

Presentation on SDG&E's 2016 Annual Electric Reliability Results

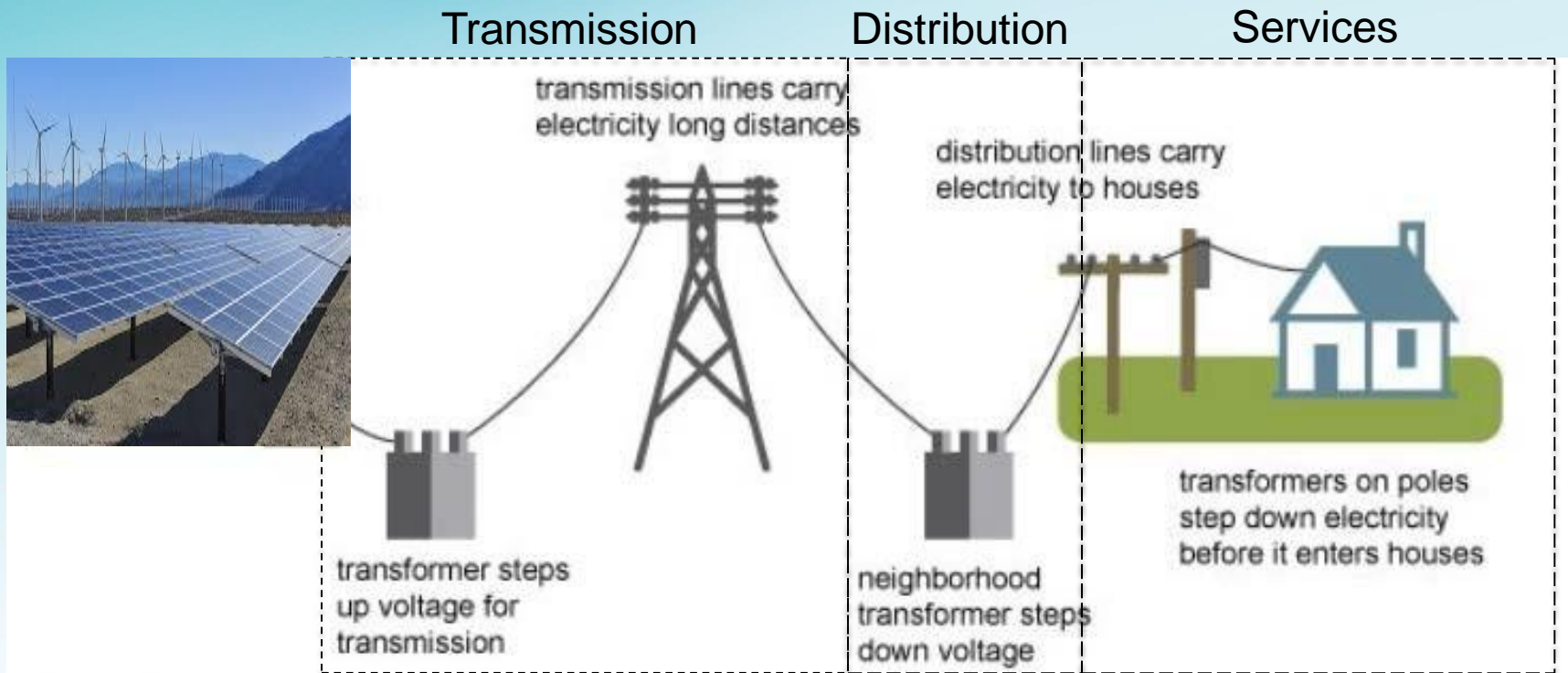
November 6, 2017



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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 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 what causes them, look for trends, and provide mitigation efforts for issues identified.
- The four metrics to measure performance:
 - **System Average Interruption Duration Index (SAIDI)**
 - SAIDI measures the average outage time experienced by customers.
 - **System Average Interruption Frequency Index (SAIFI)**
 - SAIFI is the average number of times a customer experienced a sustained outage in a given year.
 - **Customer Average Interruption Duration Index (CAIDI)**
 - CAIDI is the average time required to restore service to a customer.
 - **Momentary Average Interruption Frequency Index (MAIFI)**
 - MAIFI is the average number of momentary outages per customer per year.
- **Major Event Day (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.
 - 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 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.
- 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 underground switches that are at end of service life, to better facilitate quicker restoration by crews. Some existing 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

