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August 24, 2022

Mr. Will Seuffert
Executive Secretary
Minnesota Public Utilities Commission
121 7th Place East, Suite 350
St. Paul, MN 55101-2147

**RE: In the Matter of Otter Tail Power Company 2021 Annual Safety,
Reliability and Service Quality Report and Proposed SAIFI, SAIDI and
CAIDI Reliability Standards for 2022
Docket No. E017/M-22-159
IEEE Supplemental Filing**

Dear Mr. Seuffert:

Otter Tail Power Company (Otter Tail) submits this IEEE Supplemental filing in the above-referenced matter in compliance with ordering paragraph 6 of the Minnesota Public Utilities Commission's Order dated March 2, 2022, in Docket No. E017/M-21-225 (In the matter of Otter Tail Power Company's 2020 Annual Safety, Reliability and Service Quality Report and Proposed SAIFI, SAIDI and CAIDI Reliability Standards for 2021 and future standards).

6. Otter Tail must file a supplemental filing to its 2021 safety, service quality, and reliability report 30 days after IEEE publishes the 2021 benchmarking results. The supplemental filing must include an explanation for any standards the utility did not meet.

The attached IEEE 2021 Benchmark Reliability Survey results were completed in late July.

Table 1 shows Otter Tail's 2021 normalized SAIFI, CAIDI and SAIDI results based on the IEEE 2.5 Beta Method for the entire Minnesota system, compared with the IEEE benchmarking second quartile for medium sized utilities. Otter Tail's **2021 results were gathered by our Interruption Monitoring System which captures customer minutes and sustained customer interruptions at the feeder level.**

Table 1

	SAIDI IEEE	SAIFI IEEE	CAIDI IEEE
2021 IEEE Benchmark Median for Medium Sized Utility	136	1.08	126
OTP MN System Wide - Actual Results	79.03	1.24	66.89

Otter Tail believes that SAIFI, the measurement of interruption frequency, exceeds the IEEE benchmark median results for medium sized utilities due to the fact we serve several rural communities with low customer densities. This rural demographic requires greater system exposure, i.e. greater transmission distances, when compared to most of the benchmark survey participants.

Otter Tail has electronically filed this document with the Minnesota Public Utilities Commission and on all persons on the official service list for the above-referenced docket. A Certificate of Service is also enclosed.

Please contact me at (218) 739-8699 or wolson@otpc.com, should you have any questions.

Sincerely,

/s/ *WENDI OLSON*
Wendi Olson
Regulatory Compliance Specialist

kaw
Enclosures
By electronic filing
c: Service List



IEEE Benchmark Year 2022 Results for 2021 Data

2022 Distribution Reliability Working Group Meeting

July 20, 2022 Denver, CO



History of the Study

Background

1. *Initiated in 2003, conducted annually*
2. *Participants are anonymous with key identifier to retain anonymity*
3. *Participation list is not revealed to anyone*
4. *Each participant can choose to share their results*
5. *No inference is made about good or bad reliability*
6. *Intended to provide information for users to assess their performance relative to peers*
7. *Called the 2022 Study (for 2021 Results)*



Benchmarking

Using annual key metrics (SAIDI, SAIFI and CAIDI) to assess performance of a system may be useful, however, needs to be tempered with judgment

DRWG Study attempts to identify various aspects that could cause a difference in reported metrics

Data may not be directly comparable, since

- Data collection & system differences exist
- Certain exclusion differences can occur, although we strive to have the differences minimized
- No exclusions for performance beyond catastrophic event day levels which could will tmed in subsequent years and then roll off

IEEE 1366-2003/2012

- addresses data issues by clearly defining the rules (i.e. what data should be excluded)
- It **DOES NOT** address the data collection issues
- Companies may not report all forms of outages, due to data collection issues or other reasons



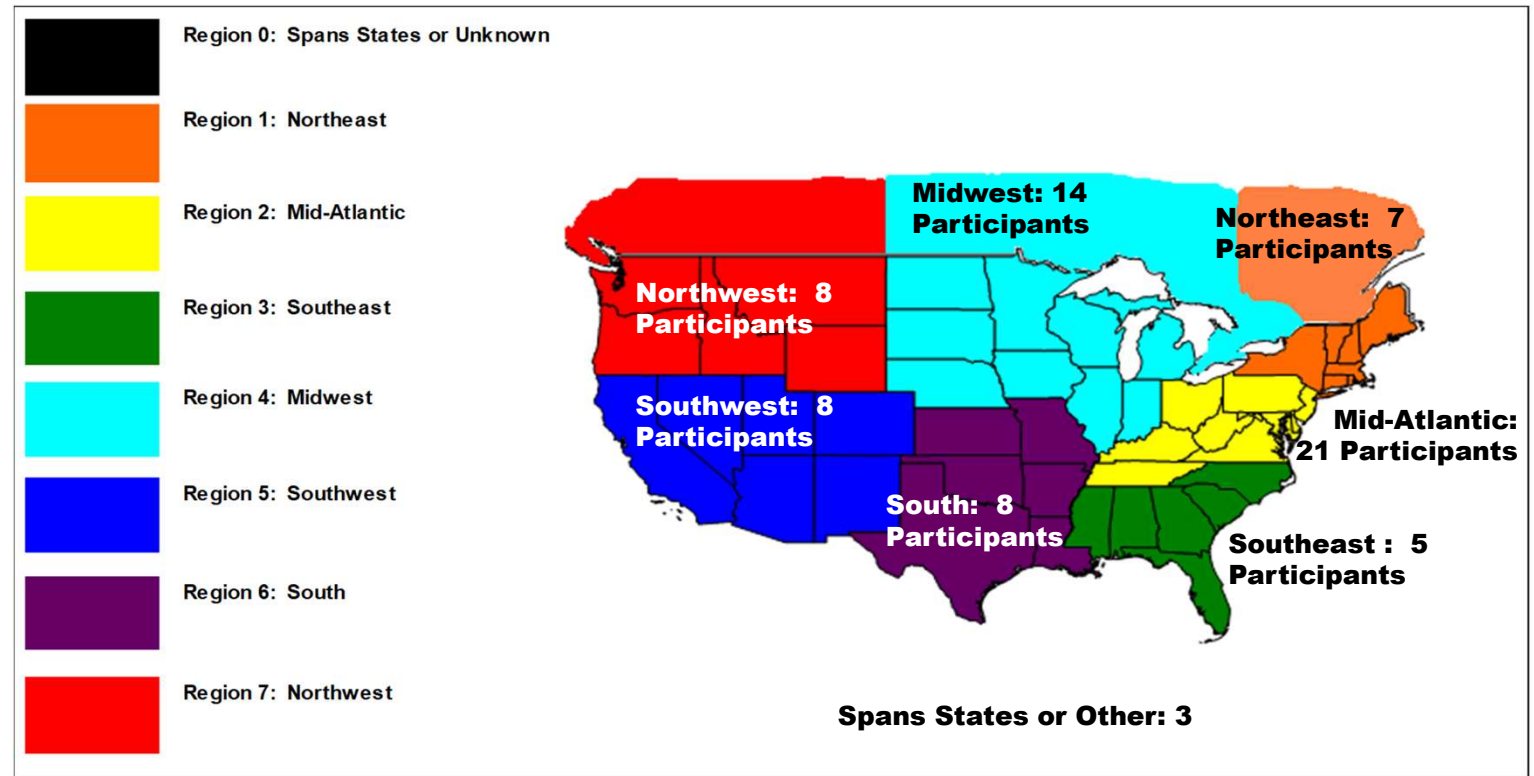
2022 Benchmark Results

For calendar data 2021



Regions represented by the participants 2022 Benchmark Study

Reports on
reliability for
about 70 million
customers





Respondents in 2022: 74

About 260 companies have responded during 20-year history

Weighted North American Performance	SAIDI (minutes)	SAIFI (interruptions)	CAIDI (minutes)
Total	543	1.62	335
Underlying	165	1.265	130
Underlying Distribution	153	1.113	137
Underlying Feed	12	0.153	77
Underlying Planned	17	0.10	164
Major Events	378	0.355	1,064
Major Event Distribution	342	0.297	1,151
Major Event Feed	37	0.059	623

74	SAIDI ALL	SAIDI IEEE	SAIDI WOF	SAIDI WOP	SAIFI ALL	SAIFI IEEE	SAIFI WOF	SAIFI WOP	CAIDI ALL	CAIDI IEEE	CAIDI WOF	CAIDI WOP
MIN	28	28	27	27	0.28	0.25	0.24	0.24	48	48	55	55
Q1	161	97	93	86	1.10	0.87	0.77	0.69	130	103	105	102
MEDIAN	236	136	124	118	1.37	1.10	0.96	0.90	172	121	134	130
Q3	443	190	174	161	1.86	1.48	1.26	1.14	255	141	152	152
MAX	7454	456	431	400	4.78	3.73	2.34	2.01	2414	256	256	270



