ELECTRIC RELIABILITY IN PA 2024 REVIEW

PA PUBLIC UTILITY COMMISSION

SAFETY SEMINAR

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WEDNESDAY SEPTEMBER 3, 2025

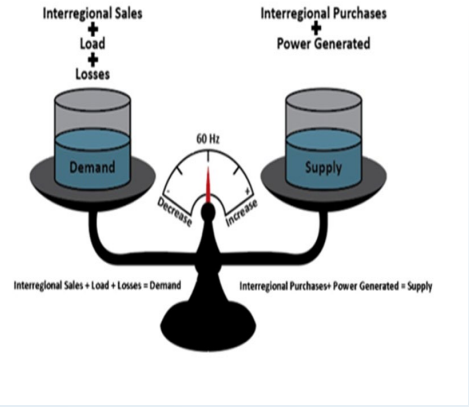
Electric Reliability In PA 2024 Review

Disclaimer

- **My presentation and opinions expressed do not necessarily represent those of the Commission, or any of the Commissioners.**

Electric Service Reliability Reports available here: https://www.puc.pa.gov/filing-resources/reports/electric-service-reliability-report/.

Electric Grid Reliability



- **What constitutes Electric Grid Reliability?**
  - **Three major components.**
    - **1. An available product: Generated Electric Power (Gen).**
      - **Online Generation must always equal customer load (demand).**
    - **2. A bulk long distance wholesale supply system: Bulk Power Transmission (BES).**
      - **You must have long distance transportation system to reach the retail distributors.**
    - **3. Local retail supply: Electric Distribution Companies (EDCs)**
      - **Given the first two components are in place we have product (electric power) to deliver to our customers.**

EDC Reliability Indices

- **Let's examine EDC reliability indices briefly. All defined in IEEE Std 1366-2022 and in 52 Pa. Code § 57.192.**
  - **SAIFI = System Average Interruption Frequency Index**
    - **How often the average customer experiences a sustained interruption over a predefined period of time, usually rolling 12-months, expressed as the number of interruptions.**
  - **CAIDI = Customer Average Interruption Duration Index**
    - **Average time, expressed in minutes, for restoration of customers experiencing a sustained outage over a predefined period of time, usually rolling 12-months.**
  - **SAIDI = System Average Interruption Duration Index**
    - **Total duration of interruption for the average customer during a predefined period of time, usually rolling 12-months, expressed in minutes.**

EDC Reliability Indices (cont'd)

- **Major Events Excluded**
  - **Current PUC Major Events at 52 Pa. Code § 57.192 – essentially a large storm event that impacts 10% or more of total customers.**
  - **Industry standard IEEE 2.5 Beta Major Event Days (MEDs).**
    - **Forthcoming PUC rulemaking to offer this option to PA EDCs.**
    - **EDCs that "opt-in" to IEEE will be required to propose new benchmarks.**

EDC Reliability Indices (cont'd)

- **Benchmarks and Standards.** **NOTE – benchmarks and standards are not statutorily established – they are established by the PUC via order(s).**
  - **Current benchmark represents the statistical average of the EDC's annual, system-wide, reliability performance index values for the five years from 1994 through 1998.**
  - **Current standard is 120% of the benchmark for the large EDCs (Duquesne, PECO, PPL, and FirstEnergy) and 135% for the small EDCs.**