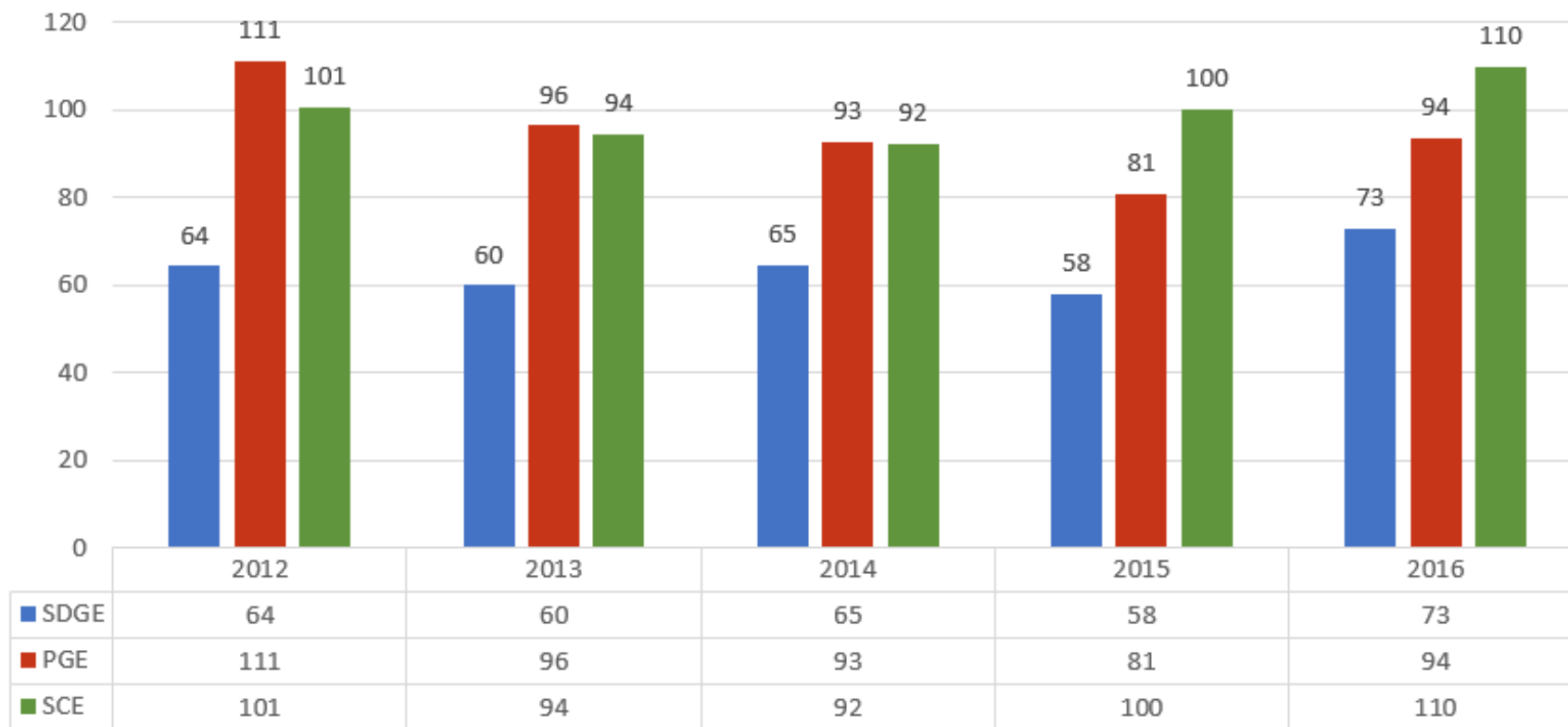


- Awards/Recognition
 - PA Consulting - Leader in Energy and Utilities Consultation
 - Best in the West in Reliability for 11 consecutive years
 - 2015 Best in the Nation
 - 2016 CPUC Report - Best Investor Owned Utility in CA
 - Per reliability data for the years 2006-2015, SDG&E's reliability metrics demonstrated consistently superior reliability performance, with the lowest scores in the state for three of the four reliability metrics (SAIDI, SAIFI, and MAIFI).

