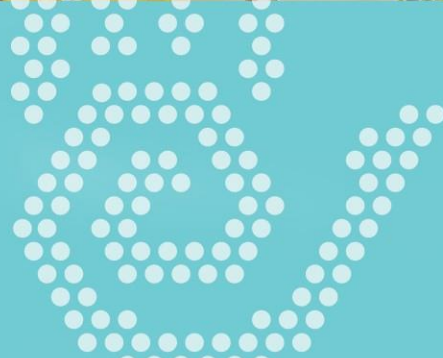


# Presentation on SDG&E's 2017 Annual Electric Reliability Results

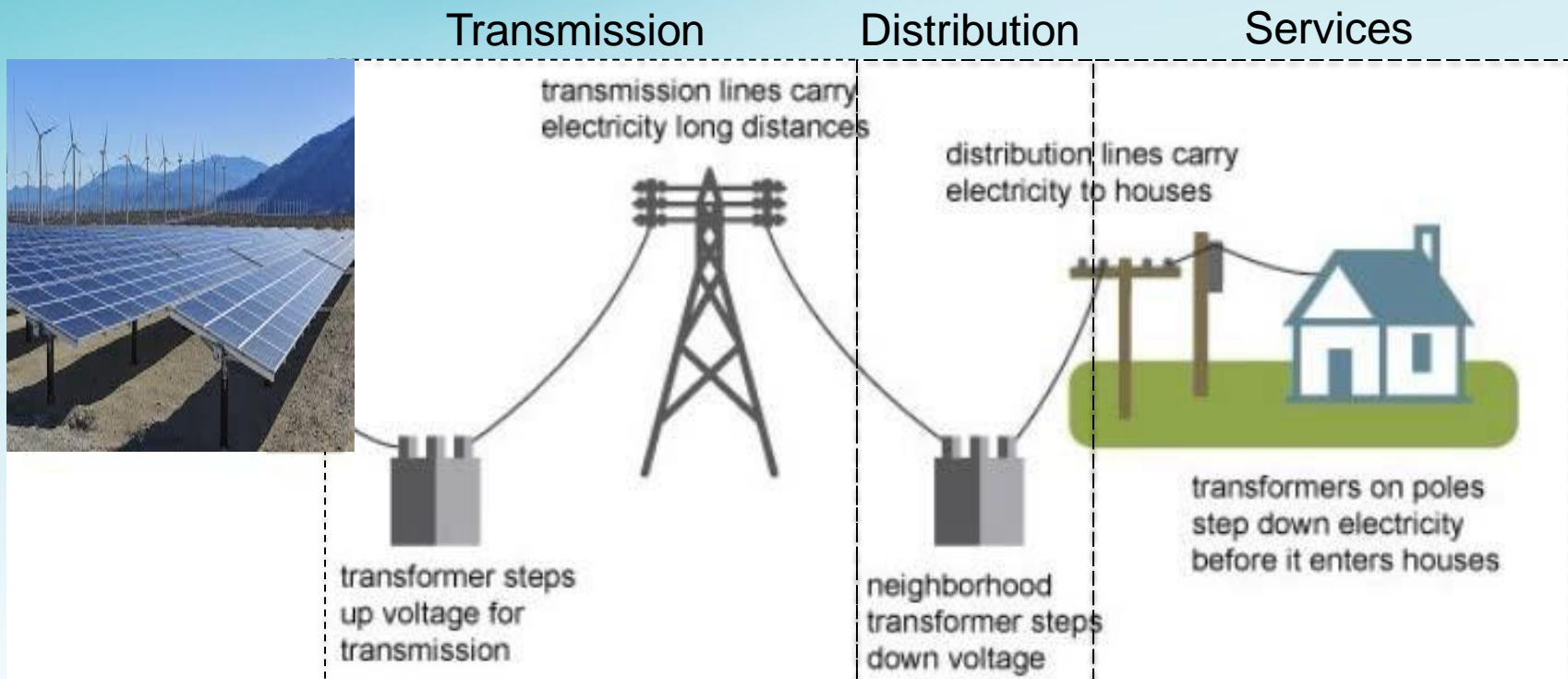
December 13, 2018



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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. 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 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 13 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



