Oracle Utilities Analytics Dasboards for Distribution Analytics, Outage Analytics

Metric Reference Guide

Release 2.6.0

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Oracle Utilities Analytics Dasboards for Distribution Analytics, Outage Analytics Metric Reference Guide

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Contents

Preface

This document describes the Oracle Utilities Network Management Analytics components (such as metrics, dashboards, analyses, and subject areas) available in Oracle Utilities Analytics Dashboards. These metrics are used in the pre-built analyses, and/or available for customers to use via OBIEE Answers in building new analyses or extending existing analyses.

Audience

This guide is intended for all users of Oracle Utilities Analytics Dashboards for Oracle Utilities Network Management System.

Documentation Accessibility

For information about configuring and using accessibility features for Oracle Utilities Analytics, see the documentation at http://docs.oracle.com/cd/E23943_01/bi.1111/e10544/appaccess.htm#BIEUG2756.

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at http://www.oracle.com/us/corporate/accessibility/index.html.

Access to Oracle Support

Oracle customers have access to electronic support through My Oracle Support. For more information, visit: http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info or http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs if you are hearing impaired.

Related Documents

For more information, see the following documents:

- *Oracle Utilities Analytics Release Notes*
- *Oracle Utilities Analytics Getting Started Guide*
- *Oracle Utilities Analytics Quick Install Guide*
- *Oracle Utilities Analytics Installation Guide*
- *Oracle Utilities Analytics Administration Guide*
- *Oracle Utilities Analytics Developer's Guide*

See Also:

- Oracle Utilities Network Management System Documentation Library

Conventions

The following notational conventions are used in this document:

Notation	Indicates
boldface	Graphical user interface elements associated with an action, terms defined in text, or terms defines in the glossary
italic	Book titles, emphasis, or placeholder variables for which you supply particular values
monospace	Commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter

Chapter 1

Dashboard Content Reference

Oracle Utilities Analytics Dashboards, Release 2.6.0, provides analysis of and data from Oracle Utilities Network Management System using Oracle Business Intelligence Enterprise Edition built-in metrics. Non-spatial analytics, information that is not tied to geography, is represented in a series of dashboards showing tables, bar graphs, pie charts, and gauges. Spatial analytics, or information that is geographically related, use OBIEE integrated Map Viewer technology to represent events, weather data, map data, and other geographical information.

This chapter describes the Oracle Utilities Analytics Dashboards content for Oracle Utilities Network Management System. The dashboards are grouped by the following analytics:

- Outage Analytics
- Distribution Analytics

Outage Analytics

This section describes the metrics available in Outage Analytics of Oracle Utilities Analytics Dashboards. Outage Analytics enables utilities' customers to monitor and measure outage management system metrics.

Outage Analytics mainly focuses on restoration of power. It helps business users to prioritize restoration efforts and manage resources based on the criteria, such as number of customers impacted, locations of emergency facilities, size of outages, duration of outages, and more.

Oracle Utilities Analytics provides Outage Analytics content in the following dashboards:

- Overview
- Current Outages
- Customers and Crews
- Customers and Events
- Historical Outages
- Reliability

Overview

The Overview dashboard provides a high-level overview of the near real-time information about outages. The near real-time period can be configured.

To access this dashboard:

1. Go to the **Home** page.
2. Select **Dashboards** > **Outage Analytics** > **Overview**.

Outage Summary

Property	Details
Description	This analysis shows a summary of outage details, such as the average outage duration, customer minutes interrupted, and customers impacted, as on the last extraction time, along with the count of various types of outages at various control zone hierarchy levels.
Purpose	Outage managers can get a quick overview of the extent of outages and customers impacted from the current outages.
Representation	The green, yellow, and red legends represent the number of customers impacted due to outages. Each color depicts the severity in the impact. The table displays the outage information, along with a tree view of control zone hierarchy. The outage duration, customer minutes interrupted, and customers impacted are also displayed.
Drill Down	The **Outage Events** column link drills down to the Overview (in the Current Outages dashboard) and Overview (in the Historical Outages dashboard) dashboard pages for more details about the events. The **Customers Impacted** column link drills down to the Customers Impacted dashboard page for specific customer details.
Source Object	Recent Customer Outage Fact, Recent Job Fact
OBIEE Subject Area	NMS - NRT Overview
Metrics	Non Outage Events, Outage Events, Fuzzy Events, Dispatched Outages, Confirmed Outages, Device Outages, Service Outages, Average Outage Duration, CMI, Customers Impacted

Restoration Status

Property	Details
Description	This analysis shows the number of customers currently in outage, the number of customers who have been restored, the number of new customers in outage, and the total number of events. The data is shown as of the last 24 hours.
Purpose	Business users can analyze the extent of outages and number of customers impacted. They can help to prioritize restoration efforts and managing resources based upon the criteria, such as locations of emergency facilities, size of outages, and duration of outages.

Property	Details
Representation	The bar graph shows the number of new customers in outage, number of customers restored, and number of customers still experiencing outage. The line graph represents number of events. The X-axis represents the snapshot time in hours. The Y1-axis represents the number of customers, while the Y2-axis represents the number of total events. Hover over the bars for specific details. At some point, the customers still experiencing outage should reach zero indicating that all the customers experiencing outages are restored.
Drill Down	No drill down
Source Object	Outage Fact
OBIEE Subject Area	NMS - NRT Overview
Metrics	Number of Customers Out, Customers Restored, Customers Remaining Out, Number of Events

Critical Customers Without Power

Property	Details
Description	This analysis focuses on the critical, key, medical, and LSE customers affected by the current outages as of the last extraction date.
Purpose	This tool provides the details of major customers impacted due to an outage. Business users can prioritize the restoration services accordingly.
Representation	The bar graph shows the number of customers against each type of customer classification. The X-axis represents the division of the customer. The Y-axis represents the number of customers. Hover over the bars for specific values. The table shows the total number of customers impacted and the number of customers against each customer bucket. The details are collated according to a control zone hierarchy.
Drill Down	The **Customers Impacted** column link drills down to the Customers Impacted dashboard page for specific customer details.
Source Object	Recent Customer Outage Fact
OBIEE Subject Area	NMS - NRT Overview
Metrics	Total Customers Impacted, Critical Customers, Key Customers, Medical Customers, LSE Customers

Current Outages by Device Type

Property	Details
Description	This analysis shows the number of events against each device type. The data is shown as of the current date.

Property	Details
Purpose	This analysis helps users to get a quick view of which device types are associated with most outage events.
Representation	The bar chart shows the current event count for each of the device types, as on date. The X-axis represents the device type. The Y-axis represents the number of events. Hover over the bars for specific values. The table shows the number of customers impacted due to outages against each device type. The details are collated as a control zone hierarchy.
Drill Down	The **Events** column link drills down to the Analysis dashboard page (in the Current Outages dashboard) for specific outage details.
Source Object	Recent Customer Outage Fact
OBIEE Subject Area	NMS - NRT Overview
Metrics	Events, Customer Impacted

Crew Assignment Summary

Property	Details
Description	This analysis displays the number of tasks assigned to each crew type. The data is displayed as of the last extraction date.
Purpose	This analysis provides an overview of the work loads assigned to various crew types. Users can drill down through this analysis to more detailed crew assignment information in other parts of the application.
Representation	The bar chart shows the distribution of assignments across various crew types. The X-axis represents the crew type. The Y-axis represents the number of assignments. Hover over the bars for specific details.
Drill Down	The graph bars drill down to Crews Assigned dashboard page for crew specific details.
Source Object	Recent Customer Outage Fact
OBIEE Subject Area	NMS - NRT Overview
Metrics	Assignments

Wire Down Overview

Property	Details
Description	This analysis provides an overview of all the events, the number of customer calls, and the total number of customers affected due to the wire downs at control zone hierarchy level. The data is displayed as of the last extraction date.

Property	Details
Purpose	This analysis provides a summary view of wire down events recorded in each control zone hierarchy level. It also provides the number of events, as well as customers impacted and calls received in relation to these wire down events. Users can drill down through this analysis to detailed information about wire down events and their status in other parts of the application.
Representation	The table shows the number of customer calls and customers impacted due to events. The details are collated as a control zone hierarchy.
Drill Down	The **Events** column link drills down to the Wire Down Events dashboard page for more details.
Source Object	Recent Job Fact, Recent Customer Outage Fact, Recent Call Fact
OBIEE Subject Area	NMS - NRT Overview
Metrics	Number of Events, Customers Interrupted, Number of Calls

Current Outages

The Current Outages dashboard provides a snapshot of the network outages recorded in a region.

To access this dashboard:

1. Go to the **Home** page.
2. Select **Dashboards** > **Outage Analytics** > **Current Outages**.

The dashboard includes the following dashboard pages. The data for current calendar year and month is displayed by default. You may modify the criteria per requirement.

- Overview
- Overlay Map
- Hourly Trend
- Analysis
- Wire Down Events

Overview

The Overview dashboard page provides a geographical representation of all the recent outage events in a region.

Current Customer Outages

Property	Details
Description	This map displays all outage events that are within near real-time range. It also shows the regions where outage events occurred, the number of customers impacted on the respective events.

