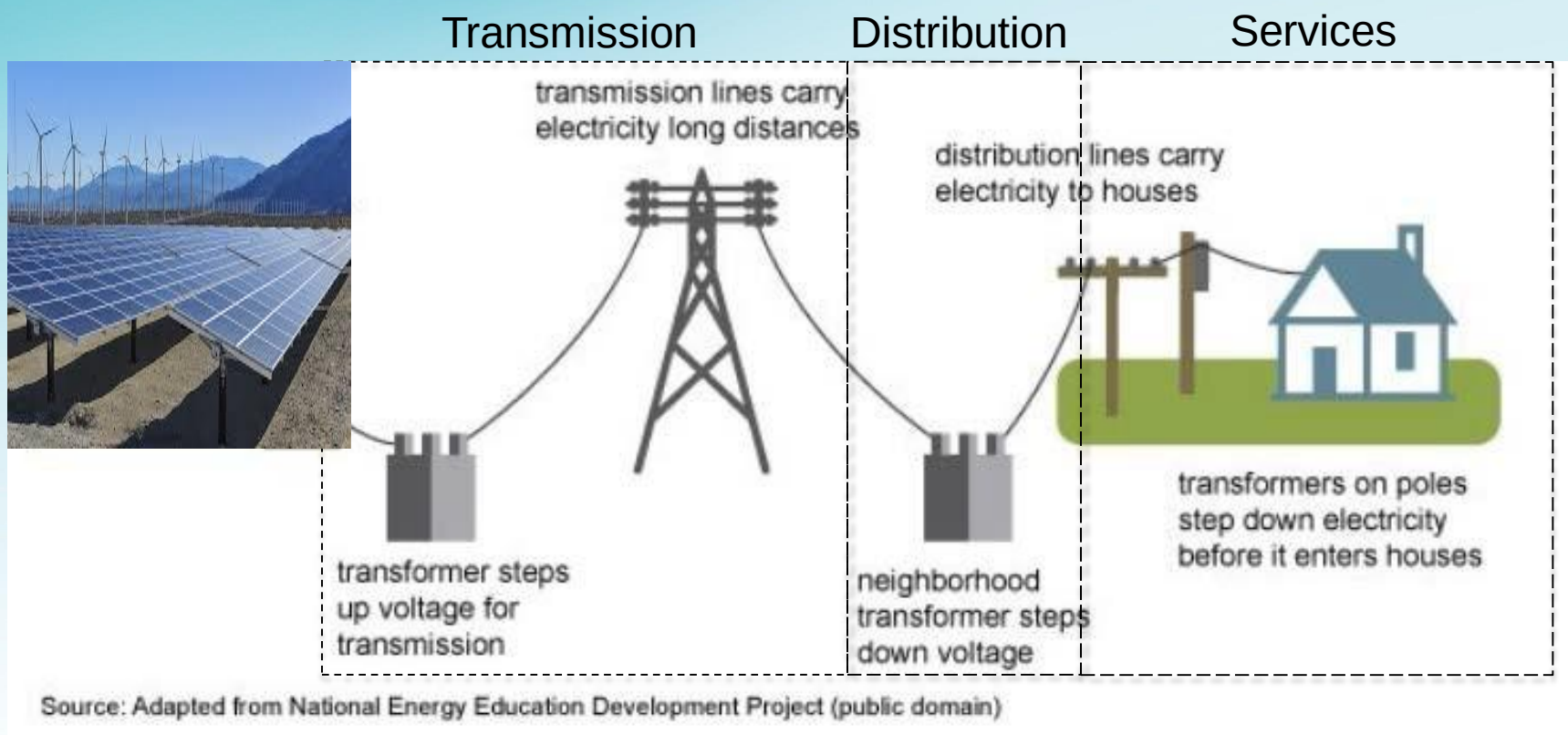
Presentation on SDG&E's 2018 Annual Electric Reliability Results

October 2, 2019

Classifications of our Assets



Reliability statistics are broken down by Transmission, Substation, and Distribution

Reliability Goals and Metrics

- SDG&E's goal is to:
  - 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:
  - **S**ystem **A**verage **I**nterruption **D**uration **I**ndex (SAIDI)
    - SAIDI measures the average outage time experienced by customers.
  - **S**ystem **A**verage **I**nterruption **F**requency **I**ndex (SAIFI)
    - SAIFI is the average number of times a customer experienced a sustained outage in a given year.
  - **C**ustomer **A**verage **I**nterruption **D**uration **I**ndex (CAIDI)
    - CAIDI is the average time required to restore service to a customer.
  - **M**omentary **A**verage **I**nterruption **F**requency **I**ndex (MAIFI)
    - MAIFI is the average number of momentary outages per customer per year.
- **M**ajor **E**vent **D**ay (MED) : A day in which the daily system SAIDI exceeds a threshold value.