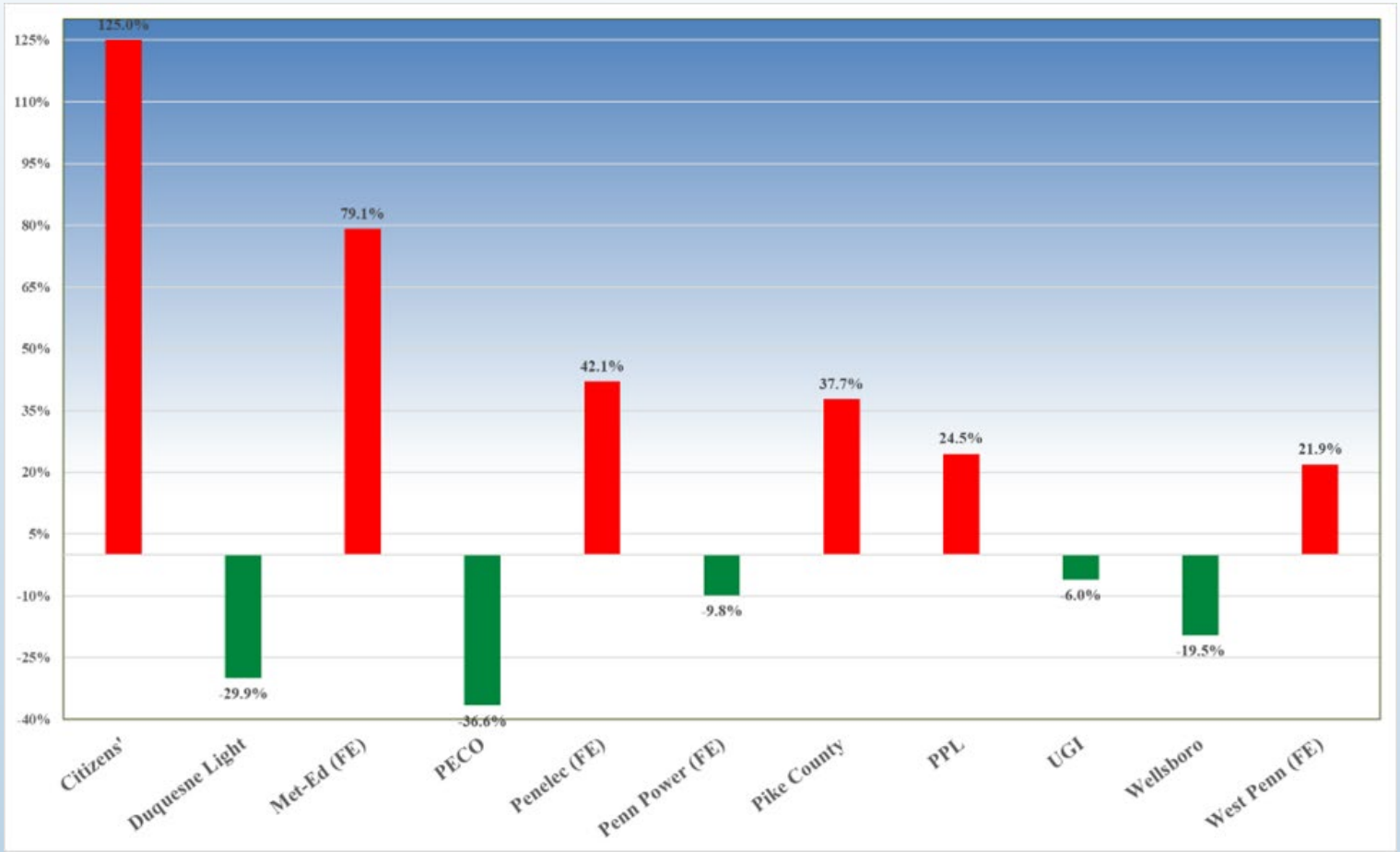
EDC Reliability Indices

SAIFI vs Benchmarks

Of the 11 PA EDCs:

3 of the 7 Large EDCs met their SAIFI Benchmark in 2024.

2 of the 4 Small EDCs met their SAIFI Benchmarks.