Property	Details
Purpose	The spatial representation of current outages helps in providing a comprehensive overview of the current outage situation. The analysis also helps business users to understand the spatial distribution of key metrics, such as customers impacted, customer minutes interrupted, and average outage duration.
Representation	The color-coded region on the map shows specific details about the outages in that region, such as the city where the outage has occurred, number of customers impacted, average outage duration, and customer minutes interrupted. Use the **Customers Impacted**, **Average Outage Duration (in Minutes)**, and **Customer Minutes Interrupted** check boxes to color fill the outage locations based on the selection. Use the **Events by Customers Impacted** check box to color fill the regions based on the number of events in that region. The **Events with Crew** check box indicates if the presence of crew in the outage location. The table shows the event details, outage duration, estimated restoration time, and customers impacted.
Drill Down	The **Customers Impacted** column link drills down to the Customers Impacted dashboard page showing the respective details of the customers experiencing outages. The **Event Number** column link drills down to the Crews Assigned and Event Profile dashboard pages for respective event details.
Source Object	Recent Customer Outage Fact
OBIEE Subject Area	NMS - NRT Overview
Metrics	Customers Impacted, Customer Minutes Interrupted, Average Outage Duration (in Minutes)

Overlay Map

The Overlay Map dashboard page integrates weather information (from third-party vendors), along with the current outage information.

Several weather layers can be enabled. They have to be configured for the weather information to be available. See "Enabling Weather Information" section in Chapter 4 in the *Oracle Utilities Analytics Administration Guide* for more details.

Current Customer Outages - Additional Overlays

Property	Details
Description	This map displays all outage events within the near real-time range. It highlights the regions where outage events occurred, the number of customers impacted, and average outage duration in those regions. Weather information from third-party vendor is also available in the map.

Property	Details
Purpose	Business users can identify how weather factors such as temperature, humidity, pressure, etc, impact on the outage patterns.
Representation	The color-coded region on the map shows the company, region, division, and postal code details for each of the regions, along with the customers impacted due to outages, average outage duration (in minutes), and customer minutes interrupted. The **Legend** drop down displays the data by average outage duration (in minutes), customer minutes interrupted, and customers impacted. The **Weather Layers** section provides various layers showing the temperature, radar, humidity, pressure, IR satellite, forecast high, forecast low, and the forecast stations.
Drill Down	No drill down
Source Object	Recent Customer Outage Fact
OBIEE Subject Area	NMS - NRT Overview
Metrics	Customer Impacted, Customer Minutes Interrupted, Average Outage Duration (In Minutes)

Hourly Trend

The Hourly Trend dashboard page provides an hourly summary of the number of customers interrupted, customers restored, along with the events occurring in every hour. It gives an overview of the overall restoration progress, analyzing if more crews need to be introduced to improve the overall strategy planning.

Restoration Status

Property	Details
Description	This analysis shows the number of customers currently in outage, the number of customers who have been restored, and the number of events. The data is shown as of the last 24 hours.
Purpose	Business users can analyze the extent of outages and number of customers impacted. They can help to prioritize restoration efforts and managing resources based upon the criteria, such as locations of emergency facilities, size of outages, and duration of outages.
Representation	The bar graph shows the number of new customers in outage, number of customers restored, and number of customers still experiencing outage. The line graph represents the number of events. The X-axis represents the snapshot time in hours. The Y1-axis represents the number of customers, while the Y2-axis represents the number of outage events. Hover over the bars for specific details. At some point, the customers still experiencing outage should reach zero indicating that all the customers experiencing outages are restored.

Property	Details
Drill Down	No drill down
Source Object	Outage Fact
OBIEE Subject Area	NMS - NRT Overview
Metrics	Number of Customers Append, Number of New Customers Out, Number of Events

Estimated Number of Restorations

Property	Details
Description	This analysis shows the number of customers expected to be restored in the next 24 hours.
Purpose	Business users can track the number of customers that can be restored at each time interval.
Representation	The line graph shows the number of customers going to be restored on an hourly basis. The X-axis represents the time in hours. The Y-axis represents the number of customers. Hover over the line for specific details.
Drill Down	No drill down
Source Object	Outage Fact
OBIEE Subject Area	NMS - NRT Overview
Metrics	Number of customers expected to be restored

Events Hourly Trend

Property	Details
Description	This analysis shows the number of unrestored events and the number of customers restored as of the current date. The data is shown for each hour of the day.
Purpose	Business users can track the number of customers going to be restored at each time interval.
Representation	The bar graph shows the number of unrestored events and customers restored on an hourly basis. The X-axis represents the hour of the day. The Y-axis represents the number of unrestored events at each hour. Hover over the line for specific details. Number of Unrestored Events = (Number of Events + Number of New Events) - (Number of Events Restored + Number of Events Cancelled)
Drill Down	No drill down
Source Object	Outage Fact
OBIEE Subject Area	NMS - NRT Outage
Metrics	Unrestored Events, Customers Restored

Analysis

The Analysis dashboard page provides a summary of current outages and unrestored events.

Current Outage Events by Device Type

Property	Details
Description	This analysis shows the current outage events (as percentage) categorized by the device type. The data is displayed as of the previous extraction time.
Purpose	This analysis provides business users with a quick overview of how events are distributed across various device types. It also gives insight into which device types are more involved in outage events.
Representation	The pie chart shows the distribution of current outage events across each device type. The table displays the respective event numbers against each device type, and also the number of customers impacted for each of the events.
Drill Down	The **Event Number** column link drills down to the Event Profile dashboard page for specific details about the selected event. **Note**: The Event Profile dashboard page opens as a new tab in the browser. It also shows the details of the customers impacted due to the selected event and the call details.
Source Object	Recent Customer Outage Fact
OBIEE Subject Area	NMS - Recent Customer Outage
Metrics	Device Type, Customers Impacted

Unresolved Events

Property	Details
Description	This analysis displays the number of customer calls received corresponding to a given event, grouped by the event status. The events are categorized into event statuses. For example: new (NEW), onsite (ONS), assigned (ASN), and enroute (ENR). The data is displayed as on the last extraction time. **Note**: A single event can have an impact on multiple customers.
Purpose	Based on the number of calls against each event, business analysts can quickly identify the state with highest priority.
Representation	The bar graph shows the number of calls received from customers against each outage event status. The X-axis represents the event status. The Y-axis represents the number of customer calls received. Hover over the graph for respective values. The table shows the number of customer calls received per each outage event number against the respective event status.

Property	Details
Drill Down	The **Event Number** column link drills down to the Event Profile dashboard page for specific details about the selected event. **Note**: The Event Profile dashboard page opens as a new tab in the browser. It also shows the details of the customers impacted due to the selected event and the call details.
Source Object	Recent Call Fact
OBIEE Subject Area	NMS - NRT Overview
Metrics	Number of Calls

Wire Down Events

The Wire Down Events dashboard page displays the near real-time events associated with all wire downs. It provides details of all current events related to wire down scenarios, along with the number of calls received and name of the calling entity, and lays out this data according to the control zone.

The page also provides information on wire down event hourly trend, as well as trend in number of calls received related to wire downs.

Events with Wire Down Calls

Property	Details
Description	This analysis displays the number of events associated with active wire downs for the last 24 hours.
Purpose	Business users can figure out the time of the day that has the maximum number of wire down events.
Representation	The bar graph shows the number of active events in a specific time bucket, thus helping to understand the trend of number of outage events. The X-axis represents the time buckets for the last 24 hours. The Y-axis represents the outage events with active wire down calls. Hover over the graph for specific details.
Drill Down	No drill down
Source Object	Recent Job Fact
OBIEE Subject Area	NMS - NRT Overview
Metrics	Number of Events

Call Summary

Property	Details
Description	This analysis shows the hourly customer call summary in the last 24 hours.

Property	Details
Purpose	This analysis helps business users to monitor the progress of outage restoration. Decrease in the number of calls may indicate that the restoration is in progress.
Representation	The line graph shows the number of customer calls received on an hourly basis. The X-axis represents the time in hours. The Y-axis represents the number of customer calls. Hover over the graph for specific details.
Drill Down	No drill down
Source Object	Recent Call Fact
OBIEE Subject Area	NMS - NRT Overview
Metrics	Number of Calls

Active Wire Down Calls

Property	Details
Description	This analysis displays a list of all wire down calls that are associated with active events only. The event number and caller information are also displayed to help take immediate action on those calls.
Purpose	This analysis provides sufficient details about wire down calls, so outage managers can pin-point and follow up a specific wire down event and their resolution progress. The **Active Wire Down Calls** table acts as a directory of wire down events, including information such as caller name, call time, event number, and caller comments.
Representation	The table displays the event number and caller information across the control zone hierarchy.
Drill Down	The **Event Number** column link drills down to the Event Profile dashboard page for specific details about the selected event. **Note**: The Event Profile dashboard page opens as a new tab in the browser. It also shows the details of the customers impacted due to the selected event and the call details.
Source Object	Recent Call Fact
OBIEE Subject Area	NMS - NRT Overview
Metrics	Call Time

Customers and Crews

The Customers and Crews dashboard page provides a snapshot of the customers currently experiencing outages and the crews allocated.

To access this dashboard:

1. Go to the **Home** page.

2. Select **Dashboards** > **Outage Analytics** > **Customers and Crews**.

The dashboard includes the following dashboard pages.

- Customers Impacted
- Calls Received
- Current Crews
- Crews Assigned

Customers Impacted

The Customers Impacted dashboard page provides details about the customers currently experiencing outages.

