



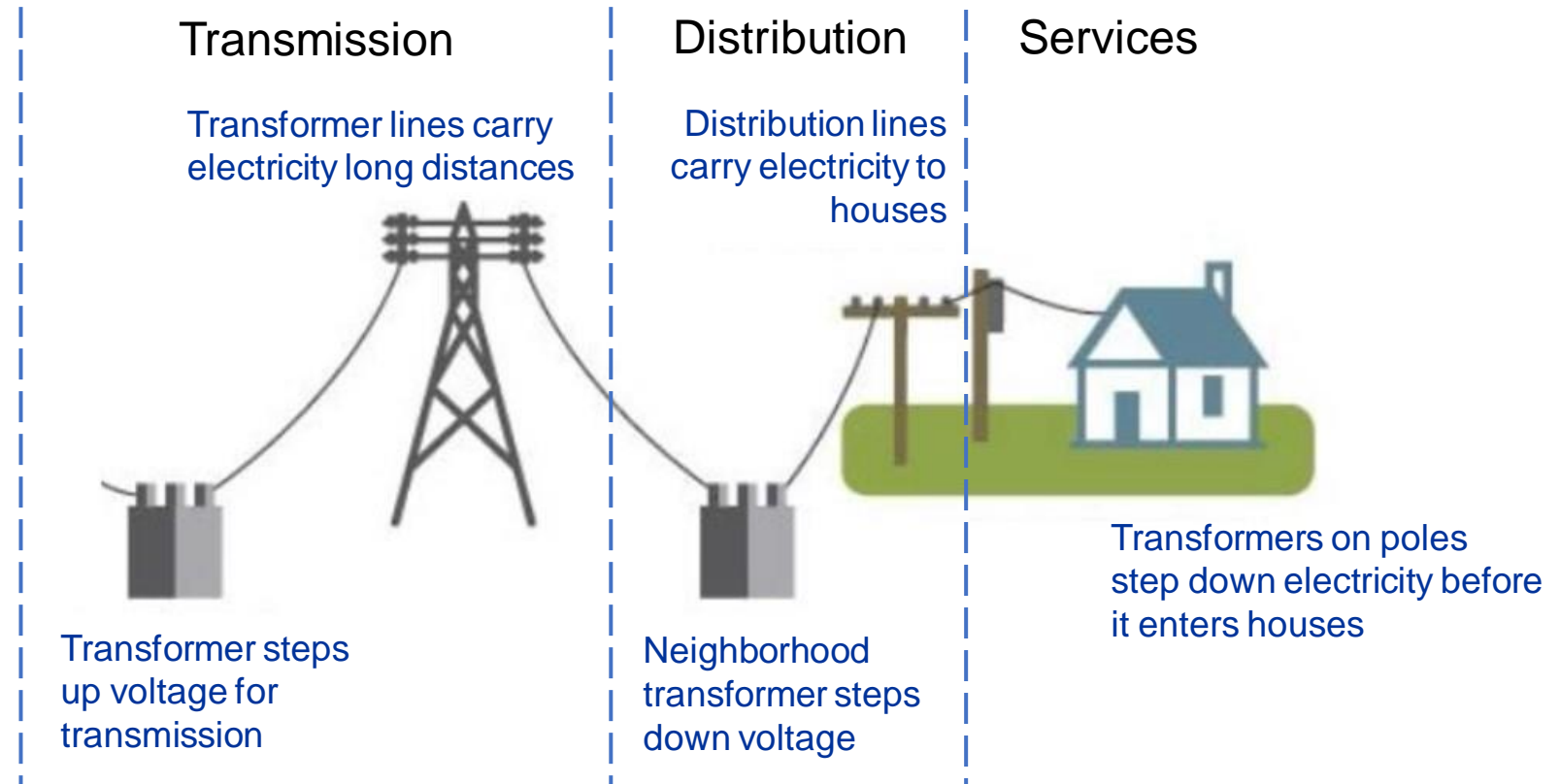
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SDG&E 2019 Annual Electric Reliability Results

December 9, 2020



Classifications of our Assets



Source: Adapted from National Energy Education Development Project (public domain)

Reliability statistics are broken down by Transmission, Substation and Distribution

