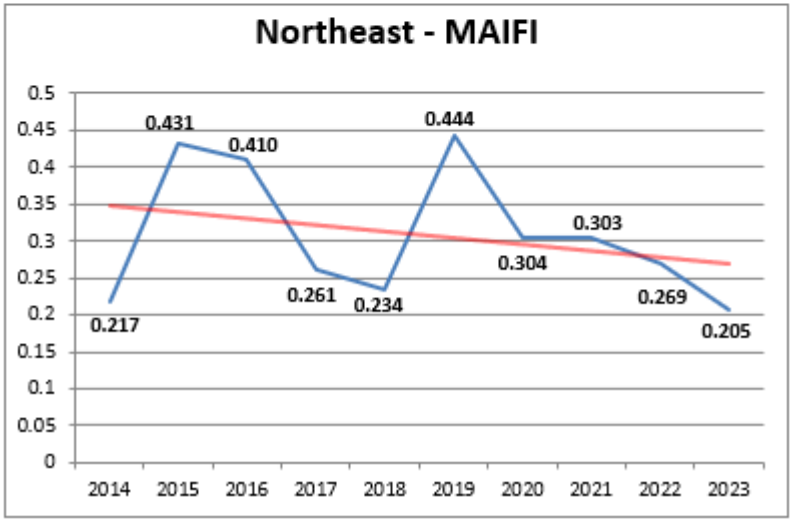


District Indices - Planned and Unplanned (Excludes ISO; Includes MED)

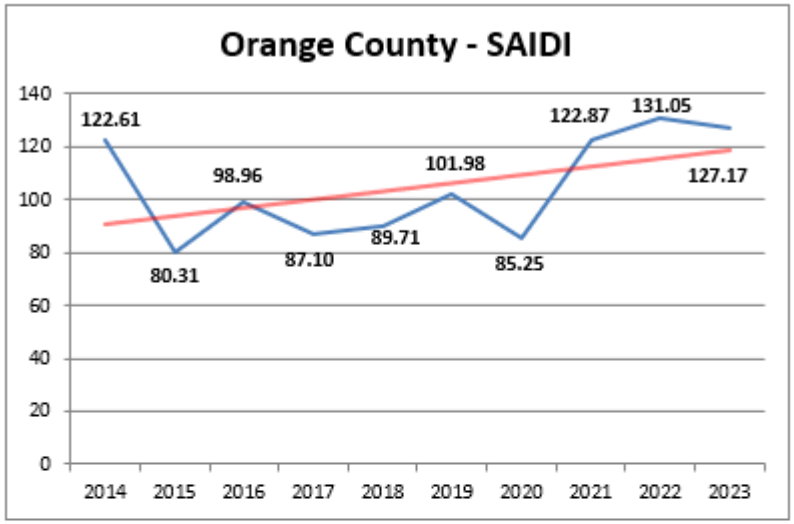


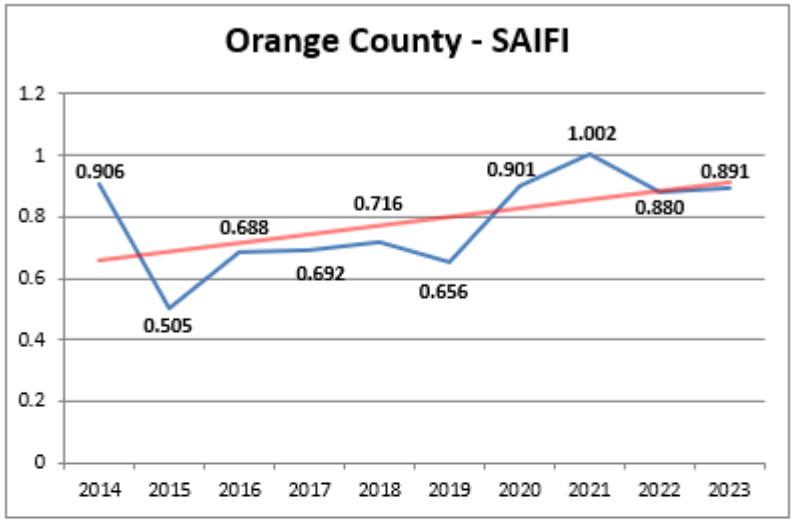


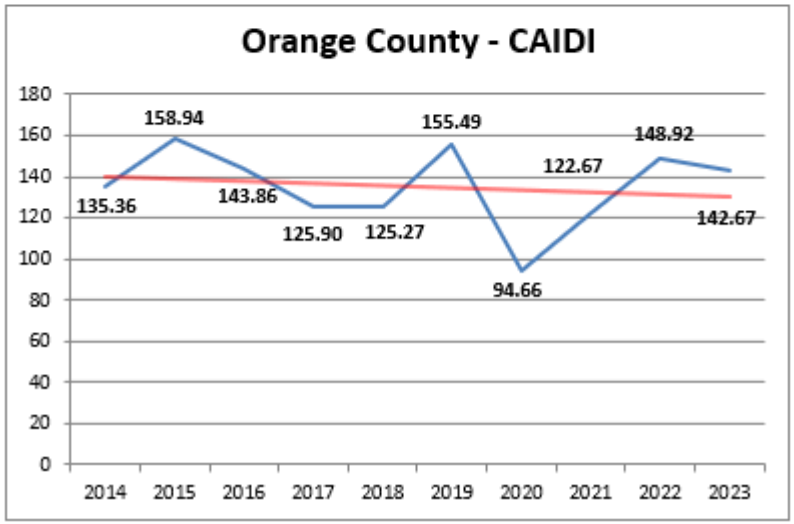


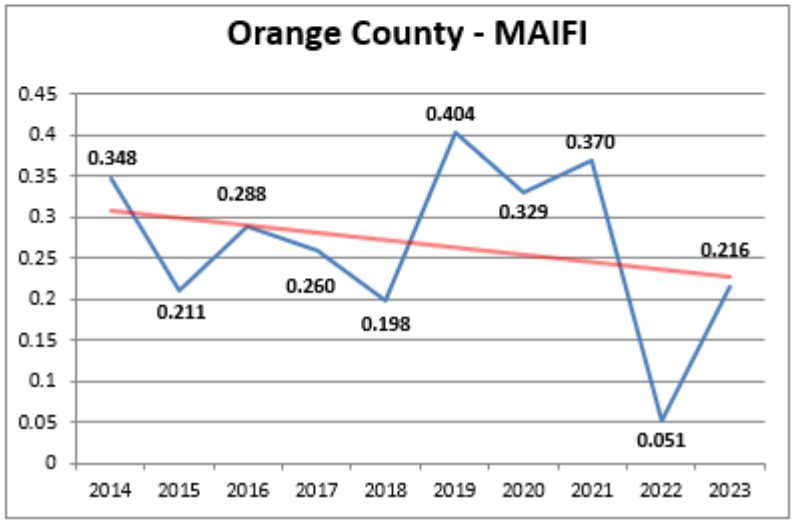


District Indices - Planned and Unplanned (Excludes ISO; Includes MED)

