



# KPIs

## U.S. ELECTRIC GRID OUTAGE ANALYSIS

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## Introduction to Electric Outage KPIs

Electric outages can greatly impact communities and businesses, making it essential to monitor Key Performance Indicators (KPIs) related to them. These metrics provide insights into outage frequency, duration, response times, and restoration efforts, helping utilities identify trends and improve operational efficiency.

Tracking KPIs not only assesses performance but also fosters transparent communication with stakeholders, enhancing trust and preparedness for future disruptions. In today's world, where energy reliability is crucial, leveraging KPIs is vital for making informed decisions and strengthening electric system resilience.

# Q1: Are there any trends in power outages , customer affected and Demand loss over time?

KPIS	Importance	Recommended Visual	DAX
Total Number of power outages	a clear measure of the overall frequency of outages, helping to track system reliability and identify trends in grid performance over time.	Card	COUNT ROWS of the (fData) table
# Types of Events	Categorize events (Normalized)	Card	Distinct count of (Main Event Type) field
Total Demand loss	providing a direct measure of the outages' impact on energy supply and indicating the severity of grid disruptions.	Card	calculates the SUM of values in the (Demand Loss (MW)) field.
Total Number of Customers Affected	monitoring this metric, organizations can improve communication, enhance service reliability, allocate resources effectively, and ultimately boost customer satisfaction.	Card	calculates the SUM of values in the (Number of Customers Affected) field.
Total Duration (Days)	Box Plot: Shows the Median Downtime for Outages, giving a reference point for typical outage lengths.	Box Plot - Card	calculates the SUM of values in the (Duration) field.
# NERC Regions	Shows and count the affected NERC Regions	Card - Shape Map	COUNT the current NERC Regions
Total Demand Loss per year	helps organizations measure how much demand is not being met annually. Its importance is multifaceted, as it provides insights into operational performance, financial health, and customer satisfaction	Clustered bar chart	calculates the total of the (demand loss in megawatts (MW)) field - ignoring the 0 values
Total number of customers affected by outages per year	Shows the societal impact of outages, helping to focus efforts on areas where the most people are affected.	Clustered bar chart	calculates the total of the Number of Customers Affected field



## Q2: Which event types are the most significant?

KPIS	Importance	Recommended Visual	DAX
Average Duration of Outages by Event Type	Highlights which event types lead to the longest outages, useful for addressing the most severe causes of disruptions.	Clustered bar chart	calculates the average of the column (Total Event Hours) considering only events where Total Event Hours is greater than zero.
Average number of customer affected by year.	Measures the impact of each type of outage on the population, useful for prioritizing response efforts based on impact.	Line Chart	calculates the average of the Number of Customers Affected field
Distribution of events over the 4 seasons.	helps identify seasonal patterns, enabling better resource planning, maintenance, and risk management during high-risk periods.	Donut Chart	creating a calculated column called "Season" based on the month in which an event began, using a SWITCH function in combination with the MONTH function.
Distribution of events over the Day Segments.	important for understanding when events, like outages, are most likely to occur, enabling better resource allocation	Stacked Bar Chart	creating a calculated column called "Daily Periods" that categorizes events based on the time they began. The formula uses the SWITCH function along with the HOUR function to determine which part of the day an event falls into
Percentage of Total Outages by Event Type	provides a breakdown of outage causes, categorizing them by factors, and helps pinpoint the most significant problems.	Clustered bar chart	Implicit Measure(% GT Total Number of Outage Reported)
Average MW loss across all Event types and NERC Regions	helping to identify areas and event types with the greatest impact on power supply and grid performance.	Clustered bar chart	calculates the average of the (demand loss in megawatts (MW) )field - ignoring the 0 values

Q3: Are there any special events that skew the data?