Reliability Goals and Metrics



- SDG&E's goals:
 - Provide our customers with safe and reliable power
 - Improve reliability by reducing the number of outages, and their duration, experienced by our customers
 - Review all outages and causes, validate trends, and mitigate for issues identified
- The four metrics to measure performance:
 - System Average Interruption Duration Index (SAIDI)
 - System Average Interruption Frequency Index (SAIFI)
 - Customer Average Interruption Duration Index (CAIDI)
 - Momentary Average Interruption Frequency Index (MAIFI)
- Major Event Day (MED): A day in which the daily system SAIDI exceeds a threshold value

Examples of Our Reliability Programs



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Building a strategy around overall system-wide performance in both outage duration and frequency

- **Fire Risk Mitigation (FiRM)** – Fire prevention, safety and reliability with a primary focus on lowering public safety risk due to wildfires and to optimize reliability improvements
- **Vegetation Management** – Systematic, schedule-based approach following a work plan to complete all activities annually; includes pre-inspection, tree pruning, brush clearing, etc.
- **Pole Risk Mitigation and Engineering (PRiME)** – Complete formal strength analysis of all poles in the SDG&E system, confirming poles meet or exceed current standards



Examples of Our Reliability Programs

(Continued)

- **“Tee” Modernization** – Upgrading major connection points on the underground distribution system to enhance our ability to restore customers when unplanned outages occur
- **Supervisory Control and Data Acquisition (SCADA)** – Direct operator control of over 2,000 switches across the distribution network for quick restoration
- **Business Services Project Coordination** – Customer outreach and outage notifications including restoration estimates



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Examples of Our Reliability Programs

(Continued)

- **Meteorology** – Forecasting weather and conditions for proactive preparations for adverse weather conditions. In 2018, our meteorology team expanded into the new department, ***Fire Science and Climate Adaptation***, to help focus the combined efforts
- **Proactive Cable Replacement** – Planned replacement of underground distribution cables as a function of vintage and recent reliability performance
- **Aging Infrastructure Replacement**– Substations are upgraded where major equipment has reached end of service life, and lower voltage distribution circuits commonly installed many decades ago are upgraded to higher voltage operation for increased capacity



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Examples of Our Reliability Programs

(Continued)

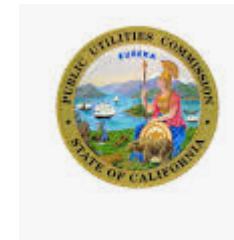
- **Inoperative Switches** – Replacing or removing switches that are at end of service life, to better facilitate quicker restoration by crews. Some strategically-placed switches are replaced with automated switches for improved outage performance
- **Reducing Vehicle Contacts with Equipment** – Relocating key device to reduce the chances of recurring outages due to vehicle contacts
- **Non-Conductive Balloon Development** – Working with the party balloon industry to help develop an alternative material that will be less likely to cause outages when contacting overhead lines



Reliability Accomplishments

Awards/Recognition

- **PA Consulting** – Leader in Energy and Utilities Consultation
 - ReliabilityOne® Award
 - Outstanding Reliability Award - “Best in the West” for 15 consecutive years
 - “Best in the Nation” for 2018
 - Outstanding System Resilience for 2020
 - Outstanding Technology and Innovation Award for 2016, 2017, 2019 & 2020
- **Edison Electric Institute** – 2018 Edison Award
- **2016 CPUC Report** – Best Investor-Owned Utility in CA