Examples of Our Reliability Programs

- SDG&E's focus is to build 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 towards lowering public safety risk due to wildfires and to optimize reliability improvements. Wood poles are replaced by steel, and larger conductor replaces smaller conductor for greater strength, better performance.
  - Vegetation Management - Systematic, schedule-based approach following a work plan to complete all activities annually; includes pre-inspection, tree pruning, brush clearing. Recognized by National Arbor Day 16 years in a row. and recognized by the CPUC as a model program.
  - 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 cont.

- "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 2000 switches across the distribution network for quick restoration. New switches are continually added to this system each year.

- Business Services Project Coordination - Customer outreach and outage notifications including restoration estimates.

Examples of Our Reliability Programs cont.

- Meteorology - Forecasting weather and conditions for proactive preparations for adverse weather. A new department was established in 2018: "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.

- Other Aging Infrastructure - In addition to cables, 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 *cont.*

- 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.

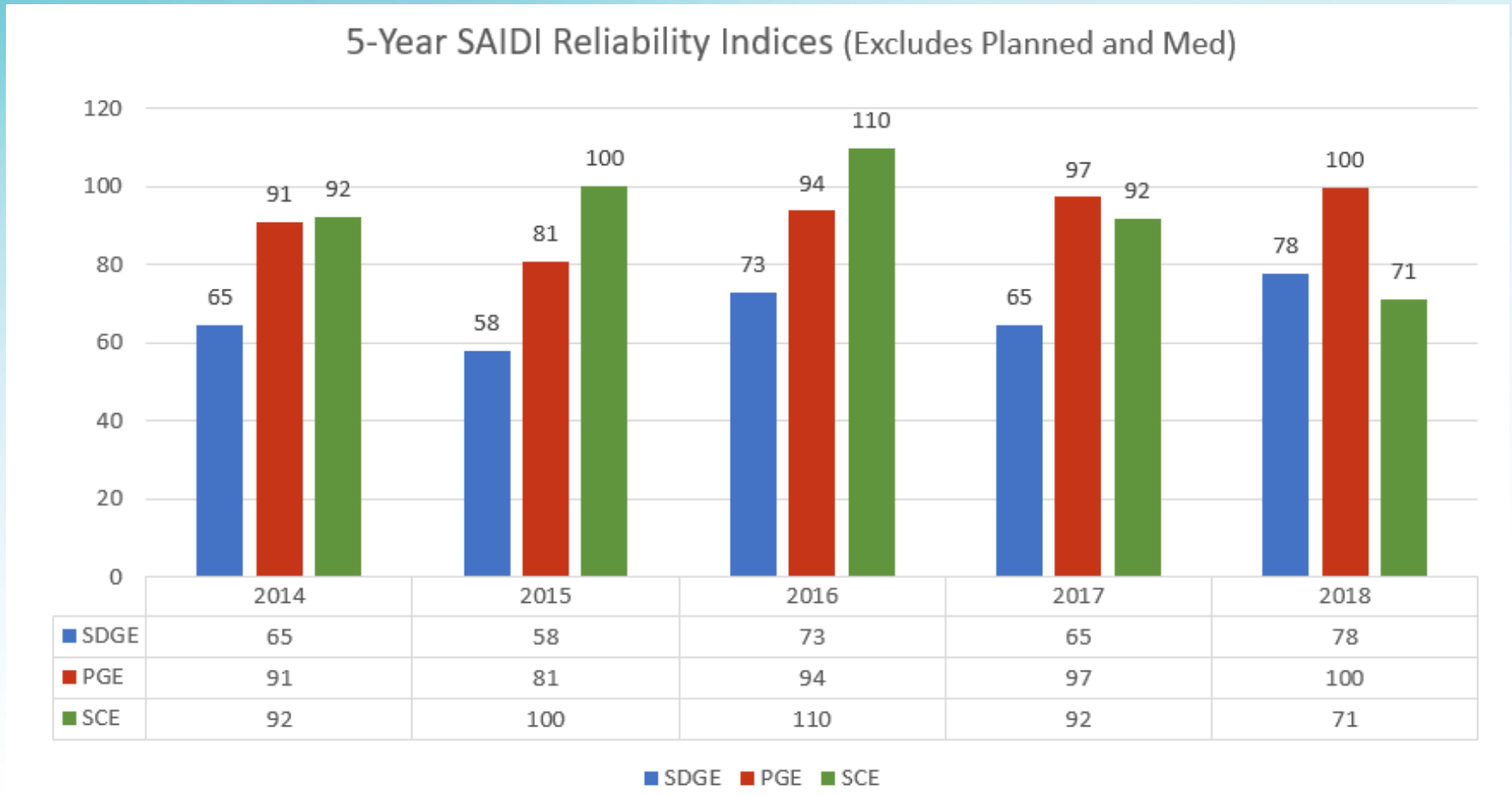
- Mylar Balloons – Working with the party balloon industry to help develop an alternative material that will be less likely to cause outages when coming into contact with overhead lines.