Respondents by Utility Size

Quartiles

SMALL	5	SAIDI ALL	SAIDI IEEE	SAIDI WOF	SAIDI WOP	SAIFI ALL	SAIFI IEEE	SAIFI WOF	SAIFI WOP	CAIDI ALL	CAIDI IEEE	CAIDI WOF	CAIDI WOP
	MIN	28	28	27	27	0.58	0.58	0.48	0.47	48	48	55	55
	Q1	92	82	56	40	1.05	0.93	0.61	0.48	87	86	92	86
	MEDIAN	212	201	144	119	1.46	1.46	1.39	1.18	106	89	104	95
	Q3	302	212	205	150	2.84	2.34	1.39	1.23	130	108	123	101
	MAX	621	402	289	185	4.78	3.73	2.34	1.58	146	146	147	151
MEDIUM	45	SAIDI ALL	SAIDI IEEE	SAIDI WOF	SAIDI WOP	SAIFI ALL	SAIFI IEEE	SAIFI WOF	SAIFI WOP	CAIDI ALL	CAIDI IEEE	CAIDI WOF	CAIDI WOP
	MIN	39	28	28	27	0.28	0.25	0.24	0.24	77	62	63	62
	Q1	154	97	94	86	1.11	0.83	0.74	0.68	133	108	113	114
	MEDIAN	219	136	120	115	1.35	1.08	0.95	0.88	182	126	135	134
	Q3	448	184	165	152	1.76	1.48	1.24	1.14	254	142	153	152
	MAX	7454	405	391	347	3.31	2.16	1.97	1.66	2414	218	222	251
LARGE	24	SAIDI ALL	SAIDI IEEE	SAIDI WOF	SAIDI WOP	SAIFI ALL	SAIFI IEEE	SAIFI WOF	SAIFI WOP	CAIDI ALL	CAIDI IEEE	CAIDI WOF	CAIDI WOP
	MIN	98	76	75	60	0.98	0.69	0.67	0.58	94	93	94	88
	Q1	177	100	93	88	1.10	0.88	0.86	0.84	141	103	105	105
	MEDIAN	273	139	149	125	1.37	1.09	0.99	0.94	176	117	134	130
	Q3	462	187	179	166	1.85	1.36	1.22	1.07	356	141	149	150
	MAX	1762	456	431	400	3.25	2.73	2.21	2.01	587	256	256	270



Survey Info Collected

Network Devices	Survey Question	Yes	No
	Record transmission system	70	2
	Infer to substation	72	0
	Infer to breaker	72	0
	Infer to recloser	72	0
	Infer to fuse	71	1
	Infer to transformer	71	1
	Infer to customer	63	9

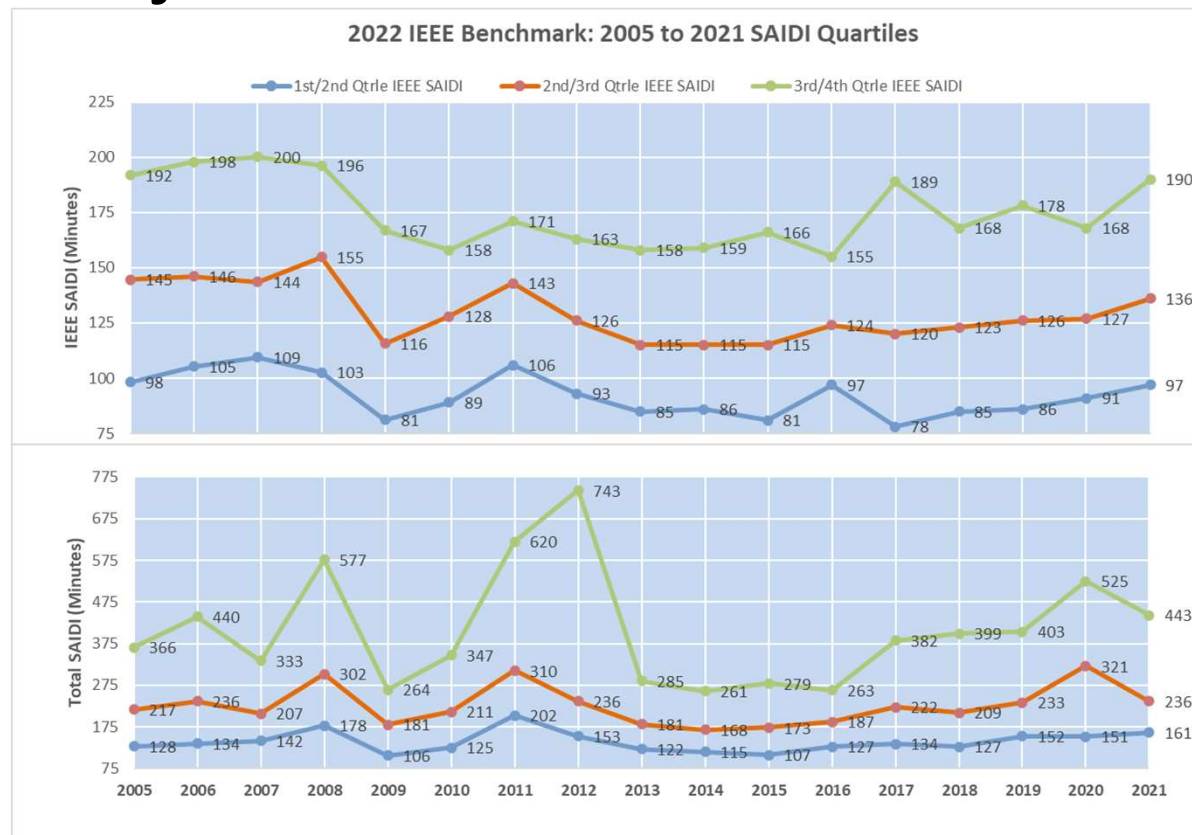
Computational Details	Survey Question	Yes	No
	Perform step restoration	72	1
	Computerized reporting system	69	3
	Use a connected model	64	8
	Model by phase	67	5
	Include inactive accounts	16	56
	Use year's average customer count	37	35

Major Event Days	Survey Question	Yes	No
	Use IEEE1366 to detect major events	68	4
	Calendar Day?	24	48
	Use a rolling 24 hours to discern time	15	57
	Use a custom period	9	63
	Accrue to the beginning of the event	25	47