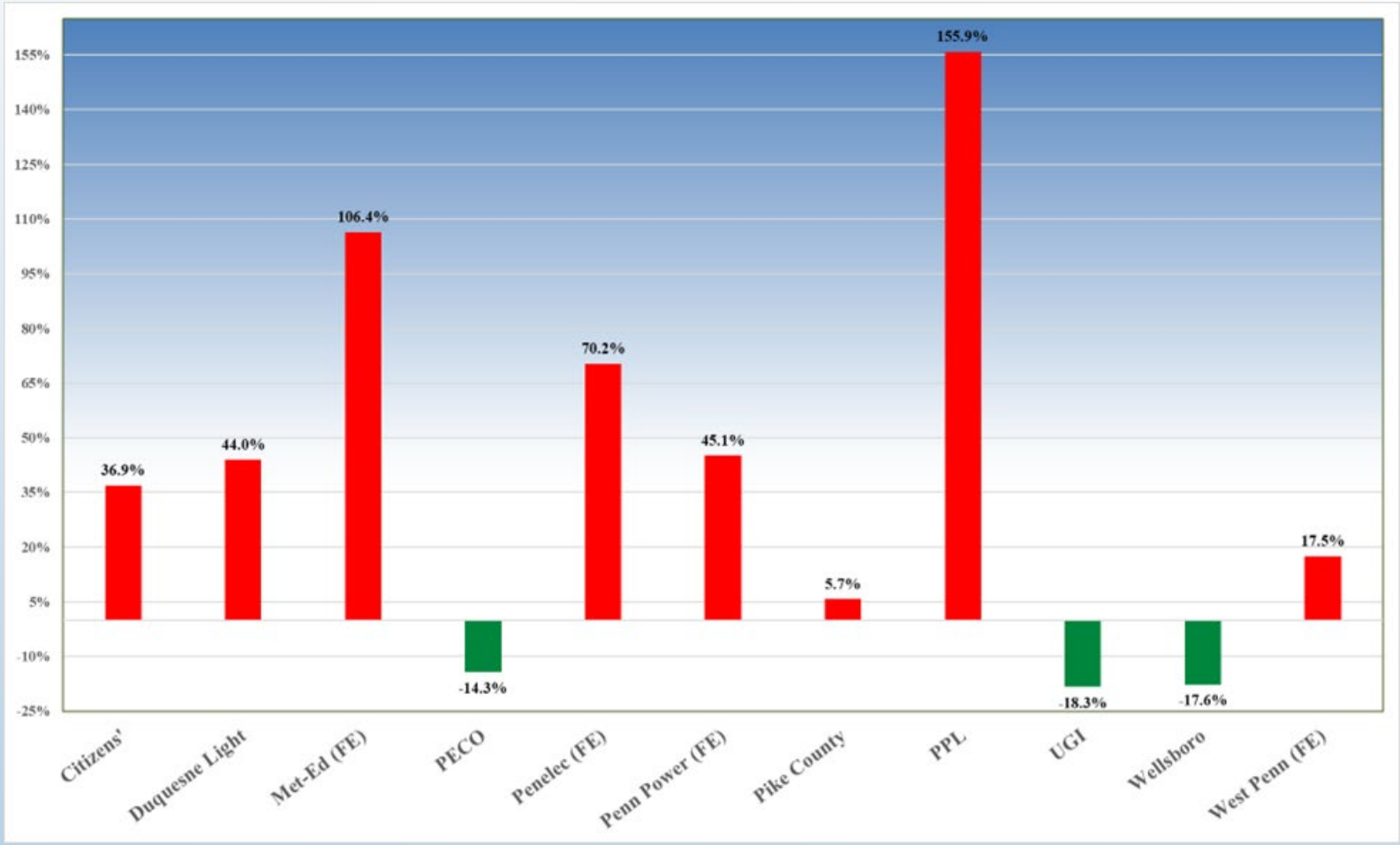
EDC Reliability Indices

CAIDI vs Benchmarks

Of the 11 PA EDCs:

Only 1 of the 7 Large EDCs has met their CAIDI Benchmark in 2024.

2 of the 4 Small EDCs have met their CAIDI Benchmarks.



