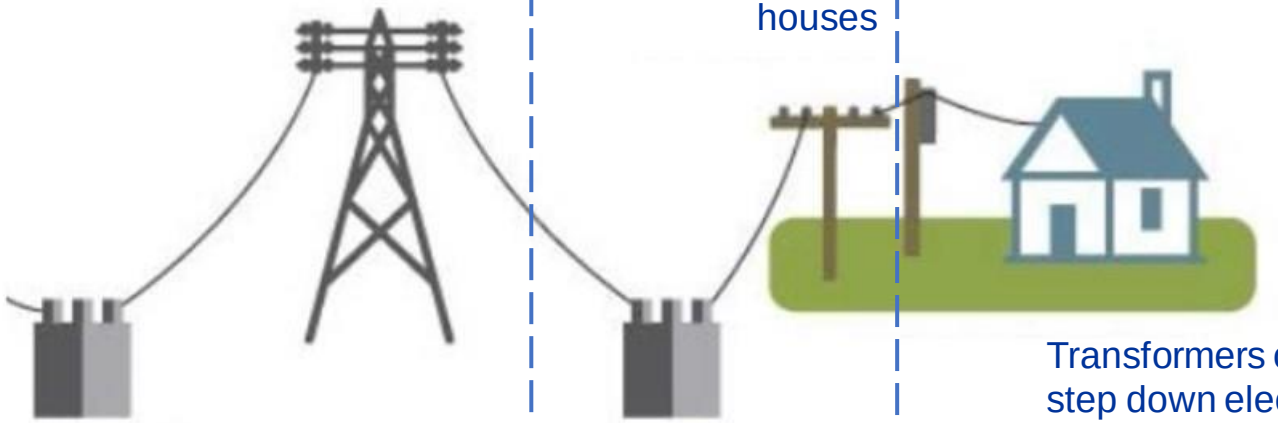
SDG&E 2020 Annual Electric Reliability Results

November 17, 2021

Classifications of our Assets

Transmission

Transformer lines carry electricity long distances



Transformer steps up voltage for transmission

Distribution

Distribution lines carry electricity to houses

Neighborhood transformer steps down voltage

Services

Transformers on poles step down electricity before it enters houses

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

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

- **Electric System Hardening (ESH)**– 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.

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

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

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 devices 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

