Electric System Reliability Metrics

System Reliability Metrics in the Electric Industry

- SAIDI: System Average Interruption Duration Index
- SAIFI: System Average Interruption Frequency Index
- CAIDI: Customer Average Interruption Duration Index

https://youtu.be/oVH9L0fCMTU

System Reliability Metrics (cont.)

- What is SAIDI?
  - SAIDI refers to “System Average Interruption Duration Index.” It is calculated by multiplying the average duration of customer interruptions by their total number and then dividing by the total number of customers in the system.
  - SAIDI describes the total duration of the average customer interruption. Logically, improved response to outages is the most direct way to improve SAIDI. Strategies to reduce the frequency of interruptions (see the next acronym below) will also help improve SAIDI: if an outage is prevented, its duration isn’t added to the index.
- What is SAIFI?
  - SAIFI refers to “System Average Interruption Frequency Index.” It is calculated by dividing the total number of customers interrupted by an outage by the total number of customers in the system.
  - In short, SAIFI describes how often the average customer experiences an interruption.
  - SAIFI can be improved by reducing the frequency of outages through better preventative maintenance. Improved equipment maintenance and tree-trimming, for example, can limit the number of service interruptions.

System Reliability Metrics (cont.)

- What is CAIDI?
  - CAIDI refers to “Customer Average Interruption Duration Index.” It is calculated as total minutes of customer interruption divided by the total number of customers interrupted.
  - CAIDI describes the average time required to restore service. Unlike SAIDI/SAIFI, CAIDI includes only customers who actually experienced an interruption. This fact makes it useful for measuring response to interruptions, but not the prevention of interruptions.
  - CAIDI improvement strategies include automated call-out of troubleshooters and crews for faster outage resolution and increased troubleshooter staffing.

Other System Reliability Metrics

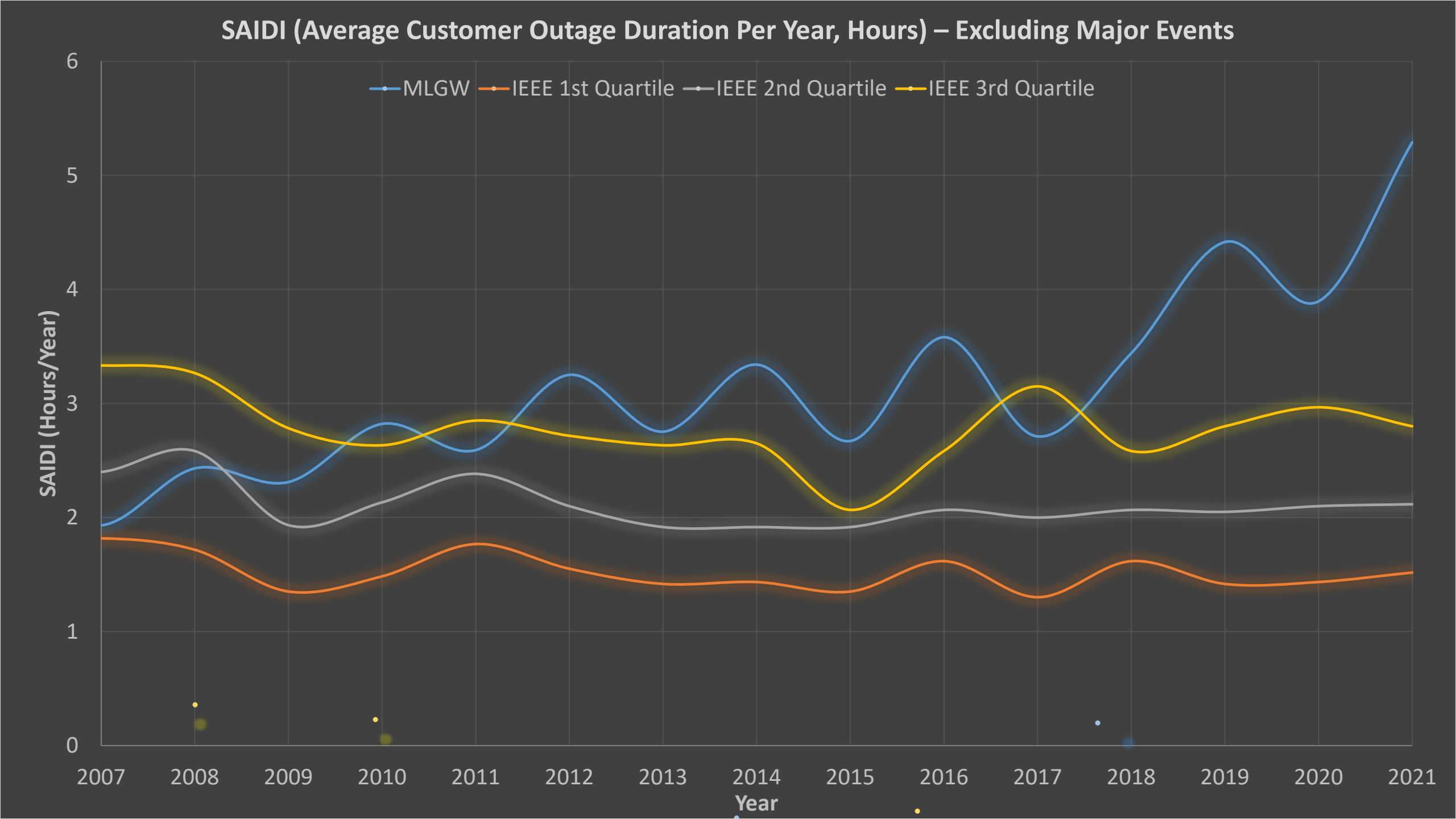
- Customer-Oriented Reliability Goals Target Customers with Worst Performance
  - CEMIx Index Measures How Often Individual Customers Experience Outages
  - CEEDIy Index Measures How Long Individual Customers Are Without Power

