Sustained Interruption Indices

Calculations of reliability indices as were shown on survey. Please refer to IEEE Std. 1366 for a full description of each index; indices as listed below should only be used by individuals familiar with reliability indices.

Average Service Availability Index – ASAI is a measure of the average availability of the sub transmission and distribution systems to serve customers. It is the ratio of the total customer minutes that service was available to the total customer minutes demanded in a time period. It is normally expressed as a percentage.

$$ASAI = \frac{Customer\ Hours\ Service\ Availability}{Customer\ Hours\ Service\ Demand}$$

System Average Interruption Frequency Index (Sustained Interruptions) – This is defined as the average number of times that a customer is interrupted during a specified time period. It is determined by dividing the total number of customers interrupted in a time period by the average number of customers served. The resulting unit is "interruptions per customer".

$$SAIFI = \frac{Total\ Number\ of\ Customer\ Interruptions}{Total\ Number\ of\ Customers\ Served}$$

System Average Interruption Duration Index – This is defined as the average interruption duration for customers served during a specified time period. It is determined by summing the customer-minutes off for each interruption during a specified time period and dividing the sum by the average number of customers served during that period. The unit is minutes. This index enables the utility to report how many minutes customers would have been out of service if all customers were out at one time.

$$SAIDI = \frac{\sum Customer\ Interruption\ Durations}{Total\ Number\ of\ Customers\ Served}$$

Customer Average Interruption Duration Index – This is defined as the average length of an interruption, weighted by the number of customers affected, for customers interrupted during a specific time period. It is calculated by summing the customer minutes off during each interruption in the time period and dividing this sum by the number of customers experiencing one or more sustained interruptions during the time period. The resulting unit is minutes. The index enables utilities to report the average duration of a customer outage for those customers affected.

$$CAIDI = \frac{\sum Customer\ Interruption\ Durations}{Total\ Number\ of\ Customer\ Interruptions}$$

Customer Average Interruption Frequency Index - The average frequency of sustained interruptions for those customers experiencing sustained interruptions.

$$CAIFI = \frac{Total\ Number\ of\ Customer\ Interruptions}{Total\ Number\ of\ Customers\ Interrupted}$$

Note *(Per IEEE P1366 – Guide for Distribution Reliability Indices):* For CAIFI index, in tallying the Total Number of Customers Interrupted, each individual customer should be only counted once regardless of number time interrupted during the reporting period.

Momentary Outage Indices

Momentary Average Interruption Frequency Index – Total number of momentary customer interruptions (usually less than 5 minutes limit) divided by the total number of customers served.

$$MAIFI = \frac{Total\ No.\ Customer\ Interruptions(Monetary)}{Total\ Number\ of\ Customers\ Served}$$

System Average RMS (Variation) Frequency Index - Corresponds to a count or rate of voltage sags, swell and/or interruptions below a voltage threshold. For example, SARFI90 considers voltage sags and interruptions that are below 0.90 per unit, or 90% of a system base voltage. SARFI70 considers voltage sags and interruptions that are below 0.70 per unit, or 70% of a system base voltage. And SARFI110 considers voltage swells that are above 1.1 per unit, or 110% of a system base voltage. The SARFIX indices are meant to assess short-duration rms variation events only, meaning that only those events with durations less than 60 seconds are included in its computation.

$$SARFI_{X\%-\ RMS\ Voltage\ Threshold\ (10-140\%)} = $$

$$\frac{\sum \begin{array}{l} number\ of\ customers\ experiencing \\ short\ duration\ voltage\ deviations\ with\ magnitudes\ above\ X\% \end{array}}{\begin{array}{l} number\ of\ customers\ served\ from\ the\ section\ of\ the \\ system\ to\ be\ assessed \end{array}}$$