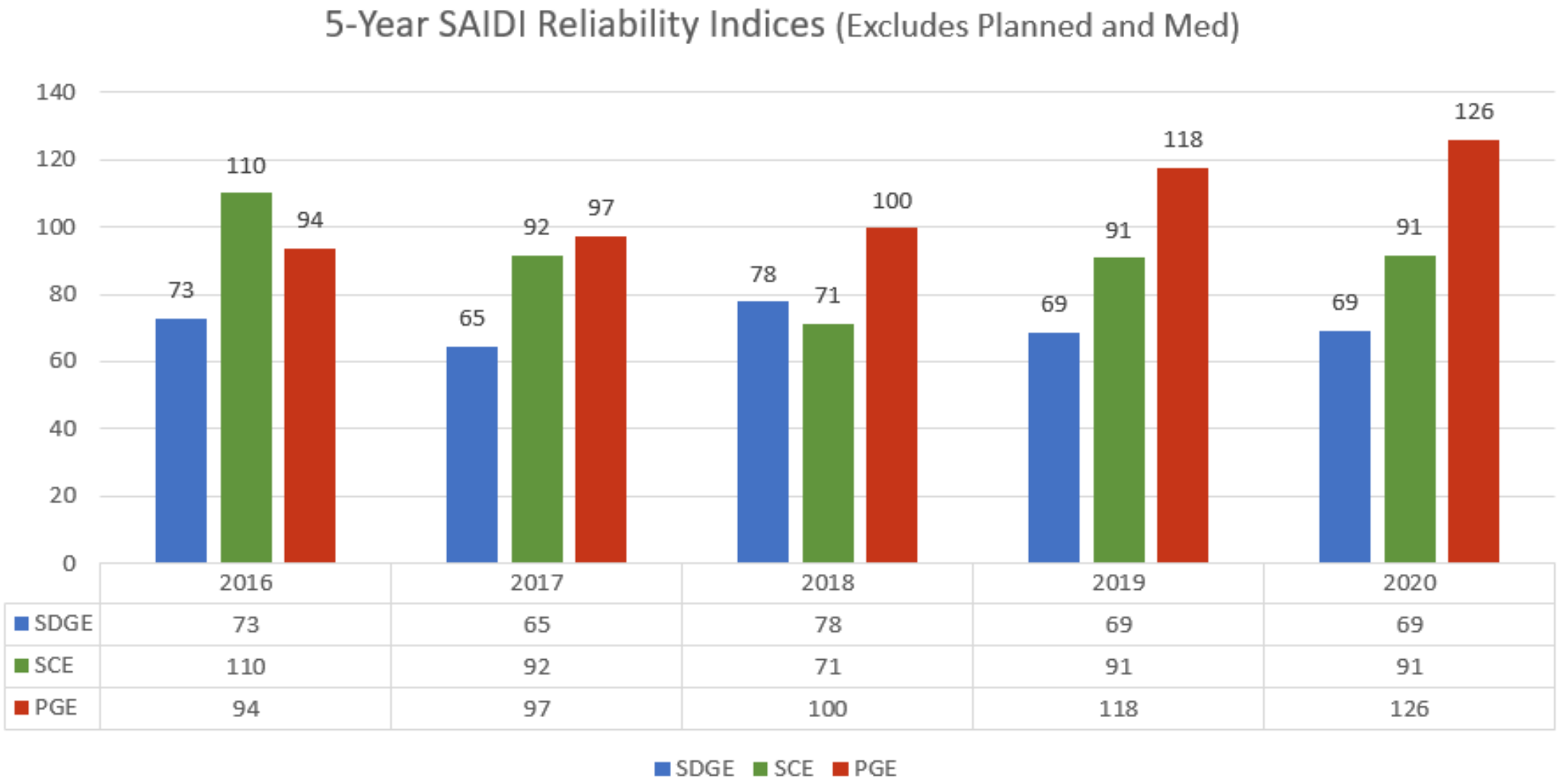
Reliability Accomplishments

Awards/Recognition

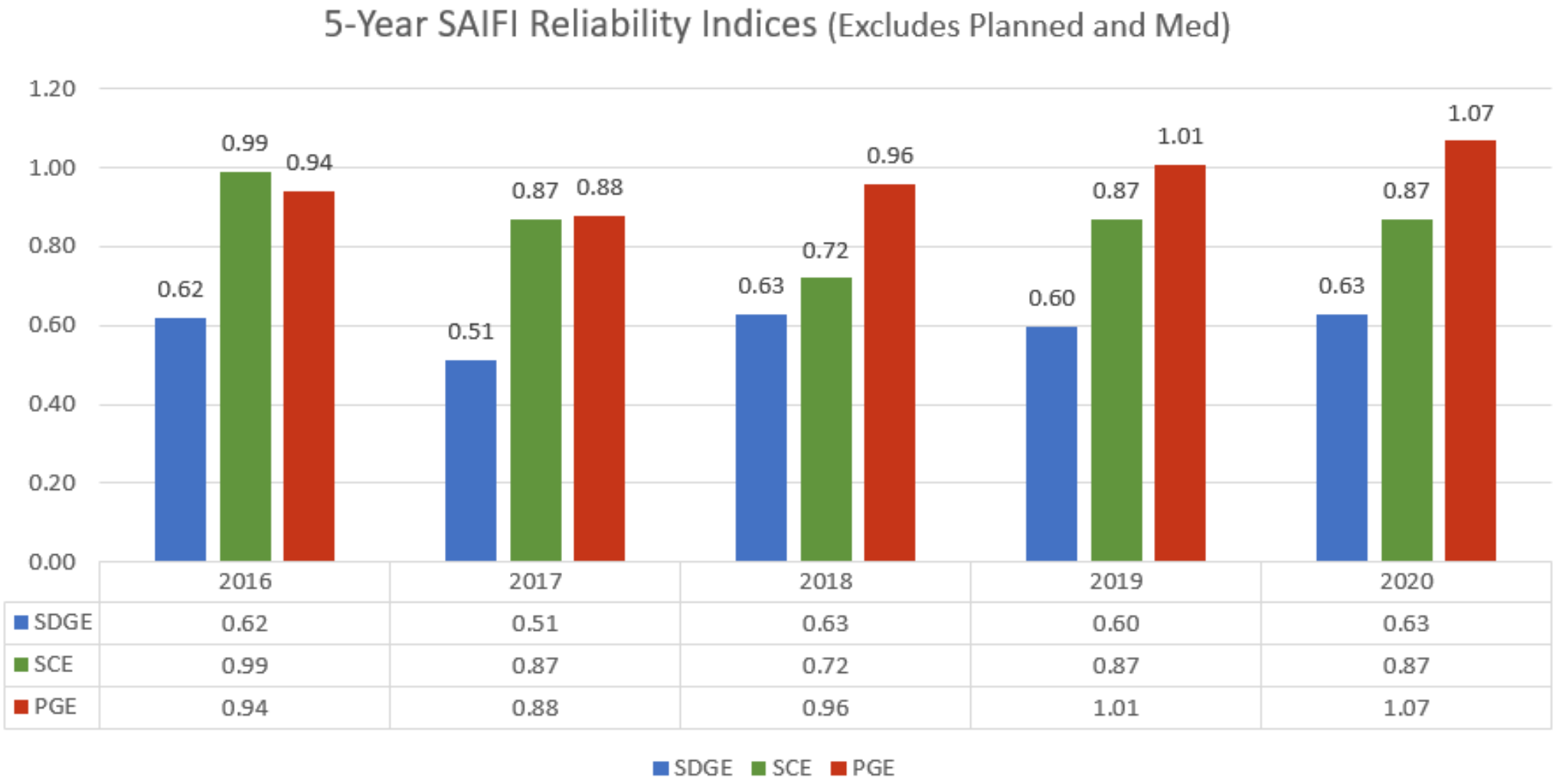
- **PA Consulting** – Leader in Energy and Utilities Consultation
  - ReliabilityOne® Award
    - Outstanding Reliability Award - “Best in the West” for 15 consecutive years
    - “Best in the Nation” for 2018
    - Outstanding System Resilience for 2020
    - Outstanding Technology and Innovation Award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

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

SAIDI Comparison – Past 5 Years



SAIFI Comparison – Past 5 Years



	2016	2017	2018	2019	2020
SDGE	0.62	0.51	0.63	0.60	0.63
SCE	0.99	0.87	0.72	0.87	0.87
PGE	0.94	0.88	0.96	1.01	1.07

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 2011 - 2020**								
MED Included					MED Excluded			
Year	**SAIDI**	**SAIFI**	**CAIDI**	**MAIFI**	**SAIDI**	**SAIFI**	**CAIDI**	**MAIFI**
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
2020	198.63	0.745	266.52	0.289	68.95	0.627	109.92	0.275

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)

	MED Included				MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI	SAIDI	SAIFI	CAIDI	MAIFI
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
2020	400.19	0.888	450.66	0.364	103.07	0.695	148.40	0.355