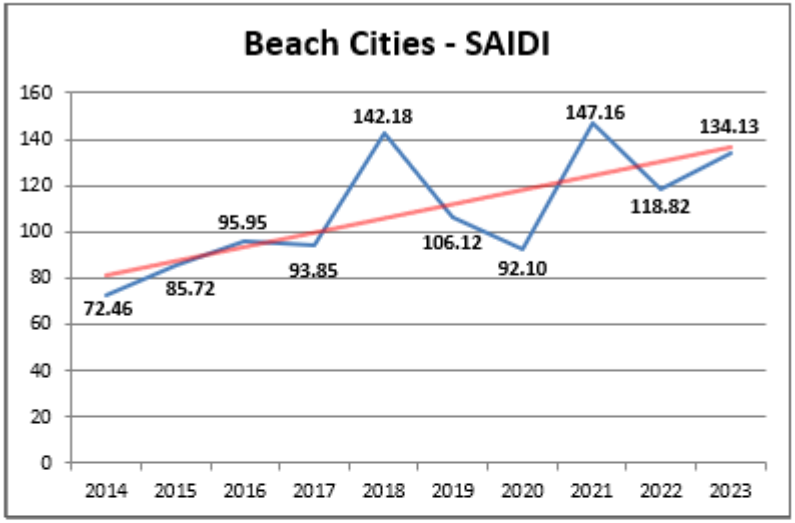


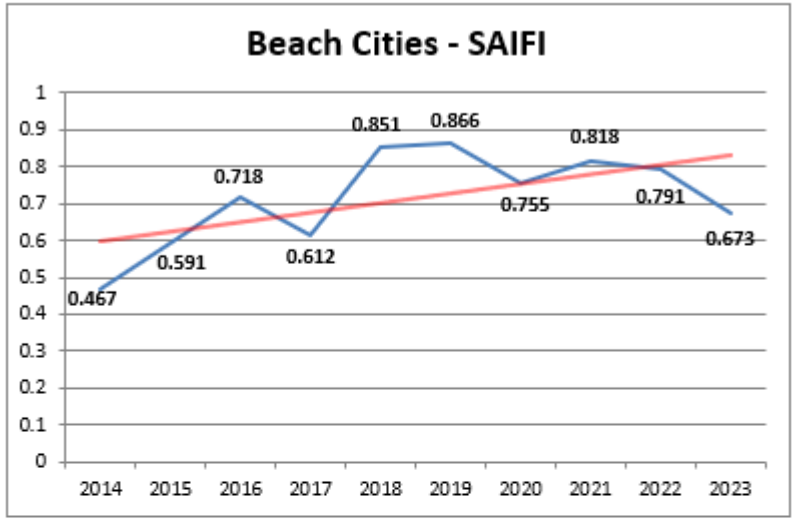


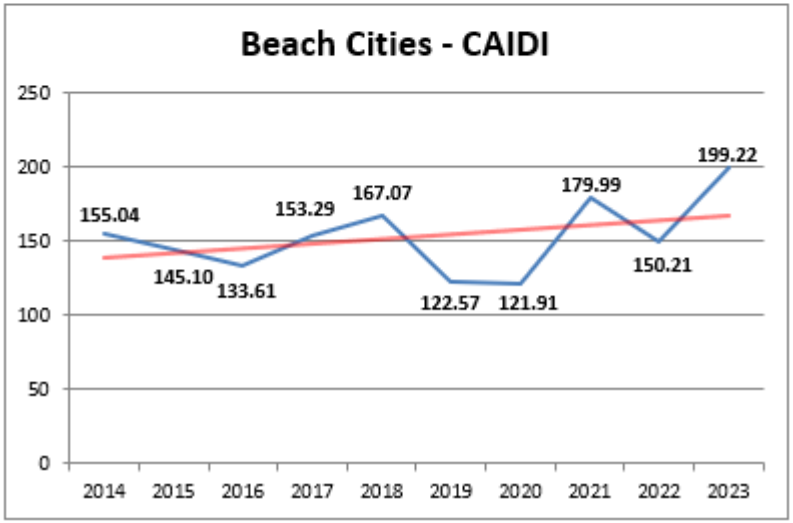


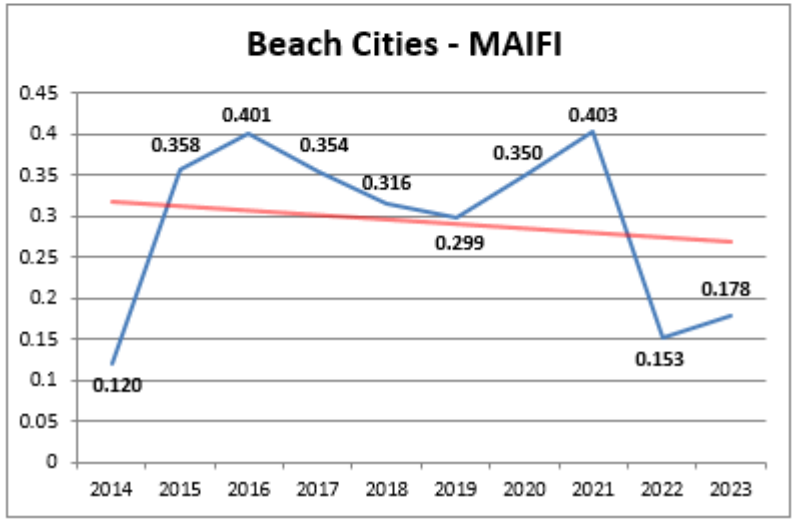


District Indices - Planned and Unplanned (Excludes ISO and MED)