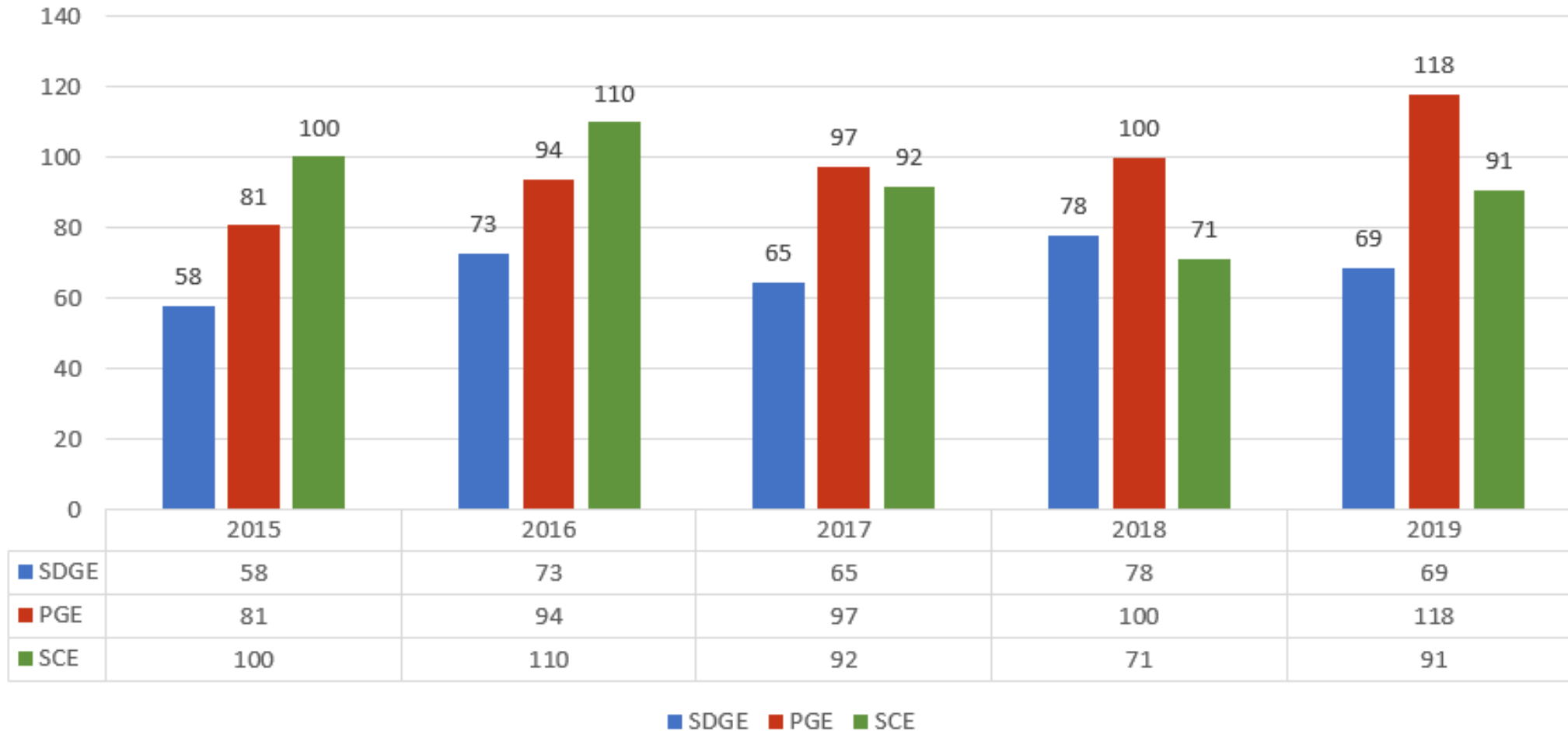


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How SDG&E compares with the other large California utilities?

SAIDI Comparison – Past 5 Years

5-Year SAIDI Reliability Indices (Excludes Planned and Med)