Reliability Accomplishments

- Awards/Recognition
  - PA Consulting - Leader in Energy and Utilities Consultation
    - Best in the West in Reliability for 14 consecutive years
    - 2017 Best in the Nation (awarded in 2018)
    - Technology and Innovation Award – 2016/17
  - Edison Electric Institute – 2018 Edison Award
  - 2016 CPUC Report - Best Investor Owned Utility in CA

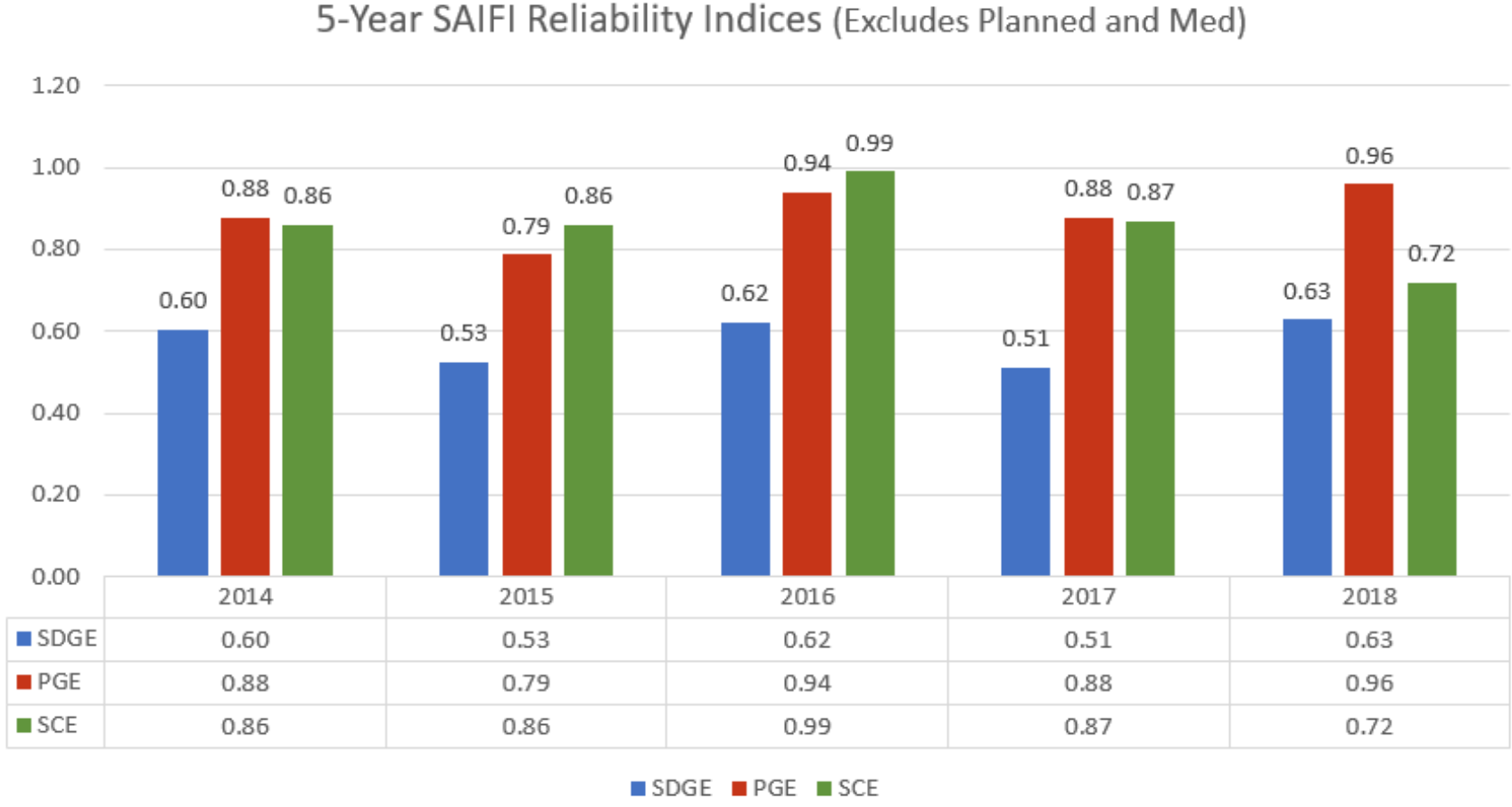
How SDGE compares with the other large California utilities?