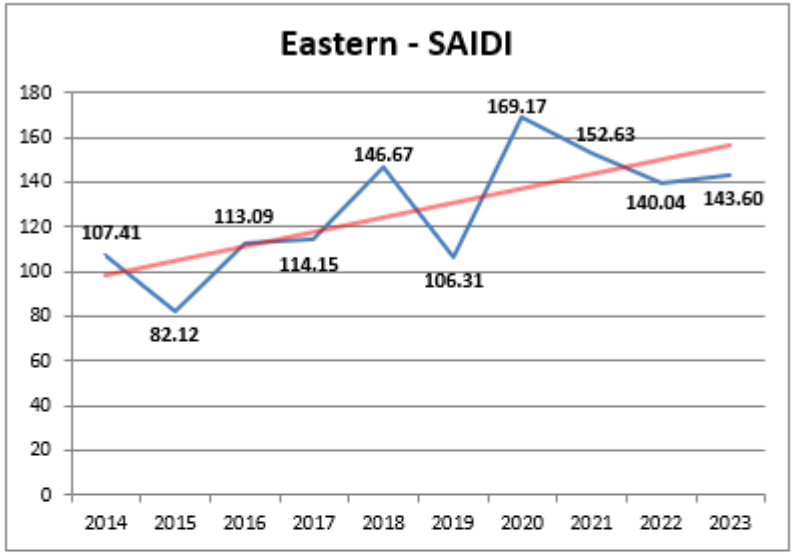


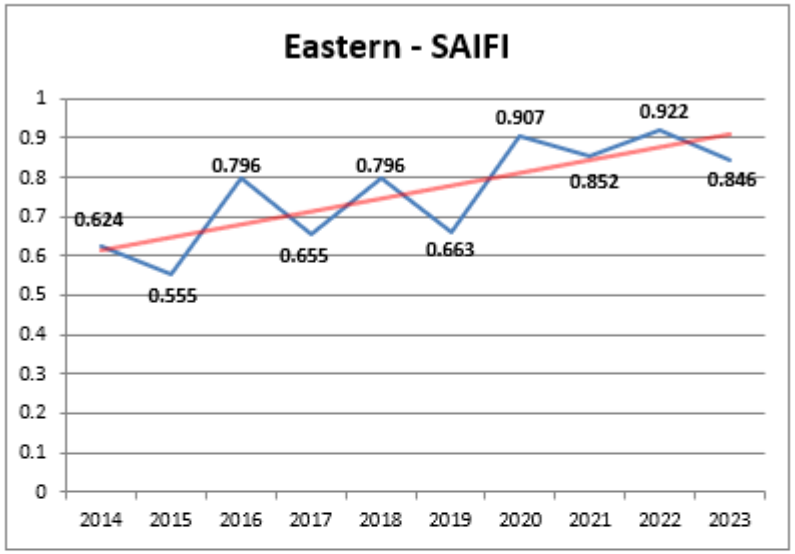


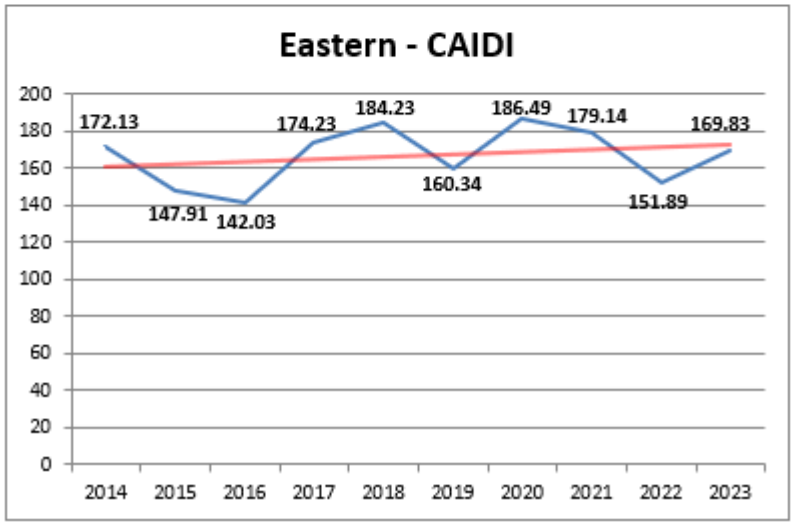


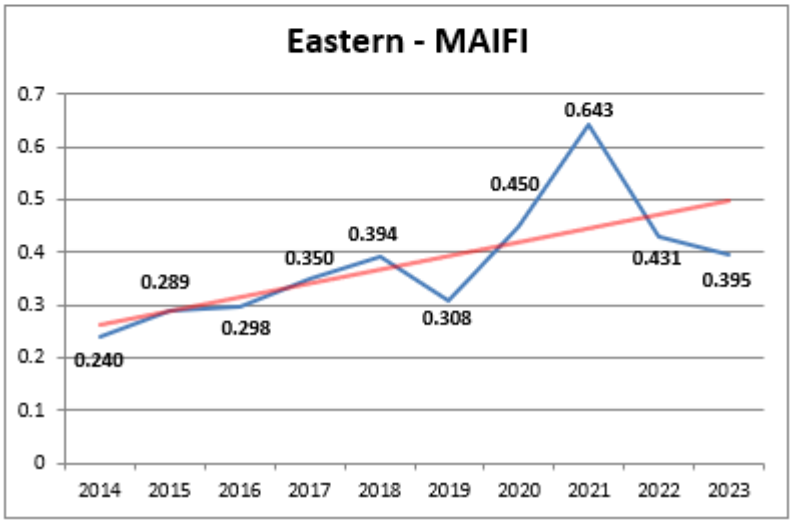


District Indices - Planned and Unplanned (Excludes ISO and MED)