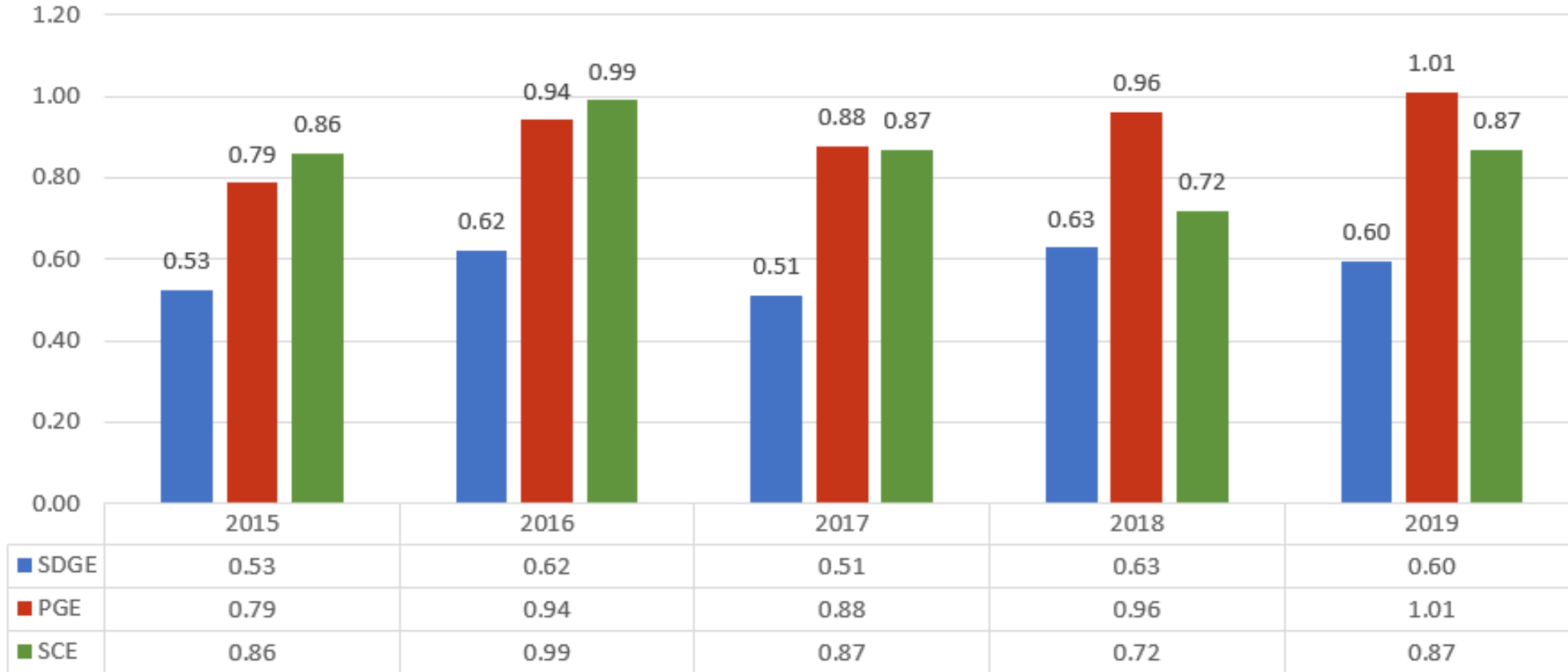


SAIFI Comparison – Past 5 Years



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5-Year SAIFI Reliability Indices (Excludes Planned and Med)



■ SDGE ■ PGE ■ SCE

SDG&E's Annual Report

How to better understand the annual report

- **Section 1** – System Indices for the last 10 years
- **Section 2** – District Reliability Indices for the past 10 years including and excluding MED
- **Section 3** – System and District Indices based on IEEE 1366 for past 10 years including planned outages and excluding MED
- **Section 4** – Service territory map including divisions of districts
- **Section 5** – Top 1% of Worst Performing Circuits (WPC) excluding MED
- **Section 6** – Top 10 major unplanned power outage events within a reporting year
- **Section 7** – Summary List of MED per IEEE 1366
- **Section 8** – Historical 10 largest unplanned outage events for the past 10 years
- **Section 9** – Number of customer inquiries on Reliability Data and the number of days per response

Section 1 – System Indices for the Past 10 Years



System Reliability

- Tables of reliability indices for the past 10 years
- Graphs depicting indices for the past 10 years

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

Section 2 – District Indices for the Past 10 Years



SDG&E’s service area is grouped into Six Districts

- Tables of reliability indices for the past 10 years
- Graphs depicting indices for the past 10 years

Table 2-2: Eastern – District Reliability Indices (MED included and excluded)

Year	MED Included					MED Excluded			
	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

Section 3 – System and District Indices for the Past 10 Years, Including Planned Outages



The data used to develop the planned outage indices in the report is from an outage management system implemented in late 2012