Customers Impacted

Property	Details
Description	This analysis provides a spatial representation of customers currently experiencing outages in a specific region.
Purpose	This analysis provides a spatial representation of customers impacted based on the postal code. It helps business users to quickly pin-point areas where most customer impact is recorded. Besides this measure, the view also allows users to view average outage duration and customer minutes interrupted across postal codes.
Representation	The color-coded region on the map shows specific details about the customers impacted in that region, such as customers impacted, average outage duration, and customer minutes interrupted, along with its postal code. The postal code link broadcasts the postal code value to the Customer Details analysis on the same dashboard page. Use the **Customer Minutes Interrupted** and **Average Outage Duration (in Minutes)** check boxes to color fill the locations based on the selection. The **Customers Impacted** check box color fills the locations based on the number of customers experiencing outages in respective locations. The severity of these outages is based on number of customers impacted.
Drill Down	No drill down
Source Object	Recent Customer Outage Fact
OBIEE Subject Area	NMS - NRT Overview
Metrics	Customers Impacted, Outage Duration, CMIs

Customer Details

Property	Details
Description	This analysis displays a list of all customers currently experiencing outages in a specific region (postal code). The customers are displayed along with the associated event, which helps in analyzing the number of customers out due to each event. The data is based on the postal code selected on the Customers Impacted map.
Purpose	This analysis enables business users to quickly pin-point areas of customers experiencing long outage duration and take remedial action. It also allows the users to identify critical customers without power in a specific postal code area, so that they can be attended to at the earliest.
Representation	The **Postal Code** drop down lists the postal codes for specific areas. The table displays customer information, outage duration, event number, and the estimated restoration time for the selected postal code.
Drill Down	The **Customer Name** column link drills down to the Customer Profile dashboard page for specific details about the selected customer. The **Event Number** column link drills down to the Event Profile dashboard page for specific details about the selected event. **Note**: Both the Customer Profile and the Event Profile dashboard pages open as new tabs in the browser.
Source Object	Recent Customer Outage Fact
OBIEE Subject Area	NMS - NRT Overview
Metrics	Outage Duration

Calls Received

The Calls Received dashboard page provides the customer call details and respective status.

Call Details

Property	Details
Description	This analysis provides summary of customer calls received after an outage. The data is displayed for the selected period.
Purpose	This analysis helps the business users to monitor the progress of outage restoration. Decrease in the number of calls may indicate that the restoration is in progress.
Representation	The table displays the call details, outage event number, and the respective event status.

Property	Details
Drill Down	The **Event Number** column link drills down to the Event Profile dashboard page for specific details about the selected event. **Note**: The Event Profile dashboard page opens as a new tab in the browser. It also shows the details of the customers impacted due to the selected event and the call details.
Source Object	Recent Call Fact
OBIEE Subject Area	NMS - Recent Call
Metrics	Event Number

Current Crews

The Current Crews dashboard page focuses on the details of the crew working on current outages.

Current Crews

Property	Details
Description	This map displays the outage event locations and the current locations of crews currently working on a near real-time basis.
Purpose	Since this analysis is based on near real-time data, business analysts can identify the current situation of outages and the crews working on them. They can identify areas of high outage concentration and estimate if enough crews are working on them. The additional information available in the tabular report, will help analyze crews that are spending lot of time working on the outages. Business analysts can take note and decide whether additional help might be required in certain cases.
Representation	The color-coded dots on the map on the left hand side shows specific locations where various crews are currently working for the outages in the field. The color coding is based on the number of minutes the crew has spent at the outage location. The color-coded dots on the map on the right hand side shows specific locations where there are outages currently in the field. The color coding is based on the number of customers impacted by the specific outage. The table shows the individual crew level details grouped by the Control Zone hierarchy of company, region, and division.
Drill Down	No drill down
Source Object	Recent Crew Activity Fact Recent Customer Outage Fact
OBIEE Subject Area	NMS - NRT Overview
Metrics	Time Spent Assigned, Time Spent En Route, Time Spent Onsite

Crews Assigned

The Crews Assigned dashboard page provides details about how crews are allocated and are responding to the current outages.

Crew Assignment Summary

Property	Details
Description	This analysis displays a list of all crew assignments for the current outages. These details provide an overview of how crews are assigned various tasks. The data is displayed as of the previous extraction time.
Purpose	Business users get a picture of crew assignment in terms of which crew is handling more assignments and which crew is handling none. This analysis helps Outage Managers pin-point the crew usage as of last data extraction time.
Representation	The table displays the crew type, crew names corresponding to each type, and the number of assignments for each of the crews.
Drill Down	The **Assignments** column link drills down to the Event Detail dashboard page for specific event details.
Source Object	Recent Crew Activity Fact
OBIEE Subject Area	NMS - NRT Overview
Metrics	Number of Assignments

On-site Crew List

Property	Details
Description	This analysis displays a list of all crews who are assigned the outage restoration tasks. These crews represent the resources actively working on restoring the current outages. The data is displayed as of the last extraction time.
Purpose	Business users can get a snapshot of which crew is assigned which task, as well as other specific outage details.
Representation	The table displays the crew details (crew and crew type), along with assignment time, en route time, and on site time for each of the crews.
Drill Down	The **Event Number** column link drills down to the Event Profile dashboard page for specific details about the selected event. **Note**: The Event Profile page opens as a new tab in the browser. It also shows the details of the customers impacted due to the selected event and the call details.
Source Object	Recent Crew Activity Fact
OBIEE Subject Area	NMS - NRT Overview
Metrics	Assignment Time, En-route time, On-site Time

Crew Assignments by Control Zone

Property	Details
Description	This analysis shows the status of crews at various control zone level hierarchies. The data is displayed as of the previous extraction date.
Purpose	Business users can view the crew assignment details across Control Zone layers. This analysis also gives information on the total crew deployed, and how many are in which state of engagement.
Representation	The table displays the total number of crew assignments and also the status (unassigned, assigned, en-route, on-site, or complete) of each event as of the previous extraction time. The bar graph shows the number of crew assignments in each status bucket, at division level of the control zone hierarchy. The X-axis represents the division. The Y-axis represents the number of assignments. Hover over the bars for specific details.
Drill Down	No drill down
Source Object	Recent Crew Activity Fact
OBIEE Subject Area	NMS - NRT Overview
Metrics	Unassigned, Assigned, En-route, On-site, Completed, Total

Customers and Events

The Customers and Events dashboard helps users to search for specific list of customers or events based on a combination of criteria. The dashboard further enables users to drill down on a specific event or customer, and view consolidated information on the specific entity.

To access this dashboard:

1. Go to the **Home** page.
2. Select **Dashboards** > **Outage Analytics** > **Customers and Events**.

The dashboard includes the following dashboard pages.

- Events
- Customers

Events

The Events dashboard page provides comprehensive search capabilities across events. The page is supported by an extensive set of prompt elements that can be use in various combinations for searching. It presents the resulting list of events with basic information against each.

Events

Property	Details
Description	This analysis displays the event number, its status, and the outage duration for each of the event in the selected month or date range.
Purpose	Based on the number of calls against each outage event, business analysts can quickly identify the state with highest priority.

Property	Details
Representation	The table shows the number of customer calls received per event number against the respective event status. It shows the number of customers impacted due to each event, the number of calls received, and the restoration date/time for each of the events. Further, the table also shows if a crew has been assigned to restore the respective outages.
Drill Down	The **Event Number** column link drills down to the Event Profile dashboard page for specific details about the selected event. **Note**: The Event Profile dashboard page opens as a new tab in the browser. It also shows the details of the customers impacted due to the selected event and the call details.
Source Object	Restored Job Fact
OBIEE Subject Area	NMS - Restored Job
Metrics	Customers Impacted, Calls Received, Restored Job

Customers

The Customers dashboard page provides insight into the details of customers being served by the utility. The page also provides comprehensive search capabilities for a user through an extensive set of prompt elements. Users can combine these prompt elements in various ways to slice and dice the customer database in the Oracle Utilities Analytics schema.

Customers

Property	Details
Description	This analysis displays a list of customers served by the utility.
Purpose	Business users can quickly search for a customer and then view associated address, device, and meter information.
Representation	The table shows the customer details (name, contact number, and the address), the name of the device installed at each customer location, and the respective meter reading of each device. It also identifies the criticality type for each customer.
Drill Down	The **Customer Name** column link drills down to the Customer Profile dashboard page for specific details about the selected customer. **Note**: The Customer Profile dashboard page opens as a new tab in the browser. It also shows the event and call summaries.
Source Object	This analysis is not associated with any of the fact tables.
OBIEE Subject Area	Shared SNL
Metrics	No metrics

Note: This analysis is based on a combination of dimensional attributes and does not rely on the fact. The response time of this analysis may be greater than the remaining analyses. Adding a suitable fact column may be considered to

reduce the number of resulting rows. Alternately, the analysis may be hidden/ scheduled for any performance issues.

Customer Profile

The Customer Profile dashboard page displays the details of the customer selected in the Customers dashboard page, as a new tab in the browser.

Note: This dashboard page is not accessible directly to business users. The users will be able to navigate to this page only from the Customers dashboard page.

Customer Locations

Property	Details
Description	This analysis shows a list of all addresses associated with the selected customer.
Purpose	This analysis provides key details about a specific customer. Typically, it can be used by Customer Service or Audit team members to analyze or work with a single customer's outage history.
Representation	The table shows the customer details (name, contact number, ID, and the address), the meter reading on the device installed at the customer location, and the criticality type of the customer.
Drill Down	No drill down
Source Object	This analysis loads data from the Supply Node Lookup (CD_SNL) dimension table. It is not associated with any of the fact tables.
OBIEE Subject Area	Shared - SNL
Metrics	None

Note: This analysis is based on a combination of dimensional attributes and does not rely on the fact. The response time of this analysis may be greater than the remaining analyses. Adding a suitable fact column may be considered to reduce the number of resulting rows. Alternately, the analysis may be hidden/ scheduled for any performance issues.

