



# California Public Utilities Commission Committee on Finance and Administration



## **Report on Strategic Directive 03 – Reliability and Resiliency**

Directors Raminder Kahlon, Edward Randolph, & Cynthia Walker  
And Deputy Director Lee Palmer

March 27, 2019



## Strategic Directive 03 – Reliability and Resiliency

**1) Assure an adequate supply of regulated services and adequate infrastructure to deliver the services.**

2) Assure the quality of products and services provided by regulated entities.

3) Assure that the utility systems are resilient and capable of recovering from adverse events—such as accidents, natural disasters, and those related to cyber and physical security.

4) Assure regulated entities have proactive maintenance programs that are adequate verifiable, and auditable.





# Electric Reliability and Resource Adequacy (RA)

- **Generator Retirements Tightened RA Supply**
  - System resource adequacy supply has tightened considerably.
  - Due to retirements, especially of once-through-cooling facilities (OTC)
    - Completed: Pittsburg, Moss Landing, Encina, Mandalay, Etiwanda (not OTC)
    - Scheduled: Redondo Beach, Alamitos, Huntington Beach, Ormond Beach
- **Near Term Reliability**
  - Issues associated with potential near-term reliability are expected to be addressed in the RA & IRP proceedings, e.g. procurement and multi-year requirements.
- **Resource Sufficiency in 2018**
  - System as a whole was sufficiently resources in 2018, but there were an increasing number of deficiencies, referrals and fines. This trend has continued in 2019.

Resource Adequacy (RA) Citations	Citations Issued #	Citation Penalties \$	ESPs # of Citations	CCAs # of Citations	IOUs # of Citations
2006-7	4	\$6,500	4	0	0
2008-9	11	\$43,500	11	0	0
2010-11	7	\$32,500	6	0	1
2012-13	9	\$41,100	7	0	2
2014-15	7	\$43,000	7	0	0
2016-17	9	\$163,610	7	1	1
2018 (2019 not yet public)	10	2,593,439	8	2	0
<b>Total</b>	<b>57</b>	<b>\$2,923,649</b>	<b>50</b>	<b>3</b>	<b>4</b>





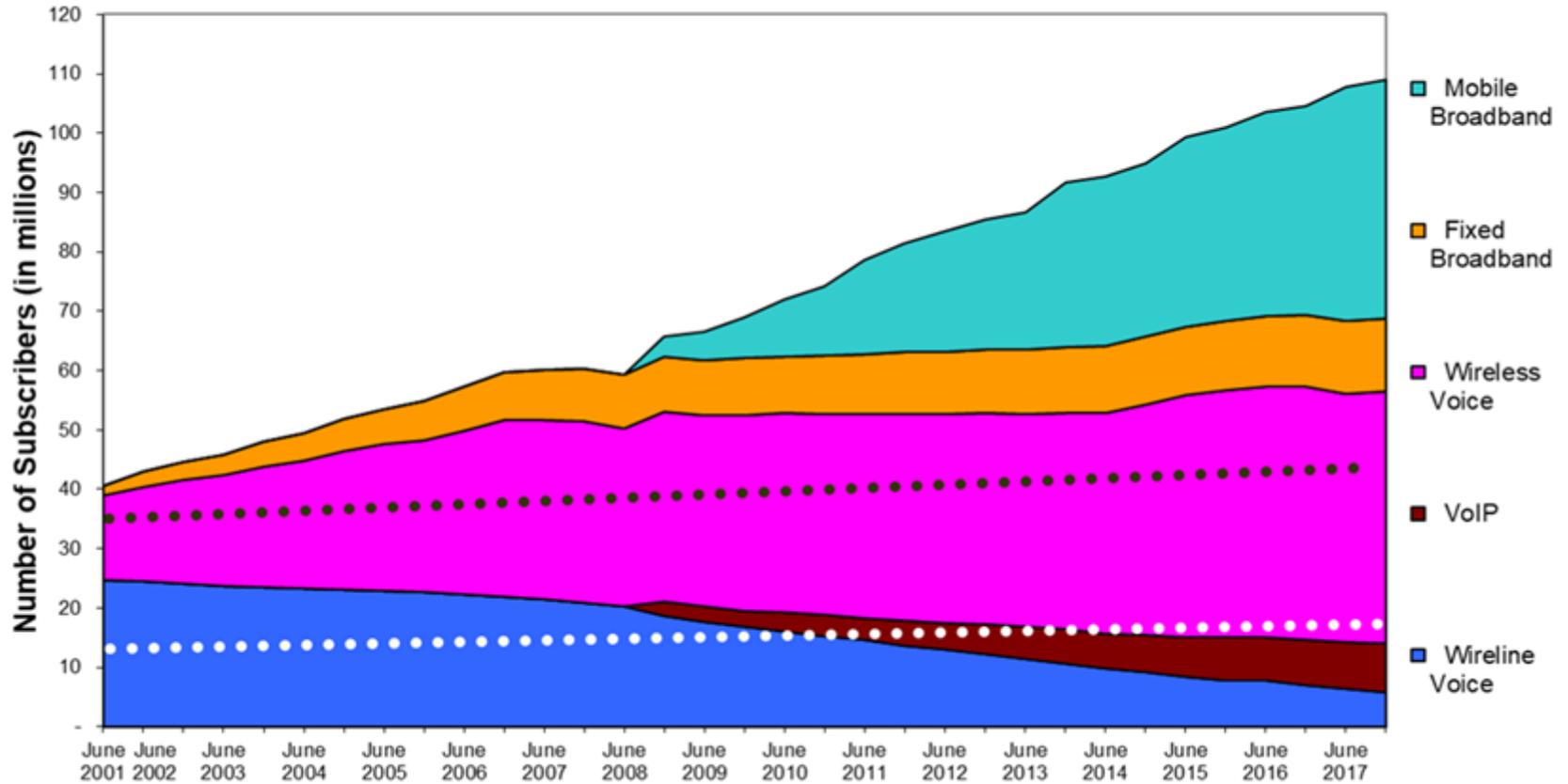
## Natural Gas Reliability and Planning

Metrics	PG&E	SoCalGas	SDG&E
Upgrades/Replacement Valves in Process (PSEP 2018 Update)	(pending)	21	2
Valve Project Upgrades Completed (PSEP 2018 Update)	(pending)	30	9
Pipeline Strength Testing (2011-2018)	1,380 miles	(pending)	(pending)
Pipeline Replacement Miles (2011-2018)	154 Miles	(pending)	(pending)
Number of Operating Flow Orders (OFOs) - 2018	Low- 64 High – 31	Low- 136 High - 83	





## Subscriber Trend of All Communications Services In California by Technology June 2001 - December 2017 (in Millions of Subscriptions)



sources: FCC Form 477 filings, June 2001 - December 2017; US Census Bureau

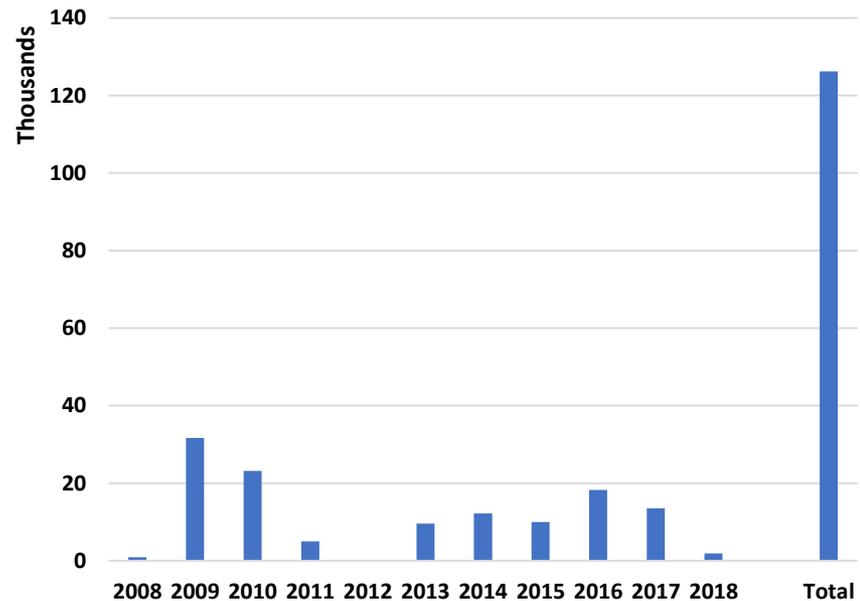




# CASF Infrastructure Grant & Loan Account Potential and Direct Connections

Year	Potential and Direct Connections (Households)
2008	912
2009	31,695
2010	23,173
2011	5,000
2012	
2013	9,595
2014	12,199
2015	9,966
2016	18,249
2017	13,543
2018	1,906
<b>Total</b>	<b>126,238</b>