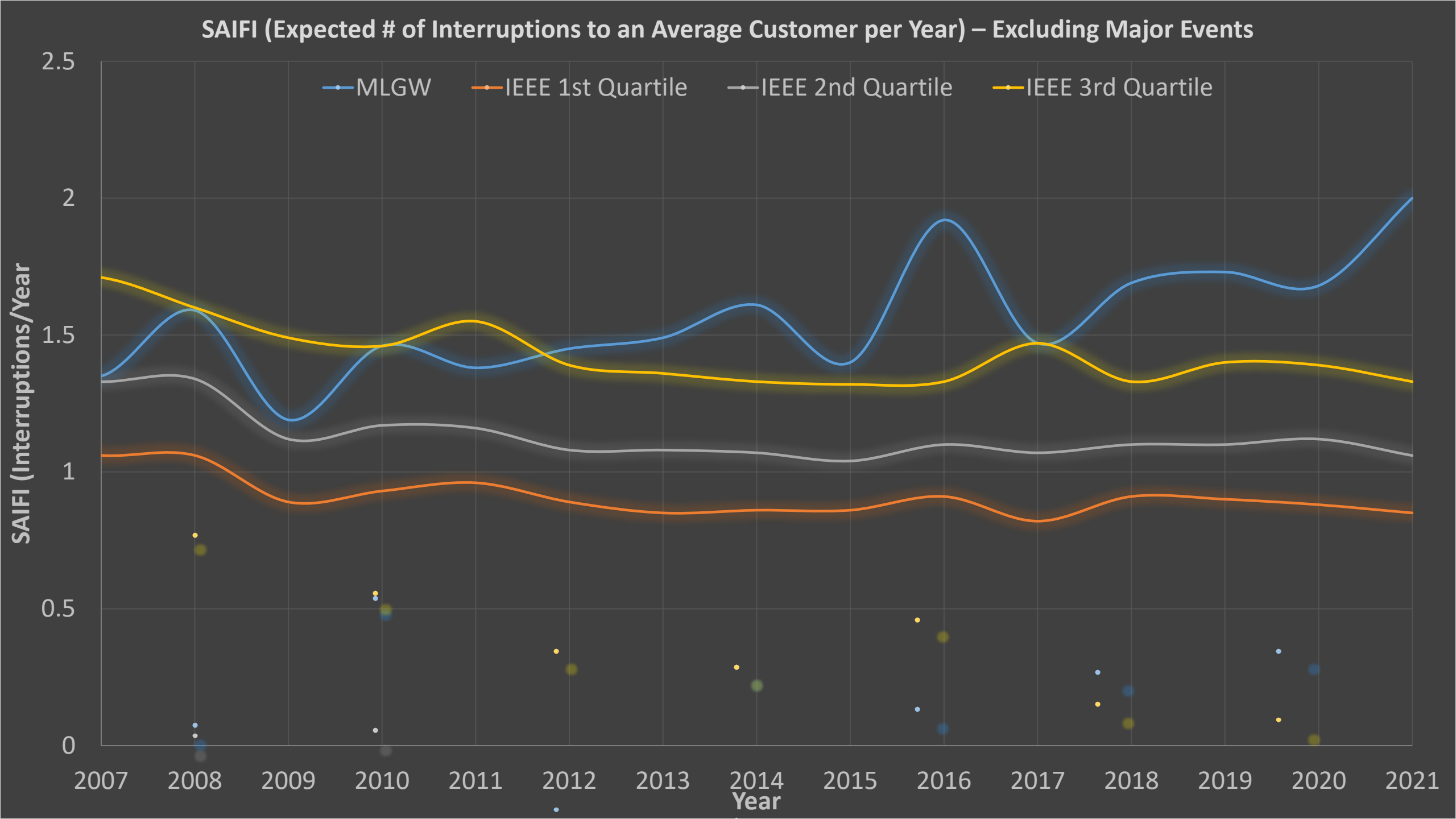
- MLGW's Goal is to Minimize Customers Experiencing:

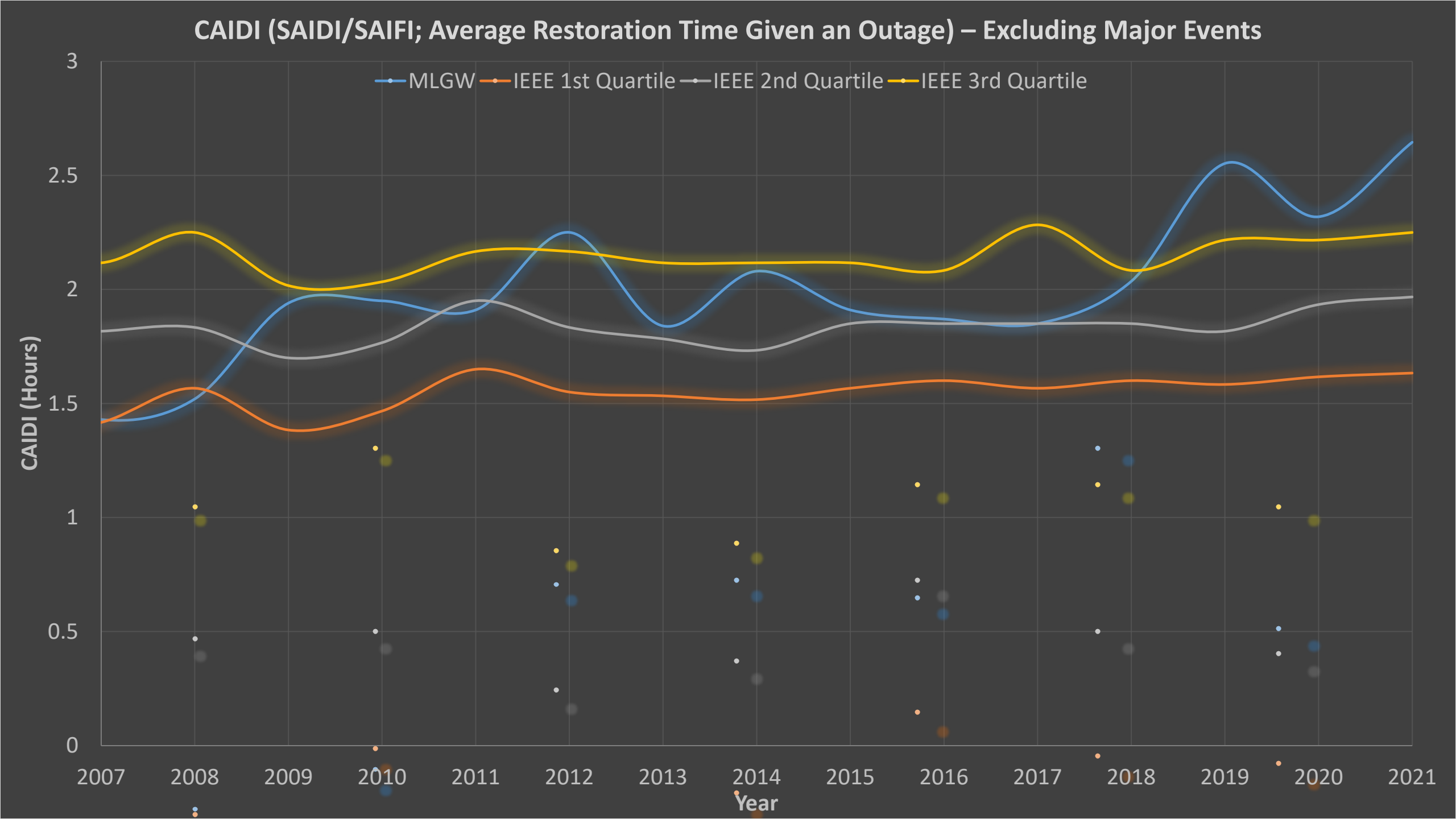
  Customers Experiencing More than 3 Interruptions (CEMI3) or