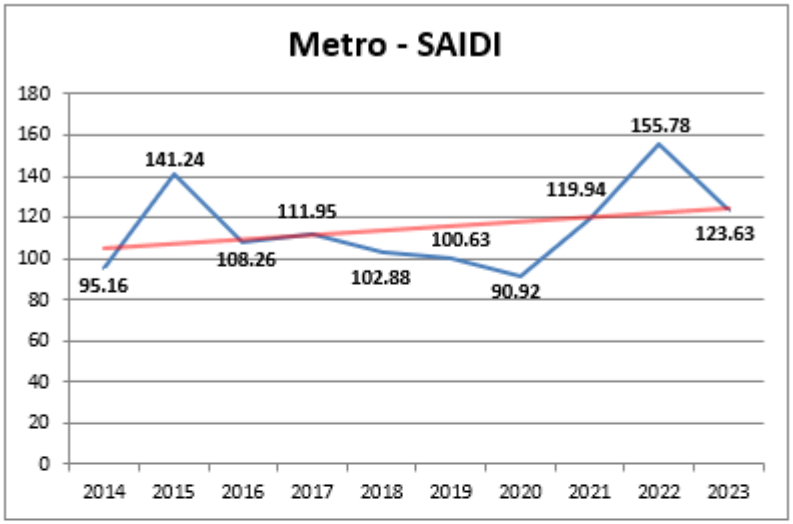


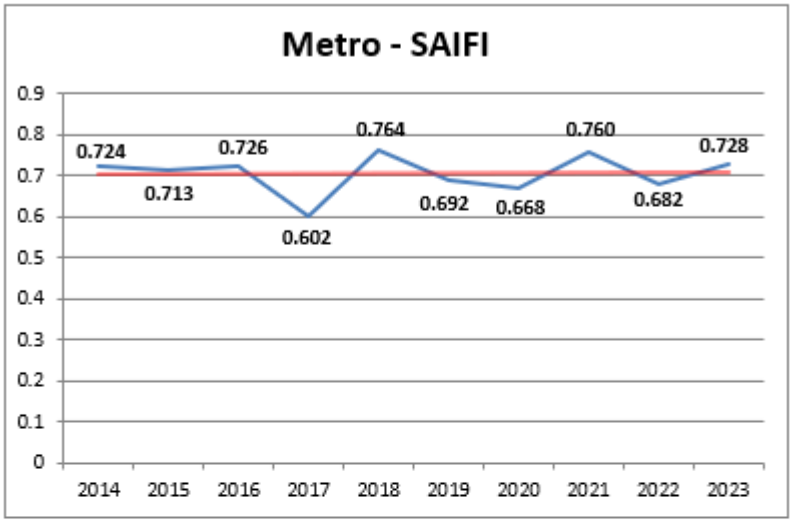


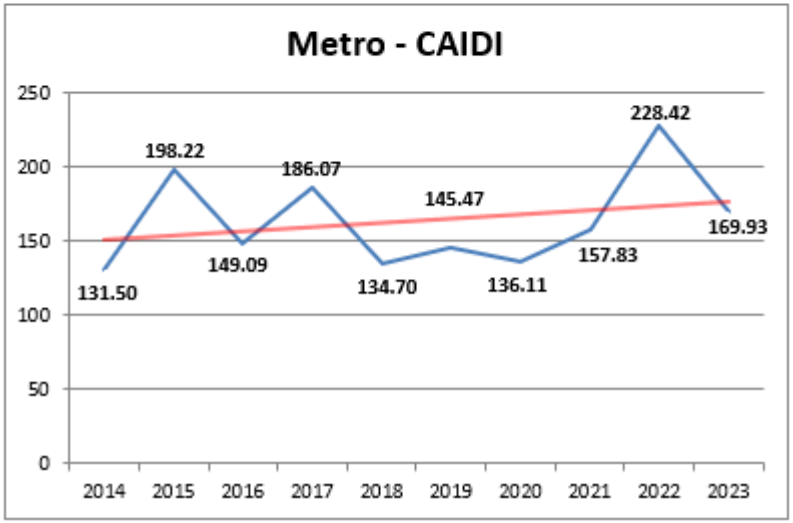


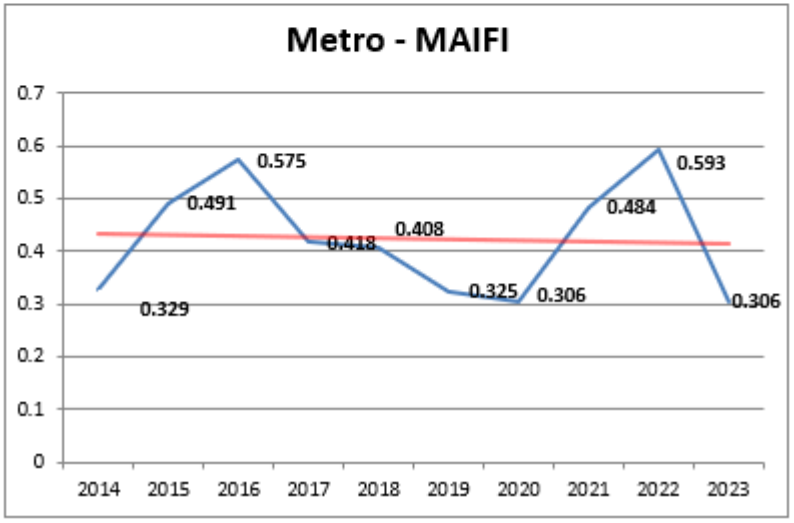


District Indices - Planned and Unplanned (Excludes ISO and MED)

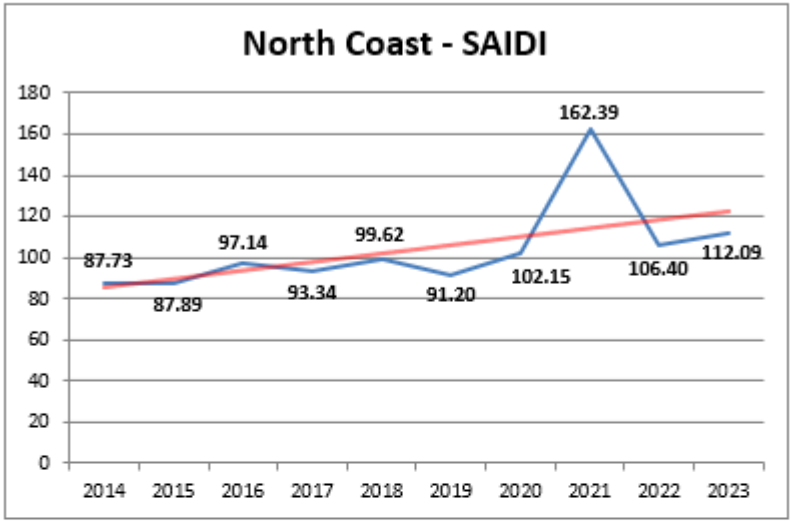


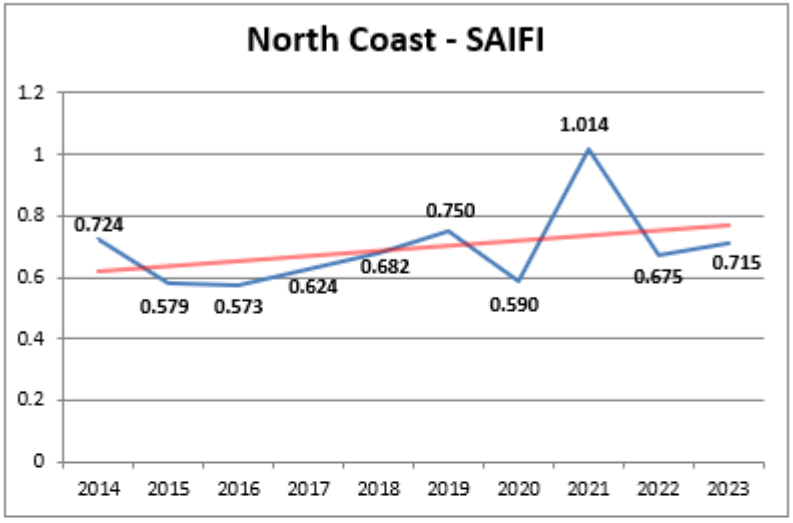


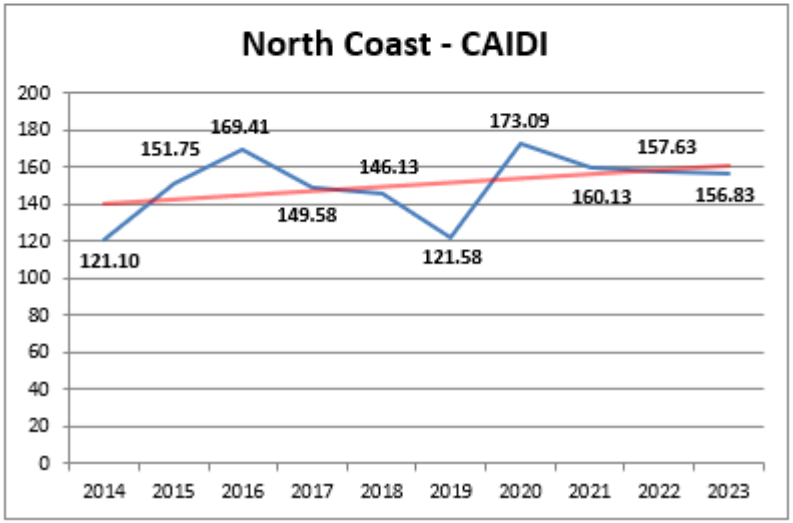


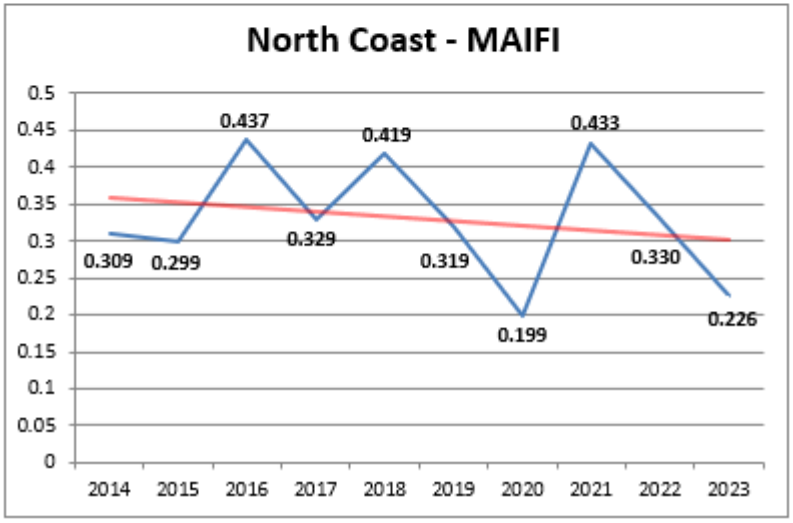


District Indices - Planned and Unplanned (Excludes ISO and MED)