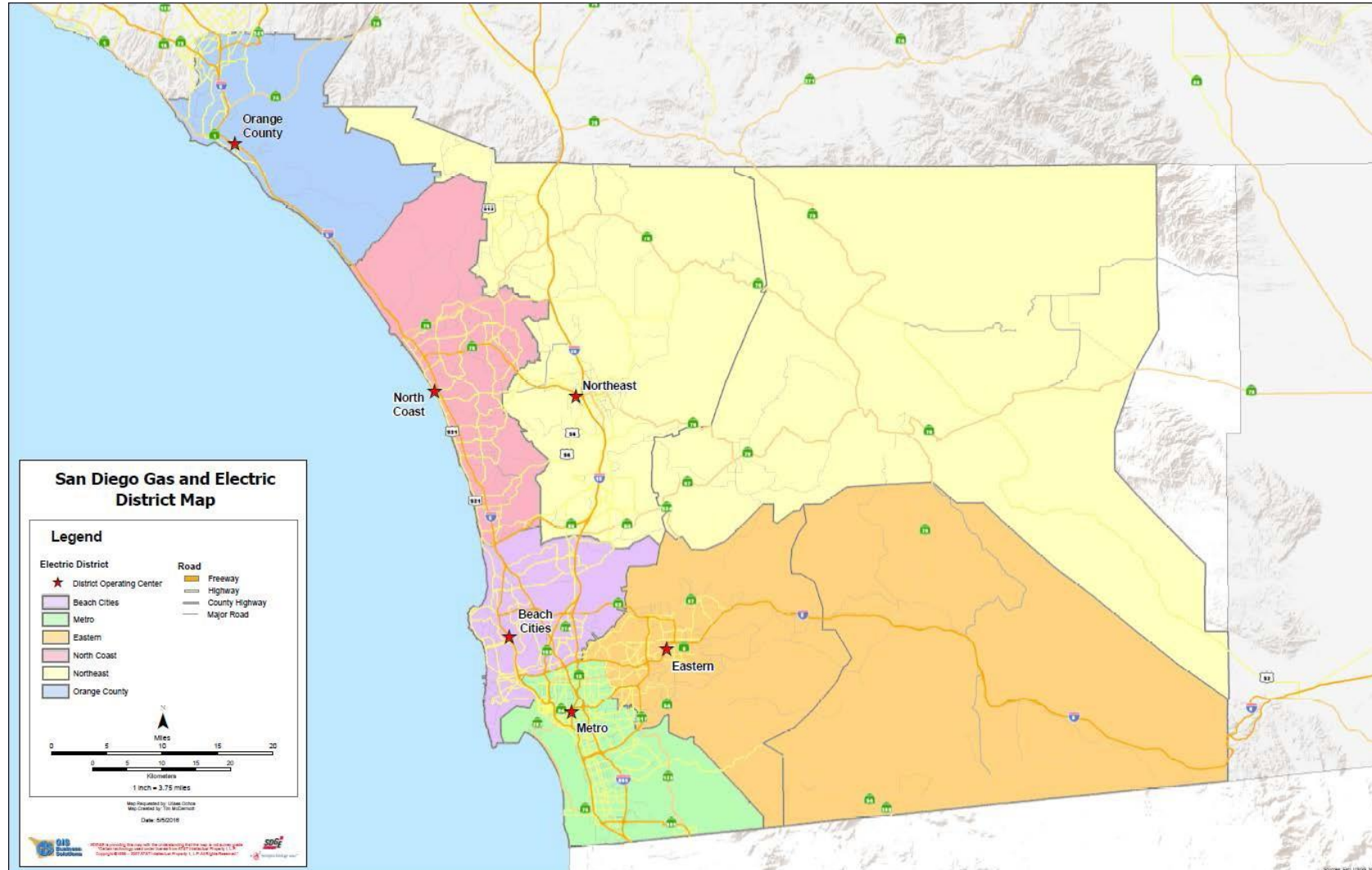
- Seven years of historical planned outage data is currently available
- 3,000+ system upgrades performed every year to improve your service

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

Section 4 – Service Area Map



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Section 5 – Top 1% of Worst Performing Circuits (WPC), excluding MED

- Tables of Worst Performing Circuits
- Tables of deficient WPC
- Explanation of why it was ranked as a deficient WPC

Table 5-1: Worst SAIDI Circuits 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 previous years worst performance list

** Circuit SAIDI represents all outages: Feeder and Branch

Section 6 – Top 10 Major Unplanned Outages within the Reporting Year



Outage events including the outage cause for 2019

- Based upon customer impact
- High wind events were a major factor during Santa Ana/Red Flag Warnings in October, especially with Public Safety Power Shutoff program in effect

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

Section 7 – Summary List of 2019 MED



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 represent all customers experiencing sustained outage at that point in time. The event day begins at midnight. For 2019, Major Event Days included the Santa Ana/RFW episode in October, due in part to the Public Safety Power Shutoff program.