EDC Reliability Indices

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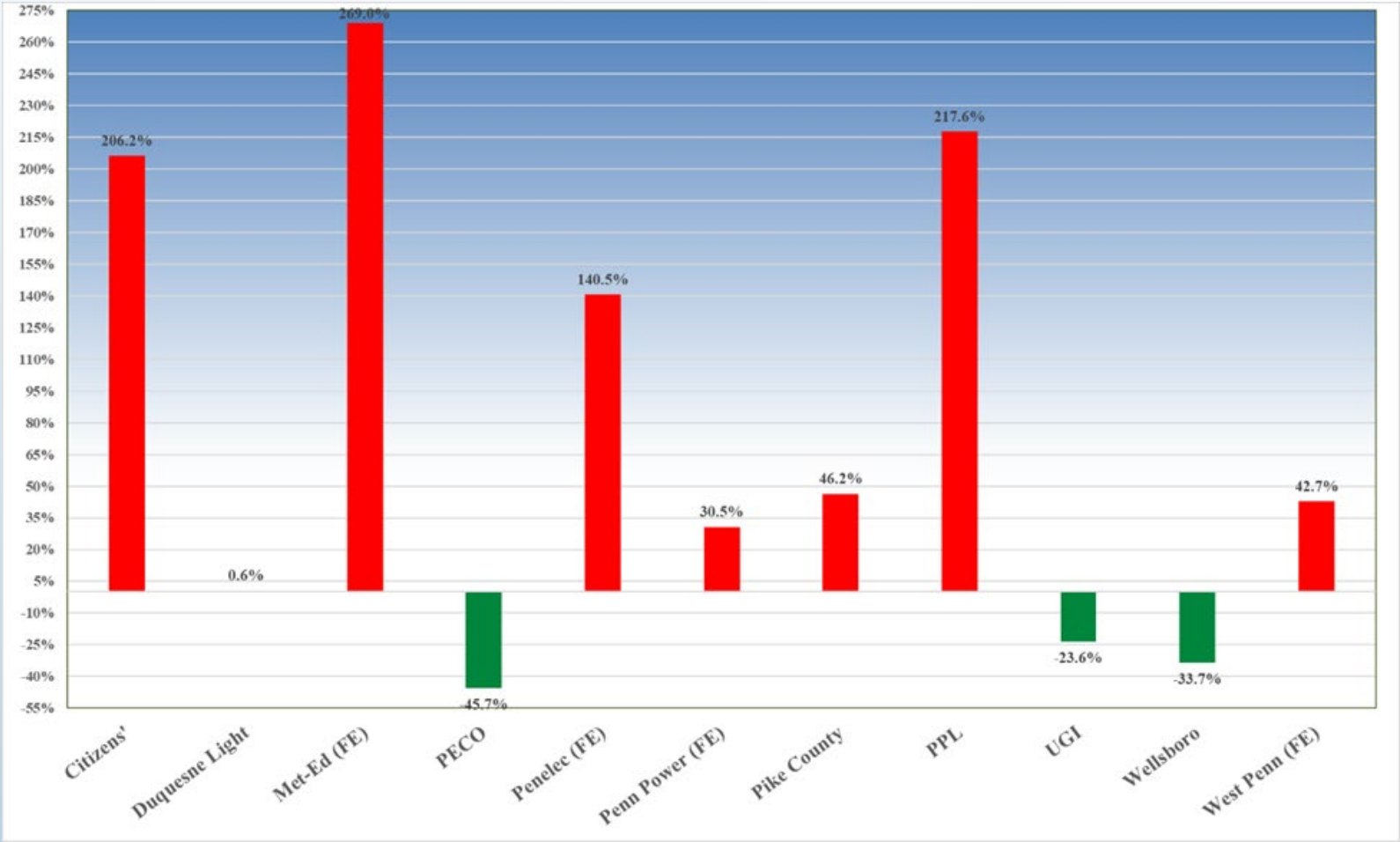
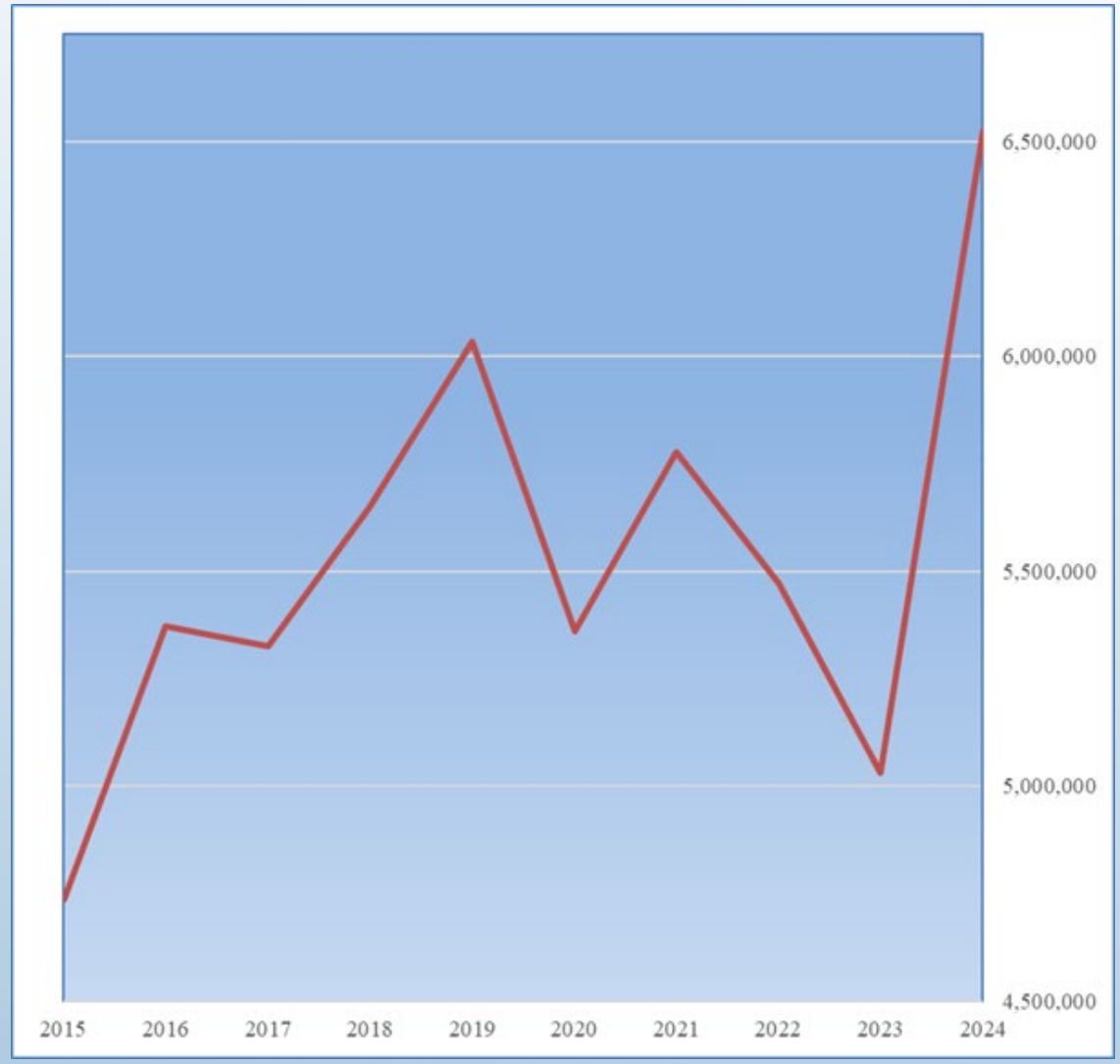