SAIDI Comparison – Past 5 Years



	2014	2015	2016	2017	2018
SDGE	65	58	73	65	78
PGE	91	81	94	97	100
SCE	92	100	110	92	71

SAIFI Comparison – Past 5 Years



	2014	2015	2016	2017	2018
SDGE	0.60	0.53	0.62	0.51	0.63
PGE	0.88	0.79	0.94	0.88	0.96
SCE	0.86	0.86	0.99	0.87	0.72

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 including 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 2009 - 2018**									
	MED Included					MED Excluded			
Year	**SAIDI**	**SAIFI**	**CAIDI**	**MAIFI**		**SAIDI**	**SAIFI**	**CAIDI**	**MAIFI**
2009	67.06	0.542	123.74	0.380		49.71	0.466	106.60	0.362
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

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
2009	86.05	0.679	126.66	0.389		60.85	0.596	102.05	0.389
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

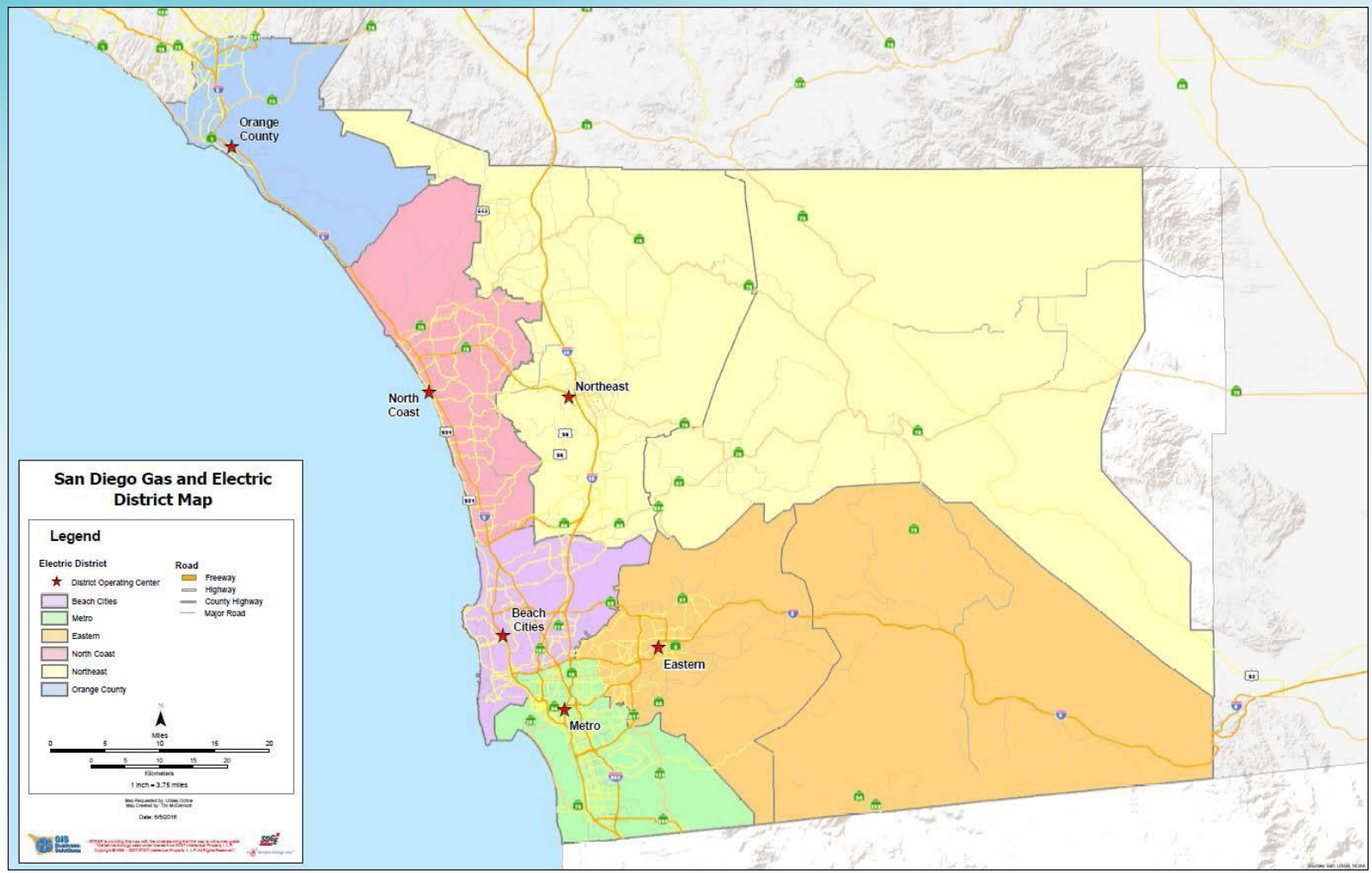
Section 3 - System and District Indices for the Past 10 Years, Including Planned Outages

