Speakers: Tanzina Islam and Christina Ospina

December 16, 2015
Overview

- Setup Utility Info
- Enter Outages
- Run Reports
Welcome to the eReliability Tracker application

Dear Users: APPA staff recently put together a video to support your efforts in waging the war on outages. It can be viewed at this link. Enjoy!

To help public power utilities with reliability metrics, the American Public Power Association created this eReliability Tracker software. Development of this software was supported by a grant from APPA’s DEED (Demonstration of Energy and Efficiency Developments) program. This software is designed to provide excellent outage data collection and categorization services with good introductory coverage of the standard IEEE 1366 metrics for public power.

To help ensure all public power utilities have access to a reliability metrics tool, APPA updates and maintains this software regularly. If you have questions on how to use this software, visit our youtube channel for instructional videos, or read the user’s guide (Leader’s Guide and Member’s Guide). If you have additional questions please email reliability@publicpower.org.

Please use the most up to date version of your preferred web browser. For the best user experience, please use a non-proprietary browser, such as Google Chrome or Firefox.

The IEEE 1366 metrics used by eReliability Tracker were created by utility personnel as a framework for internal reliability benchmarking and external utility comparison. To benchmark internally or externally, outage data should be collected and evaluated for at least five years. The eReliability Tracker software is designed to help facilitate the collection and analysis of outage data. It incorporates several powerful features to this end.

Calculating reliability metrics is a part of the pathway to continued exceptional performance. APPA’s RP3 (Reliable Public Power Provider) program designates 25 percent of its points for reliability. The RP3 program is open to all utilities seeking to document and publicize their excellence in the areas of reliability, safety, work force development, and system improvement. The growing number of utilities applying to this program shows increasing utility interest in tracking and establishing reliability indicators based on sound metrics. By regularly using this software, your utility is ensuring that it meets the RP3 best practice requirement to track reliability indices.
Manage Tab

• Users in the system
• Circuit and substation information
• Equipment and custom variable list
• Key accounts
If you are a leader, you will have access to all user accounts for your utility.

<table>
<thead>
<tr>
<th>Select</th>
<th>Username</th>
<th>Utilities</th>
<th>Role</th>
<th>Last Login</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ultraReliable</td>
<td>TESST APPA Utility</td>
<td>Member</td>
<td>Wed, 07 May 2014 19:29</td>
</tr>
<tr>
<td></td>
<td>mdcotest</td>
<td>TESST APPA Utility</td>
<td>Leader</td>
<td>Thu, 01 May 2014 19:02</td>
</tr>
<tr>
<td></td>
<td>MSuddleson</td>
<td>TESST APPA Utility</td>
<td>Leader</td>
<td>Wed, 09 Apr 2014 20:49</td>
</tr>
<tr>
<td></td>
<td>tesster</td>
<td>TESST APPA Utility</td>
<td>Leader</td>
<td>Wed, 19 Nov 2014 03:38</td>
</tr>
<tr>
<td></td>
<td>alexnho</td>
<td>TESST APPA Utility</td>
<td>Leader</td>
<td>Tue, 29 Jul 2014 02:58</td>
</tr>
</tbody>
</table>

The far right column shows when the user last logged into the system.
If you are a leader, toggle this button to require your user to reset their password during their next login attempt.

If you have a Joint Action Agency account, this is where you can add or take away your users’ access to your utilities.

Select to receive email updates on the tracker here. You can opt-in or out anytime.
There are 3 roles, or types of users, in the tracker:
- Leader
- Member
- Spectator

Each role has a different set of permissions. You can have as many users as you like in each role.
- Select the Utilities tab to see your utilities.
- If you are a JAA, you will see multiple utilities listed.
- If you are a single utility user, this will list your utility only.

This shows the current number of total customers served entered for the utility.
Manage Tab – Edit Utility

Enter the total number of customers your utility serves here. This value is used in the reporting analysis so it is important to maintain!
Manage Tab – Adding/Editing Substations

Select the substation or circuit to edit either name.
Manage Tab – Adding/Editing Substations

Edit Substation

- Name: North Substation
- [Update Substation] [Cancel]

New Substation

- Name: 
- [Create Substation] [Cancel]
Manage Tab – Adding/Editing Circuits

 Bulk Actions – Search:

- NS Circuit 1
- Circuit 2
- NS Circuit 1 Gold Hill

Showing 1 to 3 of 3 entries

Edit Circuit

- Name: Circuit 1
- Total Customers Served:

- Update Circuit
- Cancel
Customers per Circuit

- Helps speed up the process of determining the total number of customers out when there is an outage.
- This will auto-populate the “Customers Out” field in the outage form based on the circuit selected.
Customers per Circuit

Keep in mind that…

• **If the user only selects a substation** (no circuit selected), the system will add the customers across all circuits for that substation and auto-populate the total customers field.