All EDCs (except Duquesne) Customers Interrupted

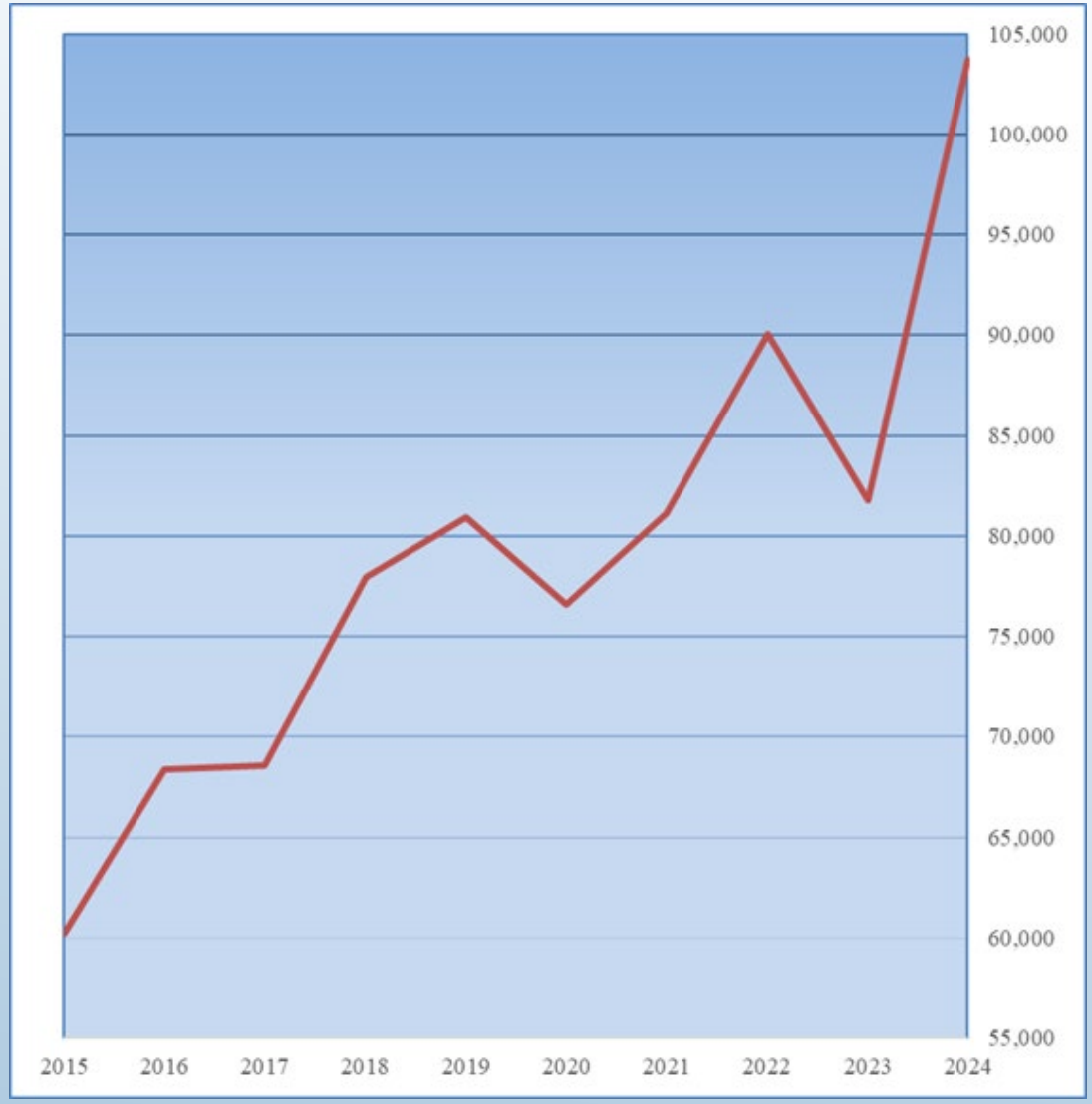


During 2015,
4,737,685
Pennsylvania EDC Customers experienced Interruptions.

During 2024,
over 6,530,000
Pennsylvania EDC Customers experienced Interruptions.

2024 saw a reversal of a downward trend since 2019.