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

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

System Indices (2013 – 2018) 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

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 2017-2018 data (Excludes Planned and MED)

Circuit	District	Circuit Customers	Substation Name	Circuit Miles	% OH	% UG	Annualized Feeder Outage Count	Annualized Total Circuit SAIDI **
*1215	Eastern	154	CRESTWOOD	23.8	97%	3%	8	3863
*440	Eastern	266	GLENCLIFF	23.2	86%	14%	6	3824
*441	Eastern	106	GLENCLIFF	27.8	90%	10%	4	3550
445	Eastern	961	BOULEVARD	108.2	95%	5%	6	1411
CE1	Metro	141	CENTRAL	1.4	0%	100%	3	1215
*212	Northeast	662	WARNERS	118.4	96%	4%	5	1166
*78	Eastern	269	DESCANSO	14.9	85%	15%	3	1099
*220	Northeast	339	SANTA YSABEL	55.1	95%	5%	2	1033
*448	Eastern	999	CAMERON	87.4	94%	6%	4	1011
79	Eastern	879	DESCANSO	76.7	93%	7%	9	968

* 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 2018
  - Based upon customer impact
  - High Wind events were a major factor during Santa Ana/Red Flag Warnings in November, 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	11/11/2018	High Winds / RFW spanning multiple days	CM, EA, NC, NE	35481	43.98	0.024
2	1/31/2018	Substation - Bushings	CM, EA	29338	2.55	0.020
3	10/12/2018	Lightning Storm	BC, EA, NC, NE	20002	1.23	0.014
4	4/20/2018	Substation - Animal Contact	BC	15554	0.75	0.011
5	5/26/2018	Substation - Jumper	CM	12601	0.72	0.009
6	12/6/2018	Faulted Recloser	CM, EA, NE, OC	12070	1.27	0.008
7	1/25/2018	Substation - Animal Contact	NC	11683	0.48	0.008
8	11/30/2018	Substation - Equipment	CM	8506	0.53	0.006
9	11/7/2018	Gas hazard - Circuits de-energized for safety	NC	6992	0.40	0.005
10	1/9/2018	Rain Storm	All Districts	6286	0.64	0.004