• **If the user only selects a circuit** (no substation selected), the system will populate the field with the number of customers on that circuit. The substation field will also be populated with the appropriate substation name.

• **If you manually enter a value into the field**, the auto-calculation aspect of this feature will be disabled.

• **If a user views or edits an existing outage** the auto-fill feature will be off (regardless of whether the user manually entered the original value or not).
Manage Tab – Adding/Editing Customers

Edit Utility

Name: TESST APPA Utility
Address: 1875 Connecticut Ave, NW, Suite 1200
City: Washington
State: District Of Columbia
Zip Code: 20009
Total Customers: 22000

Note on Total Customers: The number of customers served by the utility must be entered correctly and updated as needed. This number is used for outage-related reports.

Update Utility  Cancel
Managing Tab – Adding/Editing Customers

The customers entered here show up in the outage form for your utility to help keep track of outages on key accounts.
Manage Tab – Edit Equipment/Custom Variables
Manage Tab – Edit Equipment/Custom Variables

Select an item to either edit the name, make it a child to a parent item, or delete.
Outage Tab

• Entering outages
• Selecting the right cause
• Grouping select outages into events
• Importing/exporting data
Outage Tab – Creating an Outage

New Outage for TESST APPA Utility

Location of Outage
- Address: 1310 Rhode Island Ave NW
- Substation: North Substation
- Circuit: NS Circuit 1

Cause of Outage
- Primary Cause: Utility Maintenance and Repairs

Details of Outage
- Number of customers without power: 228
- Time outage began (Use military time): 20:20:00
- Date outage began: 05/23/2015
- Time outage ended (Use military time): 04:33:00
- Date outage ended: 05/24/2015

System Characteristics
- Descriptive characteristics:
- System voltage at site:
- Phases impacted:

Miscellaneous Details
- Key accounts without power: East Building, North building, South Building
- How was the outage reported:
- Total work hours to complete restoration: 0

Those in RED are required fields
Reliability – Getting to the Right Outage Cause

- **Always** try to select the cause that *most directly caused the outage* and will help the utility make improvements in the future.
- For example, if a wind storm knocks a tree onto the line, ‘tree’ is the cause.
- Select a cause that represents your level of available information.

![Diagram showing decision-making process based on information availability](image-url)
Outage Tab – Creating an Outage

System Characteristics
- Descriptive characteristics: Generation
- System voltage at site: 12000Y/6930
- Circuit Type: Secondary Selective
- Phases impacted: 2 (B)
- Load Interrupted (in kVA): 0

Miscellaneous Details
- Key accounts without power: East Building, North building, South Building, Outage Management System
- How was the outage reported: Outage Management System
- Total work hours to complete restoration: 0
- Total Customers Served: 22000

Work Details & Custom Variables
- Equipment Action: Work Detail
- Equipment: [Field]
- Notes: Marked as "partial restoration"

Add more variables here

Additional Details and Custom Variables

System Characteristics and Miscellaneous Details
Outage Tab – Work Details & Custom Variables

This drop-down list is pulled from your Equipment and Custom Variable List.

Customize the list to fit your utility’s needs.
Outage Tab – Creating an Event

**NOTE:** A single outage itself is recorded as an event in the tracker.
Outage Tab – Creating an Event

- NOTE: A single outage itself is recorded as an event in the tracker.
- Enhancements for grouping together outages into events are in-progress.