Potential and Direct Connections  
(Households)



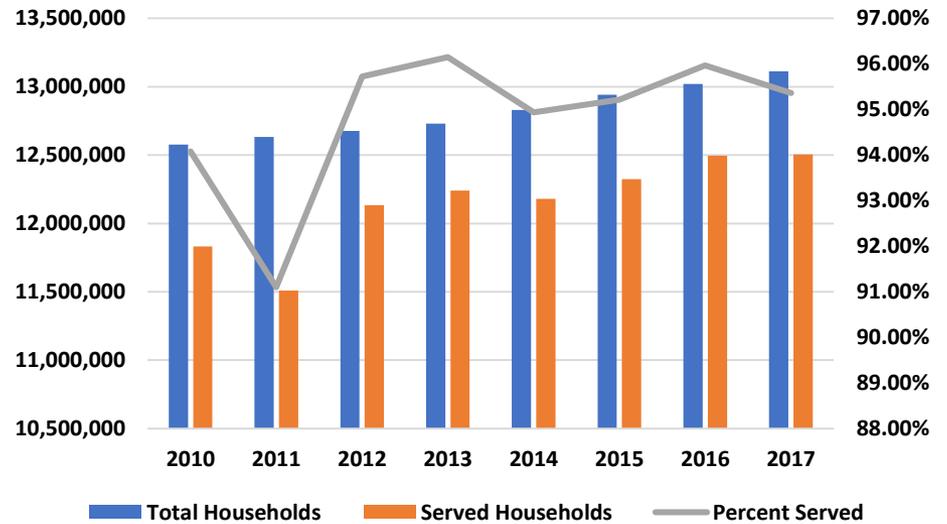


# Progress Toward the 98% Goal (Wireline)

Year	Total Households	Served Households	Percent Served
2010	12,577,498	11,832,885	94.08%
2011	12,633,402	11,509,109	91.10%
2012	12,675,875	12,134,058	95.73%
2013	12,731,222	12,241,235	96.15%
2014	12,830,035	12,180,932	94.94%
2015	12,941,948	12,323,230	95.22%
2016	13,020,413	12,494,995	95.96%
2017	13,113,840	12,505,596	95.36%

**Speeds At Least 6 Mbps Down AND 1 Mbps Up**

**Progress Toward the 98% Goal by Fixed Broadband Technology**





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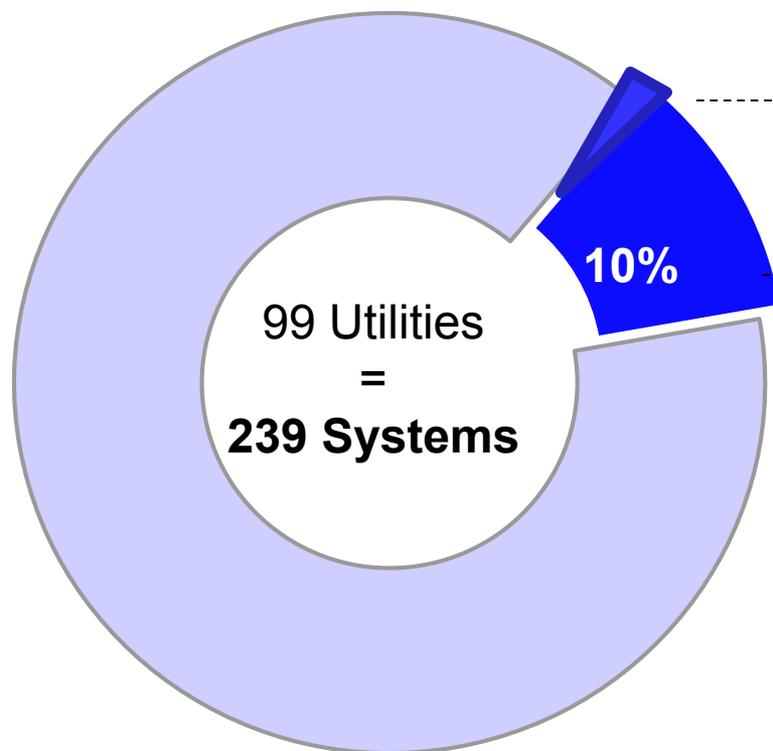
4) Assure regulated entities have proactive maintenance programs that are adequate verifiable, and auditable.





# Water Utilities

## Primary Max Contaminant Level (MCL) Violations



### 23 Water Systems above MCL

- 3 Intermittent
- 20 Continuous

### Contaminants:

- a) 1,2,3 TCP (Trichloropropane) (13)\*
- b) Bacteriological/Coliform (3)
- c) Disinfection By Products (2)
- d) Arsenic (2)
- e) Radioactivity/Gross Alpha (1)
- f) Radioactivity/Uranium (1)
- g) Lead and Copper (1)

9

2017, 2018, and 2019

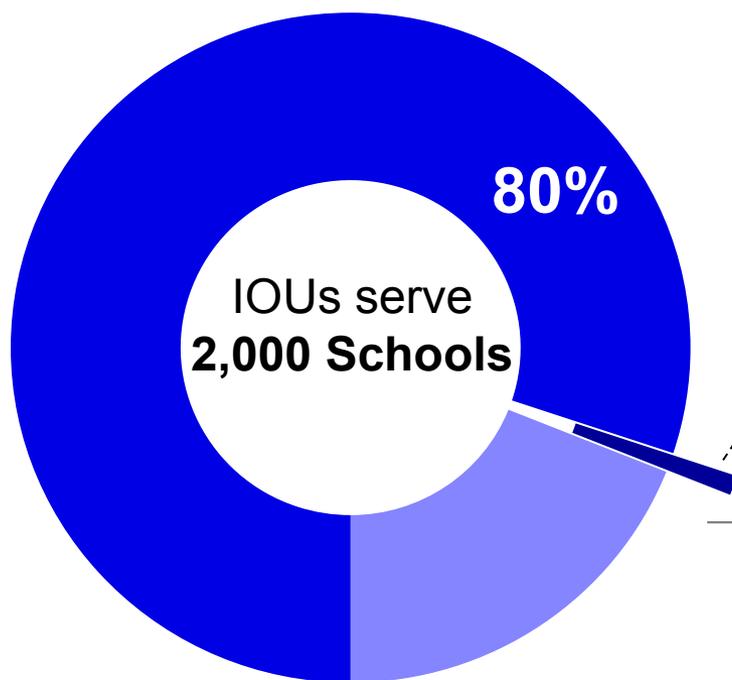
\* 1,2,3 TCP was recently established by the Secretary of the State and became effective on December 14, 2017.