Historic SAIDI Quartiles

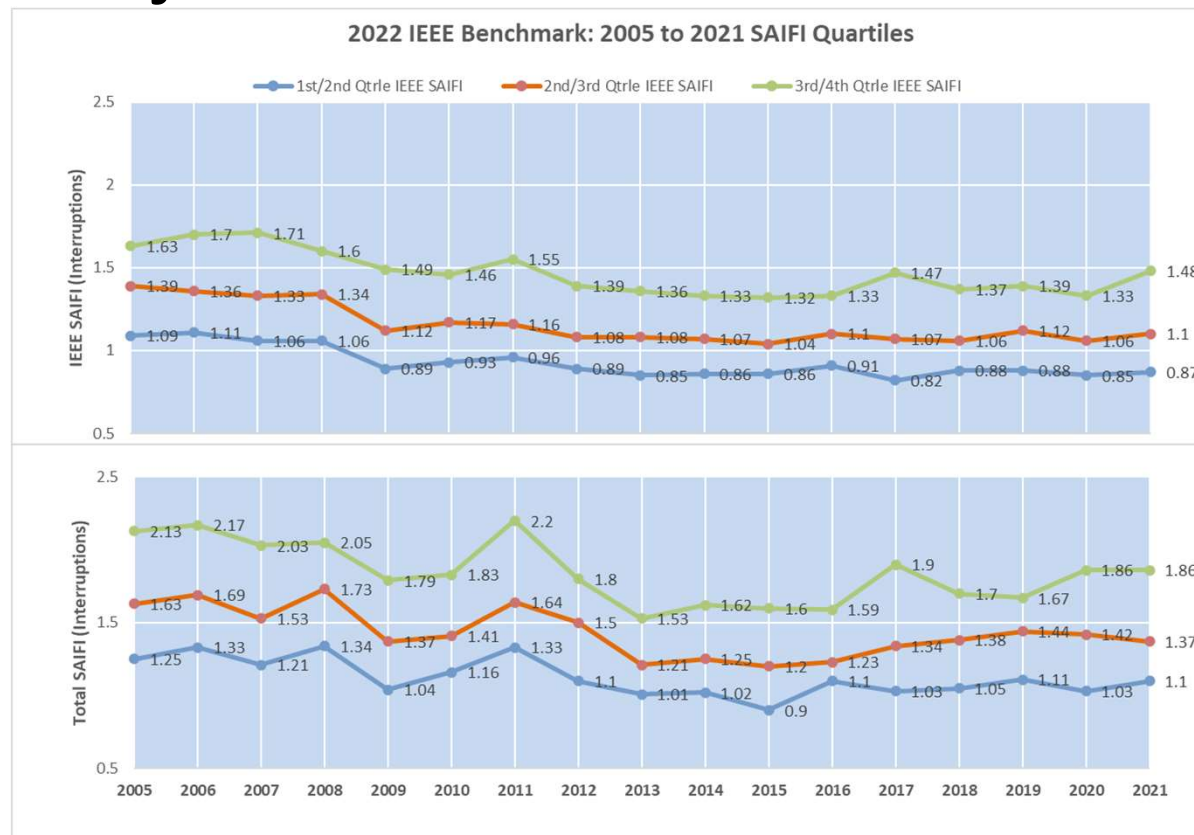
Without Major Events & Total





Historic SAIFI Quartiles

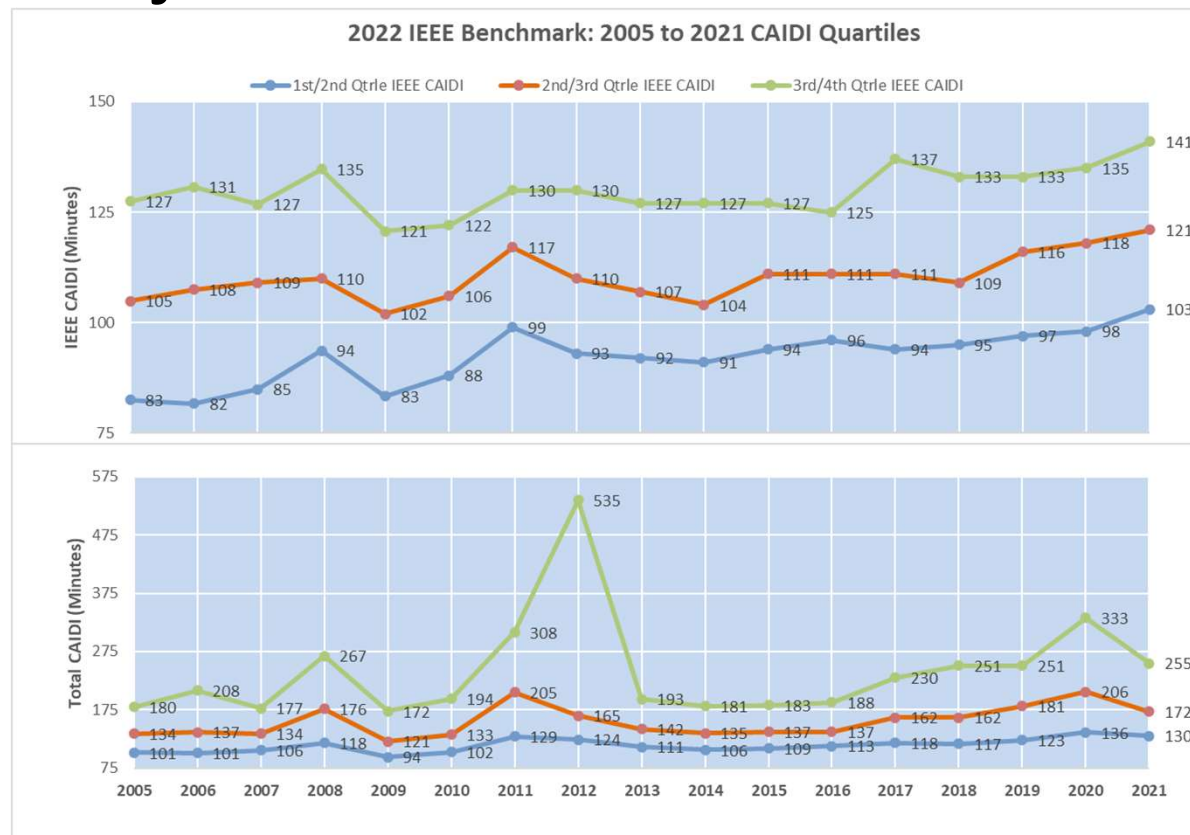
Without Major Events & Total





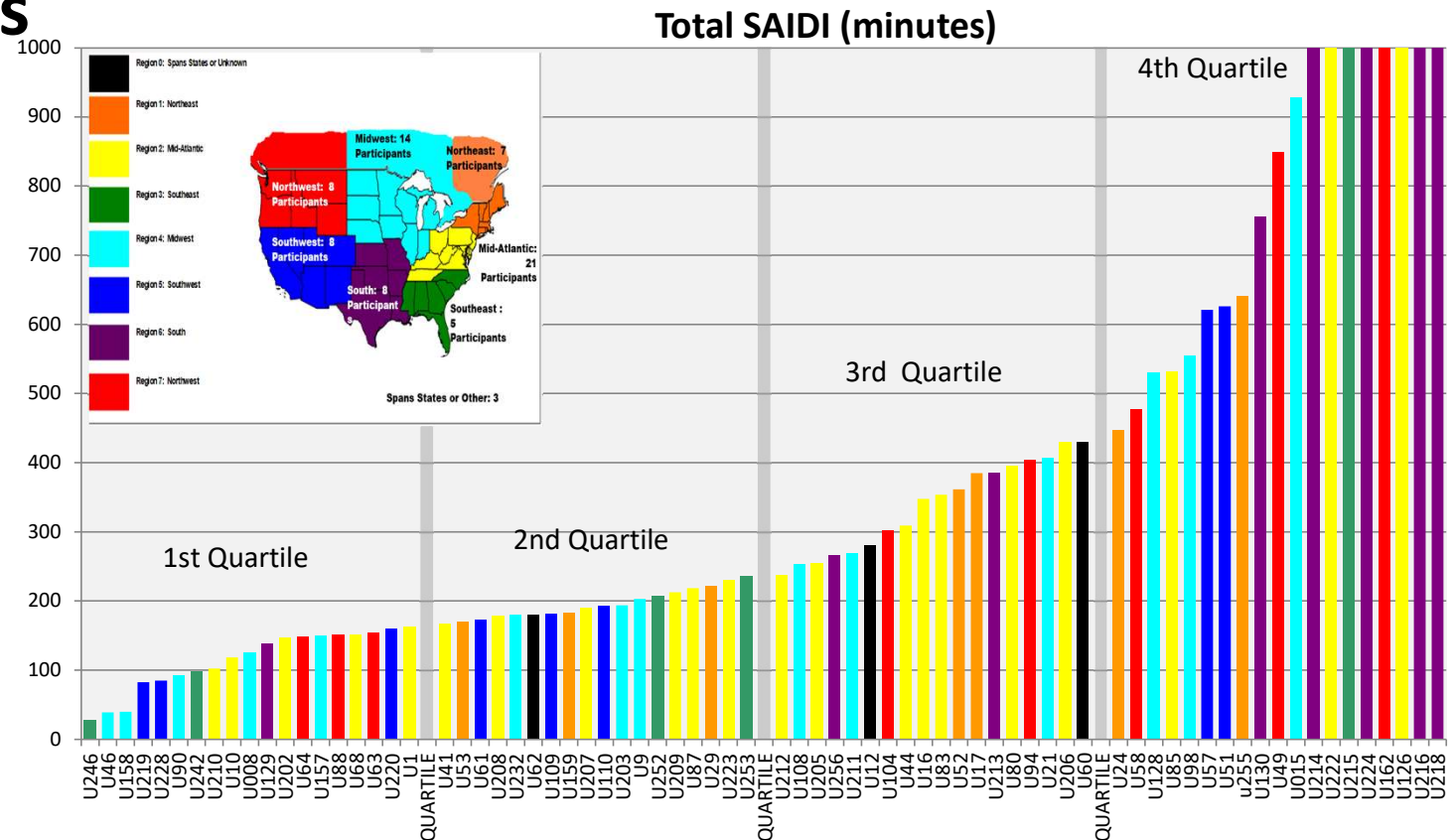
Historic CAIDI Quartiles