<table>
<thead>
<tr>
<th>Select</th>
<th>Name</th>
<th>Outages Involved</th>
<th>Start Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Marty Test Outages</td>
<td>2</td>
<td>01/01/2015</td>
</tr>
<tr>
<td></td>
<td>2461 Crystal Drive</td>
<td>1</td>
<td>08/31/2014</td>
</tr>
<tr>
<td></td>
<td>2032 Belmont Rd</td>
<td>1</td>
<td>05/03/2014</td>
</tr>
<tr>
<td></td>
<td>1875 Connecticut Ave., NW, Suite 1200</td>
<td>2</td>
<td>01/01/2014</td>
</tr>
<tr>
<td></td>
<td>2900 K ST NORTHWEST</td>
<td>1</td>
<td>09/05/2013</td>
</tr>
<tr>
<td></td>
<td>1330 MASSACHUSETTS Ave NORTHWEST</td>
<td>1</td>
<td>09/05/2013</td>
</tr>
<tr>
<td></td>
<td>1310 RHODE ISLAND Ave NORTHWEST</td>
<td>1</td>
<td>09/05/2013</td>
</tr>
<tr>
<td></td>
<td>2735 OLIVE ST NORTHWEST</td>
<td>1</td>
<td>09/05/2013</td>
</tr>
<tr>
<td></td>
<td>2735 OLIVE ST NORTHWEST</td>
<td>1</td>
<td>05/05/2013</td>
</tr>
<tr>
<td></td>
<td>751 P ST NORTHWEST</td>
<td>1</td>
<td>09/05/2013</td>
</tr>
<tr>
<td></td>
<td>2501 PENNSYLVANIA Ave NORTHWEST</td>
<td>1</td>
<td>08/27/2013</td>
</tr>
<tr>
<td></td>
<td>2500 Q ST NORTHWEST</td>
<td>1</td>
<td>08/27/2013</td>
</tr>
<tr>
<td></td>
<td>2900 K ST NORTHWEST</td>
<td>1</td>
<td>08/26/2013</td>
</tr>
<tr>
<td></td>
<td>1718 P ST NORTHWEST</td>
<td>1</td>
<td>07/15/2013</td>
</tr>
</tbody>
</table>
Outage Tab – Editing an Event

Edit Event

Name: 1875 Connecticut Ave, NW, Suite 1200

Cause Type
- Single-Cause Event
- Multi-Cause Event

Outages for this Event

*NEW*

Customer Interruptions based on outages marked as partial restoration
Causes Pie Chart

This toggle button allows you to either rank the causes by count or by duration.
Multiple vs Single Cause Events

When “Single-Cause Event” is selected, the first cause is used as the cause of the event as a whole.

When “Multi-Cause Event” is selected, all causes listed in the event are counted in the analysis.
Multiple vs Single Cause Events

When I run the report to rank by ‘**count**’…

‘Multi-Cause’ is selected:
Both outage’s causes are included in the report.

<table>
<thead>
<tr>
<th>Outage Cause</th>
<th>Count</th>
<th>View</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment Damage</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Lightning</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2</strong></td>
<td></td>
</tr>
</tbody>
</table>

‘Single-Cause’ is selected:
Only the first outage’s cause (based on start time/date), is accounted for in the report analysis.

<table>
<thead>
<tr>
<th>Outage Cause</th>
<th>Count</th>
<th>View</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lightning</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1</strong></td>
<td></td>
</tr>
</tbody>
</table>
Multiple vs Single Cause Events

When I run the report to rank by ‘duration’…

‘Multi-Cause’ is selected:
Outage 1: 100 CI * 10 mins = 1,000 customer minutes of duration
Outage 2: 50 CI * 10 mins = 500 customer minutes of duration

‘Single-Cause’ is selected:
Outage 1: 100 CI * 10 mins = 1,000 customer minutes of duration
Outage 2: 50 CI * 10 mins = 500 customer minutes of duration
Set “Is Part of Restoration?” to ‘Yes’ if the customers interrupted in that outage are still the same customers as before.

Set the value to ‘No’ if the customers interrupted are new customers out.

<table>
<thead>
<tr>
<th>Substation</th>
<th>Circuit</th>
<th>Customers Out</th>
<th>Start Date</th>
<th>Is Part of Restoration?</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Substation</td>
<td>Circuit 3</td>
<td>100</td>
<td>01/01/2015</td>
<td>No</td>
</tr>
<tr>
<td>North Substation</td>
<td>Circuit 2</td>
<td>50</td>
<td>01/01/2015</td>
<td>No</td>
</tr>
<tr>
<td>NS Circuit 1</td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>NS Circuit 1</td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
</tbody>
</table>
Part of Restoration

Let’s try an example scenario…

Below is how we would enter this in the tracker. For our example, we are creating 3 separate outages and grouping them into one outage event.