# School Lead Testing

## Assembly Bill 746

- All public schools must be tested for lead by **July 1, 2019**



**1,167 Schools Tested**

– 443 exempted

- **19** over limit (1.0%)  
- Corrective actions taken

Statewide (as of Dec 2018)

- 14,500 schools
- 8,287 tested/exempted (57%)
- 213 over limit (1.5%)





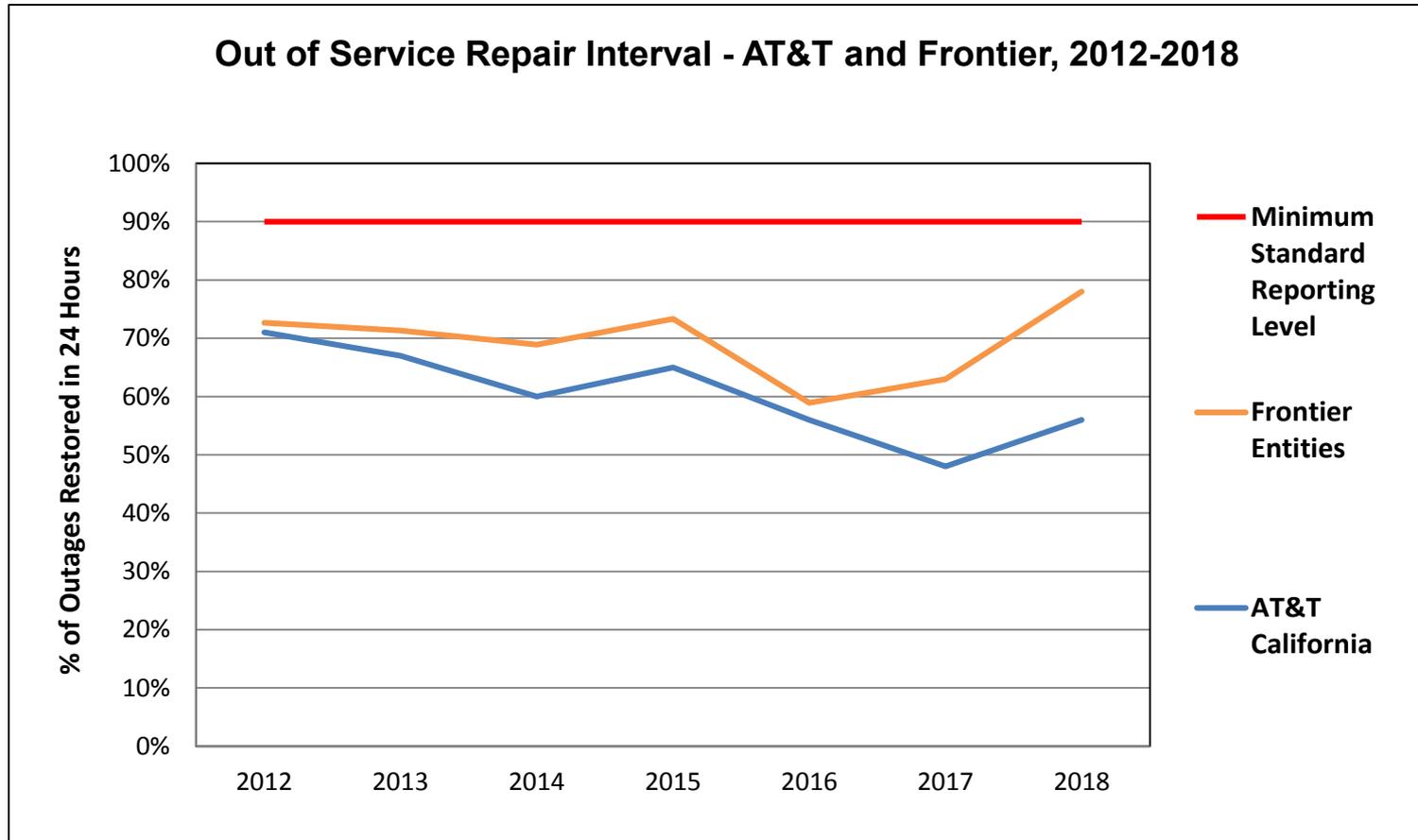
## General Order 133D

- 5 measures:
  - 1. Installation Interval**
  - 2. Installation Commitments**
  - 3. Customer Trouble Reports**
  - 4. Out of Service Repair Interval**
  - 5. Answer Time**
- Major Service Outage Reporting
- Fines for Missed Measures
  - Annual, beginning 2017
  - Option to re-invest double the fine amount in service quality improvements



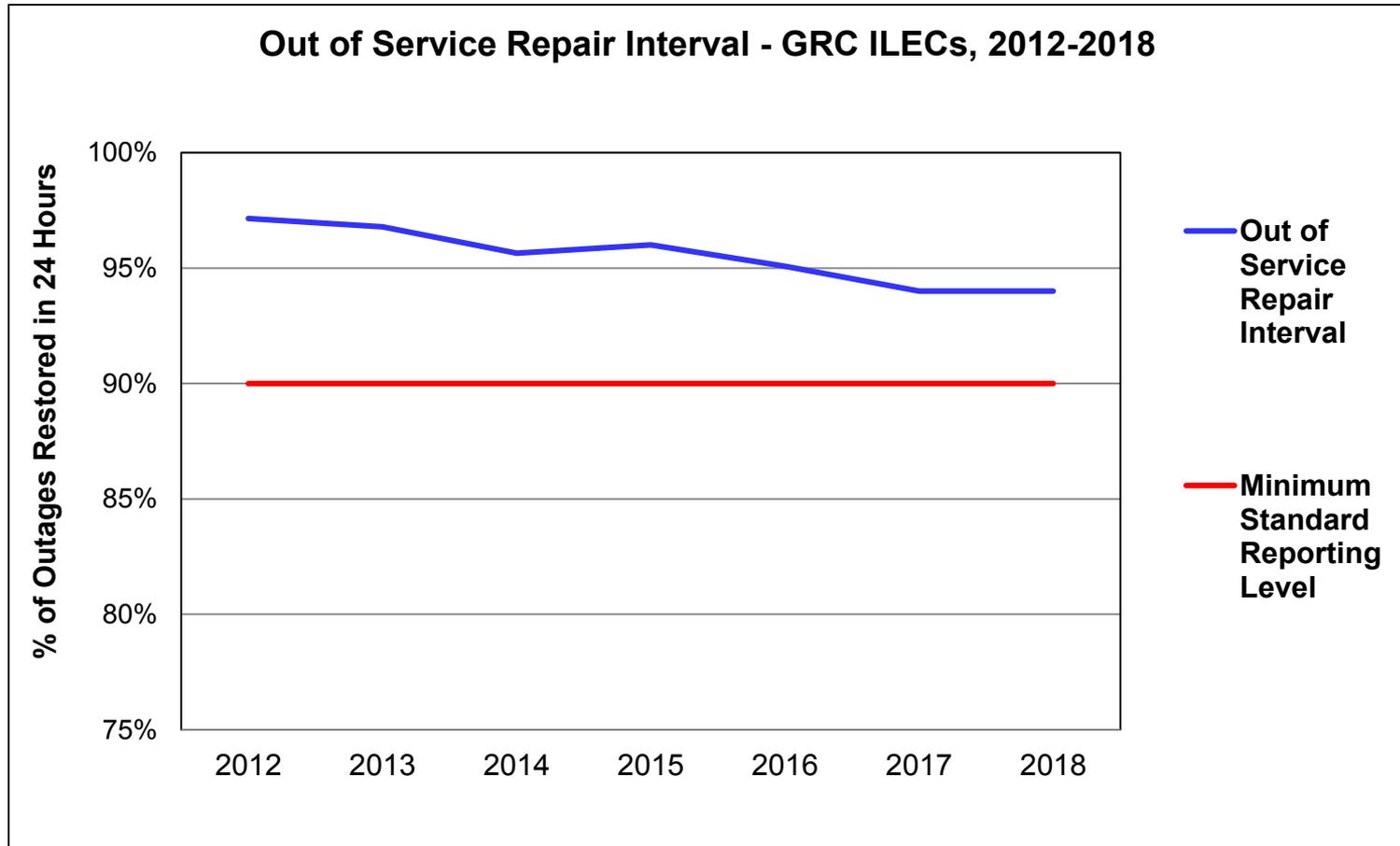


# Out of Service Measure





# Out of Service Measure





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# Electric System Reliability Metrics