Without Major Events & Total



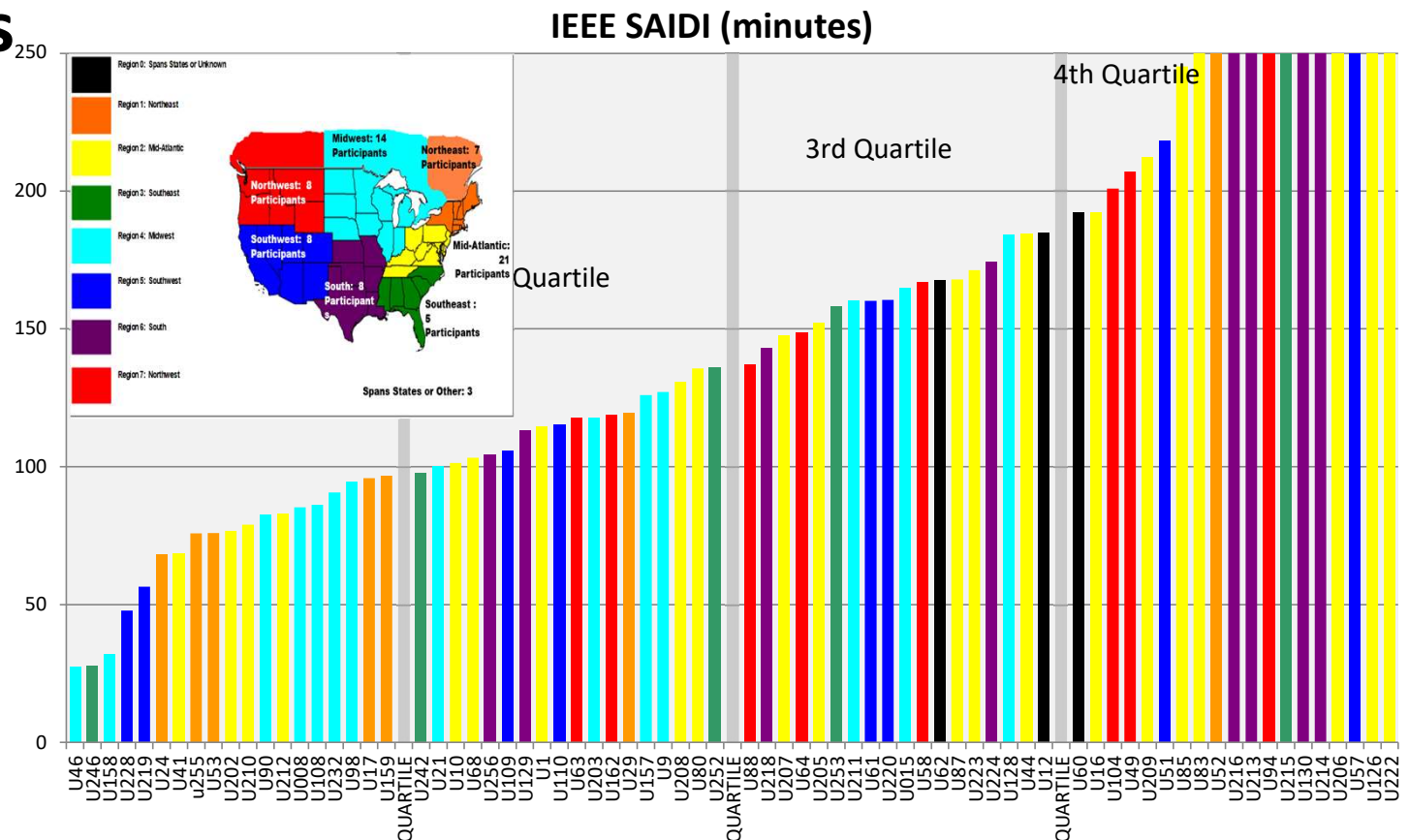
Total SAIDI

2022 Results



IEEE SAIDI

2022 Results

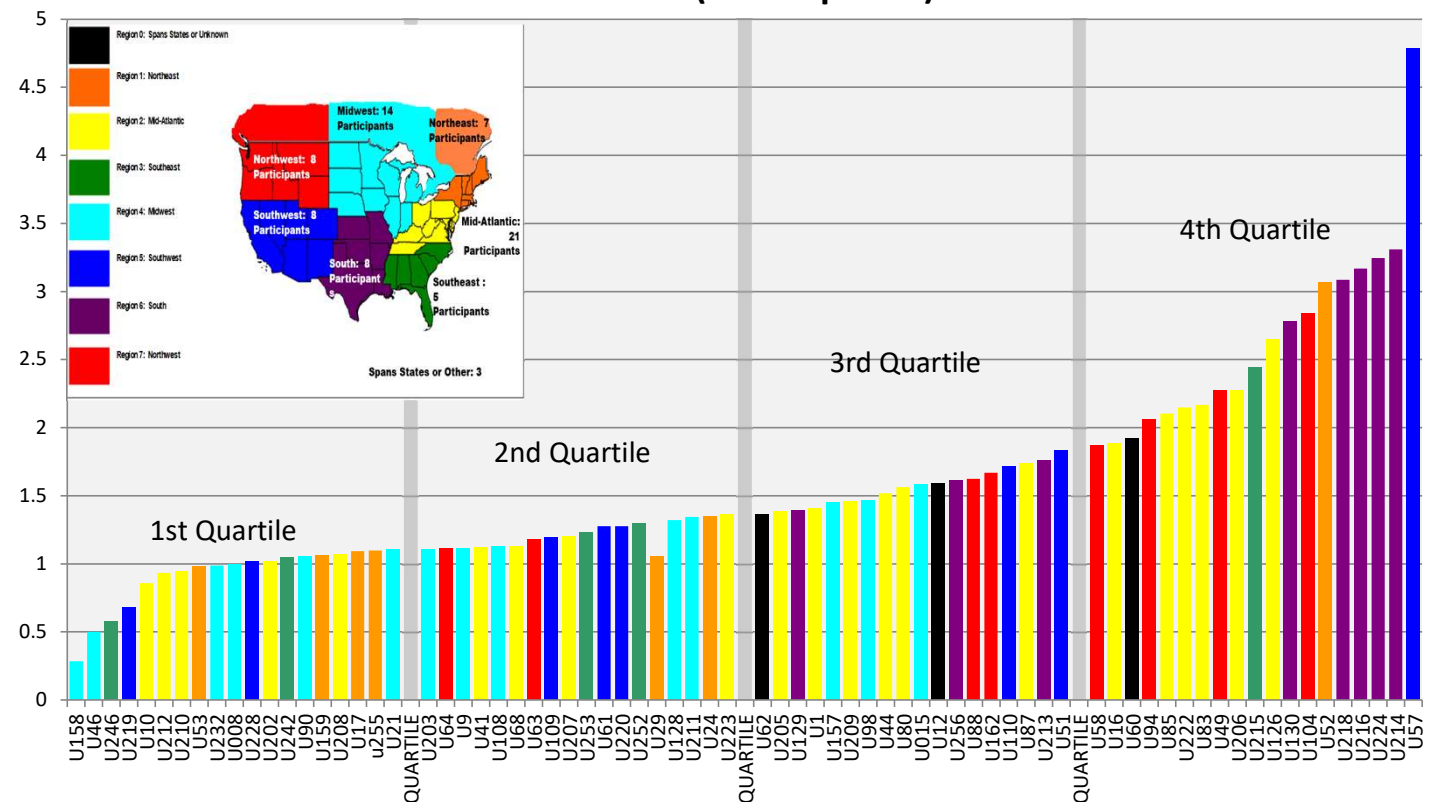


Total SAIFI

2022 Results

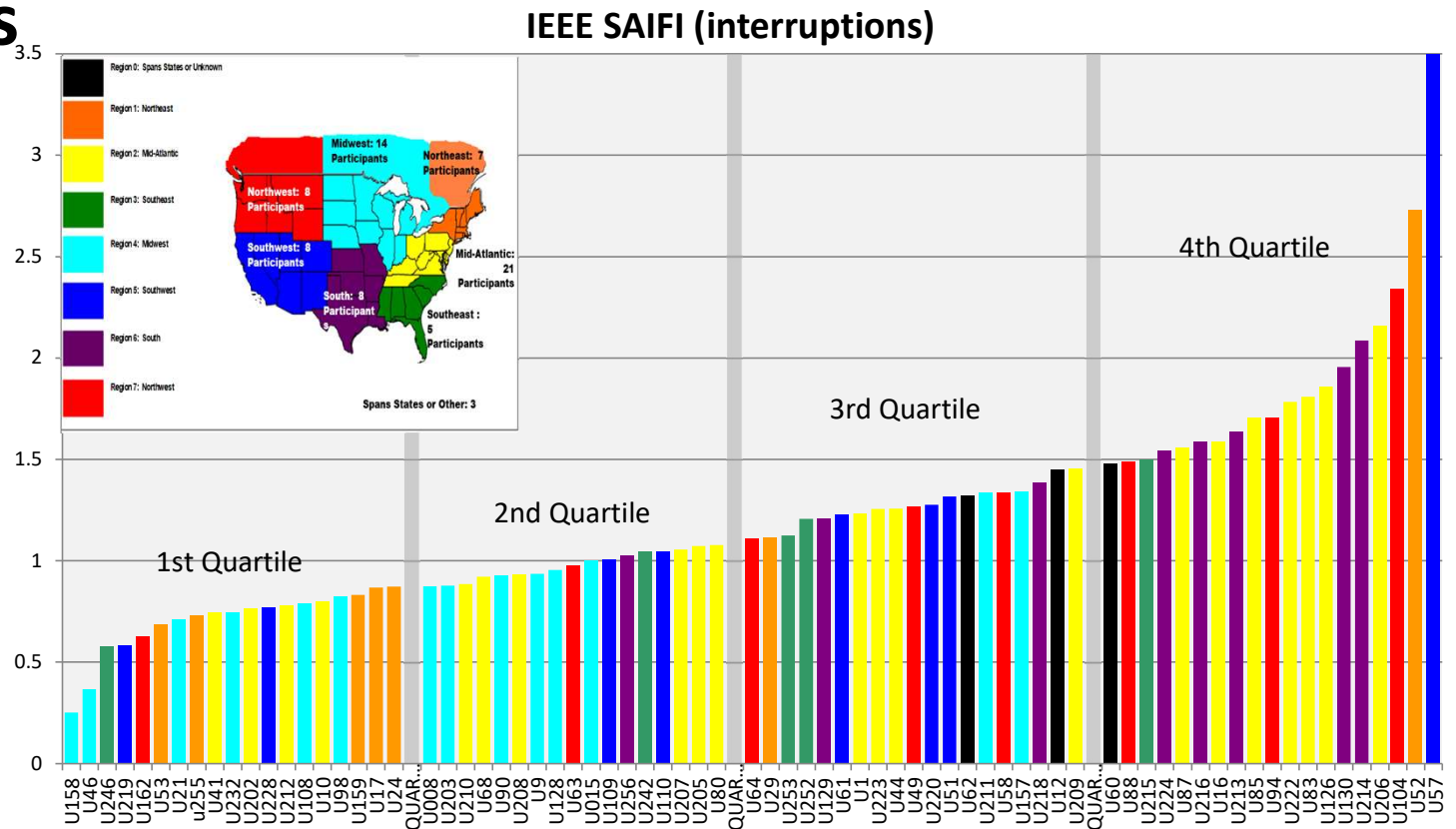


Total SAIFI (interruptions)