How SDGE compares with the other large California utilities?

SAIDI Comparison – Past 5 Years

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



■ SDGE ■ PGE ■ SCE

SAIFI Comparison – Past 5 Years

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



■ SDGE ■ PGE ■ SCE

➤ 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 for past 10 years including planned outages and excluding MED
- Section 4 – Service area map including divisions of district
- Section 5 – Top 1% of Worst Performing Circuits (WPC) excluding MED
- Section 6 – Top 10 major unplanned power outages within reporting year
- Section 7 – Summary List of MED per IEEE 1366
- Section 8 – Historical 10 largest unplanned outages 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

- Example
 - 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 2007 - 2016								
MED Included					MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI	SAIDI	SAIFI	CAIDI	MAIFI
2007	180.99	0.539	335.75	0.572	54.89	0.477	115.11	0.530
2008	59.17	0.517	114.56	0.380	59.17	0.517	114.56	0.380
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

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
2007	199.66	0.521	383.50	0.688		57.18	0.418	136.95	0.539
2008	54.52	0.523	104.16	0.498		54.52	0.523	104.16	0.498
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

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



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

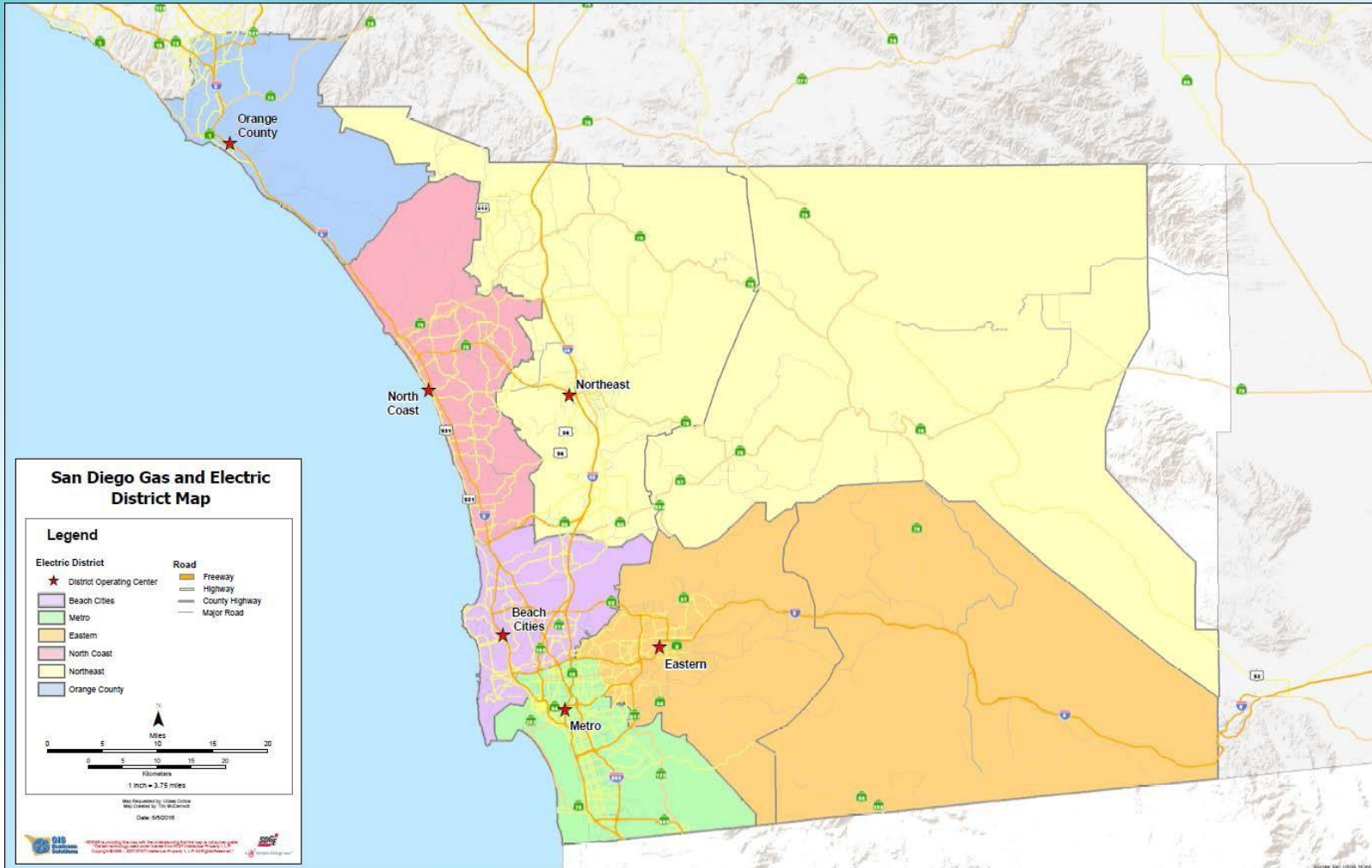
- Four years of historical planned outage data is currently available
- 5,000+ system upgrades performed every year to improve your service