Section 8 – Historical 10 Largest Unplanned Outage Events for the past 10 Years



Tables capture the ten largest unplanned outage events for each of the years from 2010 through 2019. The October outages were a function of the Santa Ana/RFW episode, due to high winds and Public Safety Power Shutoff program

2019

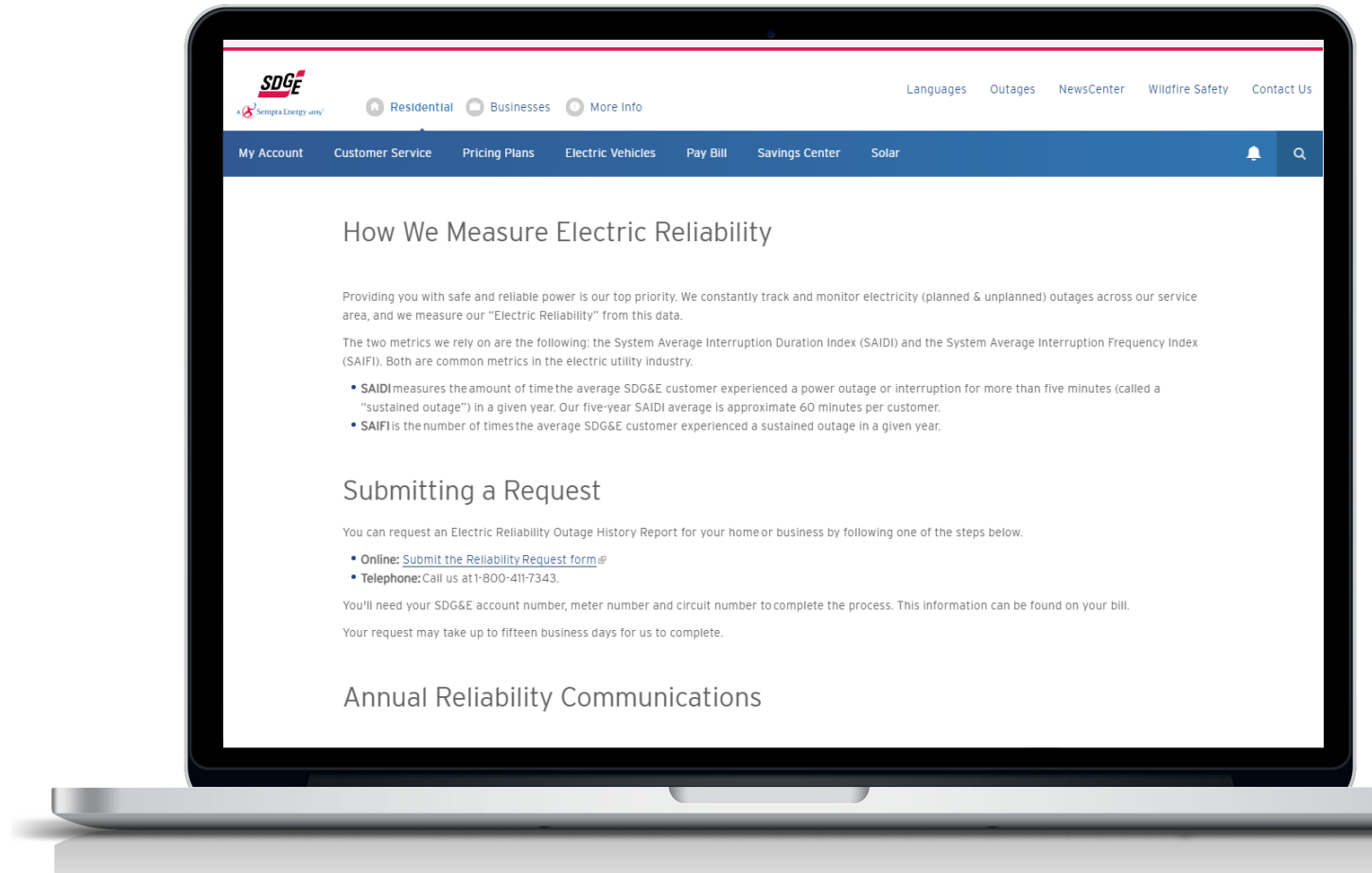
Historical 10 Largest Unplanned Outage Events				
Rank	Date	SAIDI	SAIFI	Description
1	10/20/2019	47.09	0.028	High Winds / RFW spanning multiple days
2	10/25/2019	4.92	0.004	High Winds / RFW
3	11/12/2019	3.45	0.018	Substation - Bird Contact
4	10/22/2019	1.44	0.001	Undetermined Cause
5	10/25/2019	1.21	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