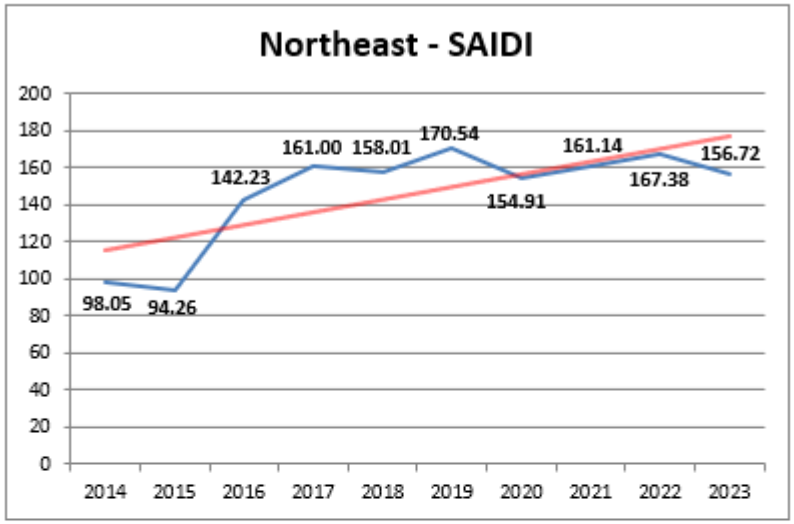


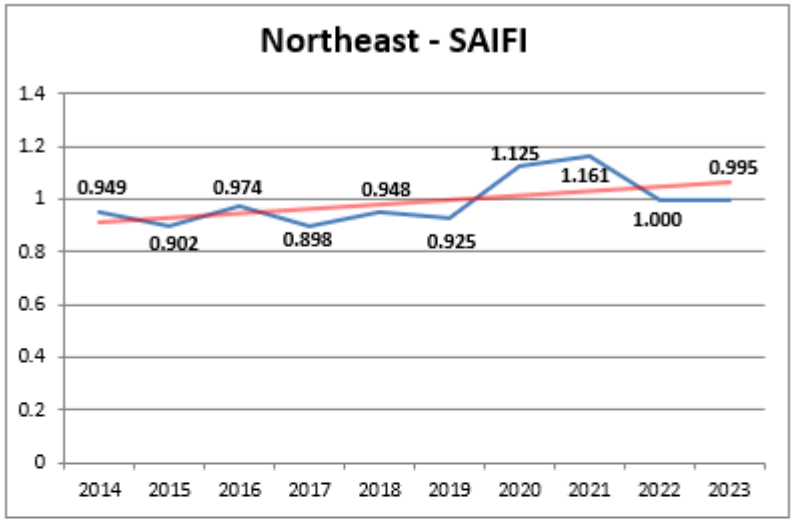


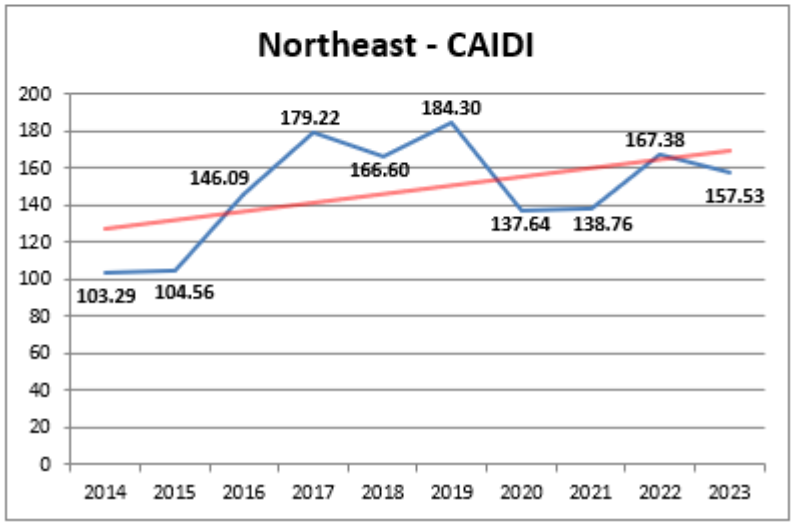


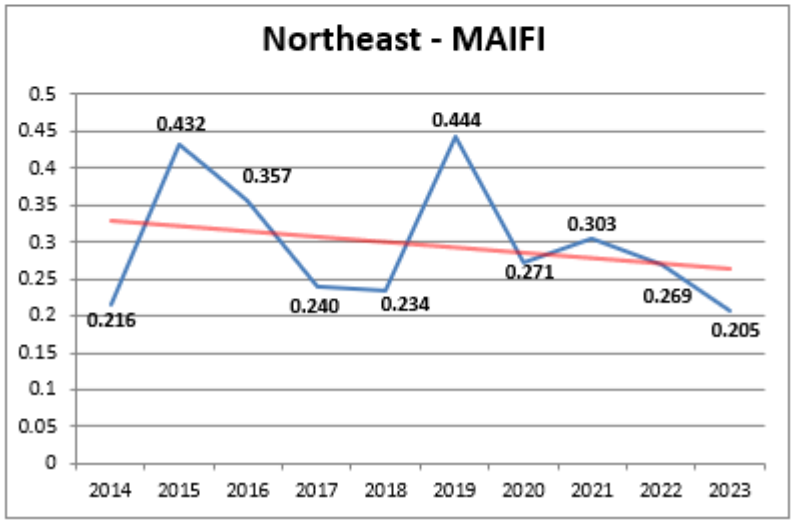


District Indices - Planned and Unplanned (Excludes ISO and MED)