System Indices (2013 – 2016) Planned and Unplanned								
MED Included				MED Excluded				
Year	SAIDI	SAIFI	CAIDI	MAIFI	SAIDI	SAIFI	CAIDI	MAIFI
2013	109.16	0.682	160.07	0.231	94.05	0.593	158.58	0.231
2014	109.22	0.763	143.18	0.278	97.99	0.733	133.66	0.259
2015	103.86	0.682	152.30	0.367	103.68	0.678	152.84	0.367
2016	125.26	0.822	152.38	0.467	111.98	0.764	146.57	0.410

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 2015-2016 data (MED included and excluded)

Circuit	District	Circuit Customers	Substation Name	Circuit Miles	% OH	% UG	Annualized Feeder Outage Count	Annualized Total Circuit SAIDI **
157	Eastern	1,008	Barrett	114.15	97%	3%	3	779
762	Beach Cities	284	Miramar	7	0%	100%	3	689
*CE3	Metro	110	Central	2.29	0%	100%	1	634
*CE1	Metro	140	Central	1.39	0%	100%	1	544
RD2	Eastern	1,164	Rolando	8.05	0%	100%	1	500
*440	Eastern	262	Glencliff	23.34	85%	15%	5	483
448	Eastern	982	Cameron	86.37	94%	6%	2	479
CD1	North Coast	409	Carlsbad 1	2.88	32%	68%	0	476
SL1	Northeast	227	Salton	5.05	98%	2%	4	467
EV1	Metro	196	El Rancho Vista	1.83	96%	4%	2	443

* 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



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- Outage events including the outage cause for 2016
 - Based upon customer impact

Top 10 Major Unplanned Power Outage Events						
Rank	Outage Date	Cause	Location	Customer Impact	SAIDI	SAIFI
1	1/31/2016	1/31 - 2/1 El Nino Storm	BC, CM, EA, NC, NE, OC	86963	13.35	0.061
2	7/21/2016	Mylar Balloon	CM	17896	1.15	0.012
3	1/5/2016	1/5 - 1/7 El Nino Storm	BC, CM, EA, NC, NE, OC	16236	0.80	0.011
4	4/3/2016	Foreign object in line	EA	14630	0.61	0.010
5	3/28/2016	Crew error	EA	12702	0.10	0.009
6	8/31/2016	Faulted portable cables	EA	12170	0.37	0.008
7	9/21/2016	Damaged capacitor bank	CM	11274	0.50	0.008
8	5/13/2016	Faulted disconnect	BC	10568	0.23	0.007
9	7/9/2016	Circuit Failure	EA	8645	0.40	0.006
10	11/15/2016	Tee Failure	CM	7253	0.37	0.005

Section 7 - Summary List of 2016 MED



San Diego Gas & Electric – Summary list of 2016 MED

Date of Outage	Description of Outage	Location	Total Number of Customers Out of Service	Customers Interrupted - Hours Into the Event Day *										
				0	1	2	3	4	5	6	7	8		
January 31	El Nino Rain Storm	All Districts	82,989	0	0	0	0	0	0	0	0	0	0	0
				Customers Interrupted - Hours Into the Event Day (continued)										
				9	10	11	12	13	14	15	16	17		
				662	766	120	48	160	809	20127	39738	39582		
				Customers Interrupted - Hours Into the Event Day (continued)										
				18	19	20	21	22	23	24	25	26		
				20411	20441	23132	21564	25286	22756	20686	13083	9905		
				Customers Interrupted - Hours Into the Event Day (continued)										
				27	28	29	30	31	32	33	34	35		
				5705	4669	4635	4223	3557	2665	2582	2339	2287		
				Customers Interrupted - Hours Into the Event Day (continued)										
				36	37	38	39	40	41	42	43	44		
				1941	1941	1421	882	875	599	427	364	364		
				Customers Interrupted - Hours Into the Event Day (continued)										
				45	46	47	48	49	50	51	52			
				9	9	9	9	9	9	9	0			

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

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 2016 through 2007.