Section 7 - Summary List of 2018 MED

San Diego Gas & Electric – Summary list of 11/12/18 MED

Date of Outage	Description of Outage	Location	Number of Customers Out of Service	Customers Interrupted - Hours Into the Event Day *								
				0	2	4	6	8	10	12	14	16
November 12	Winds / RFW	BC, CM EA, NC, NE	23,883	0	0	2	1813	7179	10950	15210	18443	11788
				Customers Interrupted - Hours Into the Event Day (continued)								
				18	20	22	24	26	28	30	32	34
				10887	9890	11940	11940	11746	11746	11746	11746	11746
				Customers Interrupted - Hours Into the Event Day (continued)								
				36	38	40	42	44	46	48	50	52
				11212	11212	10942	9529	9121	9121	9121	9121	9121
				Customers Interrupted - Hours Into the Event Day (continued)								
				54	56	58	60	62	64	66	68	70
				9121	9121	9121	9121	8577	6462	4886	4569	3957
				Customers Interrupted - Hours Into the Event Day (continued)								
				72	74	76	78	80	82	84	86	88
				3319	3319	3319	3319	3319	3273	2855	1705	1404
				Customers Interrupted - Hours Into the Event Day (continued)								
				90	92	94	96	98	100			
				712	3	3	3	3	0			

Customers reflected in the time increments represent all customers experiencing sustained outages at that point in time. The event day begins at midnight. For 2018, Major Event Days included the Santa Ana/RFW episode in November, 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 2018 through 2009. The December outages were a function of the Santa Ana/RFW episode, due to high winds and Public Safety Power Shutoff program.

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

Section 9 - Website – Outage Inquiries

sdge.com/system-reliability

Social Media

Connect with us on our social media channels

***Twitter**.com/sdge*

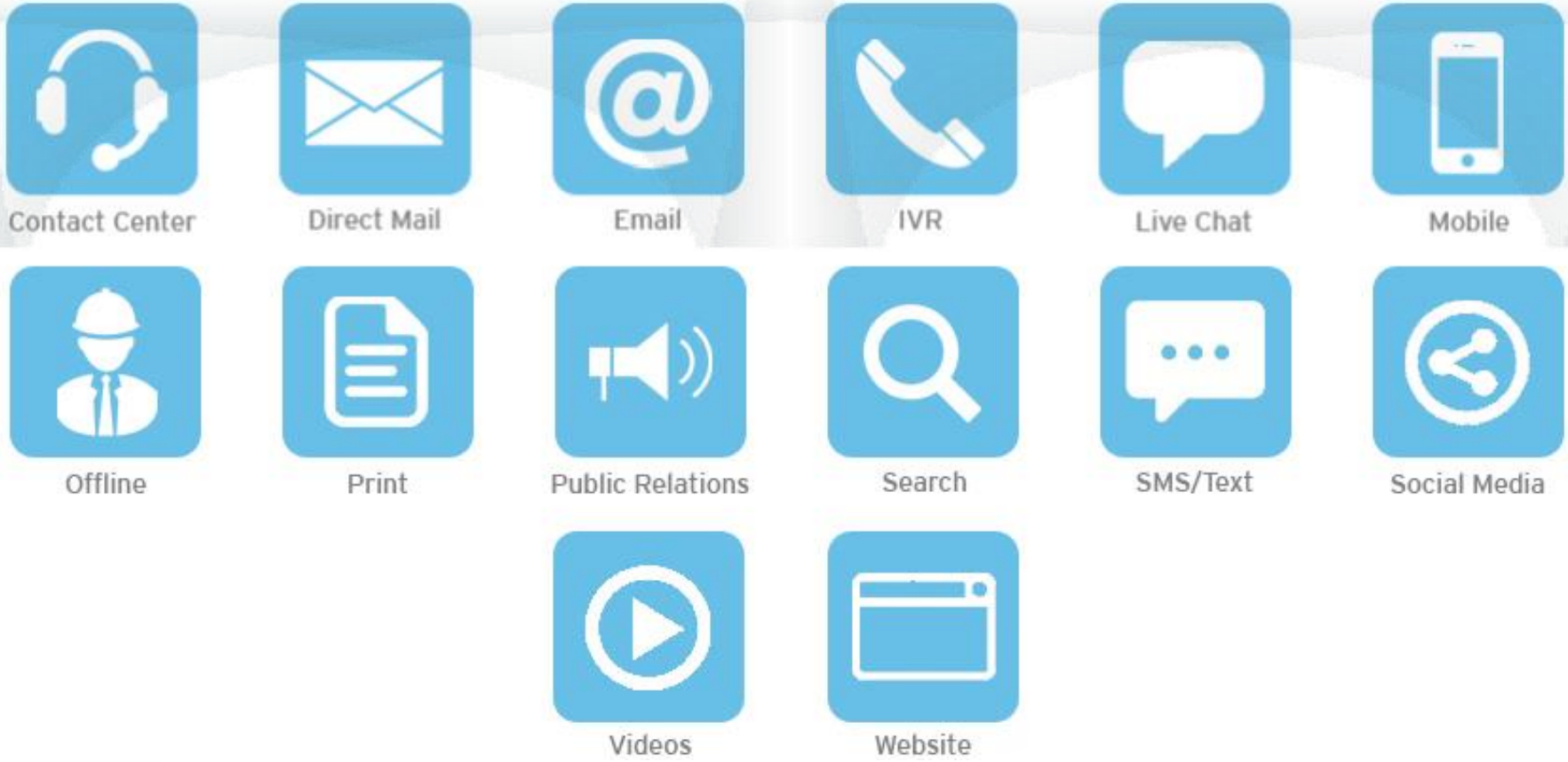
***Facebook**.com/SanDiegoGasandElectric*