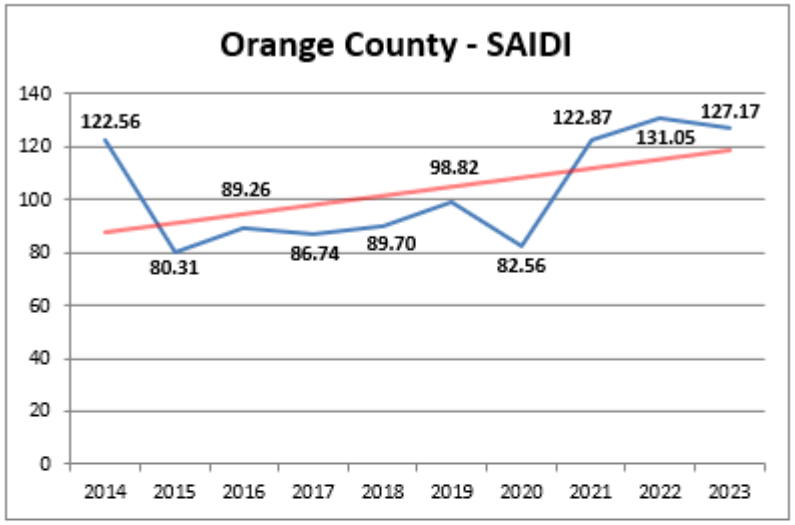


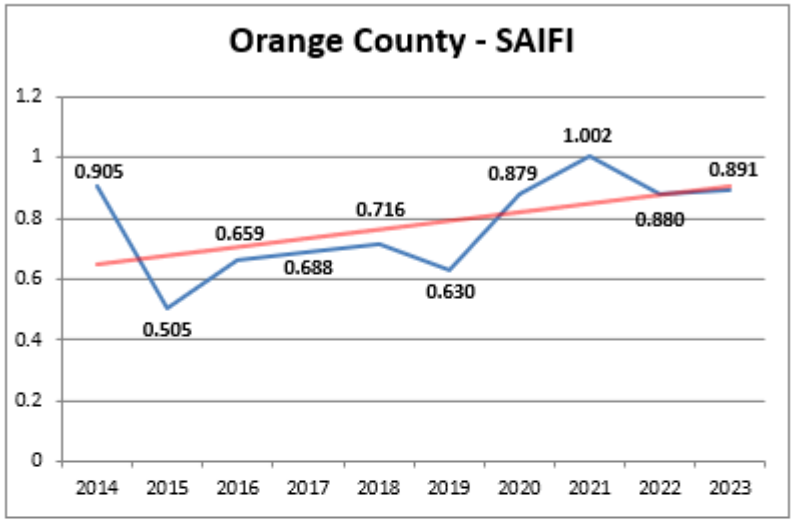


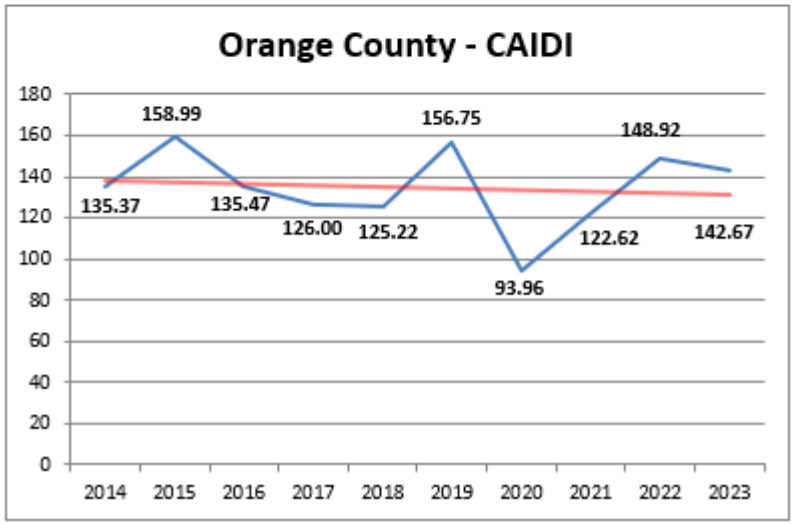


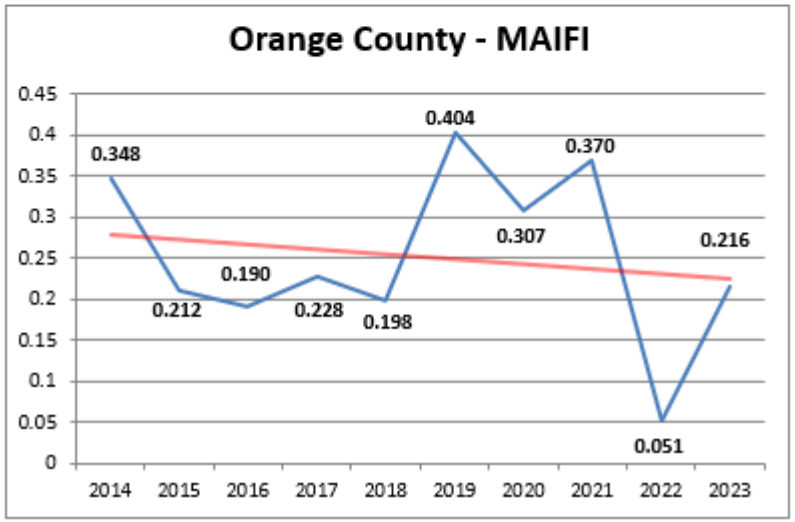


District Indices - Planned and Unplanned (Excludes ISO and MED)









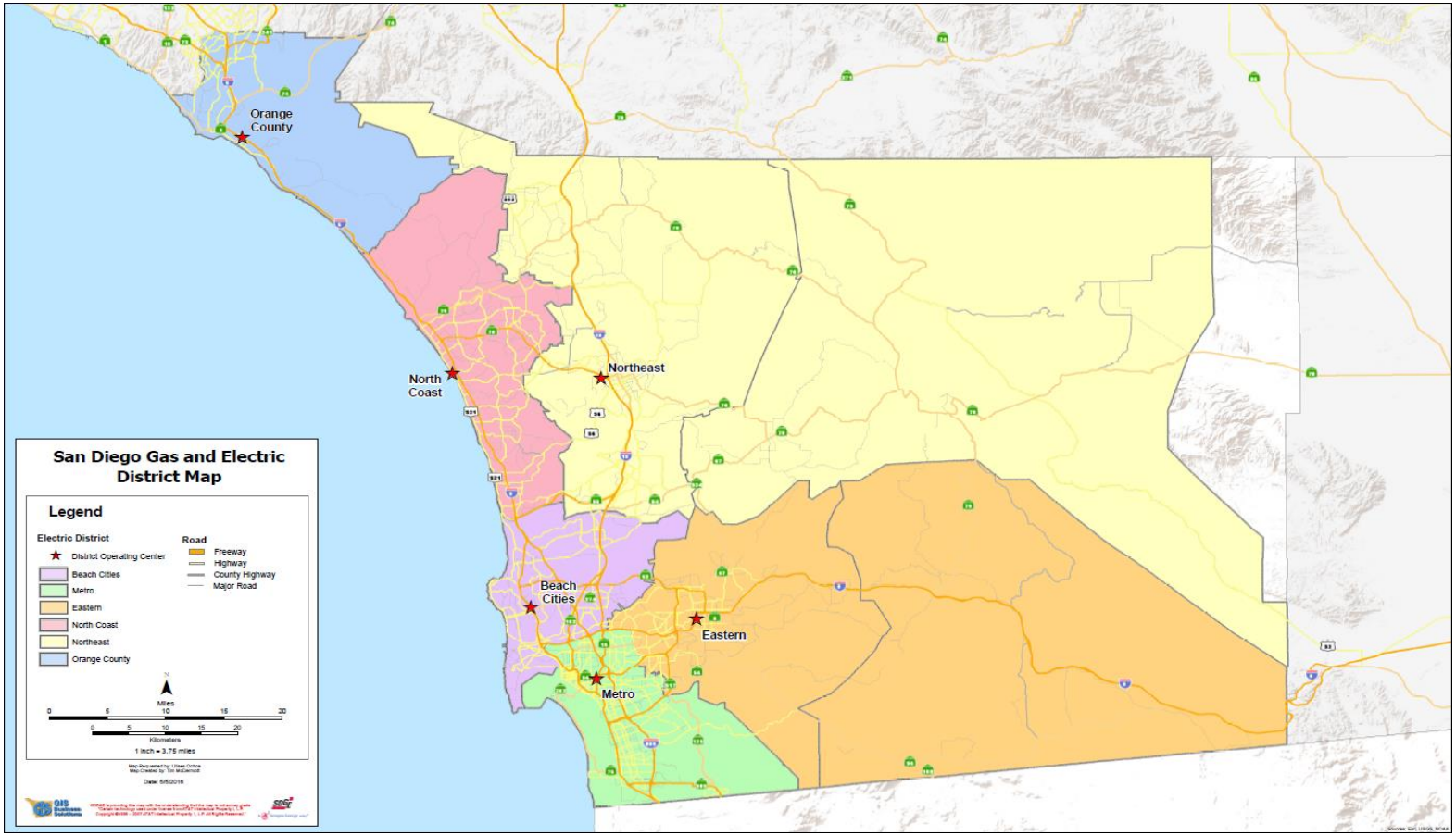
NUMBER, DATE, AND LOCATION OF PLANNED OUTAGES IN EACH DISTRICT (2023)