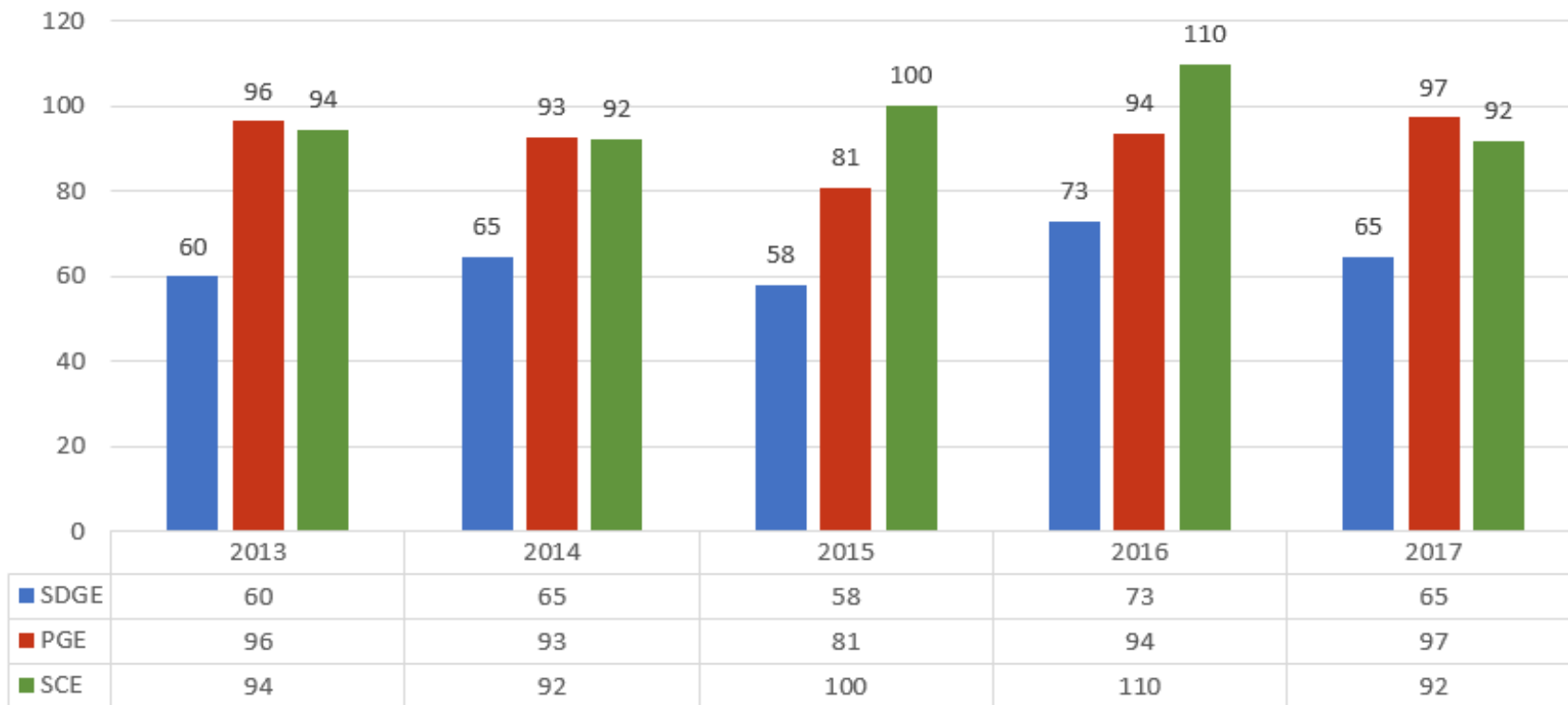
- Per reliability data for the years 2008-2017, SDG&E's reliability metrics demonstrated consistently superior reliability performance, with the lowest scores in the state for three of the four reliability metrics (SAIDI, SAIFI, and MAIFI).