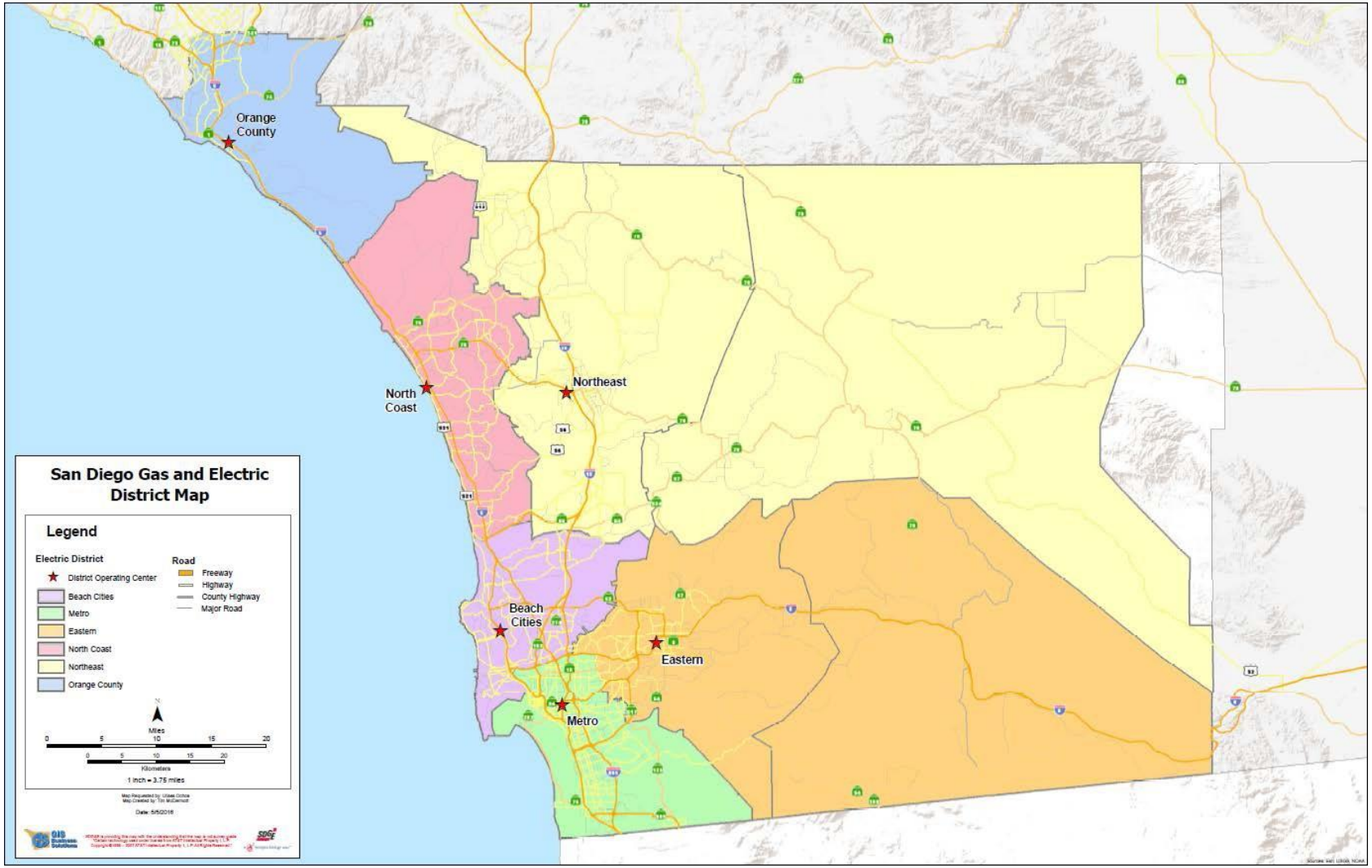
Section 3 – System and District Indices for the Past 10 Years, Including Planned Outages

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

Section 4 – Service Area Map



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 2019-2020 data (Excludes Planned and MED)

Circuit	District	Circuit Customers	Substation Name	Circuit Miles	% OH	% UG	Annualized Feeder Outage Count	Annualized Total Circuit SAIDI **
*79	Eastern	887	DESCANSO	77.6	89%	11%	12	1345
*176	Northeast	1,416	POWAY	87.5	67%	33%	2	1300
*445	Eastern	983	BOULEVARD	108.5	95%	5%	6	1239
SL1	Northeast	228	SALTON	5.0	98%	2%	3	1208
CTL1	Northeast	200	CRESTLINE	5.8	69%	31%	2	1131
221	Northeast	1,124	SANTA YSABEL	94.3	93%	7%	4	1036
OK1	Northeast	256	OAKS 1	12.5	99%	1%	3	993
*OS4	North Coast	555	OCEANSIDE 4	1.4	90%	10%	2	972
*1233	Northeast	301	PALA	28.3	95%	5%	4	959
220	Northeast	341	SANTA YSABEL	55.1	95%	5%	3	928