IEEE SAIFI

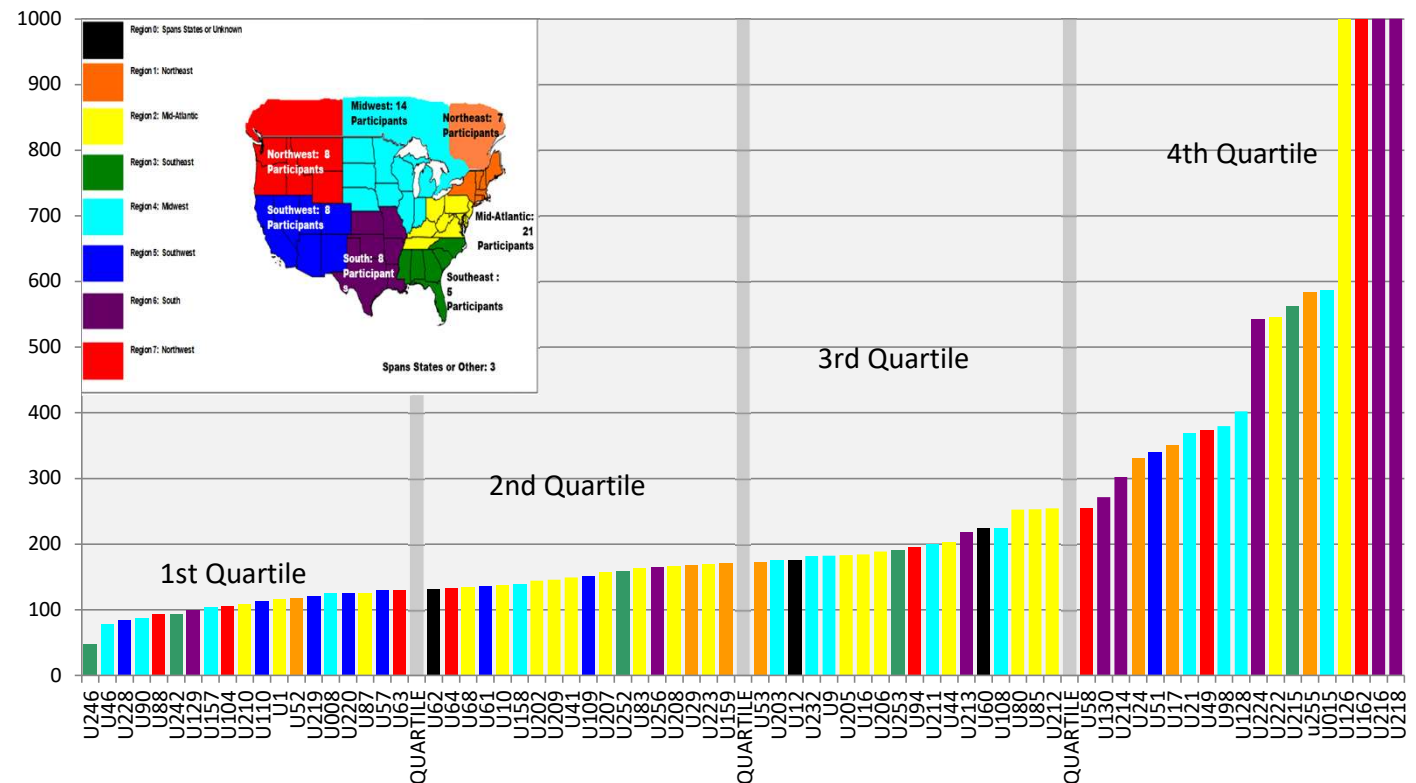
2022 Results





Total CAIDI 2022 Results

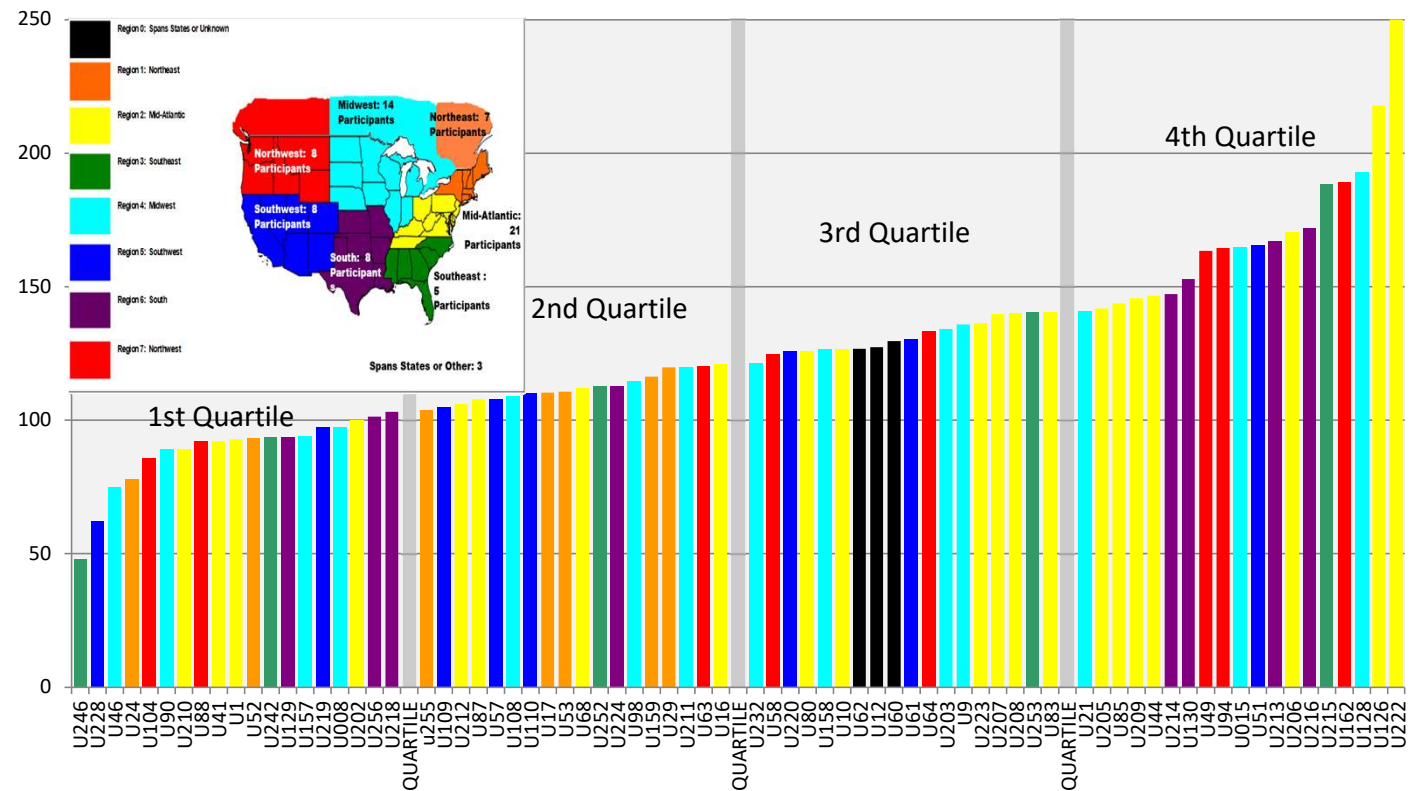
Total CAIDI (minutes)



IEEE CAIDI 2022 Results



IEEE CAIDI (minutes)





Looking at Total Reliability Metrics

By Responsible System/ME &
Underlying

Summary Graphs

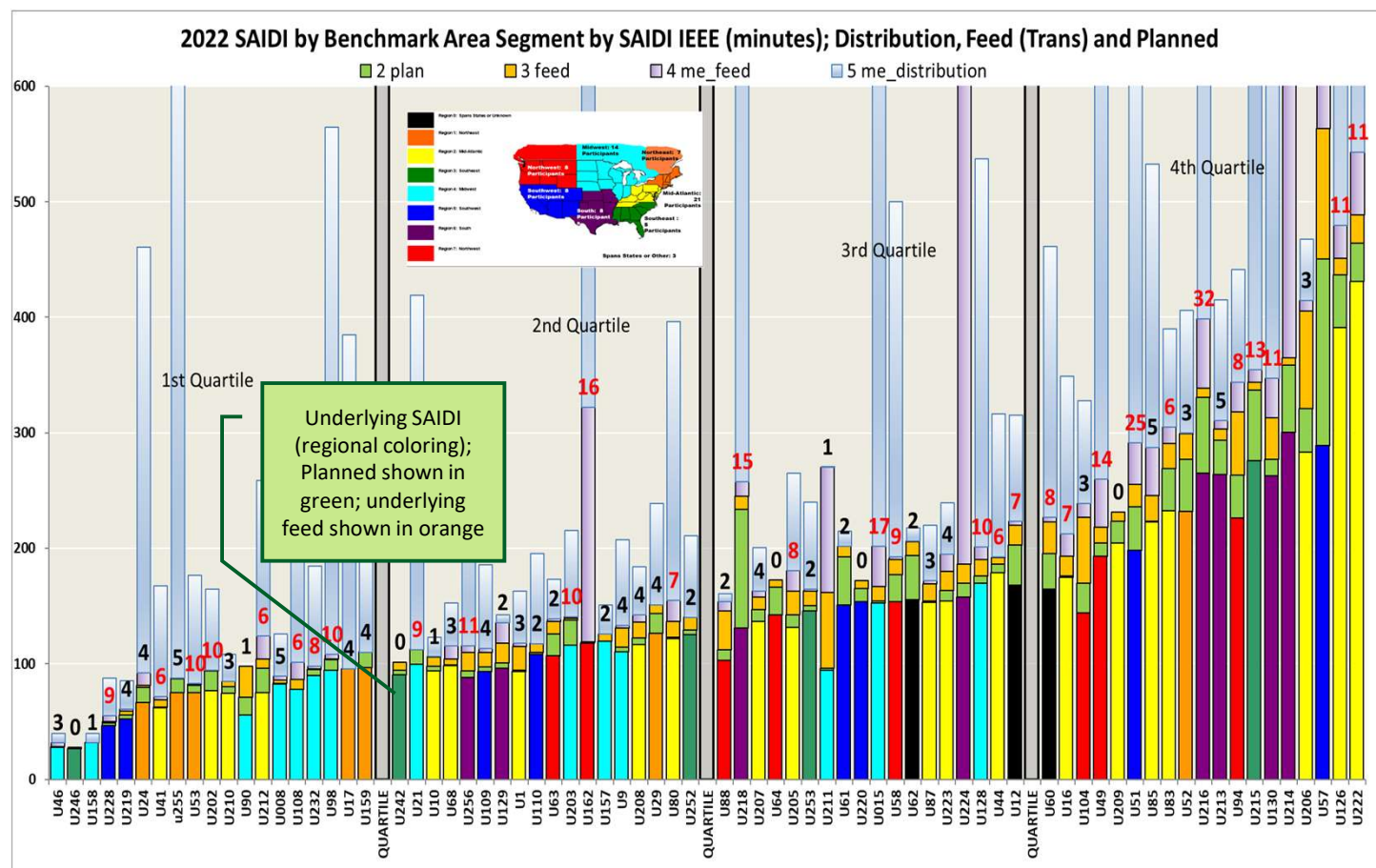
Peer utilities provide

- Total daily data,
- After removing transmission outages and
- After removing transmission and planned outages.

We calculate:

- Major events
- Underlying distribution
- Underlying feed (transmission and loss of generation)
- Planned
- Major event distribution
- Major event feed

The stacked bars show them, sorted in IEEE SAIDI performance.