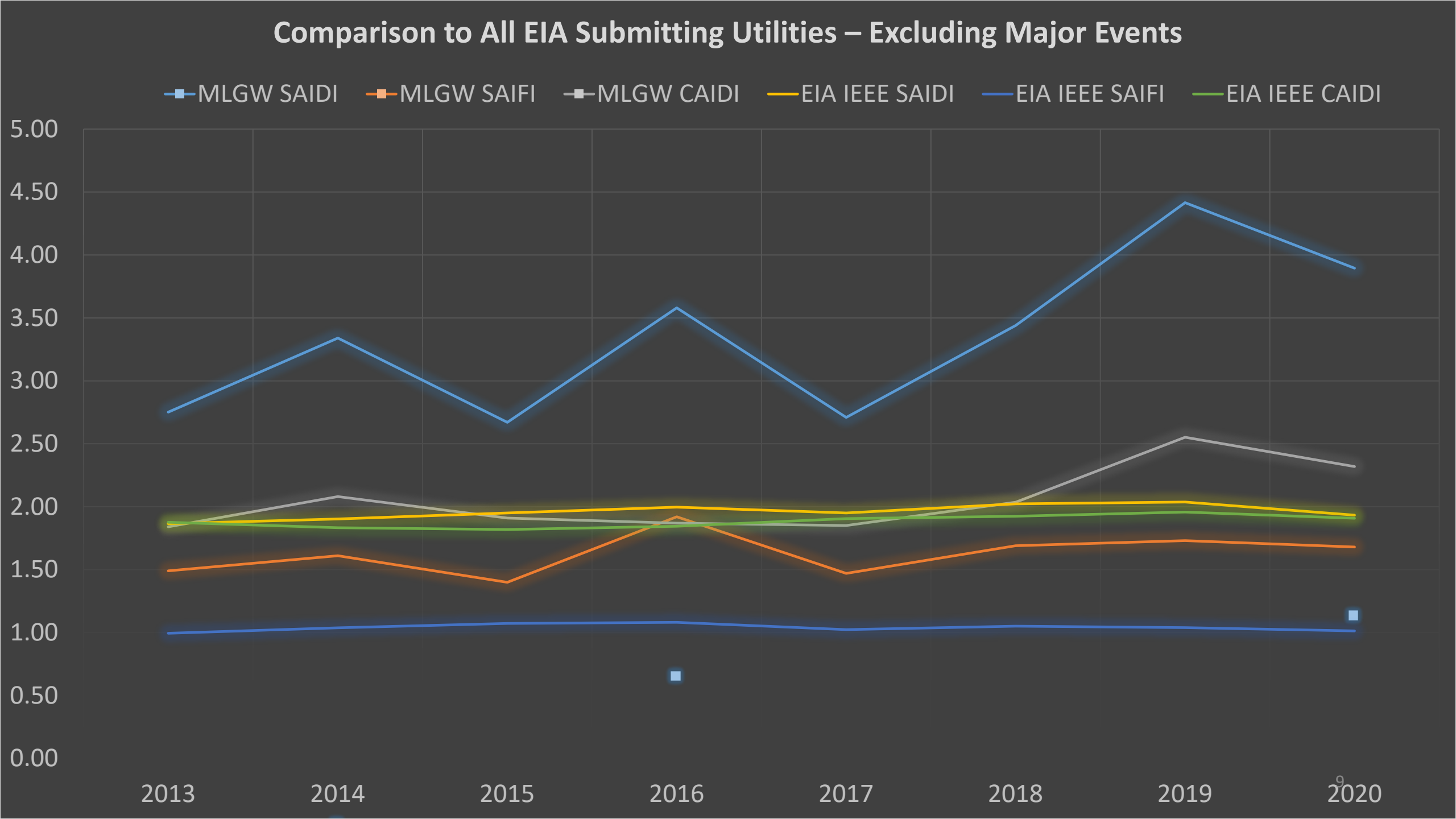
  Customers Experiencing More Than 10 Hour Events (CEEDI10)