## System Average Interruption Duration Index (SAIDI)

$$\text{SAIDI} = \frac{\text{Total minutes every customer was without power due to sustained outages}}{\text{Total number of customers}}$$

Average cumulative minutes of sustained power interruptions during the year across the system

## Customer Average Interruption Duration Index (CAIDI)

$$\text{CAIDI} = \frac{\text{System Average Interruption Duration Index (SAIDI)}}{\text{System Average Interruption Frequency Index (SAIFI)}}$$

Average duration of each sustained power interruptions during the year

## Average Interruption Duration Index (AIDI)

Average cumulative minutes of sustained power interruptions during the year on a specific circuit or in a specific geographic area.

## System Average Interruption Frequency Index (SAIFI)

$$\text{SAIFI} = \frac{\text{Number of sustained customer outages experienced by all PG&E customers}}{\text{Total number of customers}}$$

Average number of sustained power interruptions during the year across the system

## Momentary Average Interruption Frequency Index (MAIFI)

$$\text{MAIFI} = \frac{\text{Number of customers who experience Momentary Outages}}{\text{Total number of customers}}$$

Average number of momentary power interruptions during the year

## Average Interruption Frequency Index (AIFI)

Average number of sustained power interruptions during the year on a specific circuit or in a specific geographic area.





# Electric Reliability of California Investor-Owned Utilities Compared to the Southwestern States and National Average Values (2017)

Electric Reliability of California Utilities 2017 (as reported in 2018) Compared to the Southwest States and National Average Values for 2017 <sup>1</sup>					
Utility Reliability Measure	Southwest States <sup>2</sup>	National	PG&E	SCE	SDG&E
<b>SAIDI</b> Duration of Outage per Customer (Minute/Customer)	178	137	113	92	65
<b>SAIFI</b> Frequency of Outage per Customer (Event/Customer)	1.1	1.2	1.0	0.9	0.5
<b>CAIDI</b> Duration of Outage per Event (Minute/Event)	156	112	118	105	126
<b>MAIFI</b> Frequency of Momentary Interruption per Customer (Event/Customer)	Not Available	Not Available	1.6	1.4	0.3

<sup>1</sup> 2017 is the most recent full year data available.  
 Source: U.S. Energy Information Administration, national data population: 1,084 electric utilities, Southwestern States data samples: 98 electric utilities. Criteria: Combined transmission and distribution system indices, excluded Major Event Days and Independent System Operator (ISO) outages, and **included** planned outages. CA specific IOU slides following this one **exclude data on planned outages**, but that data is not available for national comparison.

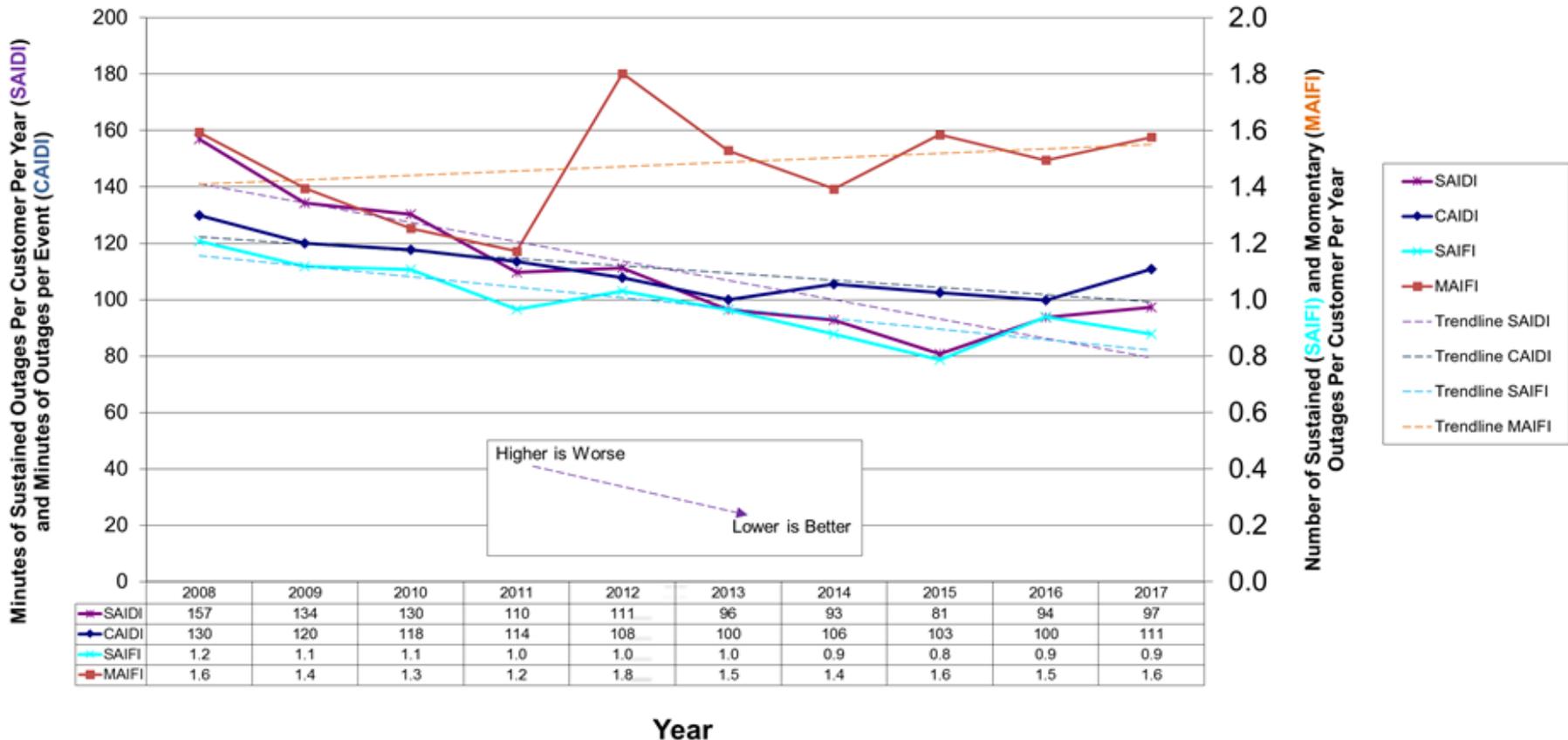
<sup>2</sup> Southwestern States include CA, NV, UT, CO, AZ, and NM





# PG&E System Reliability Indices, 2008-2017

PG&E Reliability Indices: SAIDI, CAIDI, SAIFI, MAIFI  
(Excluding Major Events)



**Note:** All system indices shown combine transmission and distribution system indices, exclude planned and CAISO outages and Major Event Days (MED). 2018 data will be submitted in July 2019.