# **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

# 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 2008 - 2017								
MED Included					MED Excluded			
Year	SAIDI	SAIFI	CAIDI	MAIFI	SAIDI	SAIFI	CAIDI	MAIFI
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
2017	117.49	0.585	200.87	0.344	64.51	0.512	125.92	0.311



## 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 2-5: Northeast – District Reliability Indices (MED included and excluded)

Year	MED Included					MED Excluded			
	SAIDI	SAIFI	CAIDI	MAIFI		SAIDI	SAIFI	CAIDI	MAIFI
2008	82.22	0.677	121.49	0.544		82.22	0.677	121.49	0.544
2009	102.02	0.851	119.85	0.583		90.74	0.800	113.50	0.569
2010	101.96	0.948	107.55	0.544		77.47	0.707	109.64	0.497
2011	612.05	1.694	361.24	0.268		59.18	0.696	84.97	0.268
2012	78.46	0.626	125.32	0.272		78.46	0.626	125.32	0.272
2013	102.07	0.708	144.08	0.213		102.06	0.708	144.09	0.213
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

## 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.

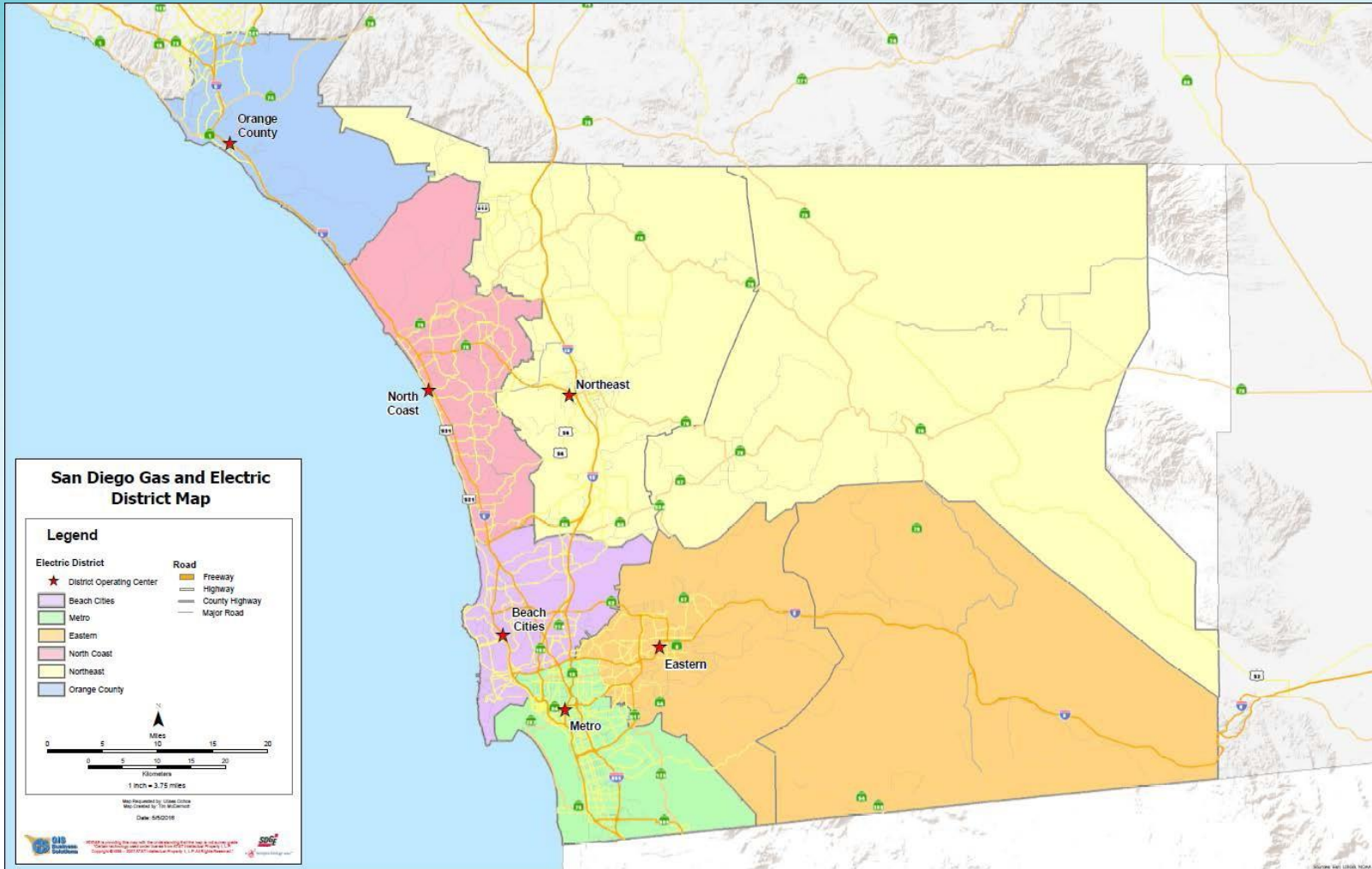
- Five years of historical planned outage data is currently available
- 3,000+ system upgrades performed every year to improve your service