- MLGW's Five-Year System Improvement goal is to reduce Customer Minutes of Interruption by 50%.


SAIDI (Average Customer Outage Duration Per Year, Hours) – Excluding Major Events
MLGW
IEEE 1st Quartile
IEEE 2nd Quartile
IEEE 3rd Quartile
SAIDI (Hours/Year)
0
1
2
3
4
5
6
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
Year


SAIFI (Expected # of Interruptions to an Average Customer per Year) – Excluding Major Events
MLGW
IEEE 1st Quartile
IEEE 2nd Quartile
IEEE 3rd Quartile
SAIFI (Interruptions/Year
2.5
2
1.5
1
0.5
0
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
Year

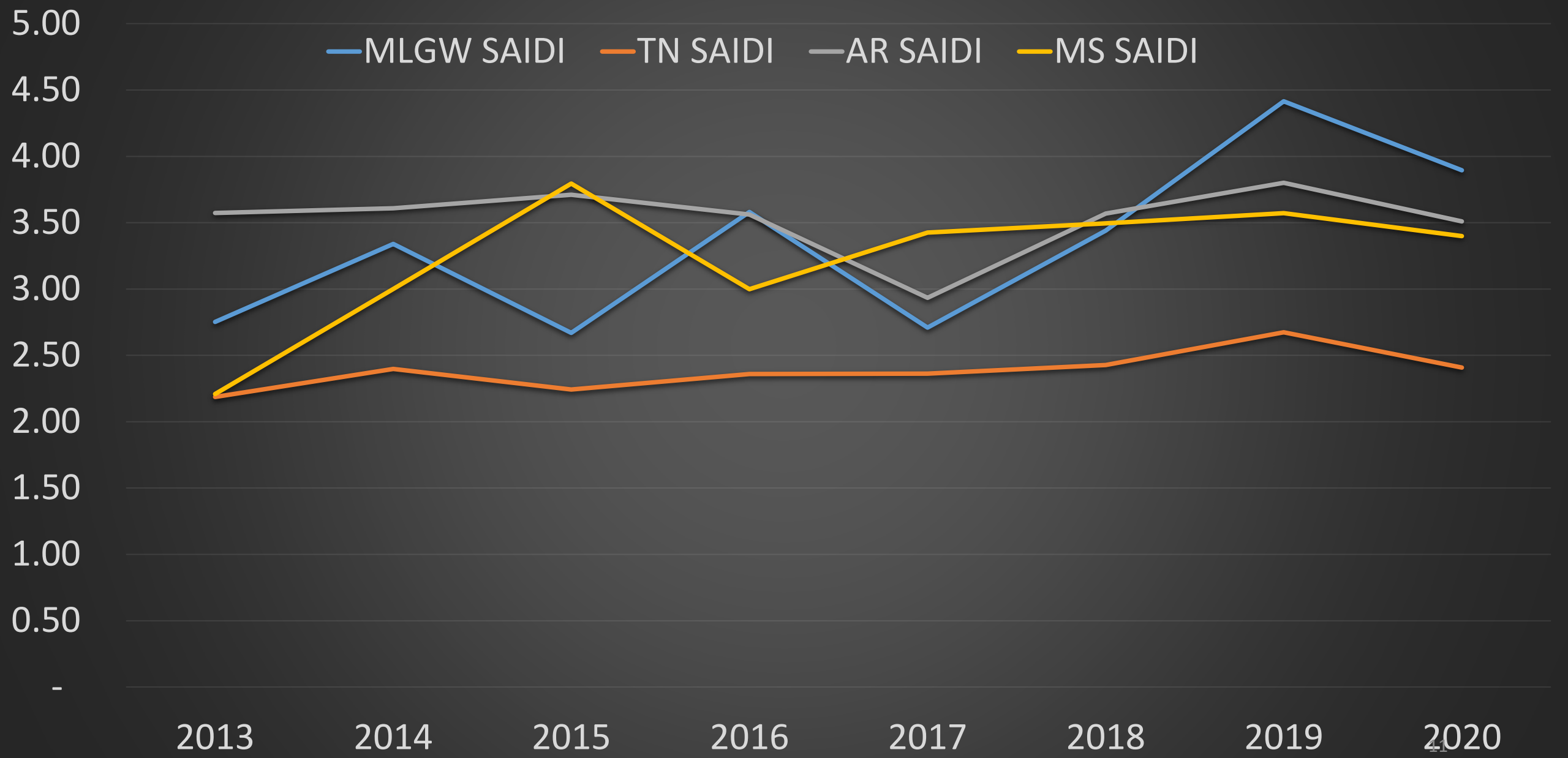

CAIDI (SAIDI/SAIFI; Average Restoration Time Given an Outage) – Excluding Major Events
MLGW
IEEE 1st Quartile
IEEE 2nd Quartile
IEEE 3rd Quartile
CAIDI (Hours)
3
2.5
2
1.5
1
0.5
0
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
Year


Comparison to All EIA Submitting Utilities – Excluding Major Events
MLGW SAIDI
MLGW SAIFI
MLGW CAIDI
EIA IEEE SAIDI
EIA IEEE SAIFI
EIA IEEE CAIDI
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
2013
2014
2015
2016
2017
2018
2019
2020