* 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 2020

- Based upon customer impact
- High wind events were a major factor during Santa Ana/Red Flag Warnings in December, 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	8/14/2020	ISO Load Curtailment	All Districts	75905	1.77	0.051
2	12/2/2020	High Winds / RFW spanning multiple days	BC, CM, EA, NC, NE	70755	81.94	0.047
3	5/26/2020	Foreign Object	BC	30018	1.36	0.020
4	10/22/2020	Load Imbalance	NE	24128	1.33	0.016
5	4/24/2020	Load Imbalance	OC	21645	0.96	0.015
6	12/7/2020	High Winds / RFW spanning multiple days	EA, NE	15326	16.05	0.010
7	5/2/2020	Undetermined	CM	15030	0.66	0.010
8	2/21/2020	OH Connector	CM	10688	0.26	0.007
9	8/11/2020	Tee Failure	CM, EA	10180	0.38	0.007
10	5/10/2020	Vehicle Contact	EA	9553	0.51	0.006

Section 7 – Summary List of 2020 MED

Summary list of 9/5/20 MED

Date of Event	Description of Event	Location	Number of Customers Out of Service	Customers Interrupted - Hours Into the Event Day								
				0	4	8	12	16	20	24	28	32
September 5	High Winds / RFW	All Districts	32,649	0	160	0	63	10134	13040	8691	8204	6779
				Customers Interrupted - Hours Into the Event Day (continued)								
				36	40	44	48	52	56	60	64	68
				3883	3883	3360	3360	3350	3350	3350	1890	1648
				Customers Interrupted - Hours Into the Event Day (continued)								
				72	76	80	84	88	92	96	100	104
				1648	1648	1648	1648	1648	1648	1648	1648	1648
				Customers Interrupted - Hours Into the Event Day (continued)								
				108	112	116	120	124	128	132	136	140
				1648	1505	863	776	776	776	776	196	127
				Customers Interrupted - Hours Into the Event Day (continued)								
				144	148	152	156	160	164	168	172	176
				127	127	127	127	124	124	124	124	124
				Customers Interrupted - Hours Into the Event Day (continued)								
				180	184	188	192	196	200	204	208	212
				124	124	73	73	73	73	73	71	9
				Customers Interrupted - Hours Into the Event Day (continued)								
				216	220	224	228	232	236	...	304	308
				9	9	9	9	1	1	1	1	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 2020, Major Event Days included the Santa Ana/RFW episodes in September and December, 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 2011 through 2020. The December outages were a function of the Santa Ana/RFW episode, due to high winds and Public Safety Power Shutoff program