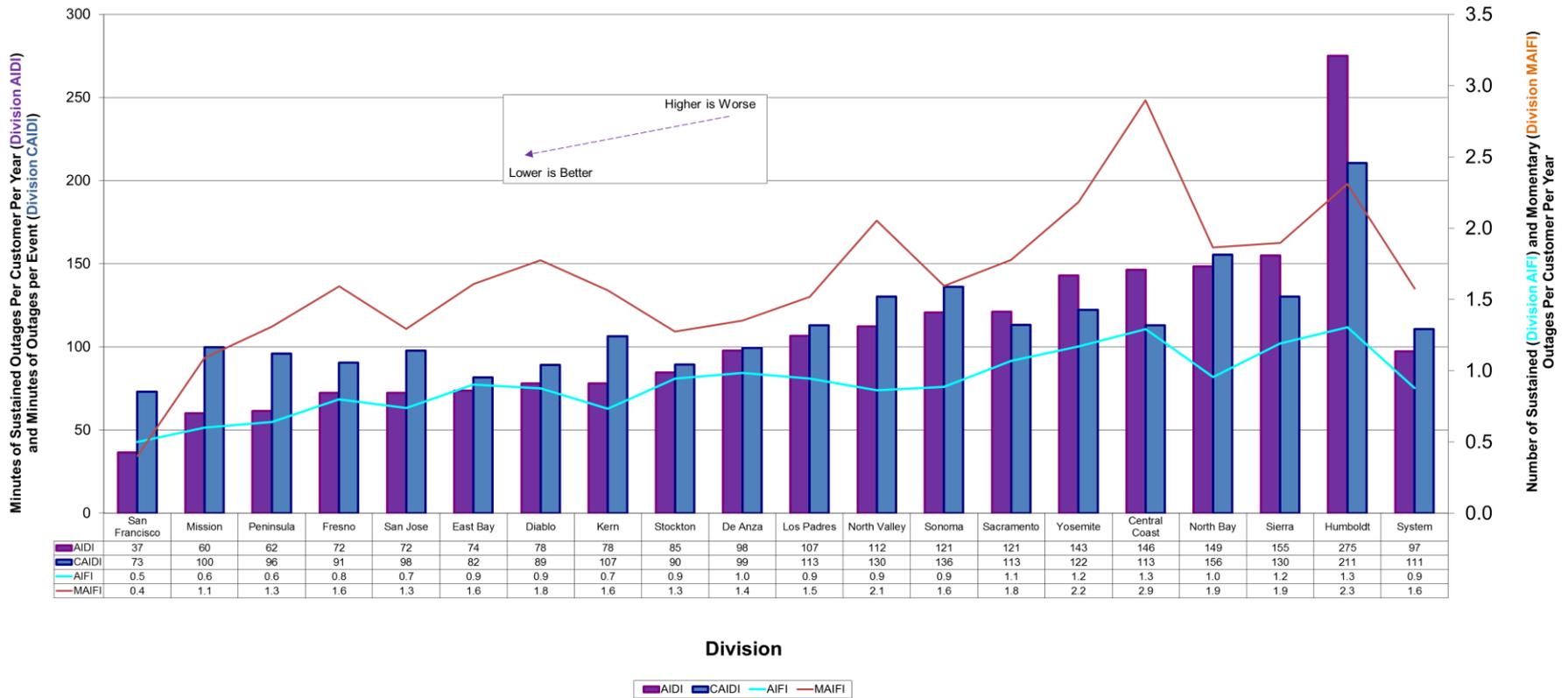




# PG&E Division Reliability Indices for 2017

## Sorted by AIDI by Division

PG&E Division Reliability Indices: AIDI, CAIDI, AIFI, MAIFI  
(Excluding Major Events)



**Note:** All division indices combine transmission and distribution, exclude planned and CAISO outages and Major Event Days (MED). 2018 data will be available in July 2019.





## PG&E System Reliability Performance Shows Improvement GRCs Authorized Reliability Investments and Smart Grid Technologies

- SAIDI, SAIFI, and CAIDI show continuous improving trends over the last 10 years.
  - However, certain districts are outliers and need improvement.
- Investments PG&E made to improve reliability include:
  - Infrastructure and system hardening investments (i.e., replace overhead conductor with covered conductor, upgrade to non-wood poles, undergrounding, etc.)
  - Targeted Circuit Program investments to address poorly-performing circuits (i.e., replace conductors, replace/repair equipment, infrared inspection, & tree trimming, etc.)
- Smart Grid Technologies utilized to improve reliability include:
  - Fault Location, Isolation, and Service Restoration (FLISR) technology that automatically cuts down duration of service outages
  - Smart Line Sensors to improve PG&E's ability to monitor for outages
  - Integrating clean and renewable energy on the grid

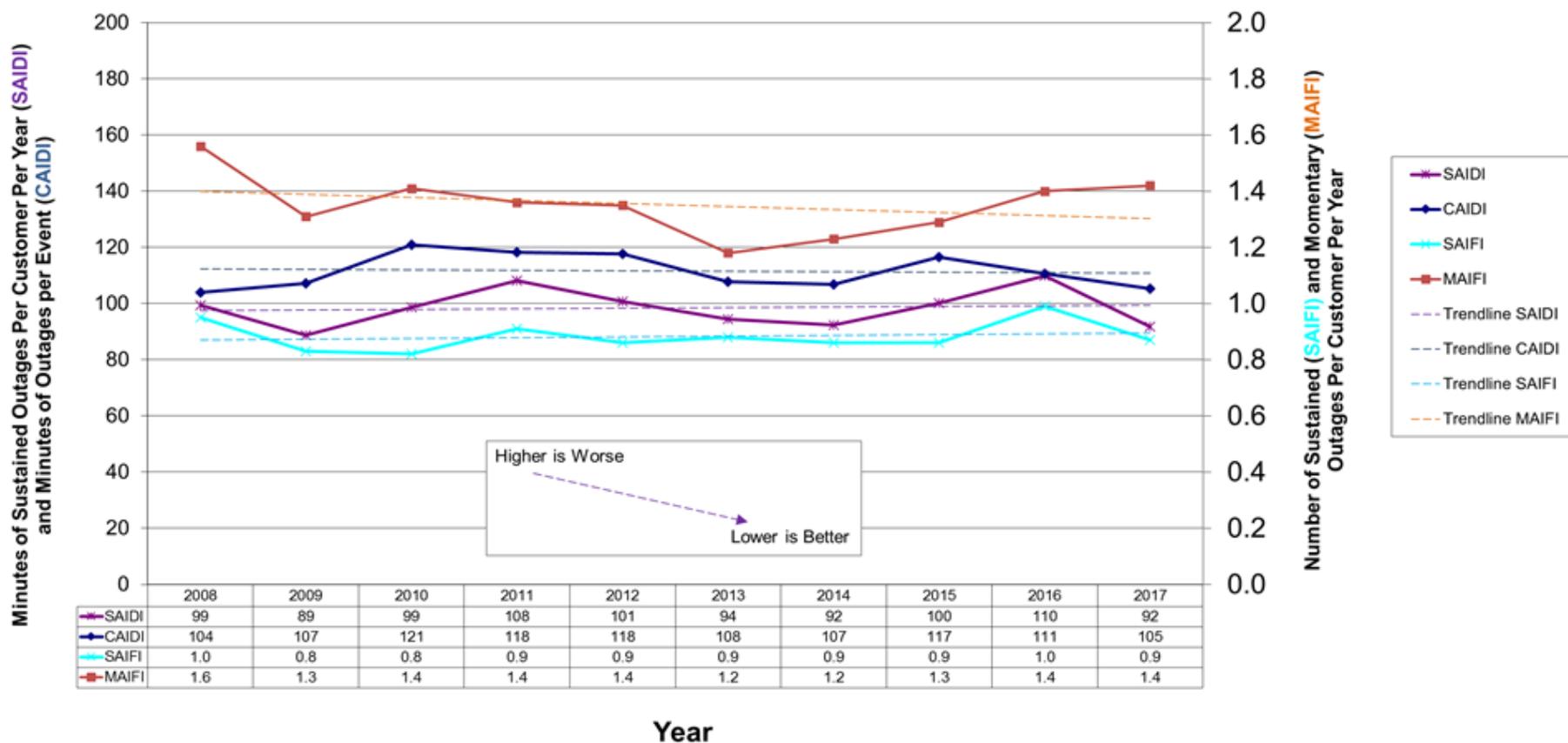
Sources: PG&E 2017 Annual Reliability Report submitted on July 12, 2018; annual report in-person meeting presentation on December 13, 2018; and 2017 GRC Application (A).15-09-001.