Recent Outage Locations

Property	Details
Description	This analysis shows the location details that experienced an outage recently, along with the number of days since last outage, for the specific address of the customer. **Note**: This analysis is based on a combination of dimensional attributes and is not associated with any fact table. Its response time may be greater than the other analyses. You may prefer to hide it to avoid any performance issues.
Purpose	Business users can identify the locations with recent outage and analyze the cause and trend.
Representation	The table shows the customer contact details and the locations where there was an outage.

Property	Details
Drill Down	No drill down
Source Object	Recent Customer Outage Fact
OBIEE Subject Area	NMS - Recent Customer Outage
Metrics	Days Since Last Outage

Event Summary

Property	Details
Description	This analysis shows the summary of all events for the selected customer.
Purpose	The Customer Service representatives use these details while responding to customer calls.
Representation	The table shows the number of events in each month.
Drill Down	The **Month** column link show the master-detail interaction with the Event Log analysis on the same dashboard page. Clicking a specific month will refresh the Event Log analysis to show the data for that month.
Source Object	Restored Customer Outage Fact
OBIEE Subject Area	NMS - Historical Overview
Metrics	Events

Event Log

Property	Details
Description	This analysis shows the events that occurred in the selected month for the specific customer. It also shows the begin date, corresponding status, outage duration, and the restoration date/time for each event. **Note**: The *Month Year* value for which the data is shown in this analysis can also be broadcast from the Event Summary analysis on the same dashboard page.
Purpose	Business users can get a clear picture on the events that occurred in a month for the selected customer. If there are multiple events at same location, they can analyze the reasons for the same and take appropriate measures.
Representation	The **Month Year** drop down filters the data for the specific month. The table shows the outage begin date, its restoration date, and the outage duration for each of the events. It also shows the status of each event.
Drill Down	No drill down
Source Object	Restored Customer Outage Fact

Property	Details
OBIEE Subject Area	NMS - Restored Customer Outage
Metrics	Outage Duration

Call Summary

Property	Details
Description	This analysis shows the summary of all calls received from the selected customer.
Purpose	The Customer Service representatives use these details to analyze the number of calls from the customer and identify any priority calls.
Representation	The table shows the number of customer calls received in each month.
Drill Down	The **Month** column link show the master-detail interaction with the Call Log analysis on the same dashboard page. Clicking a specific month will refresh the Call Log analysis to show the data for that month.
Source Object	Restored Call Fact
OBIEE Subject Area	NMS - Restored Call
Metrics	Number of Calls

Call Log

Property	Details
Description	This analysis shows the date when the customer call was logged, the call ID, and its status (resolved/pending). **Note**: The *Month* value for which the data is shown in this analysis can also be broadcast from the Call Summary analysis on the same dashboard page.
Purpose	Business users can view the number of calls from a specific customer and analyze the call details. They can also identify the priority calls logged and the respective status of each call.
Representation	The **Month** drop down filters the data for the specific month. The table shows the date and time when the call was received, the caller details (such as name, ID), the call's priority, and its status (pending or resolved).
Drill Down	No drill down
Source Object	Restored Call Fact
OBIEE Subject Area	NMS - Restored Call
Metrics	None

Event Profile

The Event Profile dashboard page displays the details of the event selected in the Events dashboard page, as a new tab in the browser.

> **Note**: This dashboard page is not accessible directly to the users. They will be able to navigate to this page only from the Events dashboard page or by clicking the **Event Number** column link in the respective analyses.

Event Profile

Property	Details
Description	This analysis shows the profile and the crew details for the selected event.
Purpose	Business users can identify details of an event, such as the feeder ID, the substation of the feeder, the event's status, its restoration date, etc.
Representation	The first table shows the location and feeder details of the selected outage event, its status, cause for the outage, number of customers impacted, and the outage duration. The second table displays the details of the crew assigned to the selected event, such as the crew name, assignment time, arrival time, and completion time.
Drill Down	No drill down
Source Object	Restored Job Fact, Restored Crew Activity Fact
OBIEE Subject Area	NMS - Restored Job, NMS - Restored Crew Activity
Metrics	Customers Impacted, Outage Duration, Assignment Time, En-Route Time, Onsite Time, Completion Time

Customers Impacted

Property	Details
Description	This analysis shows the list of customers impacted due to the selected event.
Purpose	Business users can identify the number of customers impacted due to a specific event. They can further analyze if there are multiple locations of the same customer being impacted due to the outage.
Representation	The table shows the details of the customers impacted, such the customer name, location details, outage duration, and the estimated restoration time.
Drill Down	No drill down
Source Object	Restored Customer Outage Fact
OBIEE Subject Area	NMS - Restored Customer Outage
Metrics	Outage Duration

Calls

Property	Details
Description	This analysis shows the date when the specific event was reported, the caller details, and its status (resolved/pending).
Purpose	Business users can view the number of calls logged against the specific event and analyze the event details. They can also identify the priority calls logged and the respective status of each call.
Representation	The table shows the date and time when the call (reporting an outage) was received, the caller details (such as name, ID), the call's priority, and its status (pending or resolved).
Drill Down	No drill down
Source Object	Restored Call Fact
OBIEE Subject Area	NMS - Restored Call
Metrics	No metrics

Historical Outages

The Historical Outages dashboard provides historical information showing trends that help plan for future actions. The historical data can be filtered by date range, storm name, control zone, etc.

To access this dashboard:

1. Go to the **Home** page.
2. Select **Dashboards** > **Outage Analytics** > **Historical Outages**.

The dashboard includes the following dashboard pages. The data for the selected time scale (months) is displayed by default. You may modify the criteria per requirement.

- Overview
- Historical Outage Map
- Trend
- Duration Analysis
- Event Detail

Overview

The Overview dashboard page provides a high-level summary of the outages.

Yearly Summary

Property	Details
Description	This analysis displays the number of events against the impacted customers, aggregated by year. It shows a trend of whether the number of events are increasing or decreasing over the years.
Purpose	Business users can compare the data and analyze the event trend and customers impacted.

Property	Details
Representation	The bar graph shows the year-on-year comparison of the customers interrupted. The X-axis represents the year. The Y1-axis represents the number of customers impacted due to outage events. The Y-2 axis represents the number of outage events. Hover over the bars for specific values. The line shows the number of events by year. It also shows the trend in increase or decrease of events in those years.
Drill Down	The bars drills down to the Trend dashboard page for specific details.
Source Object	Restored Job Fact, Restored Customer Outage Fact
OBIEE Subject Area	NMS - Historical Overview
Metrics	Number of Events, Customer Interrupted

Difference Between Estimated and Actual Restoration Duration

Property	Details
Description	This analysis displays the difference between estimated and actual restoration duration for the selected year and the previous year.
Purpose	Business users can compare the estimated and actual outage durations. If the difference is negative, it means that the actual restoration duration is higher than the estimated duration. In such cases, appropriate business decisions need to be taken to reduce it.
Representation	The stacked bar graph shows the number of outage events in each restoration duration time bucket (0-10 min, 10-20 min, and 20-30 min). The X-axis represents the year. The Y-axis represents the number of outage events. Hover over the bars for specific values.
Drill Down	The bars drill down to the Trend dashboard page for specific details.
Source Object	Restored Job Fact
OBIEE Subject Area	NMS - Restored Job
Metrics	Number of Events, Duration Deviation Bucket

Events by Device Type

Property	Details
Description	This analysis shows the number of events against each device type. The data is shown for the previous six months.
Purpose	Business users can identify the device types that are majorly causing the events.
Representation	The pie chart shows the distribution of events (as percentage of total) for each device type.
Drill Down	No drill down

Property	Details
Source Object	Restored Job Fact, Restored Customer Outage Fact
OBIEE Subject Area	NMS - Historical Overview
Metrics	Percentage of Events per Device Type

Outage Causes

Property	Details
Description	This analysis shows the number of events by each outage cause for the previous six months. The outage causes can include tree trimming, foreign interference, weather, etc.
Purpose	This analysis provides users with data about which type of outage cause are more associated with events. Such type of information could help in implementing adequate preventive maintenance measures to improve the system reliability.
Representation	The pie chart shows the distribution of outage causes (as percentage of total) for the previous six months.
Drill Down	The pie chart drills down to the Trend dashboard page for specific outage cause details.
Source Object	Restored Job Fact
OBIEE Subject Area	NMS - Historical Overview
Metrics	Percentage of Events per Outage Cause

Historical Outage Map

The Historical Outage Map dashboard page provides a geographical representation of the outage details.

Historical Outages

Property	Details
Description	This analysis provides a geographical view to quickly identify the number of customers impacted due to an outage in a location.
Purpose	This analysis allows user to analyze the previous months and identify how events had progressed across regions over a specific period of time.

Property	Details
Representation	The color-coded region on the map shows the number of events in a location, customers impacted due to outages, and minutes interrupted in that region. Use the **Customers Impacted** and **Customer Minutes Interrupted** check boxes to color fill the outage locations based on the respective values. Use the **Outages by Customers Impacted** check box to display the number of outages. Outage locations are represented in green, yellow, and red bubbles on the map. The severity of these outages is based on number of customers impacted.
Drill Down	No drill down
Source Object	Restored Customer Outage Fact
OBIEE Subject Area	NMS - Historical Overview
Metrics	Customer impacted, CMIs

Trend

The Trend dashboard page provides a snapshot of all the events occurred throughout the calendar year, along with their impact on customers.