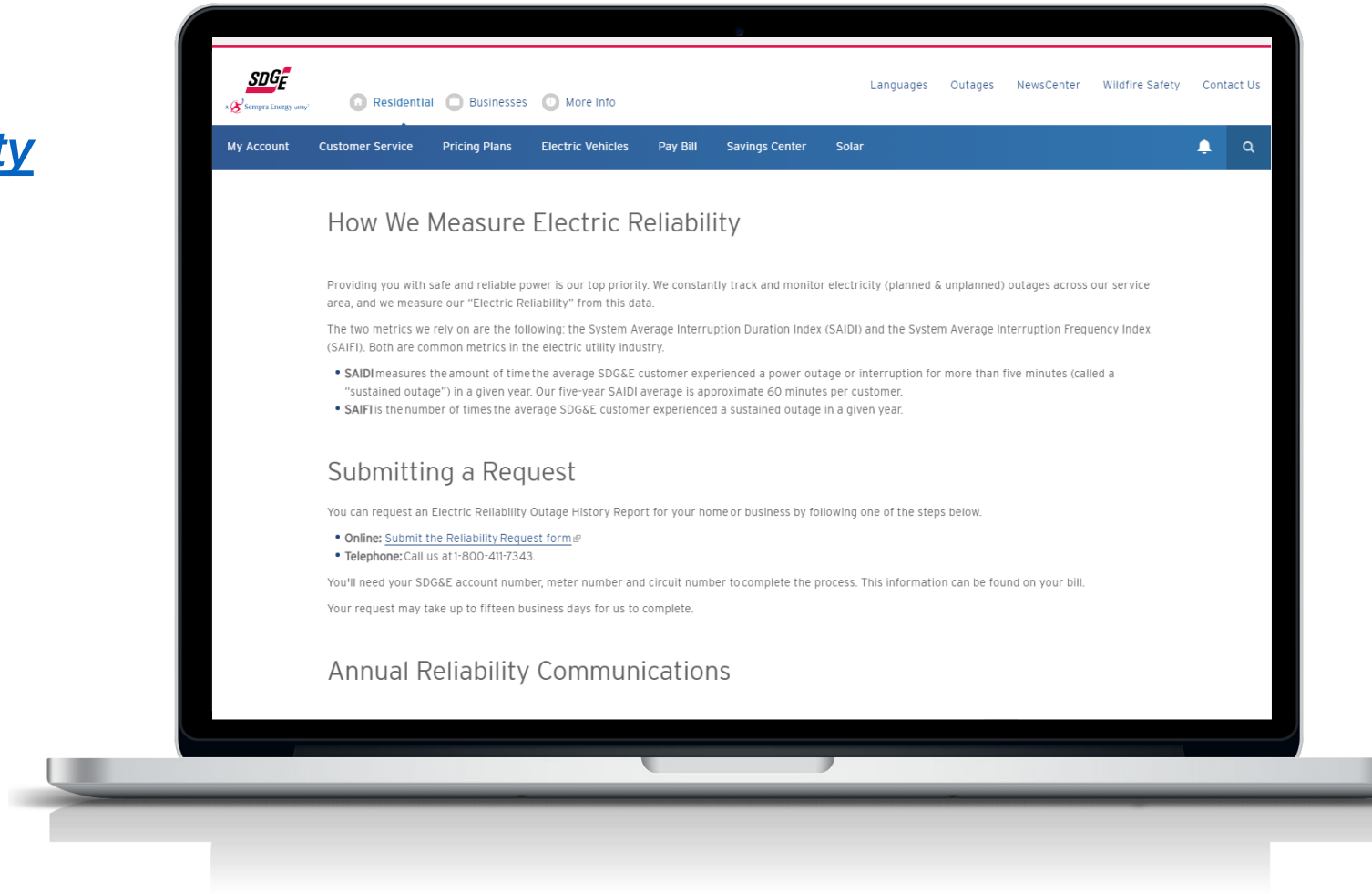
2020

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

Section 9 – Website – Outage Inquiries

Find information or submit a request:

http://www.sdge.com/system-reliability



Social Media

Connect with us on our social media channels

***Twitter**.com/sdge*

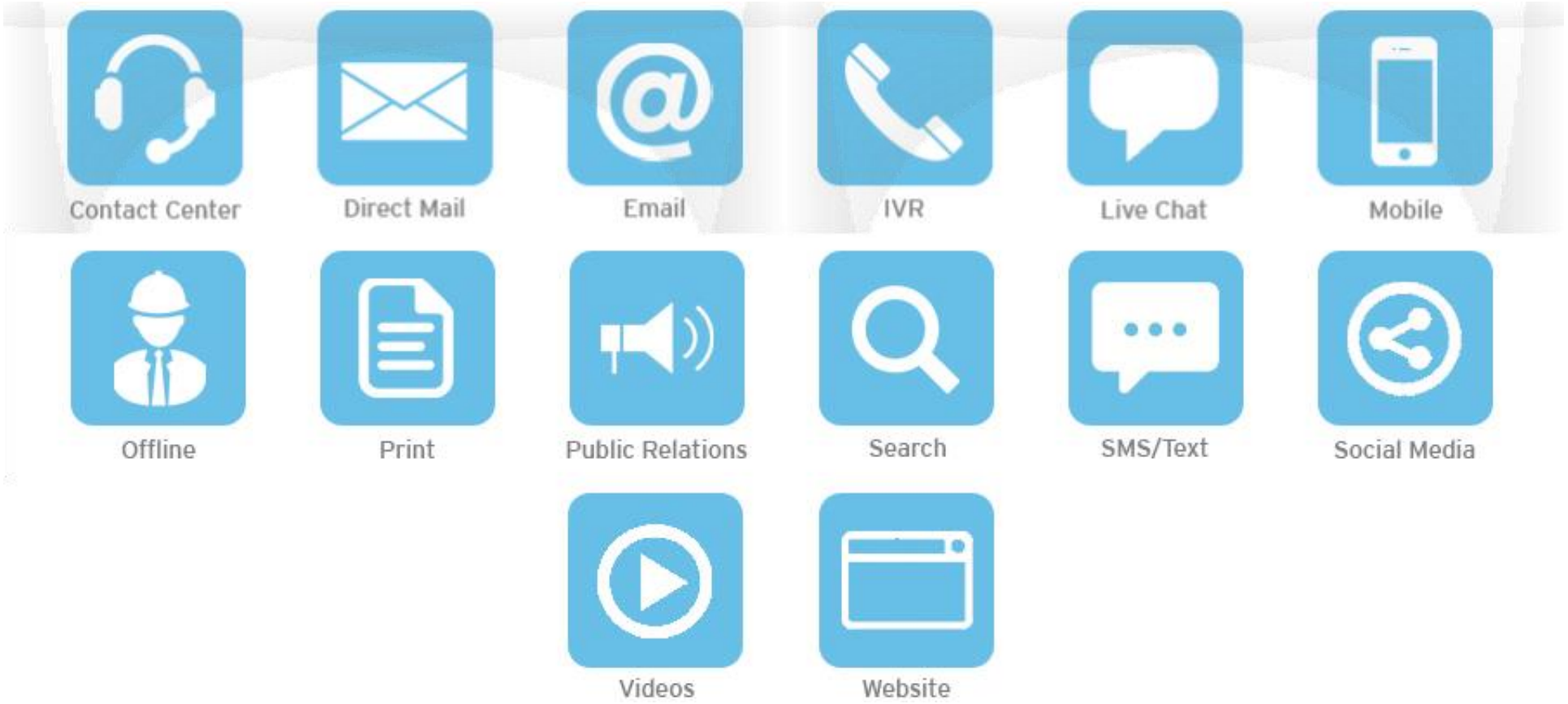
***Facebook**.com/SanDiegoGasandElectric*

***Instagram**.com/sdge*

***YouTube**.com/SDGEWebmaster*

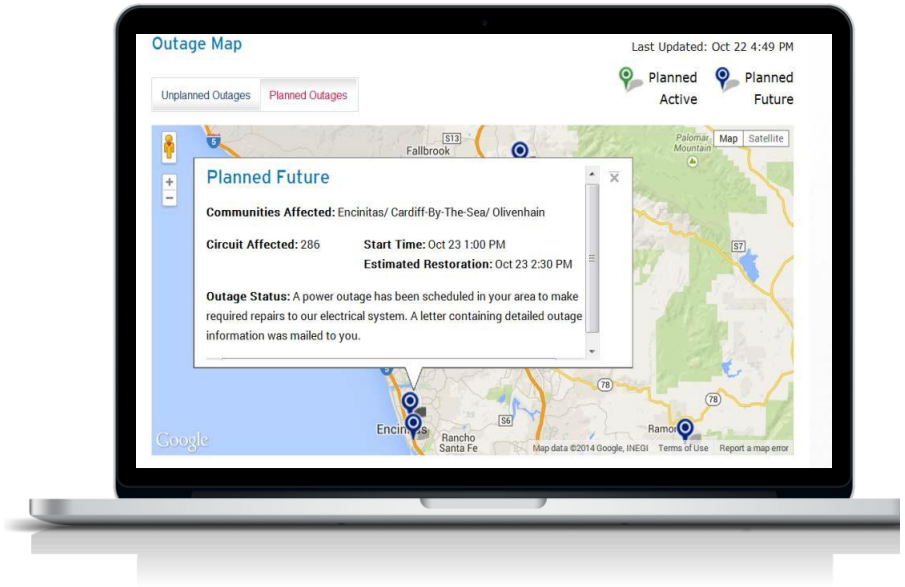
***LinkedIn**.com/company/san-diego-gas-&-electric*