System Indices (2013 – 2017) 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

# 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 2016-2017 data (Excludes Planned and MED)

Circuit	District	Circuit Customers	Substation Name	Circuit Miles	% OH	% UG	Annualized Feeder Outage Count	Annualized Total Circuit SAIDI **
212	Northeast	660	WARNERS	116.8	96%	4%	6	1293
*448	Eastern	994	CAMERON	86.7	94%	6%	4	1272
441	Eastern	105	GLENCLIFF	26.6	90%	10%	5	1145
*157	Eastern	1,015	BARRETT	114.6	97%	3%	4	1130
78	Eastern	265	DESCANSO	14.7	87%	13%	2	987
PE1	Northeast	133	PINE HILLS	7.0	96%	4%	5	867
1215	Eastern	151	CRESTWOOD	24.7	97%	3%	6	843
220	Northeast	330	SANTA YSABEL	54.7	95%	5%	2	820
222	Northeast	1,328	SANTA YSABEL	126.3	88%	12%	6	752
*440	Eastern	265	GLENCLIFF	23.2	86%	14%	5	731

\* 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 2017
  - 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	7/25/2017	Substation - Animal Contact	CM	45200	1.93	0.031
2	1/20/2017	Rain / Wind Storm	All Districts	43848	11.48	0.030
3	12/7/2017	High Winds / RFW	BC, CM, EA, NC, NE	32820	18.32	0.023
4	12/5/2017	High Winds spanning multiple days	All Districts	14313	4.77	0.010
5	2/17/2017	Rain / Wind Storm	All Districts	12799	1.07	0.009
6	10/5/2017	Mylar Balloon	EA, NE	9715	0.93	0.007
7	12/21/2017	Vehicle Contact	CM	8370	0.62	0.006
8	12/5/2017	Substation - Relay Equipment	CM	7683	0.83	0.005
9	1/14/2017	Damaged Poles	BC	7289	0.59	0.005
10	6/4/2017	Faulted Cable	CM	7263	0.74	0.005



# Section 7 - Summary List of 2017 MED



## San Diego Gas & Electric – Summary list of 2017 MED

Date of Outage	Description of Outage	Location	Number of Customers Out of Service	Customers Interrupted - Hours Into the Event Day *																
				0	1	2	3	4	5	6	7	8								
December 9	Winds / RFW	BC, CM, EA, NE	5,540	0	75	75	13	13	13	13	13	13	13							
				Customers Interrupted - Hours Into the Event Day (continued)																
				9	10	11	12	13	14	15	16	17								
				253	739	1237	2632	2632	2633	2633	2633	2645								
				Customers Interrupted - Hours Into the Event Day (continued)																
				18	19	20	21	22	23	24	25	26								
				2645	3852	2847	3259	2853	2837	3646	3646	3646								
				Customers Interrupted - Hours Into the Event Day (continued)																
				27	28	29	30	31	32	33	34	35								
				3646	3646	3646	3646	3646	3646	3646	3646	3646								
				Customers Interrupted - Hours Into the Event Day (continued)																
				36	37	38	39	40	41	42	43	44								
				3646	3646	3646	3646	3646	3646	3265	3265	3198								
				Customers Interrupted - Hours Into the Event Day (continued)																
				45	46	47	48	49	50	51	52	53								
				3198	3198	3198	3198	3198	3198	3198	3198	3198								
				Customers Interrupted - Hours Into the Event Day (continued)																
				54	55	56	57	58	59	60	61	62								
				3198	3198	3198	3012	3010	2860	2376	2084	513								
				Customers Interrupted - Hours Into the Event Day (continued)																
63	64																			
203	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 2017, Major Event Days included the Santa Ana/RFW episode in early December, due to part to the Public Safety Power Shutoff program.