Monthly Summary

Property	Details
Description	This analysis displays the number of events against the impacted customers. It shows a trend of whether the number of events are increasing or decreasing over the months. The number of customers is calculated as count of all customers who had at least one interruption in that period.
Purpose	Business users can compare the data and analyze the event trend. If there is an increase in the number of events from the previous month, appropriate business decisions need to be taken to reduce it.
Representation	This analysis provides information on the monthly trend of customers impacted and number of events. Users can get the trend over a period of past 6 months based on the month/year selected in the prompt. The X-axis represents the month and year. The Y1-axis represents the number of customers impacted due to events, while the Y2-axis represents the number of events. Hover over the bars for specific values.
Drill Down	No drill down
Source Object	Restored Job Fact, Restored Customer Outage Fact
OBIEE Subject Area	NMS - Historical Overview
Metrics	Number of Events, Customer Interrupted

Difference Between Estimated and Actual Restoration Duration

Property	Details
Description	This analysis shows the difference between estimated restoration time and actual restoration time for the current month and previous months for the selected time scale.
Purpose	If there is a large difference between the estimated and the actual restorations times, businesses may need to change their estimation methods.
Representation	The stacked bar graph shows the number of outage events for the previous six months in each restoration duration time bucket (0-10 min, 10-20 min, and 20-30 min). The X-axis represents the month and year. The Y-axis represents the number of outage events. Hover over the bars for specific values.
Drill Down	No drill down
Source Object	Restored Job Fact
OBIEE Subject Area	NMS - Restored Job
Metrics	Average Difference Between ERT, Restore Time

Outage Causes Trend

Property	Details
Description	This analysis displays the monthly trend in outage events caused due to specific outage causes. It shows whether the number of events are increasing or decreasing over the years.
Purpose	This analysis helps the business users to plan appropriate preventive maintenance activities to improve the system reliability.
Representation	The stacked bar graph shows a month-on-month comparison of the number of events occurred due to each outage cause. The X-axis represents the month and year. The Y-axis represents the number of events. Hover over the bars for specific values.
Drill Down	No drill down
Source Object	Restored Job Fact
OBIEE Subject Area	NMS - Restored Job
Metrics	Number of Events

Average Duration by Crew Activities

Property	Details
Description	This analysis shows the average duration (in minutes) of various crew activities for the selected time scale.

Property	Details
Purpose	Business users can analyze how the time spent by a crew on various activity stages varies across the selected period. It helps to pinpoint inefficiencies in the crew assignment or task execution plans.
Representation	The stacked bar graph displays the average duration taken for each crew activity in the selected month. The X-axis represents the year and month. The Y-axis represents the average duration. Hover over the bars for specific details.
Drill Down	No drill down
Source Object	Restored Crew Activity Fact
OBIEE Subject Area	NMS - Historical Overview
Metrics	Arrive to Complete, Dispatch to Arrive, Assign to Dispatch, Call to Assign

Duration Analysis

The Duration Analysis dashboard page provides a detailed analysis of the outage durations.

Estimated Restoration Time Analysis

Property	Details
Description	This analysis shows the average actual restoration time, average estimated restoration time, and the difference (variation) for the selected period
Purpose	Business users can identify any deviations in restoring the outages within the estimated time and analyze the reasons for the same.
Representation	The **View By** drop down slices the data by crew, crew type, substation, or outage cause dimension attributes. The table displays the estimated restoration time, actual restoration time, and the difference between actual and estimated restoration times for the selected dimension attribute. Difference = Average Estimated (In Minutes) - Average Actual (In Minutes)
Drill Down	No drill down
Source Object	Restored Job Fact
OBIEE Subject Area	NMS - Restored Job
Metrics	Average Estimated (In Minutes), Average Actual (In Minutes), Difference (in Minutes)

Event Detail

The Event Detail dashboard page provides a detailed summary about the outage events at account level.

Event Detail

Property	Details
Description	This analysis shows a summary of all events that occurred in the selected month.
Purpose	Business users can plan effective restoration processes to reduce the outage durations.
Representation	The table displays the event number, event type, outage duration, number of customers impacted, and the customer calls received in the selected month. The data is shown per control zone hierarchy.
Drill Down	The **Event Number** column link drills down to the Event Profile dashboard page for specific details about the selected event. **Note**: The Event Profile dashboard page opens as a new tab in the browser. It also shows the event and call summaries.
Source Object	Restored Job Fact
OBIEE Subject Area	NMS - Restored Job
Metrics	Outage Duration (HH : MM), Customers Interrupted, Number of Calls

Reliability

The Reliability dashboard provides a summary of the feeder performance and also the following IEEE performance metrics:

- SAIDI (System Average Interruption Duration Index)
- SAIFI (System Average Interruption Frequency Index)
- CAIDI (Customer Average Interruption Duration Index)
- MAIFI (Momentary Average Interruption Frequency Index)

These indices are calculated as per IEEE standards and help in tracking system reliability metrics such as SAIDI, SAIFI, CAIDI, and MAIFI.

To access this dashboard:

1. Go to the **Home** page.
2. Select **Dashboards** > **Outage Analytics** > **Reliability**.

The dashboard includes the following dashboard pages. The data for current calendar year and month is displayed by default. You may modify the criteria per requirement.

- Feeder Performance
- Trend
- Reliability by Control Zone
- Reliability
- Device Analysis

Feeder Performance

The Feeder Performance dashboard page provides a snapshot of the overall health of the feeders, including those performing worse. This can alert the businesses to take the action well in advance.

Top 10 Worst Performing Feeders

Property	Details
Description	This analysis shows the top 10 worst performing feeders in the selected and previous months. It displays the feeders sorted by their SAIDI numbers, and also how each feeder contributes to the total SAIDI value.
Purpose	Business users can identify the feeders that are not performing well, and thus analyze how each feeder contributes to the total SAIDI value. Based on the analysis, they might choose to replace or upgrade feeders or check if there are any external factors impacting the feeder performance. Also, they can figure out if any load balancing techniques have to be used.
Representation	The table shows the SAIDI values and ranks (for both current month and previous month) for each of the top 10 worst performing feeders. The percentage of total value is also shown.
Drill Down	No drill down
Source Object	Control Zone Outage Fact
OBIEE Subject Area	NMS - Control Zone Outage
Metrics	SAIDI, % of Total, Rank of SAIDI, Previous SAIDI Rank

Feeder Analysis

Property	Details
Description	This analysis shows the percentages of system SAIDI and SAIFI for the selected period.
Purpose	By comparing SAIDI and SAIFI values in an analysis, business users can view the percentage of customers interrupted against the percentage of outage duration. This helps them in planning appropriate solutions during major interruptions.
Representation	The scatter graph shows the percentages of SAIDI and SAIFI. The X-axis represents the percentage of system SAIFI. The Y-axis represents the percentage of system SAIDI. Hover over the dots for specific values. SAIDI = Customer Minutes Interrupted/Number of Customers SAIFI = Number of Customers Interrupted/Number of Customers % System SAIFI = SAIFI of a feeder/system SAIFI % System SAIDI = SAIDI of a feeder/system SAIDI

Property	Details
Drill Down	No drill down
Source Object	Control Zone Outage Fact
OBIEE Subject Area	NMS - Control Zone Outage
Metrics	% System SAIFI, % System SAIDI

Top 10 Worst Feeders Impact on System SAIFI

Property	Details
Description	This analysis shows the percentage of system SAIFI and cumulative percentage of system SAIFI for the top ten worst performing feeders. The data is displayed for the selected period.
Purpose	Business users can focus on those feeders causing adverse impact on the transmission, and thus plan the restoration.
Representation	The line graph shows the percentages of system SAIFI for each of the feeders. The X-axis represents the feeder. The Y-axis represents the percentage of SAIFI. Hover over the bars to view specific values.
Drill Down	No drill down
Source Object	Control Zone Outage Fact
OBIEE Subject Area	NMS - Control Zone Outage
Metrics	% of System SAIFI, Cumulative % of System SAIFI

Trend

The Trend dashboard page provides a snapshot of the SAIDI trends for the selected period.

System Monthly Trend

Property	Details
Description	This analysis shows the SAIDI trend in the previous 12 months.
Purpose	The analysis compares the SAIDI values for the current and previous months. Business users can analyze whether the system performance is better or worse than the previous period. Users can thus identify any system issues.
Representation	The line graph shows the SAIDI values for each month, along with the average monthly SAIDI. The X-axis represents the month and year. The Y-axis represents the SAIDI values. Hover over the lines for specific details.
Drill Down	No drill down
Source Object	Control Zone Outage Fact
OBIEE Subject Area	NMS - Control Zone Outage
Metrics	Monthly SAIDI, Average Monthly SAIDI

Feeder Monthly Trend

Property	Details
Description	This analysis shows the SAIDI trend for the selected feeder in the previous 12 months.
Purpose	The analysis compares the SAIDI values for the current and previous months. Business users can analyze whether the feeder performance is better or worse than the previous period. Users can thus identify any feeder issues.
Representation	The **Feeder** drop down slices the data by various feeders in the system. The line graph shows the SAIDI values for each month, along with the average monthly SAIDI, for the selected feeder. The X-axis represents the month and year. The Y-axis represents the SAIDI values. Hover over the lines for specific details.
Drill Down	No drill down
Source Object	Control Zone Outage Fact
OBIEE Subject Area	NMS - Control Zone Outage
Metrics	Monthly SAIDI, Average Monthly SAIDI

System Rolling Year To Date

Property	Details
Description	This analysis shows the trend of cumulative SAIDI for the year to date (YTD) period. The data is shown from January of the selected year till the selected month.
Purpose	The analysis compares the SAIDI values for the current and previous months. Business users can analyze whether the system performance is better or worse than the previous period. Users can thus identify any system issues.
Representation	The line graph shows the year to date SAIDI values for each month. The X-axis represents the month and year. The Y-axis represents the SAIDI values. Hover over the lines for specific details.
Drill Down	No drill down
Source Object	Control Zone Outage Fact
OBIEE Subject Area	NMS - Control Zone Outage
Metrics	YTD SAIDI

Feeder Rolling Year To Date

Property	Details
Description	This analysis shows the trend of cumulative SAIDI for year to date (YTD) period for selected feeder. The data is shown from January of the selected year till the selected month.