Number of Interruptions Annually

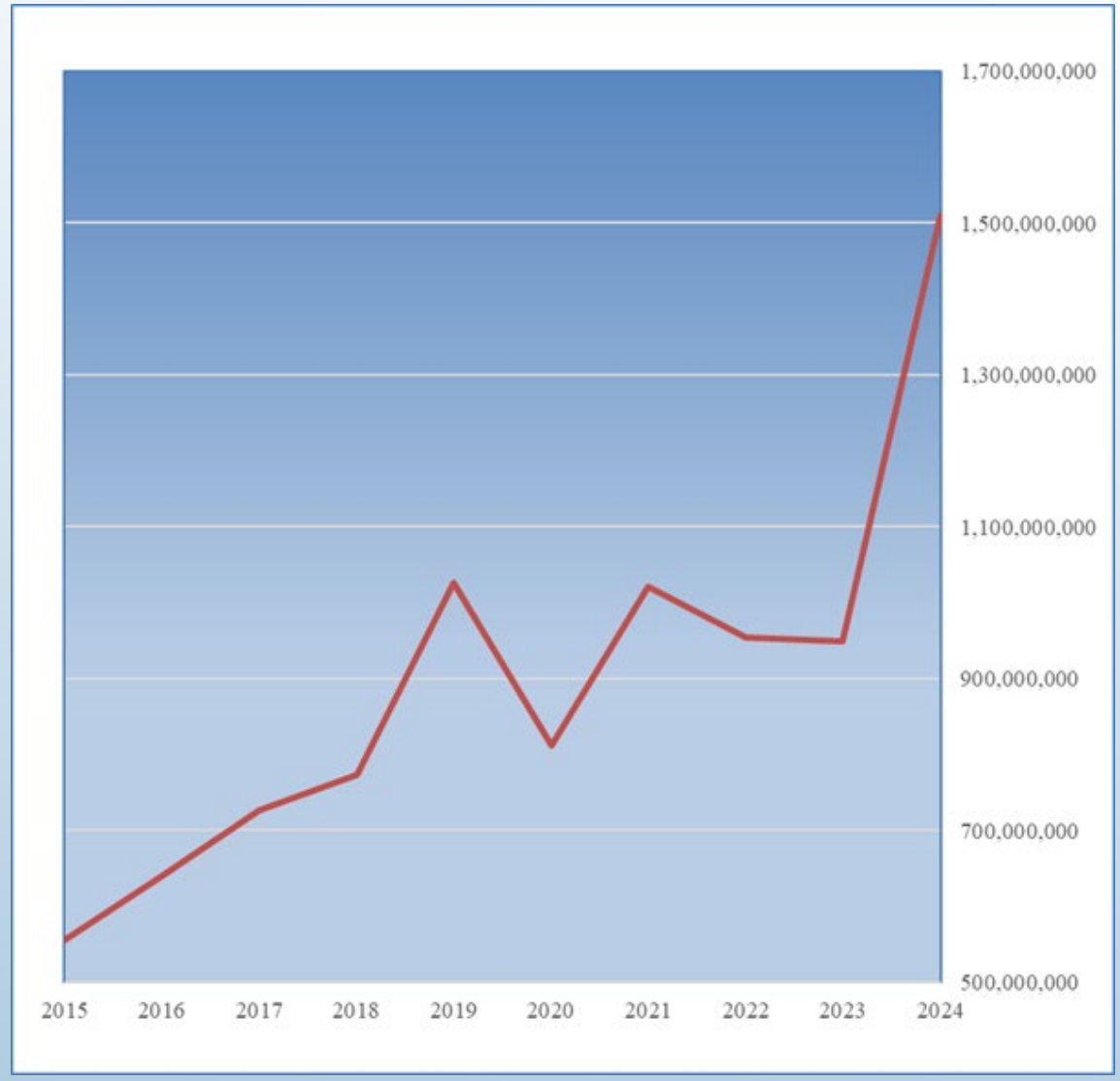


During 2015
Pennsylvania EDCs experienced 60,218 Customer Interruption events.

During 2024
Pennsylvania EDCs experienced 103,683 Customer Interruption events.

Increase in 9 years was approximately 72%.