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

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



Contact Center



Direct Mail



Email



IVR



Live Chat



Mobile



Offline



Print



Public Relations



Search



SMS/Text



Social Media



Videos



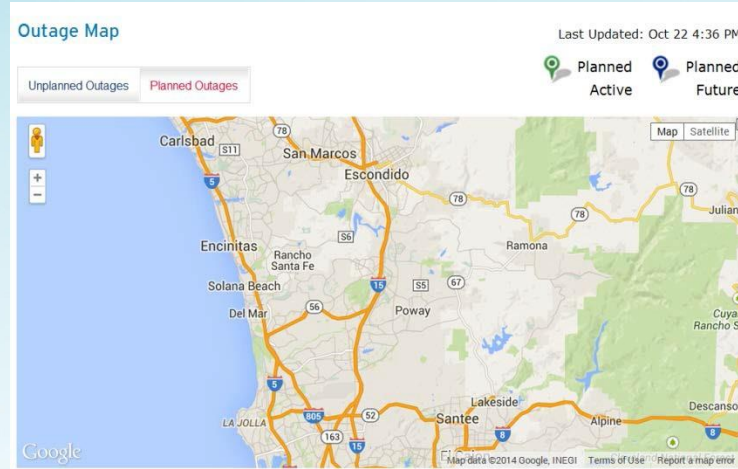
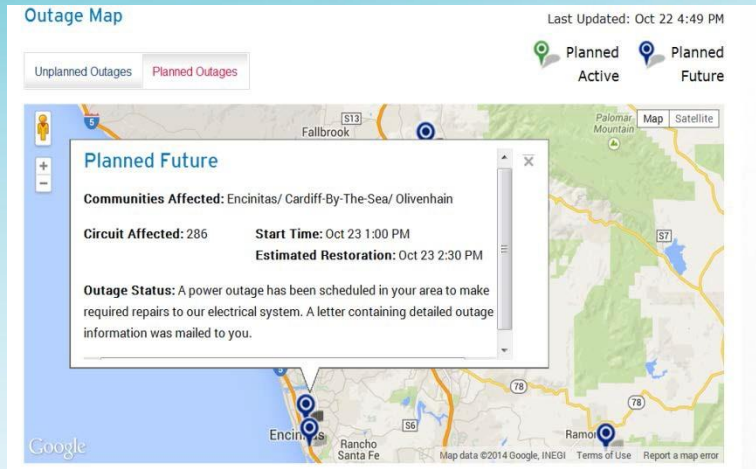
Website

Outage Tools for Customers

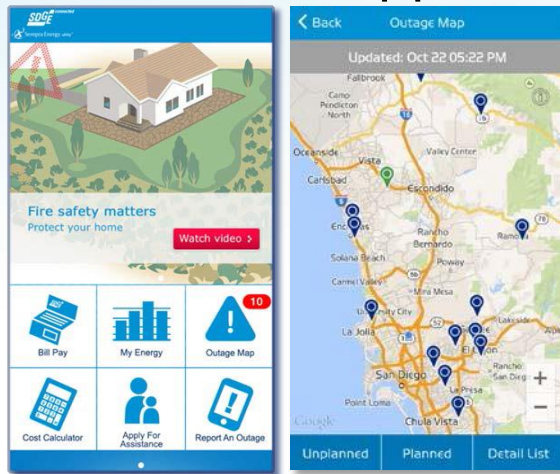


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Outage Map



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
- Comparison of 3 Largest IOUs in California

Summary *Cont.*

- SDG&E 2016 Annual Report available on CPUC website
- Social Media
- Customer Service
- Customer Engagement Channels
- Outage Tools for Customers