Property	Details
Purpose	The analysis compares the SAIDI values for the current and previous months. Business users can analyze whether the feeder performance is better or worse than the previous period. Users can thus identify any feeder issues.
Representation	The **Feeder** drop down slices the data by various feeders in the system. The line graph shows the year to date SAIDI values for each month. The X-axis represents the month and year. The Y-axis represents the SAIDI values. Hover over the lines for specific details.
Drill Down	No drill down
Source Object	Control Zone Outage Fact
OBIEE Subject Area	NMS - Control Zone Outage
Metrics	YTD SAIDI

System Rolling 12 Months

Property	Details
Description	This analysis shows the sum of SAIDI for the previous 12 months for each month on the X-axis.
Purpose	The analysis compares the SAIDI values over the previous 12 months. Business users can analyze whether the system performance is better or worse than the previous period. Users can thus identify any system issues.
Representation	The line graph shows the respective 12-month rolling SAIDI values for each month. The X-axis represents the month and year. The Y-axis represents the SAIDI values. Hover over the lines for specific details.
Drill Down	No drill down
Source Object	Control Zone Outage Fact
OBIEE Subject Area	NMS - Control Zone Outage
Metrics	12-Month Rolling SAIDI

Feeder Rolling 12 Months

Property	Details
Description	This analysis shows the sum of SAIDI for the previous 12 months for each month on the X-axis for the selected feeder.
Purpose	The analysis compares the SAIDI values over the previous 12 month. Business users can analyze whether the feeder performance is better or worse than the previous period. Users can thus identify any feeder issues.

Property	Details
Representation	The **Feeder** drop down slices the data by various feeders in the system. The line graph shows the respective 12-month rolling SAIDI values for each month. The X-axis represents the month and year. The Y-axis represents the SAIDI values. Hover over the lines for specific details.
Drill Down	No drill down
Source Object	Control Zone Outage Fact
OBIEE Subject Area	NMS - Control Zone Outage
Metrics	12-Month Rolling SAIDI

Reliability by Control Zone

The Reliability by Control Zone dashboard page focuses on the reliability indices calculated for each control zone.

Momentary/Sustained Interruptions

Property	Details
Description	This analysis shows the feeder performance for momentary interruptions and sustained interruptions occurring for a considerable period in the selected year and month.
Purpose	Business users can analyze the data and identify the customers impacted in a specific control zone.
Representation	The first table shows the number of momentary interruptions and the customers impacted in the control zone hierarchy. The second table shows the number of sustained interruptions and the customers impacted in the control zone hierarchy, along with SAIDI, CMI, SAIFI, and CAIDI values. The data is shown for the selected month.
Drill Down	No drill down
Source Object	Control Zone Outage Fact
OBIEE Subject Area	NMS - Control Zone Outage
Metrics	MAIFI, Number of Momentary Interruptions, Number of Customer Served, SAIDI, SAIFI, ASAI, CMI, CAIDI

Substation Interruption Events

Property	Details
Description	This analysis shows the interruptions occurring at the substations for a considerable period in the selected year.
Purpose	Business users can identify the substations where more number of outages are occurring.

Property	Details
Representation	The stacked bar graph shows the momentary and sustained interruptions in each of the substations. The X-axis represents the substations. The Y-axis represents the outage events. Hover over the bars for specific details.
Drill Down	The labels on the X-axis of the stacked bar graph have the master-detail interaction with the Feeder Interruption Events analysis on the same dashboard page. Clicking on a specific substation label refreshes the Feeder Interruption Events to show the data for the specific substation.
Source Object	Control Zone Outage Fact
OBIEE Subject Area	NMS - Control Zone Outage
Metrics	Sustained Interruptions, Momentary Interruptions

Feeder Interruption Events

Property	Details
Description	This analysis shows the interruptions occurring at the feeders for a considerable period in the selected time scale.
Purpose	Business users can identify the substations where more number of outages are occurring.
Representation	Use the **Substation** drop down list to select the substation with feeders having interruptions. The stacked bar graph shows the momentary and sustained interruptions in each of the feeders in the selected substation. The X-axis represents the feeder. The Y-axis represents the outage events. Hover over the bars for specific details.
Drill Down	No drill down
Source Object	Control Zone Outage Fact
OBIEE Subject Area	NMS - Control Zone Outage
Metrics	Sustained Interruptions, Momentary Interruptions

Reliability

The Reliability dashboard page provides a summary of the reliability indices calculated for each city and control zone.

Reliability by City

Property	Details
Description	This analysis provides a spatial representation of the customers interrupted in a specific region. It displays the reliability indices calculated for each city in the selected month.

Property	Details
Purpose	Business users can identify improvements on reliability for the lowest cost.
Representation	The color-coded region on the map shows the customers interrupted in that region. The images (flag icons in red, yellow, and green), variable shapes, and bubbles on the map represent the SAIDI, CMI, CAIDI, and SAIFI indices respectively. Hover over the legends for specific values. The table displays the number of customers interrupted in each city, along with the respective SAIDI, CMI, CAIDI, and SAIFI indices.
Drill Down	No drill down
Source Object	City Outage Fact
OBIEE Subject Area	NMS - City Outage
Metrics	Customers Interrupted, SAIDI, CAIDI, CMI

Device Analysis

The Device Analysis dashboard page focuses on the device performance.

Interruption Map

Property	Details
Description	This map displays the number of outages for each device and the customer minutes interrupted due to the outage. The data is displayed for the selected month.
Purpose	Business users can analyze the performance of each device. They can identify the device location and take appropriate measures for restoring it.
Representation	The images (flag icons in red, yellow, and green) represent the device location of outage. Hover over the flags for number of outage devices, device location (device coordinates), name of the device, and the customer minutes interrupted for respective devices. The table displays the device name, number of outages for each device, and the total customer minutes interrupted due to the outages.
Drill Down	No drill down
Source Object	Restored Customer Outage Fact
OBIEE Subject Area	NMS - Restored Customer Outage
Metrics	Customer Minutes Interrupted, Outages by Devices

Distribution Analytics

This section describes the metrics available in Distribution Analytics of Oracle Utilities Analytics Dashboards. The analytics enable the Utilities' customers to monitor and measure network distribution.

The analytics mainly focus on feeder functionality. Based on certain feeder values (such as its length, capacity, etc), users can calculate the power actually distributed.

Oracle Utilities Analytics Dashboards for Oracle Utilities Network Management System provides Distribution Analytics content in the Distribution dashboard.

Distribution

The Distribution dashboard provides various analytics about feeders and their performance.

To access this dashboard:

1. Go to the **Home** page.
2. Select **Dashboards** > **Distribution Analytics** > **Distribution**.

The dashboard includes the following dashboard pages. The data for current calendar year and previous month is displayed by default. You may modify the criteria per requirement.

- Feeder Load (Composite)
- Feeder Performance

Feeder Load (Composite)

The Feeder Load (Composite) dashboard page focuses on the feeder load statistics in the Oracle Utilities Network Management System model.

Feeder Load

Property	Details
Description	This analysis shows the average feeder load, on a monthly basis, for the previous 15 months. The load is measured in kilovolt-ampere (kVA).
Purpose	Business users can analyze if the feeder is handling the load as per its capacity or it is being overloaded.
Representation	The line graph shows the average feeder load for the previous 15 months. Hover over the line for specific details. The X-axis denotes the calendar month. The Y-axis denotes the average feeder load in kVA. Use the graph to view the low-level details of the feeder load.
Drill Down	No drill down
Source Object	Feeder Delivered Load Snapshot Fact
OBIEE Subject Area	DMS - Feeder Delivered Load Snapshot
Metrics	Average kVA, kw, kVAr, Amp, Voltage

Feeder Load Detail

Property	Details
Description	This analysis displays the maximum daily feeder load details for the selected month. The details include feeder information and maximum load that can be carried by the feeder in terms of amperes, voltage, etc.
Purpose	Business users can analyze the data and observe or monitor the peaks in the feeder load for the selected month. Any deviations in the load will impact the network distribution.
Representation	The table shows the name of the feeder, manufacturing company of the feeder, and load details for the selected month.
Drill Down	No drill down
Source Object	Feeder Delivered Load Snapshot Fact
OBIEE Subject Area	DMS - Feeder Delivered Load Snapshot
Metrics	Maximum kVA, Maximum kw, Maximum kVAr, Maximum Amp, Maximum Voltage

Greatest Feeder Peak Load Detail

Property	Details
Description	This analysis shows the feeders that experienced the maximum peak load (in kVA) in the selected month. It also shows where the heaviest load exists within the distribution network.
Purpose	The feeders are ranked based on the load each one of them experienced in the selected month. Business users can monitor such feeders closely to ensure that the overload conditions do not occur. Overload might cause breakdown leading to outages.
Representation	The table shows the maximum load for each of the feeder and also the ranking.
Drill Down	No drill down
Source Object	Feeder Delivered Load Snapshot Fact
OBIEE Subject Area	DMS - Feeder Delivered Load Snapshot
Metrics	Maximum kVA

Smallest Feeder Capacity Margin

Property	Details
Description	"Breaker capacity" is the margin before which an overload may occur. This analysis displays the breaker capacity for each feeder that helps to determine the feeders having the smallest remaining margin before overloads may occur, possibly resulting in a breaker lock out.