Customer Engagement Channels

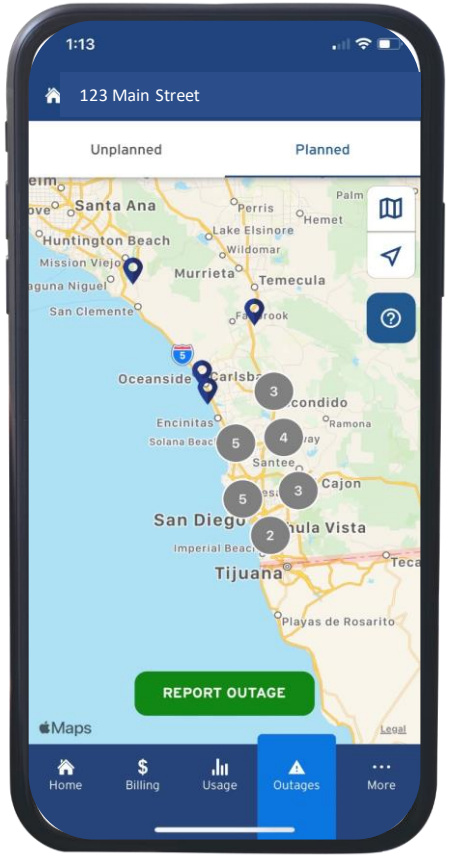


Outage Tools for Customers

Outage Map



Mobile App



Outage Video

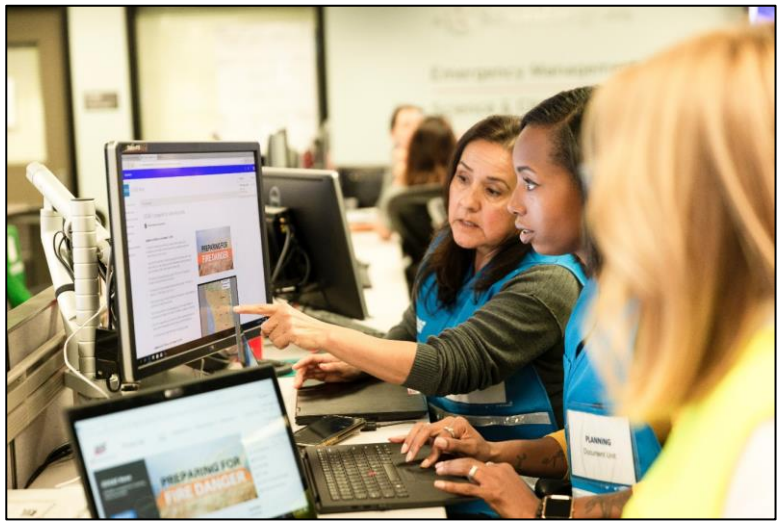
Summary At A Glance

- Classification of Assets Reliability
  - SAIDI
  - SAIFI
  - CAIDI
  - MAIFI
  - MED
- SDG&E Reliability Efforts
  - ESH
  - 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 2020 Annual Report available on CPUC website
  - www.cpuc.ca.gov
- Social Media
- Customer Service
- Customer Engagement Channels
- Outage Tools for Customers



Q&A