Section 9 – Website – Outage Inquiries



Find information or submit a request:

sdge.com/system-reliability



Social Media

Connect with us on our social media channels



[Twitter.com/sdge](https://twitter.com/sdge)



[Facebook.com/SanDiegoGasandElectric](https://facebook.com/SanDiegoGasandElectric)



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YouTube.com/SDGEWebmaster

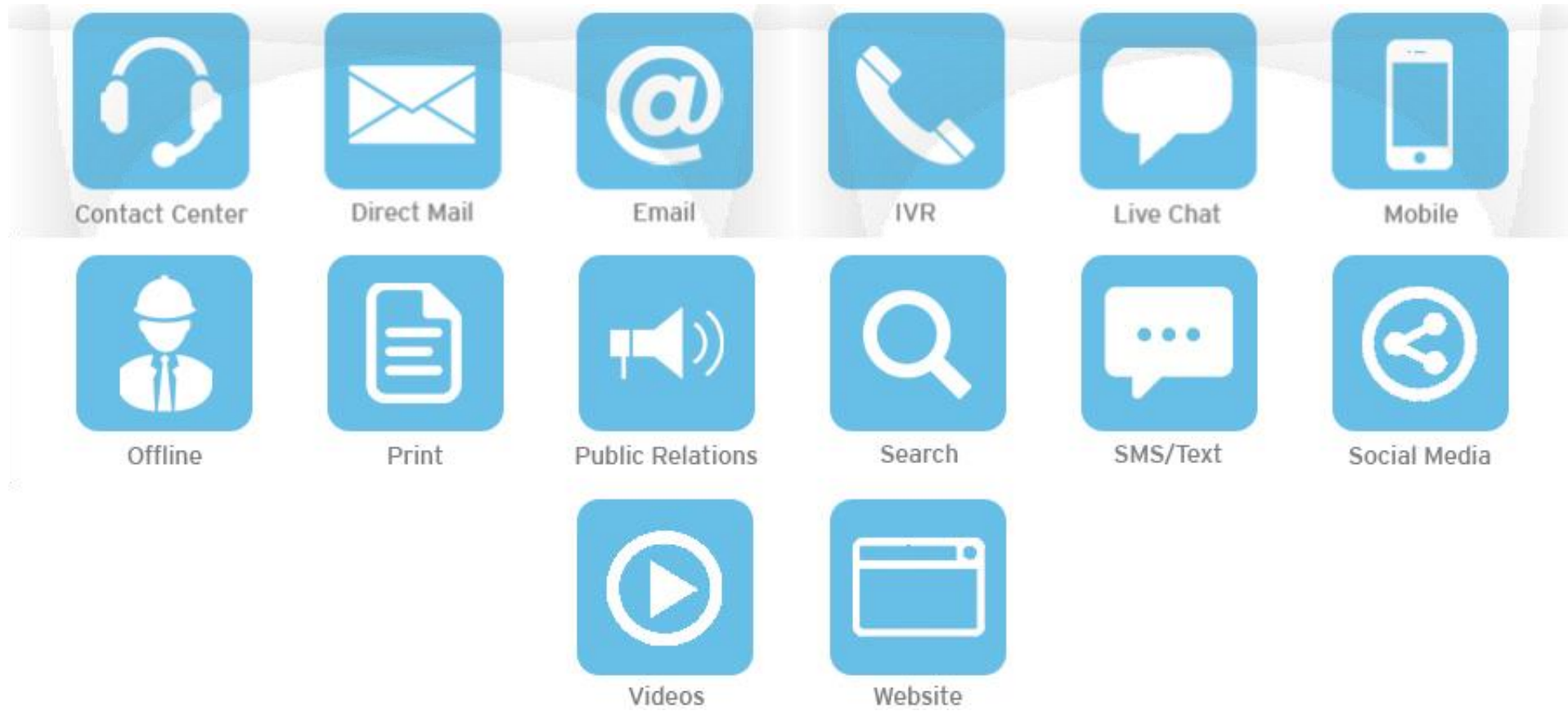


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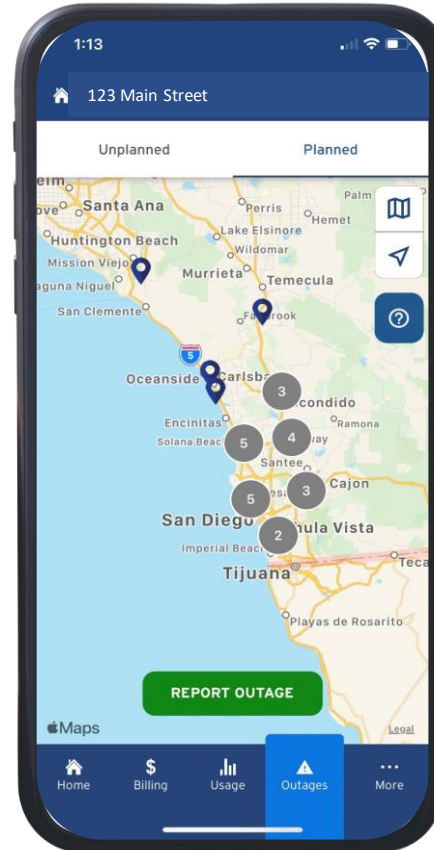
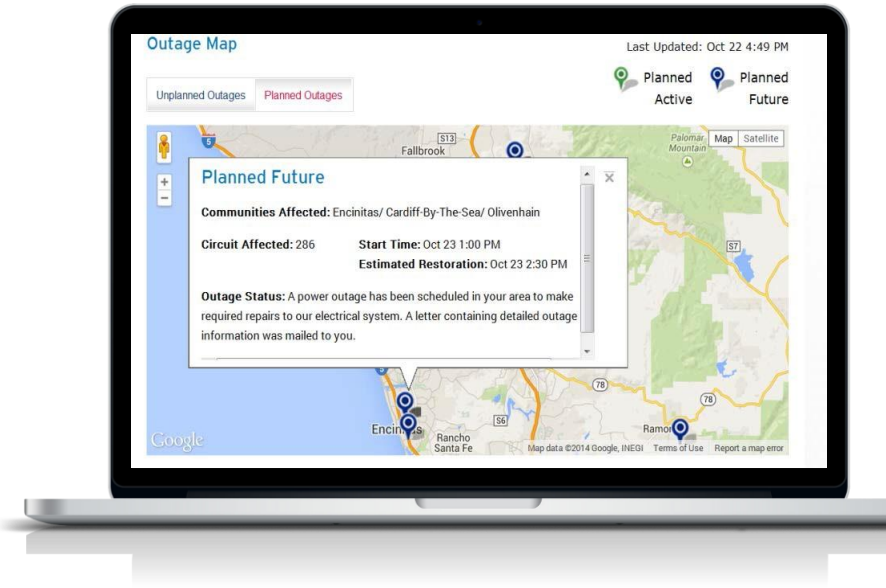
Customer Engagement Channels



Outage Tools for Customers

Mobile App

Outage Map



Outage Video



Summary At A Glance

- Classification of Assets Reliability
 - SAIDI
 - SAIFI
 - CAIDI
 - MAIFI
 - MED
- SDG&E Reliability Efforts
 - FiRM
 - Vegetation Management
 - Data Gathering/Circuit Analysis
 - Business Services Project Coordination
 - Meteorology
 - Others
- Comparison of 3 Largest IOUs in California



Summary At A Glance

(Continued)

- SDG&E 2019 Annual Report available on CPUC website
 - www.cpuc.ca.gov/General.aspx?id=4529
- Social Media
- Customer Service
- Customer Engagement Channels
- Outage Tools for Customers