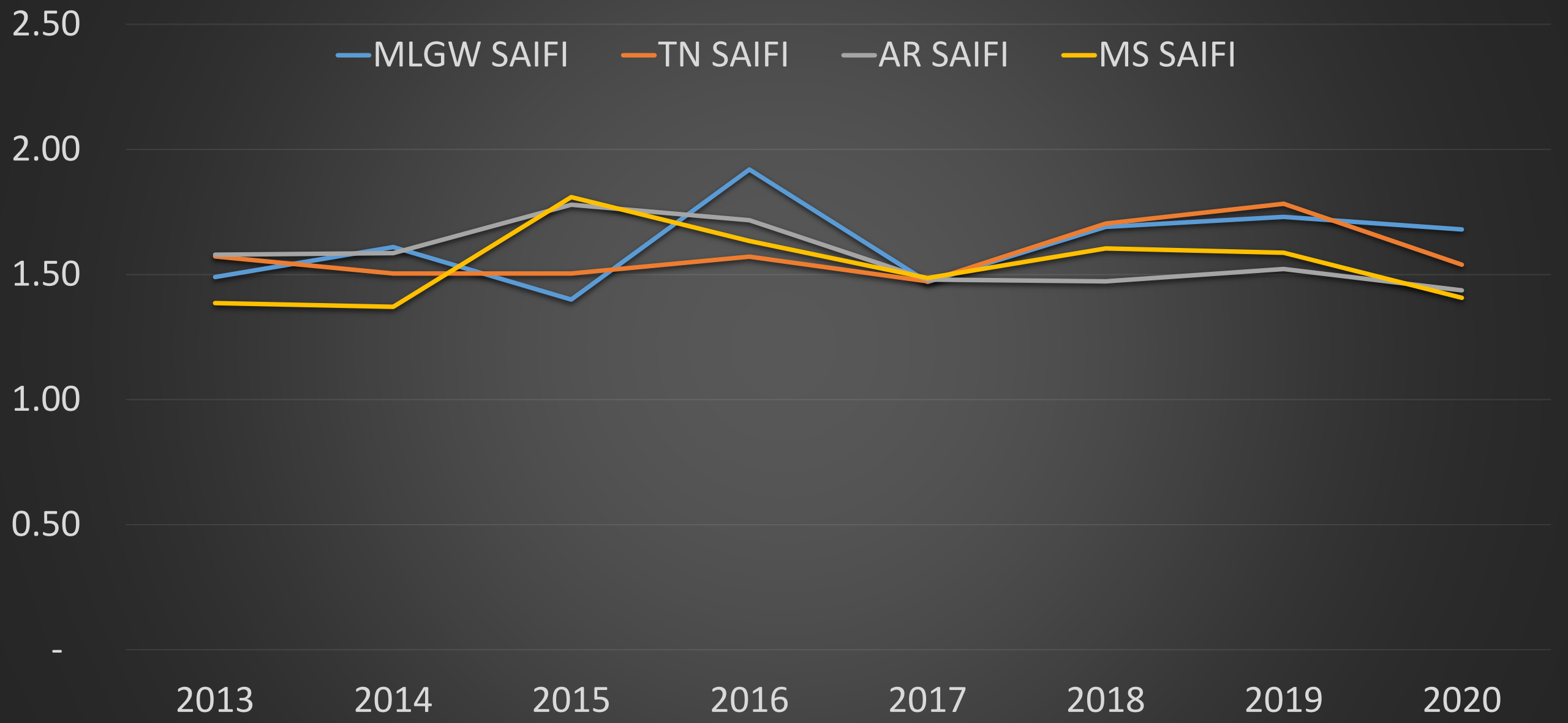
10 Largest Public Power Utilities Served sorted by SAIDI

		REPORTING YEAR	SAIDI Minutes	SAIFI	
1	Salt River Project	2016	46.4	0.66	Phoenix, AZ
2	SMUD	2020	47.6	0.9	Sacramento, CA
3	Austin Energy	2020	55.9	0.68	Austin, TX
4	CPS Energy	2020	56.8	0.93	San Antonio, TX
5	JEA	2018	58.0	1.25	Jacksonville, FL
6	Seattle City Light	2020	67.0	0.49	Seattle, WA
7	LIPA	2014-2018 avg	67.5	0.9	Long Island, NY
8	LA Dept of Water & Power	2020 -2021 Fiscal	160.5	0.79	Los Angeles, CA
9	MLGW	2021	326.4	2.1	Memphis, TN
10	Puerto Rico Electric Power	2019	576.0	3.8	Territory of Puerto Rico

SAIDI Comparison - Excluding Major Events



SAIFI Comparison - Excluding Major Events



CAIDI Comparison - Excluding Major Events