***Pinterest**.com/sdge*

***YouTube**.com/SDGEWebmaster*

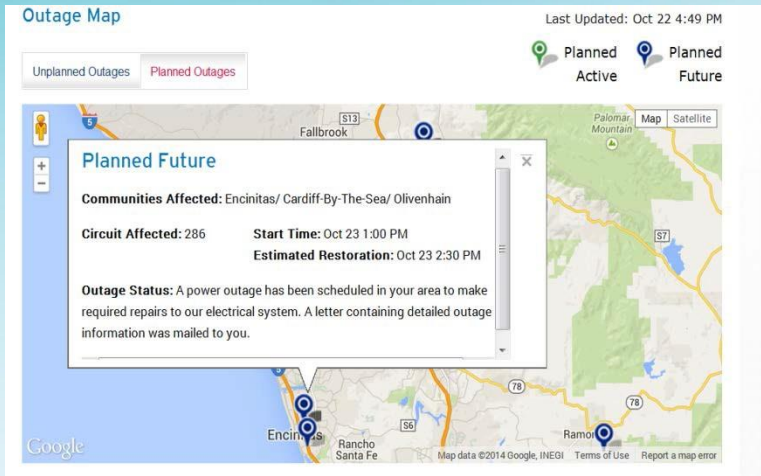
***LinkedIn**.com/company/san-diego-gas-&-electric*

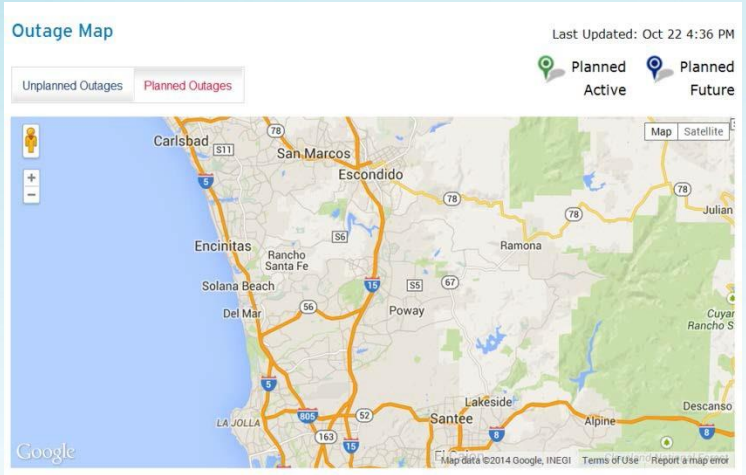
Customer Engagement Channels



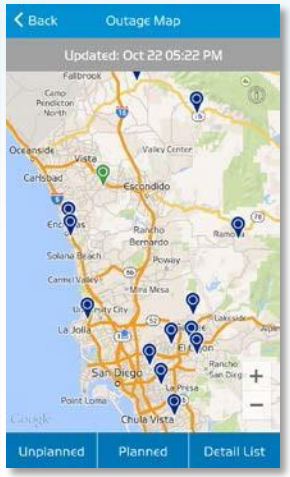
Outage Tools for Customers

Outage Map





Mobile App



Outage Video

Summary

- 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 *Cont.*

- SDG&E 2018 Annual Report available on CPUC website
- Social Media
- Customer Service
- Customer Engagement Channels
- Outage Tools for Customers