Summary Graphs

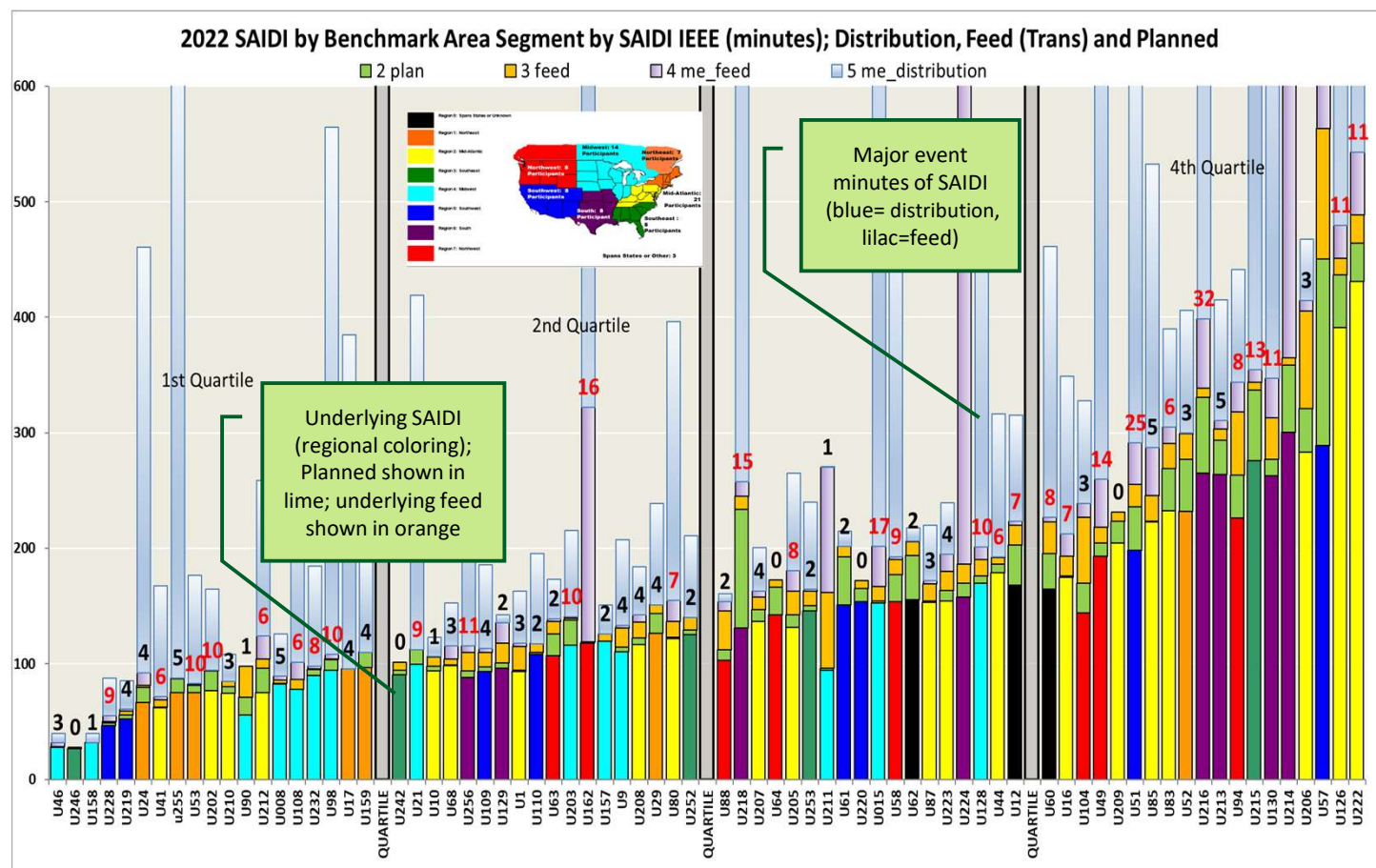
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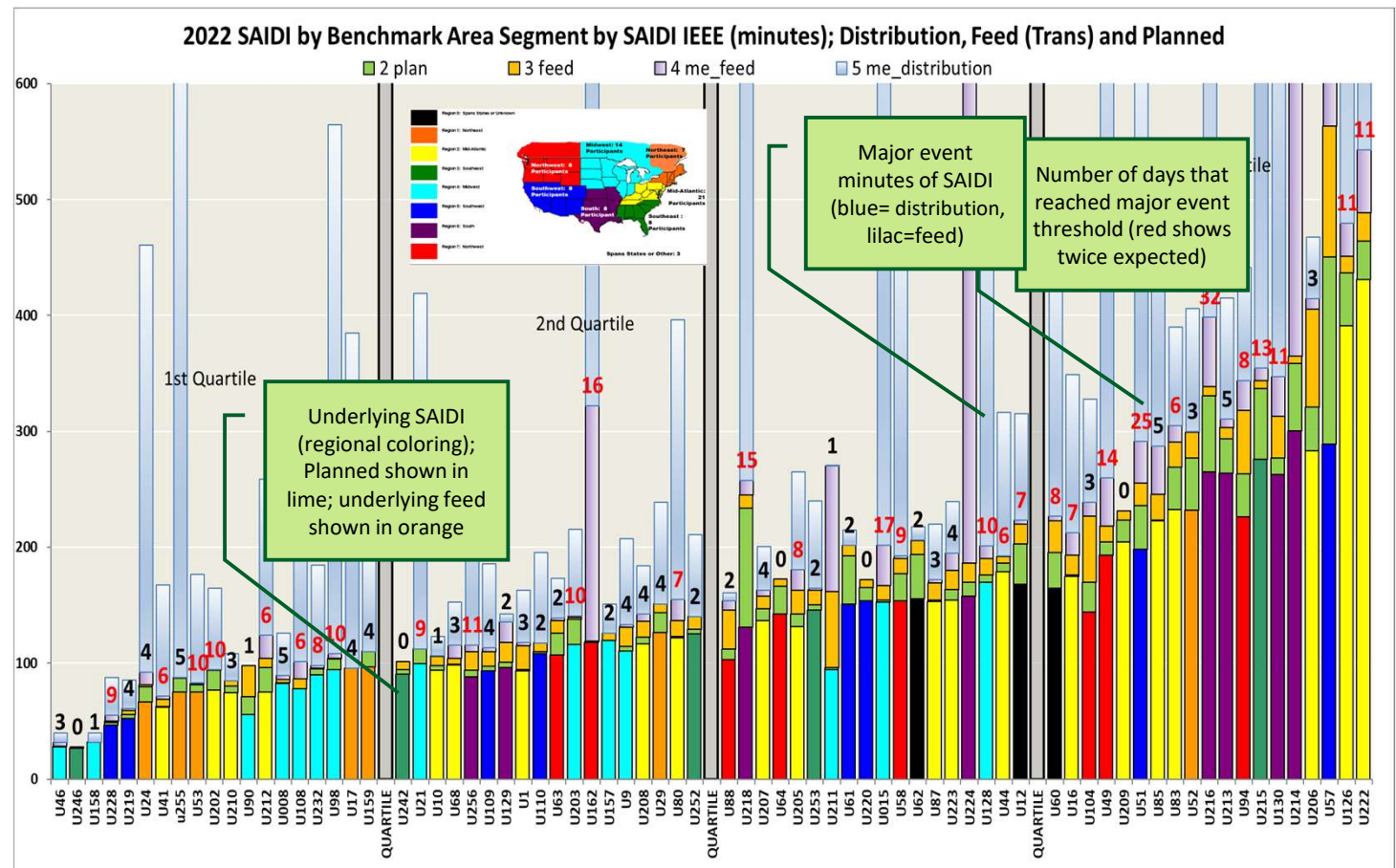
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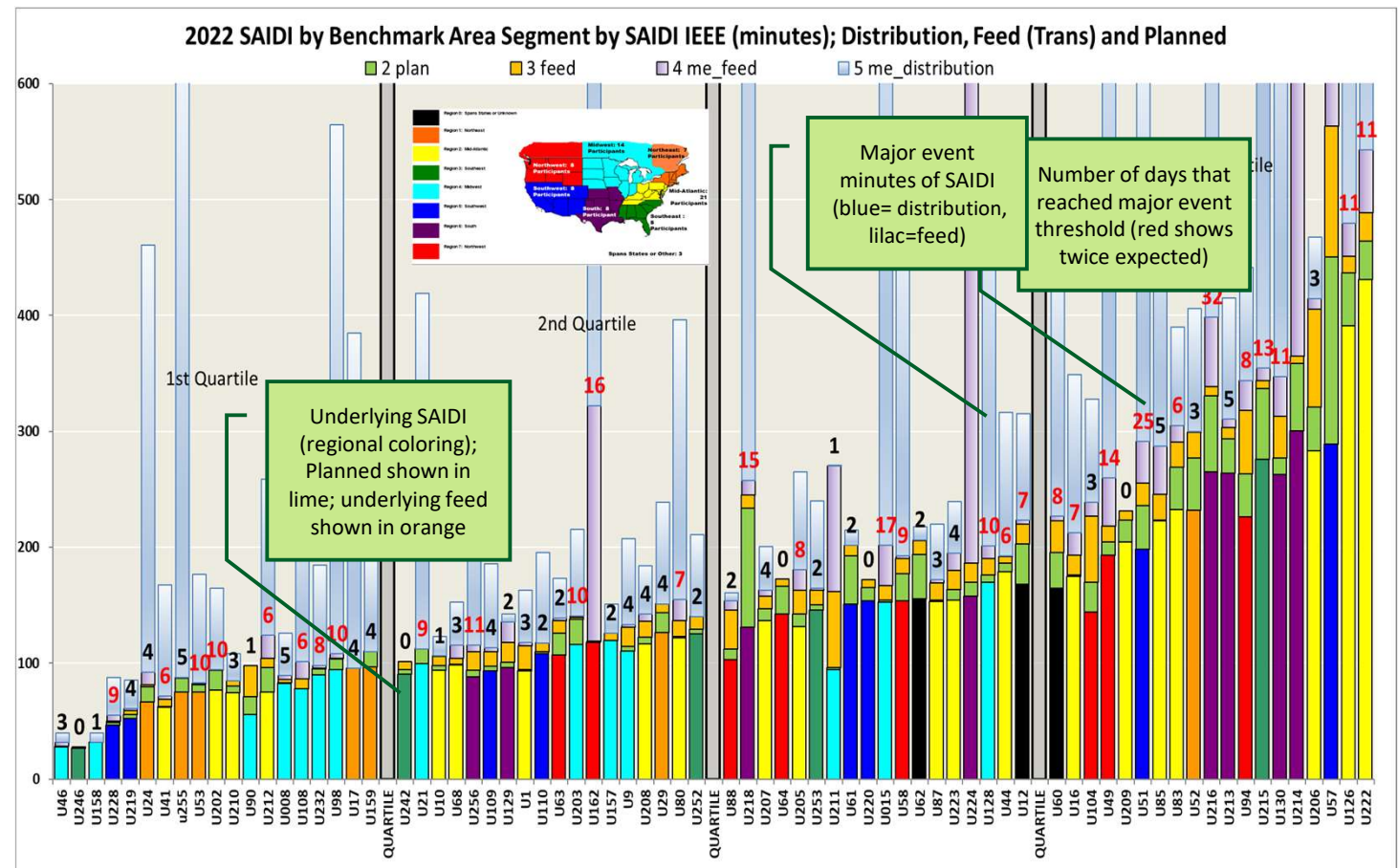
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The Year's Extreme Events