Property	Details
Purpose	Business users can identify the feeders with lowest margin and take necessary measures to set an even distribution amongst the feeders.
Representation	The table shows the maximum amplitude, maximum breaker amp limit, and the capacity margin for the respective feeder. Capacity Margin = (Maximum Breaker Amp Limit - Maximum Amp)
Drill Down	No drill down
Source Object	Feeder Delivered Load Snapshot Fact
OBIEE Subject Area	DMS - Feeder Delivered Load Snapshot
Metrics	Capacity Margin, Maximum Amp, Maximum Breaker Amp Limit

Feeder Performance

The Feeder Performance dashboard page provides a snapshot of the overall health of feeders, such as worst performing feeders. It also compares the feeder performance with that of the previous period, along with the number of interruptions and customers impacted. This can alert the businesses to take preventive action in advance.

Feeder Performance

Property	Details
Description	This analysis displays the reliability indices for company, region, division, and feeder level, along with the number of customers served per control zone. The data is displayed for the selected calendar year.
Purpose	Business users can verify the reliability indices to state the effectiveness of feeders. Users can identify the impact of outages in a specific year and control zone.
Representation	The table shows the number of sustained interruptions, number of momentary interruptions, number of customers served, and the relative reliability indices, for the selected calendar year.
Drill Down	No drill down
Source Object	Control Zone Outage Fact
OBIEE Subject Area	NMS - Control Zone Outage
Metrics	SAIDI, SAIFI, CMI, CAIDI, MAIFI, Number of Sustained Interruptions, Number of Customer Served

Top 10 Worst Performing Feeders

Property	Details
Description	This analysis displays the top 10 worst performing feeders in the selected month, sorted by their SAIDI numbers.

Property	Details
Purpose	Business users can identify the feeders that are not performing well, and thus analyze how each feeder contributes to the total SAIDI value. Based on the analysis, they might choose to replace or upgrade feeders or check if there are any external factors impacting the feeder performance. Also, they can figure out if any load balancing techniques have to be used.
Representation	The table shows the SAIDI values for each of the feeders and their corresponding SAIDI rank. The previous SAIDI rank is also shown to compare the performance in the current month and the previous month. It also shows the percentage of total SAIDI for each of the feeders. % of Total = (SAIDI * 100) / Total SAIDI The pie chart shows the share of each feeder in total SAIDI.
Drill Down	No drill down
Source Object	Control Zone Outage Fact
OBIEE Subject Area	NMS - Control Zone Outage
Metrics	SAIDI, SAIFI, CMI, CAIDI, MAIFI, Number of Sustained Interruptions, Number of Customer Served

Top 10 Consecutive Worst Performing Feeders

Property	Details
Description	Sometimes, feeders tend to under perform due to environmental factors, overload, or outdated hardware issues. This analysis displays the top 10 feeders that are consecutively performing badly. The data is shown for the selected month.
Purpose	Feeders that consecutively perform worse might need more attention. Any degrade in the performance might need necessary measures.
Representation	The table shows the SAIDI values and the respective SAIDI ranks for each of the top 10 worst performing feeders in the selected and previous months. It also shows the percentage of total SAIDI for each of the feeders. % of Total = (SAIDI * 100) / Total SAIDI The **Rank** text box displays selected ranks in the report.
Drill Down	No drill down
Source Object	Control Zone Outage Fact
OBIEE Subject Area	NMS - Control Zone Outage

Property	Details
Metrics	SAIDI, % of Total, Rank of SAIDI, Previous SAIDI Rank, Previous SAIDI

Chapter 2

NMS Management Reporting

The management reporting modules were designed specifically to meet the challenges of measuring, monitoring, and reporting performance of electric distribution operations. Considerable design and implementation guidance from the user community was incorporated into these modules, resulting in powerful, easy-to-use measuring, monitoring, and reporting tools.

A set of standard Trouble reports are available in Oracle Business Intelligence Publisher. These Trouble reports reflect the information that executives and regulatory agencies typically require from a utility's operations systems.

For more details about management reporting and using Oracle Utilities Business Intelligence Publisher, see *Oracle Utilities Analytics Installation Guide.*

Trouble Reporting Reports

The Oracle Utilities Network Management System – Trouble Reporting module gathers pertinent information about completed outages from the Oracle Utilities Business Intelligence Data Warehouse and calculates performance measures of the distribution system. The information gathered consists of historical data from various areas such as causes, devices, outage times, call details, crew details, and customer details. In addition to reports of trouble-related information, Trouble Reporting includes reports of performance measures based on reliability indices.

This section describes the following reports:

- Outage Summary
- Critical Customers Outages
- Daily Trouble Report
- Device Outage History
- Sustained Outage Summary
- Recurring Device Outages
- Reliability Indices Reports

Outage Summary

The Outage Summary reflects outage causes while displaying the number of customer interruptions and customer minutes of duration. You can organize it by company or region. Each row displays a cause, while the columns display the report categories.

The Outage Summary displays the following columns:

- The **Company** column contains the name of the company that serves the customer.
- The **Outage Cause** column contains the primary cause of the outage as determined from the drop-down selections in the Event Details window (see **Event Details** on page 2-2 for more information). This is useful for filtering, sorting, and analyzing outage causes. The logic used in determining the primary cause is the same as what is used for the Daily Trouble Report. The **Outages** column contains the total number of outages during the specified period for the cause in the specified area.
- The **Cust Out** column contains the total number of customers experiencing outages during the specified period for the cause in the specified area.
- The **Customer Minutes Interrupted** column contains the sum of the customers affected multiplied by the outage duration for each outage during the specified period for the cause in the specified area.

Critical Customers Outages

The Critical Customers Outages report displays the duration (in minutes) of the outage for the critical customer. It contains the following columns:

- The **Company** column contains the name of the company that serves the customer.
- The **Region** column contains the name of the region that serves the customer.
- The **Branch** column contains the name of the branch that serves the customer.
- The **Substation** column contains the name of the substation that serves the customer.
- The **Feeder** column contains the name of the feeder that serves the customer.
- The **Per Name** column contains the name of the customer who experienced an outage during the specified period for the specified area.
- The **Customer Minutes Interrupted** column contains the sum of each outage duration (in minutes) during the specified period for the customer.
- The **Medical** column indicates whether the customer is a medical customer.
- The **Key** column indicates whether the customer is a key customer.
- The **Critical** column indicates whether the customer is an emergency customer.

Daily Trouble Report

The Daily Trouble Report displays events on a daily basis. It identifies the crew, hours worked, resolution and primary cause. Each column is organized by the report categories.

This report contains the following columns:

- The **Region** column contains the name of the region where the outage is located.
- The **Branch** column contains the name of the branch where the outage is located.
- The **Substation** column contains the name of the substation where the outage is located.
- The **Feeder** column contains the name of the feeder where the outage is located.
- The **Exclude?** column indicates whether is the outage is excluded from the reliability indices calculations (Y = excluded; N = not excluded).
- The **Event #** column contains the system identification number for the outage.
- The **Location of First Call** column contains the address of the first call received for the outage.

- The **Outage Trouble Code** column contains the clues associated with the outage.
- The **Device Name** column contains the name of the interrupting device associated with the outage.
- The **Outage Began Date** column contains the date and time the outage began.
- The **Outage Restored Date** column contains the date and time the outage was restored.
- The **Outage Duration (Minutes)** column contains the duration of the outage (in minutes).
- The **Cust Out** column contains the number of customers affected by the outage.
- The **Remedy** column contains the action take to resolve the outage, as entered in the Event Details window.
- The **Event Note** column contains the operations event note associated with the outage.
- The **Crew Contact** column contains the name of the crew leader for the crew associated with the outage, if any.
- The **Crew Dur** column contains the duration between the time the crew accepted the assignment and the time the crew arrived at the outage location (in minutes).
- The **Cause of Outage** column contains the primary cause of the outage as determined from the drop-down selections in the Event Details window. This is useful for filtering, sorting, and analyzing outage causes.

The logic used in determining the primary cause is shown in the following table:

Weather	Environ-ment	Vegetation	Foreign Interference	Defective Equipment	Scheduled	Utility Error	Other	Use as Cause of Outage
any	any	any	any	any	selected	any	any	Scheduled
any	any	any	any	any	unselected	selected	any	Utility Error
any	any	any	any	any	unselected	unselected	selected	Other
any	any	any	selected	any	unselected	unselected	unselected	Foreign Interference
any	any	selected	unselected	any	unselected	unselected	unselected	Vegetation
any	any	unselected	unselected	selected	unselected	unselected	unselected	Defective Equipment
any	selected	unselected	unselected	unselected	unselected	unselected	unselected	Environment
selected	unselected	unselected	unselected	unselected	unselected	unselected	unselected	Weather
unselected	unselected	unselected	unselected	unselected	unselected	unselected	unselected	none

- The **Scheduled** column contains the value selected from the Scheduled drop-down in the Event Details window, indicating whether the outage was scheduled or not.
- The **Utility Error** column contains the value selected from the Utility Error drop-down in the Event Details window, indicating any utility error associated with the outage.
- The **Other** column contains the value selected from the Other drop-down in the Event Details window, indicating any other characteristics associated with the outage.
- The **Foreign Interference** column contains the value selected from the Foreign Interference drop-down in the Event Details window, indicating any foreign interference associated with the outage.