# SCE System Reliability Indices, 2008-2017

**SCE Reliability Indices: SAIDI, CAIDI, SAIFI, MAIFI (Excluding Major Events)**



**Note:** System reliability indices combine transmission and distribution system indices, exclude planned and CAISO outages and Major Event Days (MED). 2018 data will be available in July 2019.

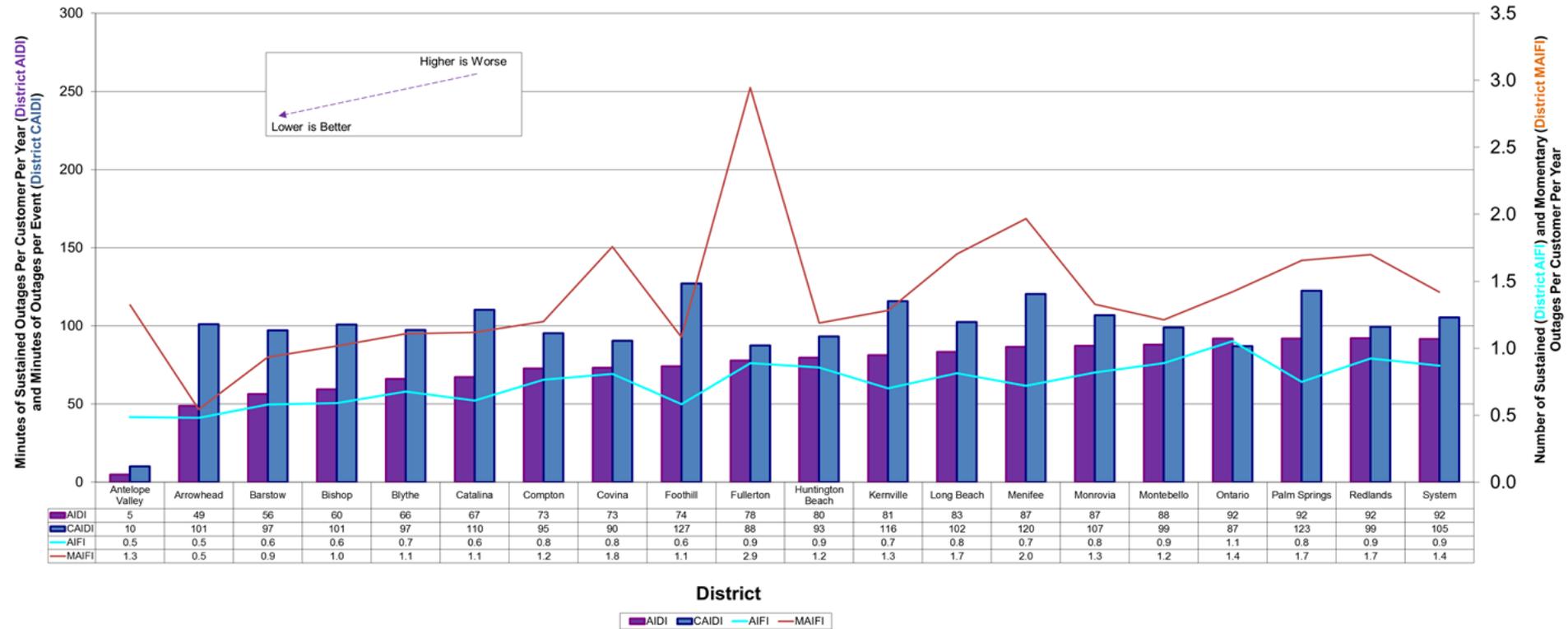




# SCE District Reliability Indices (Part 1 of 2)

## Districts Better than SCE System Average, Sorted by AIDI for 2017

**SCE District Reliability Indices: AIDI, CAIDI, AIFI, MAIFI for District AIDIs Equal or Better than System AIDI (Excluding Major Events)**



**Note:** SCE district reliability indices combine transmission and distribution, exclude planned and CAISO outages and Major Event Days (MED).

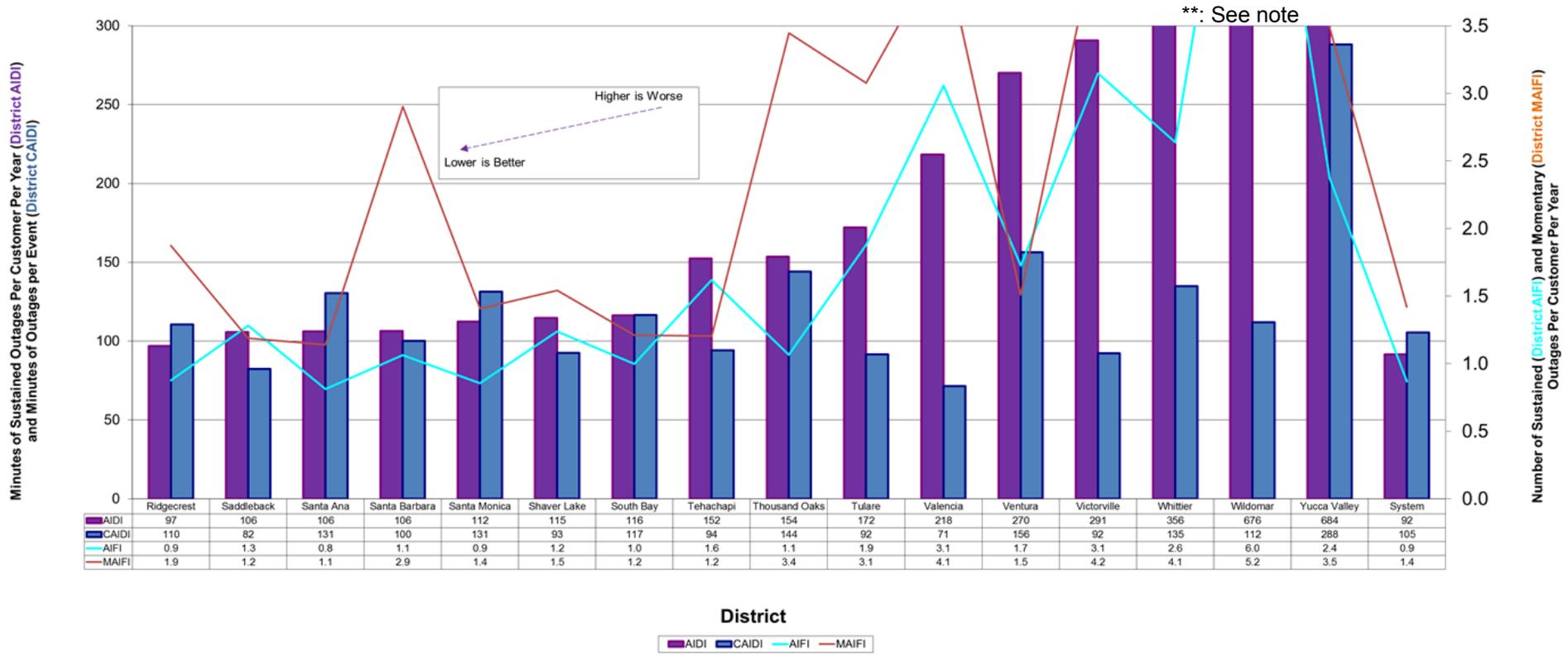




# SCE District Reliability Indices (Part 2 of 2)

## Districts Worse than SCE System Average, Sorted by AIDI for 2017

**SCE District Reliability Indices: AIDI, CAIDI, AIFI, MAIFI for District AIDIs Greater than System AIDI\*\* (Excluding Major Events)**



**Note:** District reliability indices combine transmission and distribution system, exclude planned and CAISO outages and Major Event Days (MED). \*\* Whittier, Wildomar, and Yucca Valley district AIDI values; Valencia, Victorville, Whittier, and Wildomar district MAIFI values; and Wildomar district AIFI values extend beyond the graph.