Planned Outages - 2023						
Month	**Beach Cities**	**Eastern**	**Metro**	**North Coast**	**Northeast**	**Orange County**
January	36	47	20	25	78	9
February	27	59	25	13	94	22
March	24	57	28	25	96	30
April	27	76	34	24	119	38
May	41	71	35	18	102	31
June	36	56	49	25	160	15
July	29	65	21	22	134	10
August	25	68	29	19	131	8
September	38	53	28	31	150	12
October	41	72	21	29	162	15
November	37	86	25	27	114	5
December	28	52	25	31	90	8
Totals	**389**	**762**	**340**	**289**	**1430**	**203**

In 2023, there were 3,413 primary planned outages.

SECTION 4 – SERVICE TERRITORY MAP INCLUDING DIVISIONS OF DISTRICTS

MAP OF SERVICE TERRITORY WITH DIVISIONS OF DISTRICTS



SECTION 5 – TOP 1% OF WORST-PERFORMING CIRCUITS (WPC), EXCLUDING MED

TOP 1% OF WORST-PERFORMING CIRCUITS (2022-2023)

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 by the Decision, SDG&E is providing a table of WPCs based on the Circuit SAIDI indices (Table 5.1) and the Circuit SAIFI indices (Table 5.2). Each index is based on a two-year historical period[1].

The Below Metric is Circuit SAIDI

Table 5.1: 2023 Worst SAIDI Circuits List based upon 2022-2023 data (Excludes Planned, MED and Load Curtailment)

Circuit	District	Circuit Customers	Substation Name	Circuit Miles	% OH	% UG	Annualized Feeder Outage Count	Annualized Total Circuit SAIDI **
CTL1	Northeast	199	CRESTLINE	5.8	69%	31%	8	2298
171	Northeast	1192	BORREGO	45.9	64%	36%	3	1256
CCB1	Beach Cities	172	COUNTRY CLUB	3.3	3%	97%	2	962
172	Northeast	994	BORREGO	58.5	67%	33%	4	875
170	Northeast	610	BORREGO	52	68%	32%	3	874
340	Metro	4030	SUNNYSIDE	39.9	20%	80%	1	673
RA3	Northeast	369	RAMONA	3.6	82%	18%	3	660
558	Orange County	1256	TRABUCO	17.7	21%	79%	2	649
EO2	Metro	616	EO2	5.1	68%	32%	1	649
757	North Coast	807	BATIQUITOS	7.9	0%	100%	1	607

* Circuit appeared for three consecutive years in the worst performance list

** Circuit SAIDI represents the two-year average (2022-2023) of all outages: Mainline, Feeder, Backbone, and Branch

[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.

The Below Metric is Circuit SAIFI.

Table 5.2: 2023 Worst SAIFI Circuits List based upon 2022-2023 data (Excludes Planned, MED, and Load Curtailment

Circuit	District	Circuit Customers	Substation Name	Circuit Miles	% OH	% UG	Annualized Feeder Outage Count	Annualized Total Circuit SAIFI **
CTL1	Northeast	199	CRESTLINE	5.8	69%	31%	8	7.8
PB5	Beach Cities	636	PACIFIC BEACH 5	3.9	80%	20%	1	4.5
FM3	Metro	769	FAIRMOUNT 3	5.7	88%	12%	0	4.1
171	Northeast	1192	BORREGO	45.9	64%	36%	4	4.1
448	Eastern	1,029	CAMERON	87.1	91%	9%	6	4.0
CCB1	Beach Cities	172	COUNTRY CLUB	3.3	3%	97%	2	3.9
*442	Eastern	1135	GLENCLIFF	59.7	66%	34%	3	3.9
170	Northeast	610	BORREGO	52	68%	32%	3	3.7
973	Northeast	1379	CREELMAN	53.2	41%	59%	4	3.6
SO1	North Coast	290	SOUTH OCEANSIDE	1.5	67%	33%	2	3.5

* Circuit appeared for three consecutive years in the worst performance list

** Circuit SAIFI represents the two-year average (2022-2023) of all outages: Mainline, Feeder, Backbone, and Branch

b. Any circuit appearing on either list of “deficient” WPC circuits that also appeared on the previous 2 year's lists would be marked by an asterisk. For each asterisked circuit, each utility shall provide the following information:

Circuit 442

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.

A historical record of the metric:

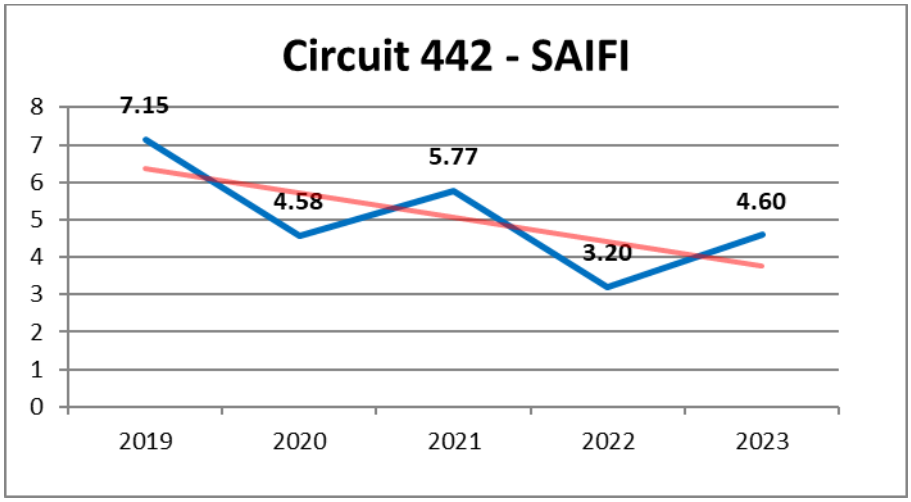
C442: 2-Year Circuit SAIFI Data

Cir	Metric	2022	2023
442	Circuit SAIFI	3.2	4.6

Note: See methodology in section 5c

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

Circuit 442 was on the worst circuit SAIFI list largely due to de-energization and bird contacts, accounting for 45% of SAIFI, with the balance being due to various outage causes.