- The **Vegetation** column contains the value selected from the Vegetation drop-down in the Event Details window, indicating any vegetation conditions associated with the outage.
- The **Defective Equipment** column contains the value selected from the Defective Equipment drop-down in the Event Details window, indicating any defective equipment associated with the outage.
- The **Environment** column contains the value selected from the Environment drop-down in the Event Details window, indicating any environmental conditions associated with the outage.
- The **Weather** column contains the value selected from the Weather drop-down in the Event Details window, indicating any weather conditions associated with the outage.

Device Outage History

The Device Outage History displays the history of outages for a selected device during a selected period. A summarization of the customer interruptions, customer minutes interrupted and number of events for each distinct interrupting device and each distinct interrupting device type is also displayed.

This report contains the following columns:

- The **Device Name** column contains the name of the interrupting device.
- The **Exclude?** column indicates whether is the outage is excluded from the reliability indices calculations (Y = excluded; N = not excluded).
- The **Location of First Call** column contains the address of the first call received for the outage.
- The **Outage Began Date** column contains the date and time the outage began.
- The **Outage Restored Date** column contains the date and time the outage was restored.
- The **Customer Interruptions** column contains the total number of customers affected by the outage.
- The **Customer Minutes Interrupted** column contains the sum of the customers affected by the outage multiplied by the outage duration.
- The **Event #** column contains the system identification number for the outage.
- The **Remedy** column contains the action taken to resolve the outage, as entered in the Event Details window.
- The **Event Note** column contains the operations event note associated with the outage.
- The **Cause of Outage** column contains the primary cause of the outage as determined from the drop-down selections in the Event Details window. This is useful for filtering, sorting, and analyzing outage causes. The logic used in determining the primary cause is the same as what is used for the **Daily Trouble Report** on page 2-2.
- The **Scheduled** column contains the value selected from the Scheduled drop-down in the Event Details window, indicating whether the outage was scheduled or not.
- The **Utility Error** column contains the value selected from the Utility Error drop-down in the Event Details window, indicating any utility error associated with the outage.
- The **Other** column contains the value selected from the Other drop-down in the Event Details window, indicating any other characteristics associated with the outage.
- The **Foreign Interference** column contains the value selected from the Foreign Interference drop-down in the Event Details window, indicating any foreign interference associated with the outage.

- The **Vegetation** column contains the value selected from the Vegetation drop-down in the Event Details window, indicating any vegetation conditions associated with the outage.
- The **Defective Equipment** column contains the value selected from the Defective Equipment drop-down in the Event Details window, indicating any defective equipment associated with the outage.
- The **Environment** column contains the value selected from the Environment drop-down in the Event Details window, indicating any environmental conditions associated with the outage.
- The **Weather** column contains the value selected from the Weather drop-down in the Event Details window, indicating any weather conditions associated with the outage.

Sustained Outage Summary

The Sustained Outage Summary displays the total sustained outages and the customers interrupted for a specified period, organized by region.

- This report displays the following columns:
- The **Company** column contains the name of the company where the outages are located.
- The **Region** column contains the name of the region where the outages are located.
- The **Branch** column contains the name of the branch where the outages are located.
- The **Substation** column contains the name of the substation where the outages are located.
- The **Feeder** column contains the name of the feeder where the outages are located.
- The **Outages** column contains the total number of outages in the specified area during the specified period.
- The **Cust Out** column contains the total number of customers experiencing outages during the specified period in the specified area.
- The **Customer Minutes Interrupted** column contains the sum of the customers affected multiplied by the outage duration for each outage during the specified period in the specified area.

Recurring Device Outages

The Recurring Device Outages report identifies interrupting devices that have been associated with a specified number or more sustained and momentary outages. This report displays all device outages for the period requested and is organized by the report categories. A summarization of the information for all of the devices on each distinct feeder is also displayed.

This report displays the following columns:

- The **Company** column contains the name of the company where the outages are located.
- The **Region** column contains the name of the region where the outages are located.
- The **Branch** column contains the name of the branch where the outages are located.
- The **Substation** column contains the name of the substation where the outages are located.
- The **Feeder** column contains the name of the feeder where the outages are located.
- The **Device Type** column contains the device type of the interrupting device on which the outages are located.
- The **Total Outages** column contains the total number of outages on the device during the specified period.

- The **Total Duration** column contains the total duration of outages on the device experiencing outages during the specified period.
- The **Customer Minutes Interrupted** column contains the sum of the customers affected multiplied by the outage duration for each outage on the device during the specified period.

Reliability Indices Reports

The reliability indices (SAIDI, SAIFI, CAIDI, etc.) are calculated values that provide a measure of the reliability of the distribution system. These reports contain three main categories of reports: Sustained Interruptions, Momentary Interruptions, and Sustained and Momentary Interruptions. In each report, each column is organized by report categories.

For more information about reliability indices, refer to the IEEE Std 1366-2003.

Feeder Reports

There are two types of sustained interruptions reports:

- Customers Experiencing Multiple Interruptions (CEMI)
- Average Service Availability Index (ASAI), System Average Interruption Frequency Index (SAIFI), System Average Interruption Duration Index (SAIDI), Customer Average Interruption Duration Index (CAIDI), Customer Average Interruption Frequency Index (CAIFI)

Indice Report

The Indice report displays the ASAI, SAIFI, SAIDI, CAIDI, CAIFI, MAIFI, MAIFIe, ACI, MSAIFI, CEMI and CEMSMI calculations for a specified period by feeder. (See descriptions of each calculation in the following paragraphs.)

The Indice Report displays the following columns:

- The **Company** column contains the name of the company where the outages are located.
- The **Region** column contains the name of the region where the outages are located.
- The **Branch** column contains the name of the branch where the outages are located.
- The **Substation** column contains the name of the substation where the outages are located.
- The **Feeder** column contains the name of the feeder where the outages are located.
- The **ASAI** column contains the Average Service Availability Index value for the feeder. This is the fraction of time that a customer has received power during the specified period.
- The **SAIFI** column contains the System Average Interruption Frequency Index value for the feeder. This indicates how often the average customer experienced a sustained interruption during the specified period.
- The **SAIDI** column contains the System Average Interruption Duration Index value for the feeder. This indicates the total duration of interruption, in minutes, for the average customer during the specified period.
- The **CAIDI** column contains the Customer Average Interruption Duration Index value for the feeder. This represents the average time required to restore service to those customers experiencing sustained interruptions during the specified period.
- The **CAIFI** column contains the Customer Average Interruption Frequency Index value for the feeder. This gives the average frequency of sustained interruptions for those customers experiencing sustained interruptions during the specified period for the specified area. The customer is counted once regardless of the number of times interrupted for this calculation.

- The **MAIFI** column contains the Momentary Average Interruption Frequency Index value for the feeder. MAIFI indicates how often the average customer experienced a momentary interruption during the specified period.
- The **MAIFI** column contains the Momentary Average Interruption Event Frequency Index value for the feeder. This indicates how often the average customer experienced a momentary interruption event during the specified period. It does not include momentary interruptions immediately preceding a lockout.
- The **ACI** column contains the Average Number of Customers per Interruption value for the feeder. This indicates the average number of customers interrupted for each interruption (sustained or momentary) during the specified period for the specified area.
- The **MSAIFI** column contains the Momentary and Sustained Average Interruption Frequency Index value for the feeder. This indicates how often the average customer experienced a momentary and sustained interruption during the specified period.
- The **CEMI** column contains the Customers Experiencing Multiple Interruptions value for the feeder. This indicates the ratio of individual customers experiencing more than 3 sustained interruptions to the total number of customers served.
- The **CEMSMI** column contains the Customers Experiencing Multiple Sustained and Momentary Interruption Events value for the feeder. This is the ratio of individual customers experiencing more than 3 of both sustained and momentary interruption events to the total customers served. Its purpose is to help identify customer issues that cannot be seen using averages.

Indices by City

There is also a report that displays all of the Indices calculations for a specified period by city, state and country rather than by feeder.

This report displays the following columns:

- The **City** column contains the name of the city where the outages are located.
- The **CEMI** column contains the Customers Experiencing Multiple Interruptions value for the city.
- The **ASAI** column contains the Average Service Availability Index value for the city.
- The **SAIFI** column contains the System Average Interruption Frequency Index value for the city.
- The **SAIDI** column contains the System Average Interruption Duration Index value for the city.
- The **CAIDI** column contains the Customer Average Interruption Duration Index value for the city.
- The **CAIFI** column contains the Customer Average Interruption Frequency Index value for the city.
- The **MAIFI** column contains the Momentary Average Interruption Frequency Index value for the city.
- The **MAIFIe** column contains the Momentary Average Interruption Event Frequency Index value for the city.
- The **ACI** column contains the Average Number of Customers per Interruption value for the city.
- The **MSAIFI** column contains the Momentary and Sustained Average Interruption Frequency Index value for the city.
- The **CEMI** column contains the Customers Experiencing Multiple Interruptions value for the city.

- The **CEMSMI** column contains the Customers Experiencing Multiple Sustained and Momentary Interruption Events value for the city.