Evaluation of Major Events

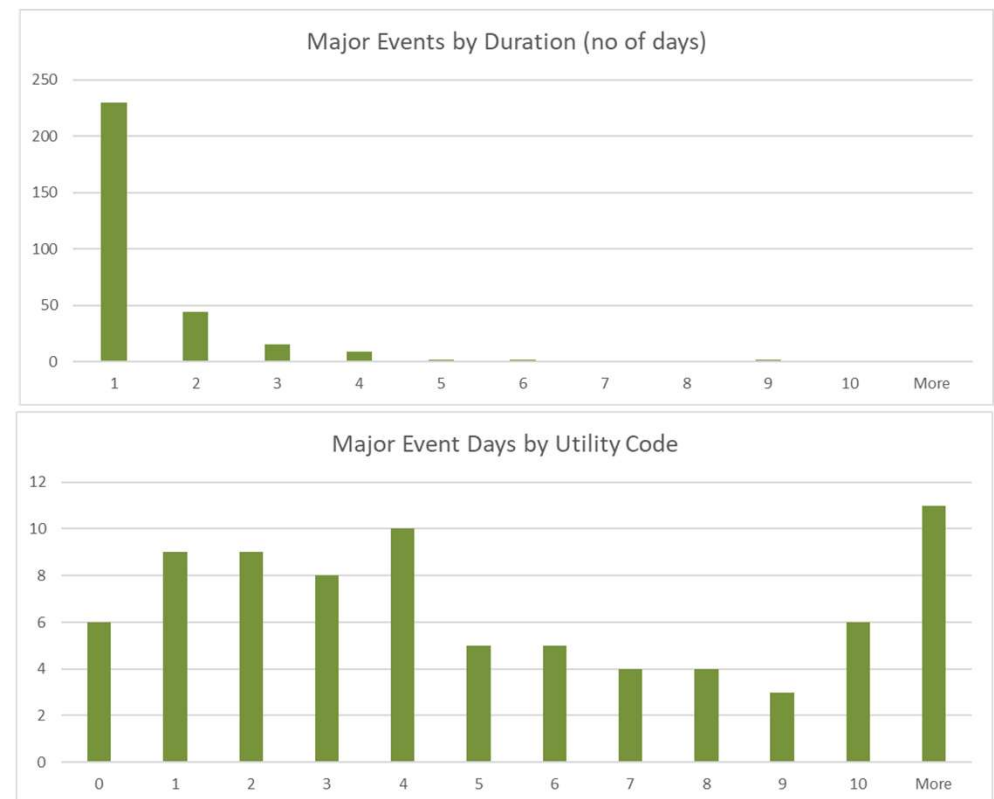


Major Events During 2021

2021 results included a larger than expected number of major event days

Peer utilities' stats

- Average of 6.2297 major event days per utility
- Median of 5 major event days per utility (double the expected 2.3)
- Only 6 companies did not experience any major events
- 230 of the days were single day events, where the next day performance was below t_{med}
- On average 69 million customers experienced 372.38 SAIDI minutes of major events across North America



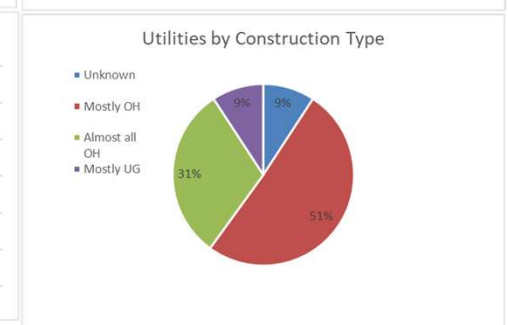
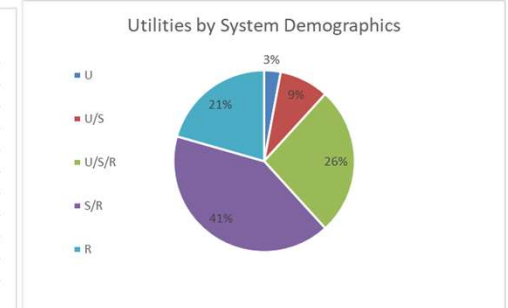
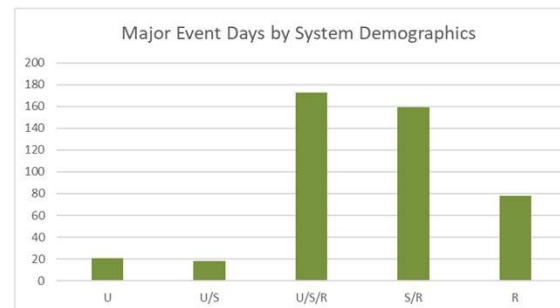


Major Events During 2021

Individuals have asserted that rural utilities have higher experiences of extreme events

Peer utilities' stats

- Use cust/mi and assessment of customers by circuit type to determine groupings.
 - Rural (R) < 24 cust/mi
 - Suburban/Rural (S/R): 24 to < 41
 - Urban/Suburban/Rural (U/S/R): 41 to < 60
 - Urban/Suburban (U/S): 60 to < 81
 - Urban (U): 81 and above
- Percentage of overhead:
 - Mostly UG has 50% or more underground,
 - Mostly OH has overhead percentage from 50-80% and
 - Almost all OH is 80% or more



Major Events Experienced during 2021: Count of Utilities for Initiating Day by Region

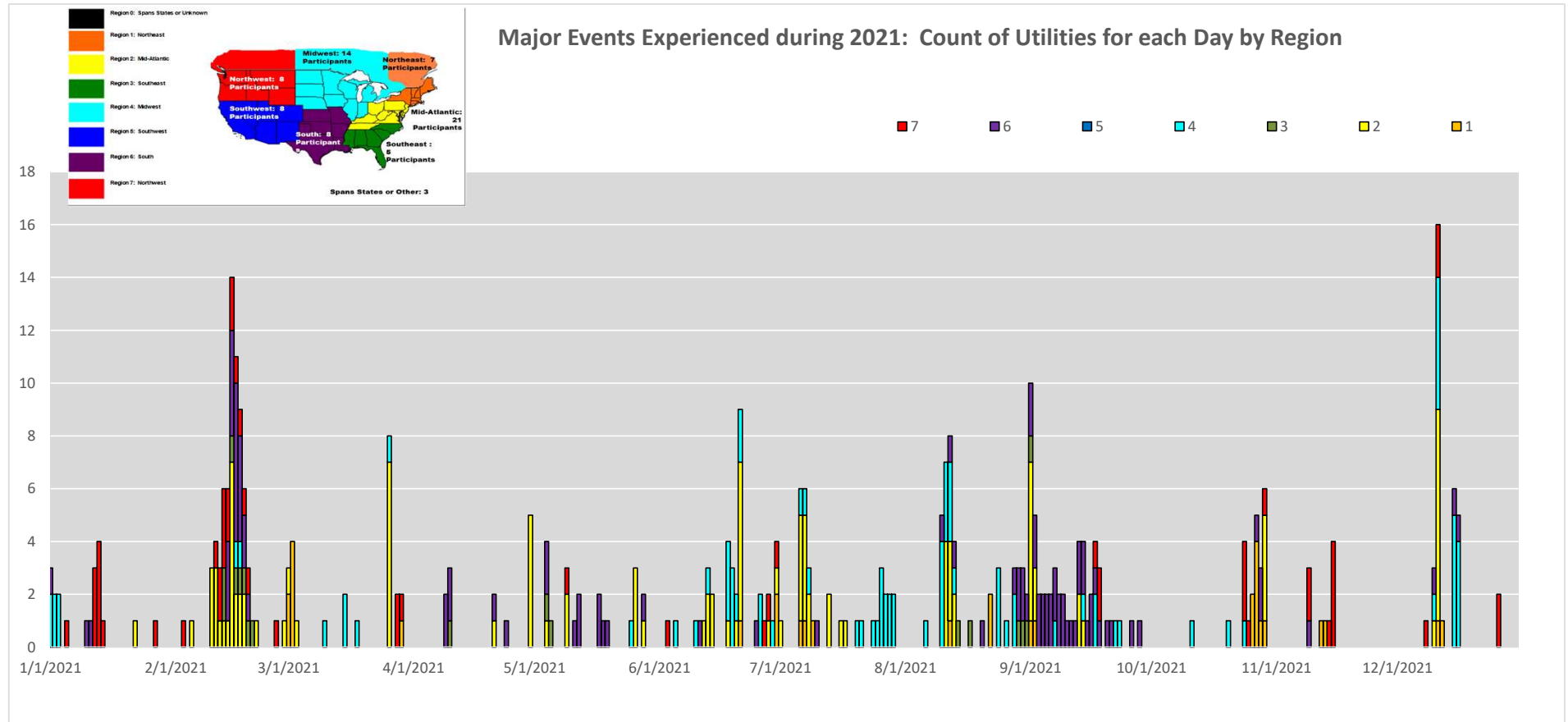
The chart displays the daily count of utilities initiating major events throughout 2021, categorized by region. The y-axis represents the number of utilities (0 to 10). The x-axis shows dates from 1/1/2021 to 12/1/2021. The legend indicates the following counts for each region:

- Region 1: Northwest: 8 Participants
- Region 2: Midwest: 14 Participants
- Region 3: Northeast: 7 Participants
- Region 4: Southwest: 8 Participants
- Region 5: South: 8 Participant
- Region 6: Southeast: 6 Participants
- Region 7: Mid-Atlantic: 2 Participants

An inset map shows the regional distribution of participants across the United States.