Customer-Minutes of Interruptions, or CMI

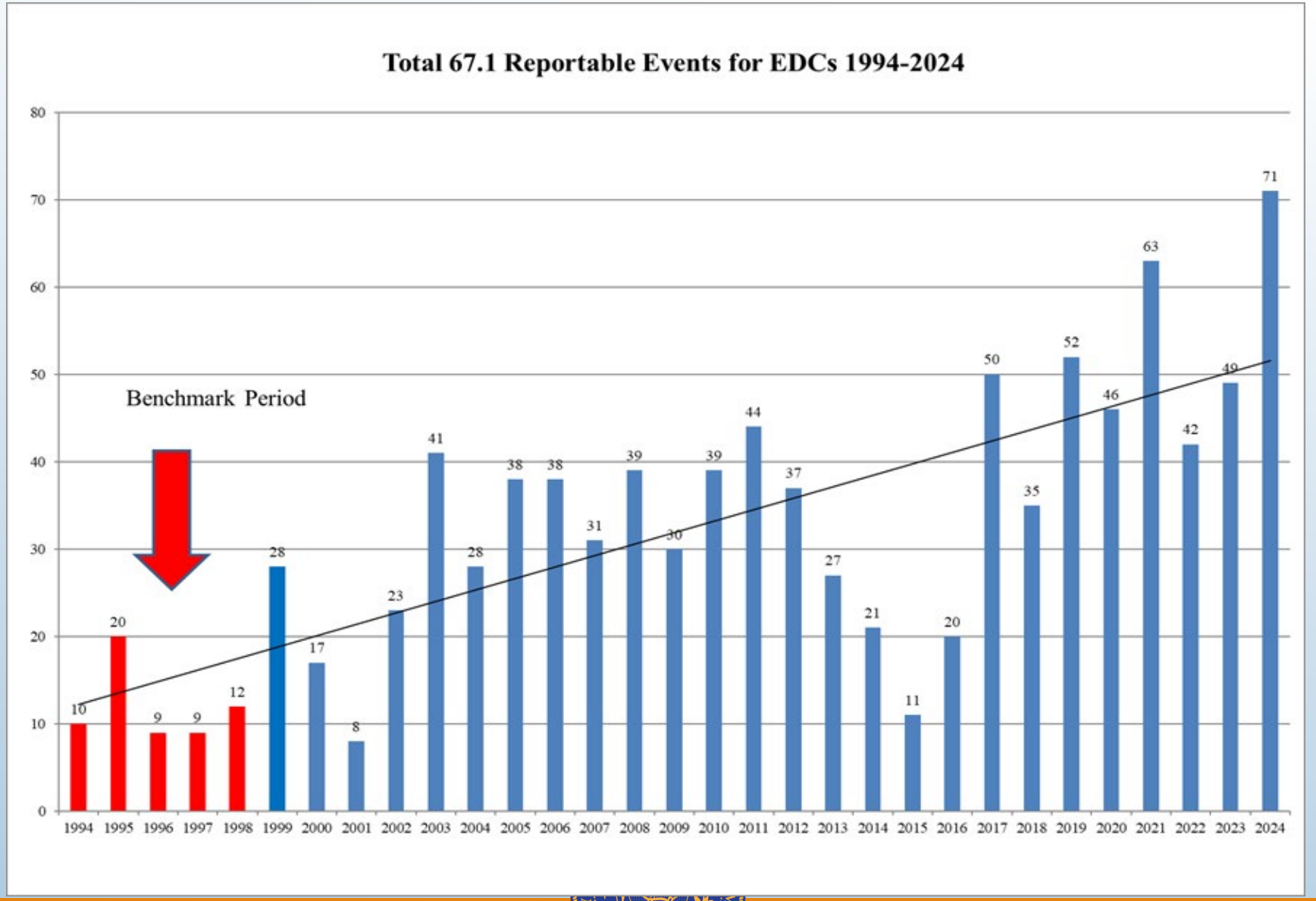


During 2015 Pennsylvania EDCs experienced 556,253,867 Customer Minutes of Interruption.