## SCE System Reliability Performance is Largely Steady GRCs Authorized Reliability Investments and Smart Grid Technology

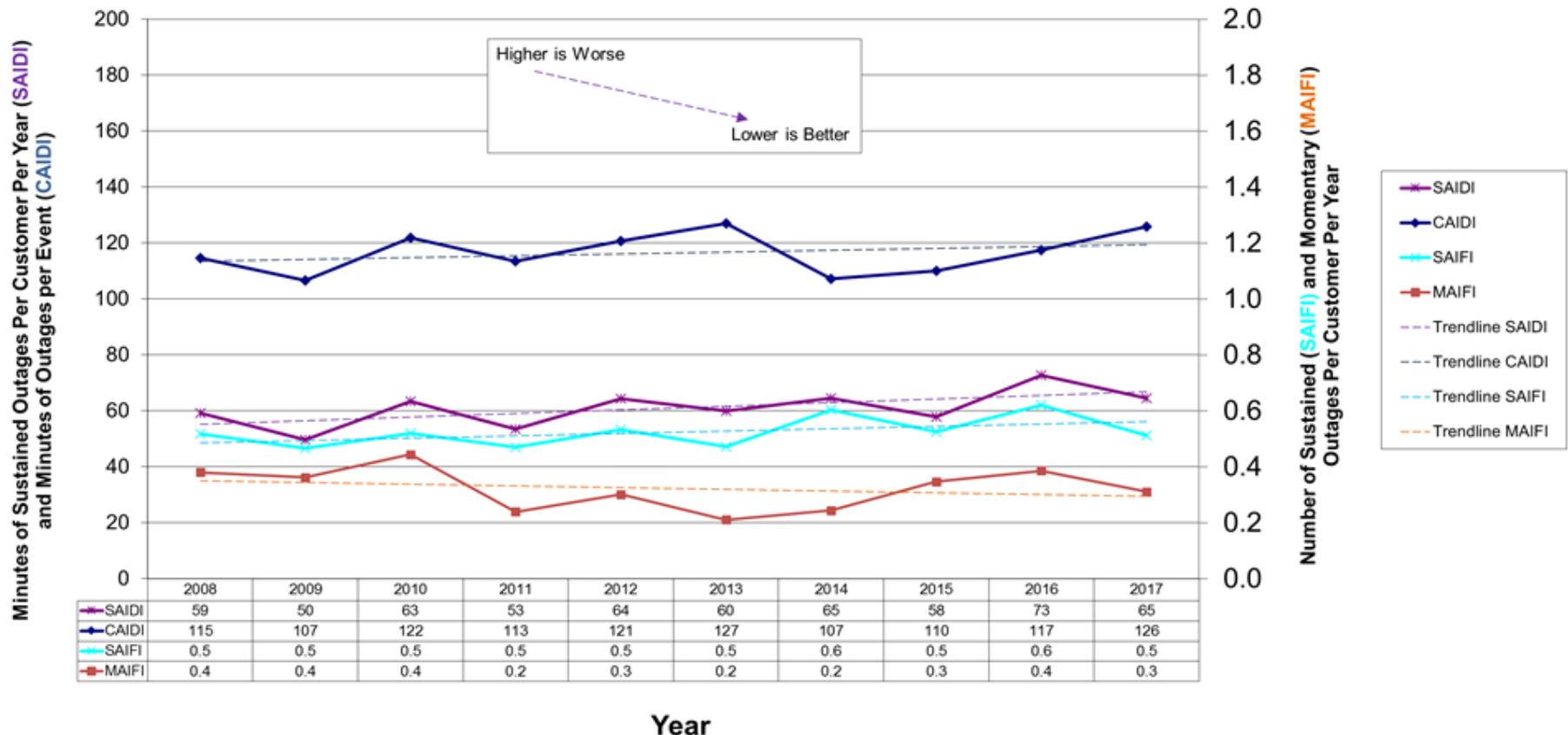
- Reliability indices largely show a steady system reliability trend over the years.
  - However certain districts need improvement.
- SCE implemented the following measures to maintain reliability:
  - Worst Circuit Rehabilitation (WCR) program (i.e., replaced fuses, switches, and fault indicators; cable testing, cable insulation improvement, etc.)
  - Overhead and underground cable and structure replacements
  - Transmission and Distribution pole replacements
- Smart Grid Technologies implemented to improve reliability include:
  - Automation for isolating failures
  - Automation for enablement and optimization of DER generation

**Source:** SCE 2017 Annual Reliability Report submitted on July 17, 2018; SCE annual reliability report in-person public meeting presentation on December 4, 2018; and 2018 GRC Application (A).16-09-001.



# San Diego Gas & Electrical (SDG&E) System Indices, 2008-2017

## SDG&E Reliability Indices: SAIDI, CAIDI, SAIFI, MAIFI (Excluding Major Events)



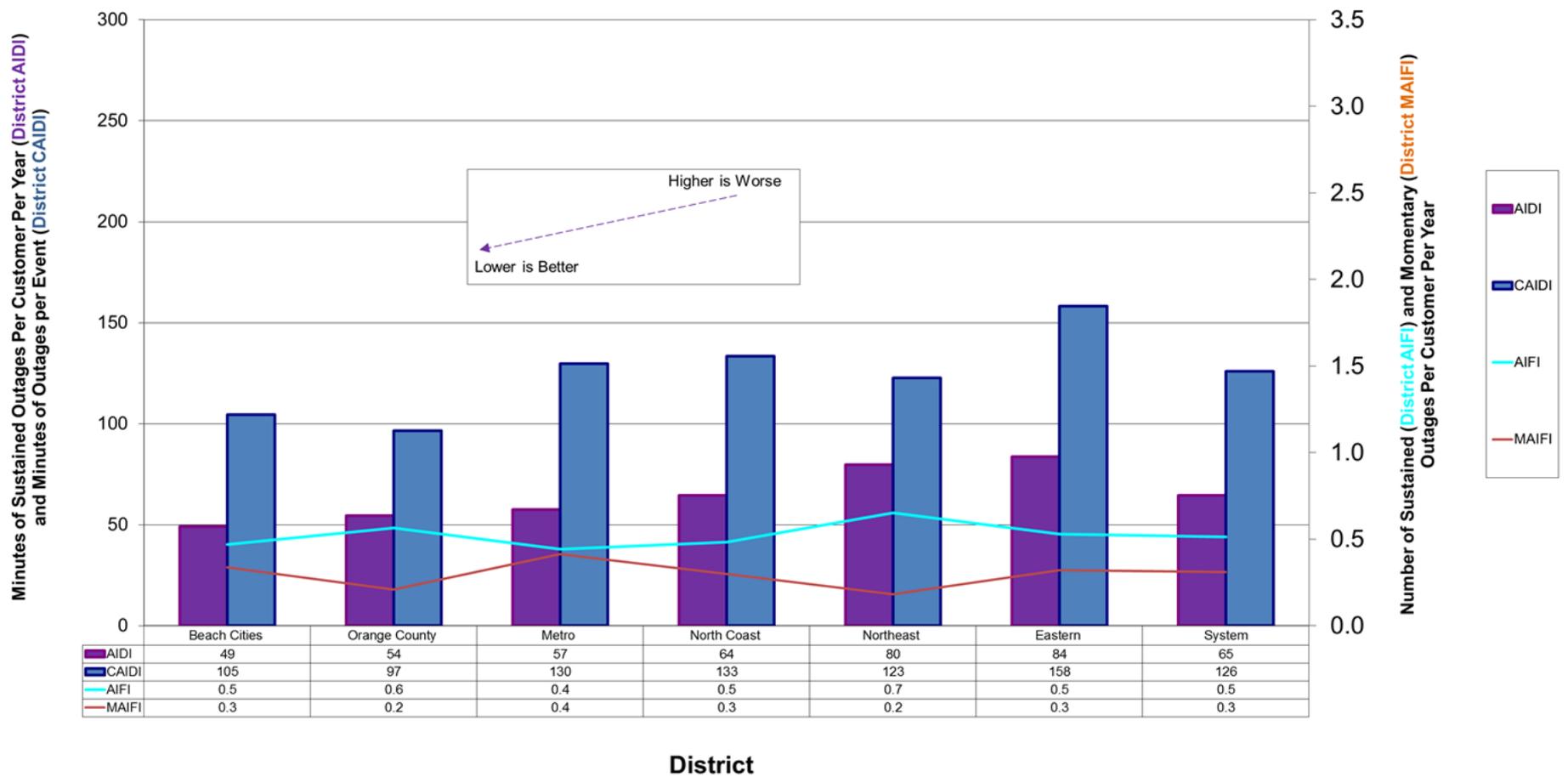
**Note:** System reliability indices combine transmission and distribution system indices, exclude planned and CAISO outages and Major Event Days (MED). 2018 data will be available in July 2019.