Note the use of the column “Is Part of Restoration?”

<table>
<thead>
<tr>
<th>Select</th>
<th>Address</th>
<th>Substation</th>
<th>Circuit</th>
<th>Cause</th>
<th>Customers Out</th>
<th>Start Time</th>
<th>Is Part of Restoration?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2451 Restoration</td>
<td>North Substation</td>
<td>North Circuit 1</td>
<td>Lightning ✓</td>
<td>100</td>
<td>01/01/2016 01:00:00</td>
<td>No</td>
</tr>
<tr>
<td>2</td>
<td>2451 Restoration</td>
<td>North Substation</td>
<td>North Circuit 1</td>
<td>Lightning ✓</td>
<td>50</td>
<td>01/01/2016 01:05:00</td>
<td>No</td>
</tr>
<tr>
<td>3</td>
<td>2451 Restoration</td>
<td>North Substation</td>
<td>North Circuit 2</td>
<td>Utility Human Error ✓</td>
<td>50</td>
<td>01/01/2016 01:05:00</td>
<td>No</td>
</tr>
</tbody>
</table>
Part of Restoration

If we keep all of the Part of Restoration values set to ‘No’…

\[ \text{SAIFI} = \frac{\text{Total number of customer interruptions}}{\text{Number of customers served}} = \frac{[100+50+50]}{\text{total # of customers served}} \]

Note that the number of customers interrupted is 200 because it is including the customers out from each outage entry.
Part of Restoration

Let’s try an example scenario…

SAIFI = \[
\frac{\text{Total number of customer interruptions}}{\text{Number of customers served}} = \frac{100 + 50}{\text{total # of customers served}}\]

Note that the number of customers interrupted does not include the second outage’s customers because they are marked as ‘Is Part of Restoration’, indicating that they are the same customers out.
Part of Restoration

SAIDI = Total customer minutes of interruption/ Number of customers served
= [(100)(5) + (50)(5) + (50)(5)] / total # of customers served

Note that customer minutes of duration is the sum of the customer minutes of duration for all three outages in the event (or the area of all the purple boxes), regardless of the ‘Part of Restoration’ feature.
When the Causes Pie Chart report is run by ‘Count’ and the outages are all set to ‘No’ for ‘Is Part of Restoration?’, these are our results:

<table>
<thead>
<tr>
<th>Address</th>
<th>Substation</th>
<th>Circuit</th>
<th>Cause</th>
<th>Customers Out</th>
<th>Start Time</th>
<th>Is Part of Restoration?</th>
</tr>
</thead>
<tbody>
<tr>
<td>2451 Restoration Avenue</td>
<td>North Substation</td>
<td>North Circuit 1</td>
<td>Lightning</td>
<td>100</td>
<td>01/01/2016 01:00:00</td>
<td>No</td>
</tr>
<tr>
<td>2451 Restoration Avenue</td>
<td>North Substation</td>
<td>North Circuit 1</td>
<td>Lightning</td>
<td>50</td>
<td>01/01/2016 01:05:00</td>
<td>No</td>
</tr>
<tr>
<td>2451 Restoration Avenue</td>
<td>North Substation</td>
<td>North Circuit 2</td>
<td>Utility Human Error</td>
<td>50</td>
<td>01/01/2016 01:05:00</td>
<td>No</td>
</tr>
</tbody>
</table>

Part of Restoration and Multi/Single Event
Part of Restoration and Multi/Single Event

When the Causes Pie Chart report is run by ‘Count’ and the outages are all set to ‘No’ for ‘Is Part of Restoration?’, these are our results:
If ‘Single-Cause’ is selected, the system will completely ignore the ‘Is Part of Restoration’ feature and work as previously discussed.
Reports Tab

- IEEE Statistics Report
- SAIDI/SAIFI/CAIDI Reports
- Outage Causes Report
- Causes Pie Chart Report
- Circuit Ranking Report
For momentary outage calculations, enter “5” in the Maximum Event Duration filter.

For sustained outage calculations, enter “5” in the Minimum Event Duration filter.