KPIS	Importance	Recommended Visual	DAX
Identification of outlier events (e.g., events with significantly higher outage duration	Highlights exceptional events that distort overall trends, helping avoid misinterpretation of typical outage behavior.	Line and stacked column chart	COUNT ROWS of the (fData) table Calculates the average of duration (Hours) field
Number of extreme weather events or disasters that caused outages	Identifies how many outages are caused by large-scale events, helping quantify the grid's vulnerability to external shocks.	Histogram or time series plot	Total Number of Outage Reported by Counting the rows of the (fData) table
Average impact (duration and number of people affected) of these special events	Measures the total effect of large-scale events on the population, guiding disaster preparedness efforts.	Bar chart or line graph	calculates the average of the column (Total Event Hours) considering only events where Total Event Hours is greater than zero. calculates the average of the Number of Customers Affected field



Q4: What is the most common amount of downtime for a power outage?

KPIS	Importance	Recommended Visual	DAX
Median downtime for outages	Shows the typical outage length, providing a central reference point for outage duration, useful for benchmarking.	Box plot (median outage duration)	calculates the median of the (duration of events in hours) field
Mode of outage durations (most frequent downtime period)	Highlights the most common outage duration, helping forecast the length of time to restore power in future incidents.	Histogram or Bar chart	calculates the mode of the Total Event Hours field by creating a table of unique event hour values and their occurrence counts. Then return the most frequent event duration
Distribution of outage durations (percentage of outages that lasted under 1 hour, 1–4 hours, 4–8 hours, etc.)	Provides a detailed breakdown of outage duration patterns, helping assess both short and long outages.	Stacked Bar Chart or Histogram	Using Total Duration that calculated by SUM of values in the (Duration) field.

Q5: What is the overall impact of power outages on demand loss and customers?			
KPIS	Impotence	Recommended Visual	Dax
Number of Outages Reported per year	Tracks the overall frequency of outages, identifying if the grid reliability is improving or worsening over time.	Line Chart	No Dax. Display the [Total Number of power outages] per year
Average MW loss across all Event types and NERC Regions	By monitoring this metric, organizations can improve resource allocation, enhance communication strategies, identify vulnerabilities, and ultimately foster greater customer satisfaction.	Clustered bar chart	calculates the average of the (demand loss in megawatts (MW) )field - ignoring the 0 values
Rolling 12-Month Average Customers Affected	reduces short-term variations, showing a long-term trend in how many customers are affected by outages. It helps identify persistent issues and ensures decisions are based on sustained impact rather than temporary changes.	Card	calculates it by summing the (Number of Customers Affected) field for events in the past 12 months, using DATESINPERIOD, and then averaging these sums over that period
Rolling 12-Month Average Demand Loss	offers a long-term view of demand loss, accounting for seasonal or event-driven changes. It is key to identifying ongoing patterns in energy loss and assessing the grid's stability over time.	Card	calculates it by summing the (Demand Loss (MW)) field for events in the past 12 months, using DATESINPERIOD, and then averaging these sums over that period.



Q6: What is the impact of outages by NERC regions?			
KPIS	Impotence	Recommended Visual	Dax
Events by NERC regions	providing a direct measure of the outages' impact on energy supply and indicating the severity of grid disruptions.	Stacked Column chart	Distinct count of (Main Event Type) field
Total Number of Customers Affected by NERC regions	monitoring this metric, organizations can improve communication, enhance service reliability, allocate resources effectively, and ultimately boost customer satisfaction.	Clustered bar chart	calculates the SUM of values in the (Number of Customers Affected) field.
Total MW loss by NERC Regions	By monitoring this metric, organizations can improve resource allocation, enhance communication strategies, identify vulnerabilities, and ultimately foster greater customer satisfaction.	Clustered bar chart	calculates the average of the (demand loss in megawatts (MW) )field - ignoring the 0 values
Year-over-year percentage increase or decrease in outages , customer affected and Demand Loss	Identifies the relative change in outages from year to year, helping track long-term improvements or deteriorations.	Matrix	counts the total events in the current year, compares it to the previous year using the DATEADD function, and returns the percentage difference the same in customer affected and Demand loss using customer affected field and Demand loss field