# SDG&E District Reliability Indices Sorted by AIDI for 2017

SDG&E District Reliability Indices: AIDI, CAIDI, AIFI, MAIFI  
(Excluding Major Events)



**Note:** District reliability indices combine transmission and distribution, exclude planned and CAISO outages and Major Event Days (MED)





## SDG&E System Reliability Performance Good, Slight Downward Trend GRCs Authorized Reliability Investments and Smart Grid Technology (1/2)

- SDG&E's SAIDI and SAIFI show trends of slight worsening over the years
  - However, SDG&E's starting point is significantly better than most utilities (in CA, SW, or US).
  - Certain outlier districts in SDG&E also need improvement.
- SDG&E is only utility with Performance Based Ratemaking Incentive
  - 2017 reliability measures for its Distribution Performance-Based Ratemaking (PBR) resulted in a net reward of \$1.7 million.<sup>1</sup>
- SDG&E investments to improve reliability include<sup>2</sup>:
  - Fire Risk Mitigation (FiRM) program replaces wood poles with steel poles and upgrades smaller size conductors with larger size conductors
  - Vegetation management
  - Pole Risk Mitigation and Engineering (PRiME) program analyzes all pole strengths to confirm meeting current standards
  - Supervisory Control and Data Acquisition (SCADA) allows for direct control of switches.
  - Underground cable and switch replacements
  - Device relocations reduce vehicle contacts to key equipment

<sup>1</sup> SDG&E Advice Letter 3217-E/2669-G

<sup>2</sup> Source: SDG&E 2017 Annual Reliability Report submitted on July 16, 2018, annual report in-person meeting presentation on December 13, 2018, and Sempra 2019 GRC Application (A).17-10-007





## SDG&E System Reliability Performance Good, Slight Downward Trend GRCs Authorized Reliability Investments and Smart Grid Technology (2/2)

- Smart Grid Technology to improve reliability includes<sup>3</sup> :
  - Conditioned Based Maintenance (CBM) program uses monitoring equipment in SDG&E substations and data from its outage management system to rate substation transformer load capacity.
  - Distribution grid Updates to accommodate increasing penetration of DERS

<sup>3</sup> Source: Sempra 2019 GRC testimony





## Electric System Resiliency

- The Commission has not formally adopted a definition of resiliency:
  - Usually defined by an ability to recover after an incident (ease, speed of recovery).
- Commission proceedings which involve resiliency include:
  - A.18-09-002: Application of Southern California Edison Company (U338E) for Approval of Its Grid Safety and Resiliency Program
  - R.18-04-019: OIR to Consider Strategies and Guidance for Climate Change Adaptation
  - R.16-02-007: Integrated Resource Planning (for grid integration needs and supply adequacy)
  - GRCs can include requests for resiliency investments, often coordinated with other specific proceedings:
    - Distribution Planning Investments (traditional)
    - Grid Modernization Plans (since Distribution Resource Planning commenced)
    - Smart Grid Plans (for past ~6+ years)
    - Wildfire Mitigation Plans (in the future)





## Emergency Response Plans – Water Utilities



- California Water Service
- California-American Water Company
- Golden State Water Company
- Great Oaks Water Company
- Liberty Utilities
  - Apple Valley Ranchos
  - Park
- San Gabriel Valley Water Company
- San Jose Water Company
- Suburban Water Systems



## Emergency Response Plans – Water Utilities

- **SWRCB – Evaluation of Water System Resiliency and Preparedness**
  - Comprehensive Climate Change Resolution (2017-0012)
    - Division of Drinking Water
      - Sanitary Surveys to consider climate change / extreme weather
        - » Resilience
        - » Preparedness
      - Starting in 2019
- **America’s Water Infrastructure Act of 2018**
  - Community Water System Risk and Resilience
    - Emergency Response Plans to incorporate;
      - Strategies to improve resilience
      - Climate based threats included
      - Procedures to deal with malevolent acts or natural hazards
    - Guidance to be provided by August 1, 2019 – USEPA Administrator





# Emergency Response Plans – Electric and Gas Utilities

**100%**

- Filed Under General Order 166 & GO 112-F
- All Electric and Gas Emergency Plans Received and Reviewed by SED.





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**4) Assure regulated entities have proactive maintenance programs that are adequate verifiable, and auditable.**





## Assure regulated entities have proactive maintenance programs that are adequate, verifiable, and auditable

**Safety And Enforcement Division performs a variety of assurance activities to validate that the regulated entities maintain programs that are adequate and in compliance with the Commission's General Orders.**

### **Safety and Reliability assurance activities include:**

- *Adequate*
  - Compliance
    - General Orders and modifications:
      - R.15-05-006: GO 95 High Fire Threat District requirements,
      - R.16-12-001: GO 95 Rule 18 electric maintenance
      - R.11-02-019: GO 112-F
    - CA Public Utilities Code
  - Performance
    - Metrics review
    - Outage monitor
- *Verifiable*
  - Field inspection
- *Auditable*
  - Records audit





## Assure regulated entities have proactive maintenance programs that are adequate, verifiable, and auditable

### 2018 Gas, Electric, and Communications Facilities:

- Audits / Inspections – **61**
- Incident Investigations and Customer Complaints – **667**
- Monitoring Electric Generating Facilities (Natural Gas and Renewable)
  - Forced Outages – **95+**
  - Planned Outages – **75+**
- Enforcement Actions – **\$13.35 million** (including one citation appeal pending in K.18-03-008)
- Enforcement Activity – Investigation into PG&E's Failure to Comply with Locate-and-Mark Program (I.18-12-007)

Specific questions should be directed to Safety and Enforcement Division.





## Compliance with Strategic Directive 03

CPUC staff believe the organization is substantially in compliance with SD-03





Questions?