*NEW* Exclude Loss of Supply feature can now be used!
Sample Results:

<table>
<thead>
<tr>
<th>IEEE Results</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ASAI (percent)</td>
<td>99.8141</td>
</tr>
<tr>
<td>CAIDI (minutes)</td>
<td>1725.195</td>
</tr>
<tr>
<td>SAIDI (minutes)</td>
<td>791.237</td>
</tr>
<tr>
<td>SAIFI (number of interruptions)</td>
<td>0.5</td>
</tr>
</tbody>
</table>
Reports Tab – SAIDI Report

SAIDI Report

- Start Date: 01/01/2014
- End Date: 12/31/2014
- Remove Major Events?: Use IEEE Day threshold
- Top-level Cause:

Minimum event duration (in minutes):

Maximum event duration (in minutes):

Substation:

Circuit:

Exclude Loss of Supply:

Failure of Generator Transmission
Loss of Generating Unit

SAIDI Results

![Graph showing SAIDI results over time]

Range Results

- SAIDI (minutes): 791.237
- Event Count: 3
- IEEE SAIDI Day Threshold (minutes): N/A
Reports Tab – Causes Pie Chart

This toggle button allows you to either rank the causes by count or by duration.

Select the “eye-con” to see the outages that are being included in the analysis under the specific cause.
Reports Tab – Circuit Ranking

Select the “eye-con” to see the outages that are being included in the analysis.
Reports Tab – Monthly report and Live Demo
Live Demo – Importing Data

Simple and Advanced Import Features

Speaker: Christina Ospina
Annual Report

• Customized annual report is provided to each utility as part of their subscription
• Contains aggregate data
  • Per region
  • Customer size classes
  • eReliability Tracker users as a whole

• Don’t forget to enter your data for 2015 by January 1st!!
Sample Annual Report

Table 2
Average SAIDI for all utilities that use the eReliability Tracker (with and without MEs), belong to your region, and are grouped in your customer size class

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>No MEs</th>
<th>Unscheduled</th>
<th>Scheduled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your utility's SAIDI</td>
<td>11.3212</td>
<td>7.9522</td>
<td>15.3765</td>
<td>1.1904</td>
</tr>
<tr>
<td>Average eReliability Tracker Utility SAIDI</td>
<td>108.8641</td>
<td>64.7918</td>
<td>115.4785</td>
<td>3.5419</td>
</tr>
<tr>
<td>Average SAIDI for Utilities Within Your Region</td>
<td>57.8741</td>
<td>55.9107</td>
<td>55.8001</td>
<td>1.0091</td>
</tr>
<tr>
<td>Average SAIDI for Utilities Within Your Customer Size Class</td>
<td>92.1576</td>
<td>70.8481</td>
<td>103.5822</td>
<td>3.5712</td>
</tr>
</tbody>
</table>

Table 3
Summary statistics of the SAIDI data compiled from the eReliability Tracker

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>No MEs</th>
<th>Unscheduled</th>
<th>Scheduled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Value</td>
<td>0.0473</td>
<td>0.0238</td>
<td>0.0473</td>
<td>0</td>
</tr>
<tr>
<td>First Quartile (25th percentile)</td>
<td>9.9574</td>
<td>9.2183</td>
<td>9.5674</td>
<td>0</td>
</tr>
<tr>
<td>Median Quartile (50th percentile)</td>
<td>35.4569</td>
<td>29.1636</td>
<td>36.2547</td>
<td>0.0297</td>
</tr>
<tr>
<td>Third Quartile (75th percentile)</td>
<td>103.7864</td>
<td>63.7411</td>
<td>102.8258</td>
<td>1.2341</td>
</tr>
<tr>
<td>Maximum Value</td>
<td>1262.1172</td>
<td>886.6487</td>
<td>1262.1172</td>
<td>44.6722</td>
</tr>
</tbody>
</table>

Figure 3
Average SAIDI for all utilities that use the eReliability Tracker per region

- Customized statistics and data for each utility.

- Includes aggregate data for those utilities within your region and within your customer size class for the purposes of benchmarking and comparison.
Sample Annual Report

Figure 8
Top five customer-weighted occurrence rates for common causes of sustained outages for all utilities that use the eReliability Tracker System

![Bar chart showing occurrence rates for different causes of outages.]

Figure 10
Top five customer-weighted occurrence rates for sustained outage causes in your region

![Bar chart showing occurrence rates for different causes of outages in a specific region.]
Thanks for joining us!

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Cospina@publicpower.org  202.467.2945

If you have any questions, please email Reliability@PublicPower.org.