Major Event Experiences During 2021

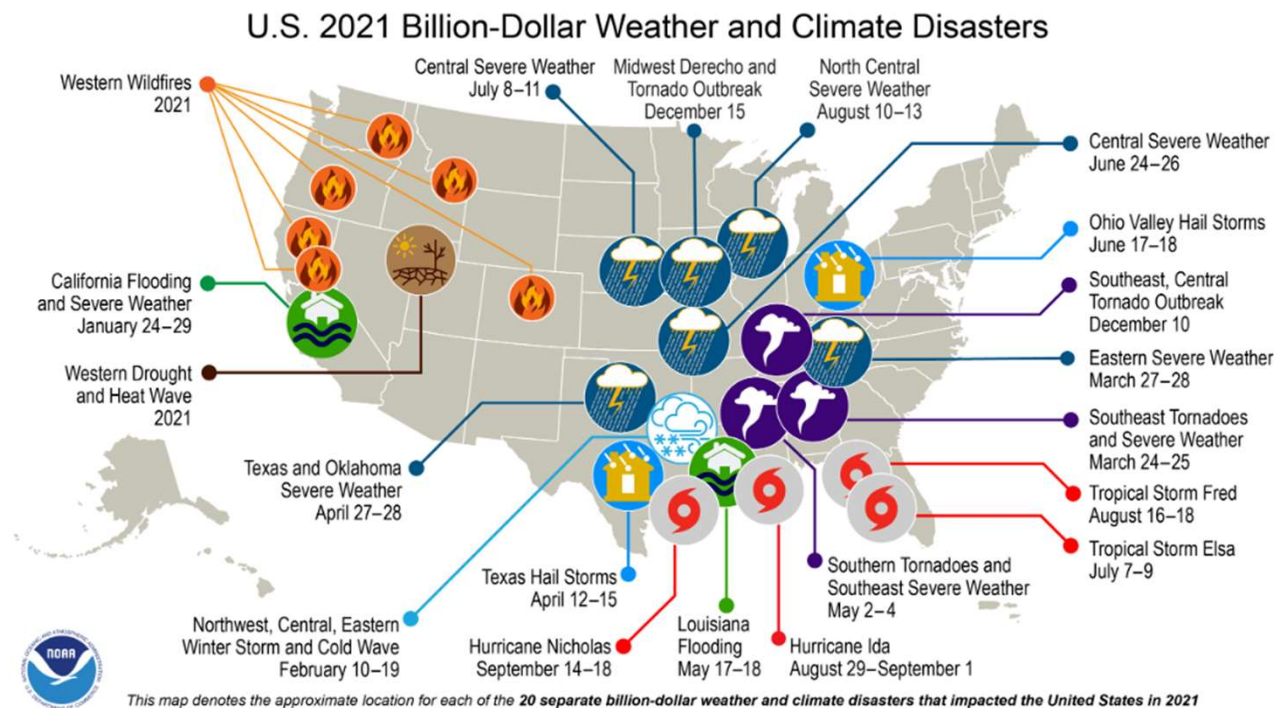




Climate At a Glance for 2021

NOAA
produces
statistics
about
billion
dollar
climate
events

Billion Dollar Disasters

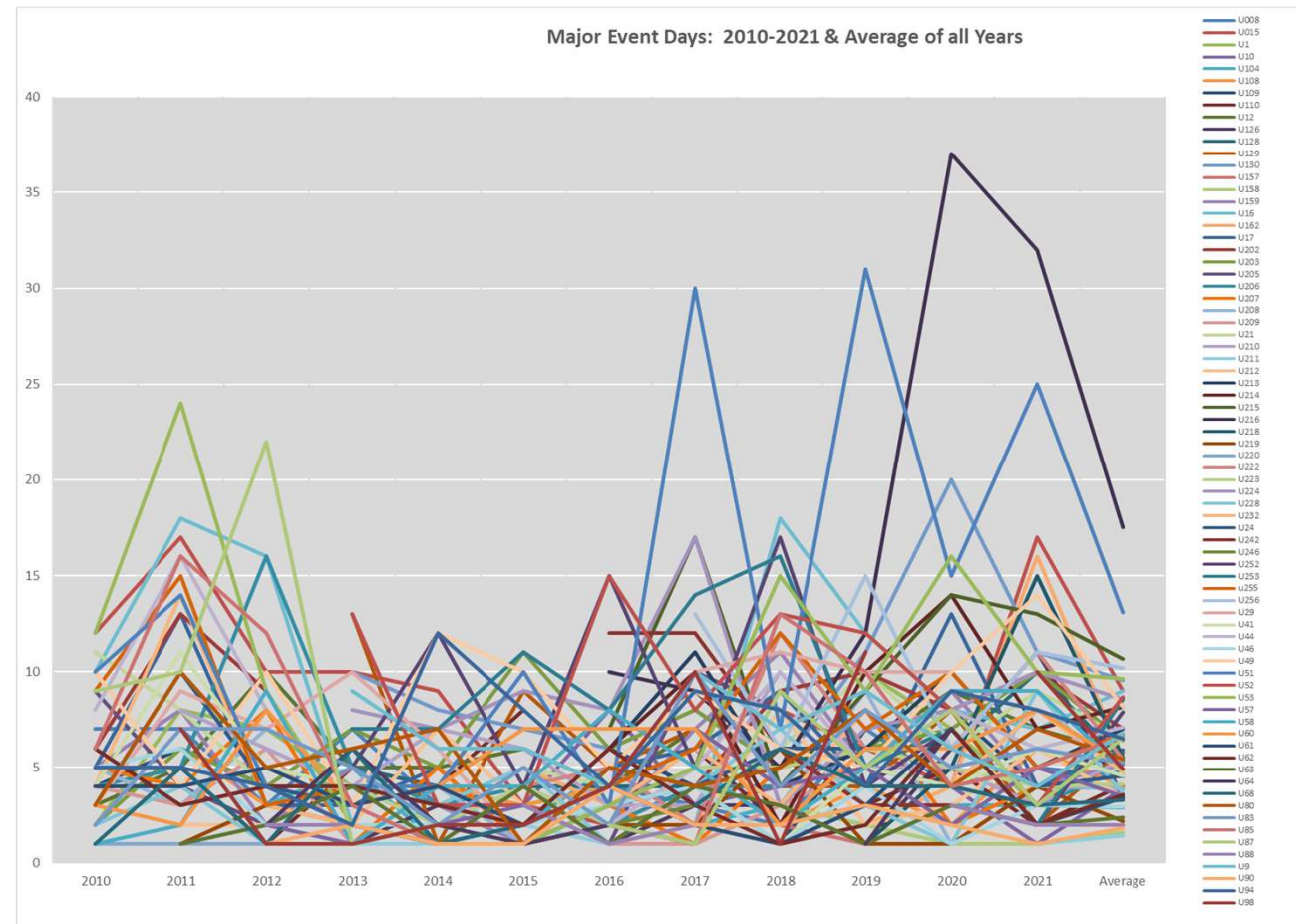






Major Event History by Utility thru CY2021

**Days per
year that
reached ME
status**





Summary

While 2021 had many major event days, years prior did also

**The daily SAIDI for many companies do not appear to be
“normally” distributed**

**Analysis of application of the statistics might be worth
considering**

**Some of the companies may provide rich data for distribution
resilience metrics under development**

**Is the work done previously by Catastrophic Event Task Force
worth refreshing?**

Questions



CERTIFICATE OF SERVICE

**RE: In the Matter of Otter Tail Power Company 2021 Annual Safety, Reliability and Service Quality Report and Proposed SAIFI, SAIDI and CAIDI Reliability Standards for 2022
Docket No. E017/M-22-159**

I, Kim Ward, hereby certify that I have this day served a copy of the following, or a summary thereof, on Will Seuffert and Sharon Ferguson by e-filing, and to all other persons on the attached service list by electronic service or by First Class Mail.

**Otter Tail Power Company
IEEE Supplemental Filing**

Dated this 24th day of August, 2022.

/s/ KIM WARD

Kim Ward
Lead Regulatory Filing Coordinator
Otter Tail Power Company
215 South Cascade Street
Fergus Falls MN 56537
(218) 739-8268

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Generic Notice	Commerce Attorneys	commerce.attorneys@ag.state.mn.us	Office of the Attorney General-DOC	445 Minnesota Street Suite 1400 St. Paul, MN 55101	Electronic Service	Yes	OFF_SL_22-159_22-159
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Kavita	Maini	kmaini@wi.rr.com	KM Energy Consulting, LLC	961 N Lost Woods Rd Oconomowoc, WI 53066	Electronic Service	No	OFF_SL_22-159_22-159

First Name	Last Name	Email	Company Name	Address	Delivery Method	View Trade Secret	Service List Name
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Matthew	Olsen	molsen@otpc.com	Otter Tail Power Company	215 South Cascade Street Fergus Falls, MN 56537	Electronic Service	No	OFF_SL_22-159_22-159
Wendi	Olson	wolson@otpc.com	Otter Tail Power Company	215 South Cascade Fergus Falls, MN 56537	Electronic Service	No	OFF_SL_22-159_22-159
Generic Notice	Residential Utilities Division	residential.utilities@ag.state.mn.us	Office of the Attorney General-RUD	1400 BRM Tower 445 Minnesota St St. Paul, MN 551012131	Electronic Service	Yes	OFF_SL_22-159_22-159
Will	Seuffert	Will.Seuffert@state.mn.us	Public Utilities Commission	121 7th Pl E Ste 350 Saint Paul, MN 55101	Electronic Service	Yes	OFF_SL_22-159_22-159
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Stuart	Tommerdahl	stommerdahl@otpc.com	Otter Tail Power Company	215 S Cascade St PO Box 496 Fergus Falls, MN 56537	Electronic Service	Yes	OFF_SL_22-159_22-159