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

Since 2020, approximately 32 miles of traditional hardening and covered conductor have been installed. In 2023, 4 PSPS Engineering Enhancement projects were energized, along with numerous Avian Protection, Wireless Fault Indicator, Fuse upgrade, Hotline Clamp, Booster removal, and Lightning Arrester projects. For 2024, ~5 additional miles are planned to be strategically undergrounded along with two additional PSPS projects and 2 Booster removal projects. Additionally, over the next

several years, SDG&E plans to construct multiple undergrounding projects on this circuit, with ~11 miles scoped for undergrounding by 2030.

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

After the undergrounding and additional PSPS work is completed, SDG&E expects a significant improvement in C442's reliability.

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

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

Definitions:

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

WPC – Worst Performing Circuits

Assumptions

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

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

Methodology used in the Annual Reliability Report

The Worst Performing Circuits identified in this Report are determined by first calculating the SAIDI for each circuit based upon the previous two years of unplanned outage data, ranking those circuits from highest to lowest based on 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 1025 circuits in 2022 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 addresses circuit reliability in multiple ways which primarily focus on assets and/or segments with higher failure rates and/or impacts. This includes focusing on specific component replacements such as tees, cables, DOE switches, and more. The scope of work for each initiative will vary.

In 2020, SDG&E established the Distribution Strategy team within the Electric System Hardening (ESH) group. This team scopes and prioritizes the various component-level asset replacements. The ESH group manages and executes the reliability projects identified by both the Distribution Strategy team and the Strategic Reliability Enhancement Team (SRET).

The Distribution Strategy team scopes by individual asset performance (Tee, switches etc.). In those cases, assets with higher failure rates and/or impact are prioritized. One example of an asset class is cable where the scoping process not only looks at

historical SAIDI and SAIFI values but also, the predicted SAIDI and SAIFI net gain from an internal asset management tool. The circuits with the highest SAIDI and SAIFI values due to unjacketed cable failure in each district are prioritized in scope.

SDG&E established the SRET, comprised of technical leaders from Distribution Operations, Engineering Standards, Regional Operations, System Protection, and Distribution Asset Management. SRET meets regularly to evaluate and authorize reliability improvement projects for areas with low circuit reliability and where customer satisfaction issues arise. The team provides strategy and guidance for continuous improvements to system reliability, integrated planning support, and budget management.

District engineers present proposals for reliability improvement projects along with a circuit analysis, cost-benefit analysis, and details on customer impact. SDG&E has implemented a practice to identify projects to be reviewed and approved by an engineering committee and then prioritized based on the largest benefit-to-cost ratio to ensure the projects that create the largest proportional system benefit are realized first. During project execution, project managers will notify the team of execution risks, such as scheduling and system impacts, to determine which projects will be constructed in the current year.

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

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

TOP 10 MAJOR UNPLANNED OUTAGE EVENTS (2023)

The table below captures the top 10 major unplanned outage events for 2023, 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	8/20/2023	Severe Weather	BC, CM, EA, NC, NE, OC	35,952	2.28	0.024
2	1/16/2023	Severe Weather	BC, CM, EA, NC, NE	27,269	3.03	0.018
3	5/6/2023	Faulted Cable	CM	15,622	0.73	0.010
4	2/21/2023	Severe Weather	CM, EA, NC, NE	14,182	3.23	0.009
5	1/7/2023	Vehicle Contact	CM, EA	11,224	1.44	0.007
6	11/6/2023	Undetermined	NC, NE	10,905	0.13	0.007
7	2/22/2023	Severe Weather	BC, CM, EA, NC, NE	9,674	1.04	0.006
8	3/1/2023	Severe Weather	BC, CM, EA, NC, NE	7,820	0.84	0.005
9	11/6/2023	Crew Error	NC	6,798	0.13	0.005
10	3/21/2023	Severe Weather	EA, NC, NE	6,653	0.36	0.004

Based upon customer impact.

SECTION 7 – SUMMARY LIST OF MED PER IEEE 1366

2023 SUMMARY LIST OF MED (2023)

The Decision requires SDG&E to track and report MED events. However, in 2023, SDG&E did not experience a MED event.

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

HISTORICAL LARGEST UNPLANNED OUTAGE EVENTS (2014-2023)

The tables below capture the ten largest unplanned outage events for each of the years from 2014 – 2023 based upon SAIDI values.

2023

Historical 10 Largest Unplanned Outage Events				
Rank	**Date**	**SAIDI**	**SAIFI**	**Description**
1	2/21/2023	3.23	0.009	Severe Weather
2	1/16/2023	3.03	0.018	Severe Weather
3	8/20/2023	2.28	0.024	Severe Weather
4	1/7/2023	1.44	0.007	Vehicle Contact
5	4/30/2023	1.22	0.002	UG Cable Failure
6	12/16/2023	1.04	0.002	Tee Connector
7	2/22/2023	1.04	0.006	Severe Weather
8	12/12/2023	0.90	0.002	Vehicle Contact
9	3/1/2023	0.84	0.005	Severe Weather
10	1/15/2023	0.80	0.001	Tee Connector

2022

Historical 10 Largest Unplanned Outage Events				
Rank	**Date**	**SAIDI**	**SAIFI**	**Description**
1	9/3/2022	1.95	0.009	Severe Weather / Heat
2	4/12/2022	1.44	0.003	Tee Connector
3	8/27/2022	0.90	0.003	Tee Connector
4	8/23/2022	0.83	0.004	Vehicle Contact
5	10/9/2022	0.79	0.004	UG Cable Failure
6	11/3/2022	0.79	0.012	Tee Connector
7	5/21/2022	0.78	0.004	UG Cable Failure
8	2/4/2022	0.78	0.003	UG Cable Failure
9	12/25/2022	0.77	0.022	Fire
10	11/17/2022	0.75	0.002	Tee Connector

2021

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

2020

Historical 10 Largest Unplanned Outage Events				
Rank	**Date**	**SAIDI**	**SAIFI**	**Description**
1	12/2/2020	81.94	0.047	High Winds / RFW spanning multiple days
2	12/7/2020	16.05	0.010	High Winds / RFW spanning multiple days
3	9/5/2020	13.35	0.006	Valley Fire
4	12/23/2020	2.89	0.004	High Winds / RFW spanning multiple days
5	12/2/2020	1.97	0.006	Vehicle Contact
6	8/14/2020	1.77	0.051	ISO Load Curtailment
7	5/26/2020	1.36	0.020	Foreign Object
8	10/22/2020	1.33	0.016	Load Imbalance
9	10/26/2020	1.23	0.003	High Winds / RFW spanning multiple days
10	2/25/2020	1.06	0.001	Severe Weather / Lightning

2019

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

2018

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

2017

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

2016

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

2015

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

2014

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

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

CUSTOMER INQUIRIES ON RELIABILITY DATA (2023)

SDG&E received 896 customer inquiries for reliability data in 2023.

The average response time was less than two business days.