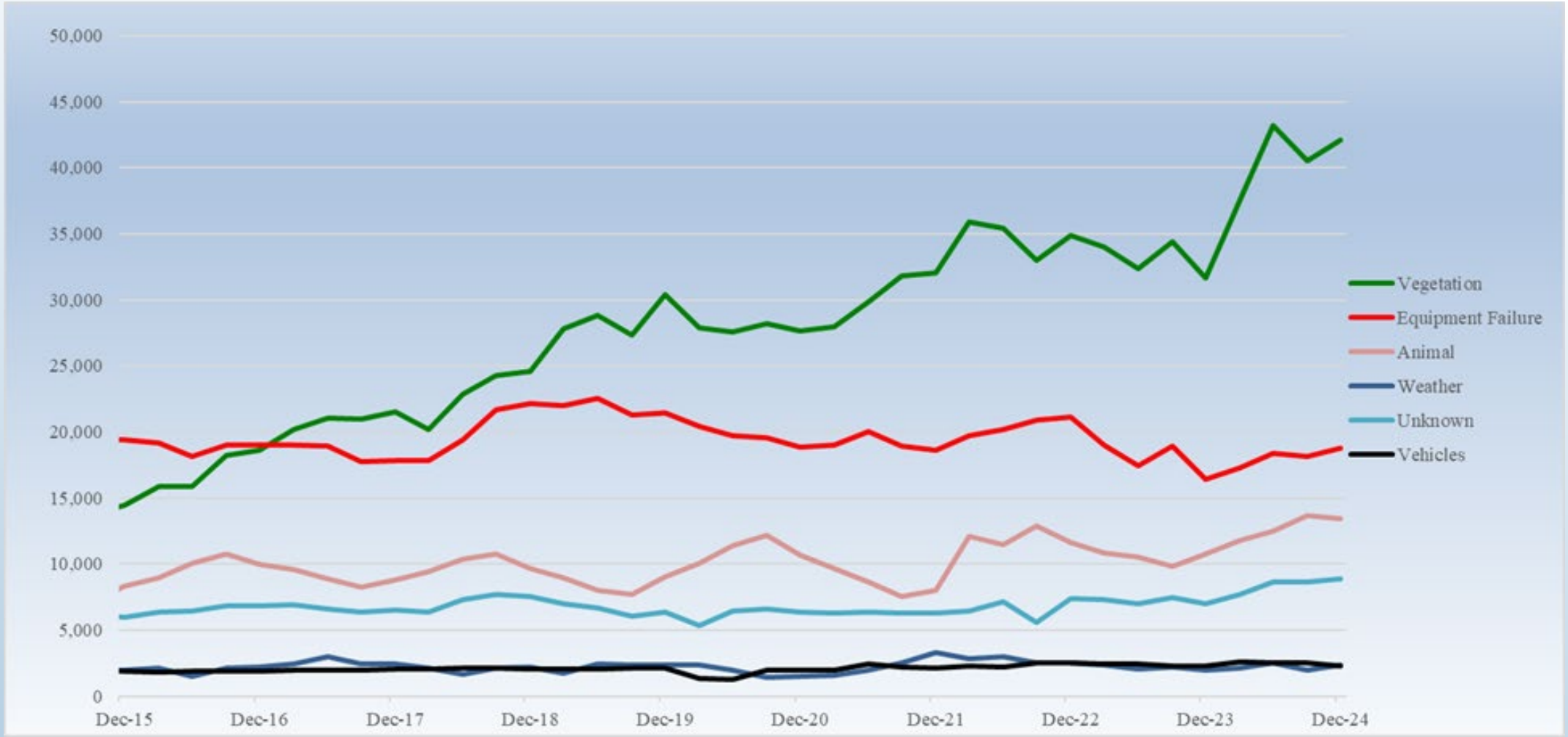
During 2024 Pennsylvania EDCs experienced approximately 1.51 billion Customer Minutes of Interruption.

Increase in 9 years was approximately 171.5%

Reportable Outage Events (52 Pa. Code § 67.1)



Outage Causes ALL EDCs 2015-2024



Outage Causes All EDCs 2015-2024 (cont'd)

- **In December 2015 (rolling 12-months), there were 14,462 outages attributed to vegetation issues.**
- **By December 2024, the annual figure had risen to 42,120 outages attributed to vegetation issues, which is an increase of approximately 191%.**
- **The vast majority of vegetation issues were from off-right-of-way (OROW).**

TUS Recommendations

- **EDCs can address OROW vegetation issues by working to improve the reliability and resilience of their facilities within the ROW.**
- **EDCs should consider utilizing methodologies to protect conductors within the ROW from hazards that may come from OROW, such as targeted undergrounding, covered overhead conductors, and hybrid undergrounding.**
- **Utilize your LTIIPs and/or fully projected future test years in base rate cases to propose such initiatives. Also to propose enhanced vegetation management programs.**

TUS Recommendations (cont'd)

- **EDCs should evaluate the impact of weather on their systems and look to increase resiliency to severe weather events and to target vegetation management efforts.**
- **TUS suggests that EDCs may utilize academic and climate resources already in Pennsylvania for such evaluation and in planning mitigation methodologies by partnering with universities and/or climate modeling entities to better understand vulnerabilities at the regional and local level and to better target mitigation and resiliency investments.**

TUS Recommendations (cont'd)

- **EDCs should also look at the total costs that a sustained outage may have on customers and society and consider these factors in any cost/benefit analysis.**
- **TUS and EDCs may benefit from the National Renewable Energy Laboratory (NREL) technical assistance deep-dive provided to TUS in 2025 on resilience and threat-based planning for extreme events impacting electrical distribution systems.**

Conclusion

- **TUS notes that customers will expect better quality and more reliable electric service, especially in a scenario where electrification increases significantly.**
- **EDCs are required to provide reliable service and must address the challenges of severe weather, aging infrastructure, and increasing demand, while also considering affordability. Easy, huh?**
- **There are tools in the proverbial toolbox – use them, or ask for the tools you need.**

Questions?