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



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Tables capture the ten largest unplanned outage events for each of the years from 2017 through 2008. The December outages were a function of the Santa Ana/RFW episode, due to high winds and Public Safety Power Shutoff program.

### 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

## Section 9 - Website – Outage Inquiries



[sdge.com/system-reliability](https://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

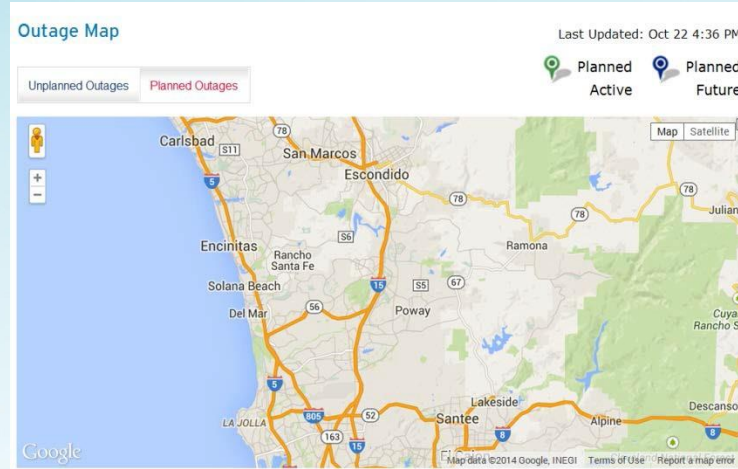
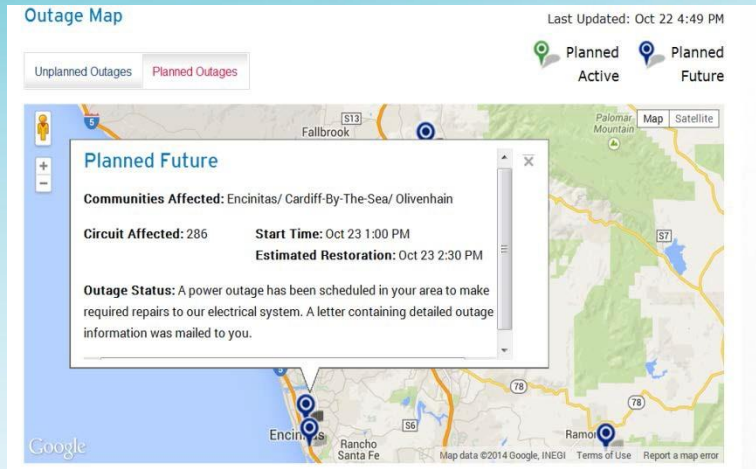


# Outage Tools for Customers

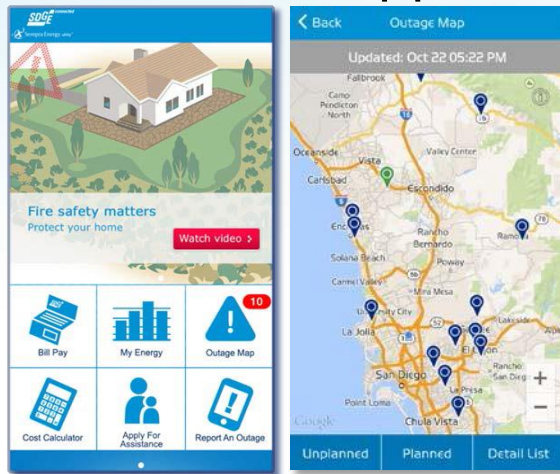


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## Outage Map



## 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
  - Others
- Comparison of 3 Largest IOUs in California

## Summary *Cont.*

- SDG&E 2017 Annual Report available on CPUC website
- Social Media
- Customer Service
- Customer Engagement Channels
- Outage Tools for Customers