

eReliability Tracker

Interruption Cost Report

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What is the CEDS Agreement?

The American Public Power Association (the Association) and the Department of Energy (DOE) entered into a cooperative agreement to do work in utility security, reliability, and resiliency. With these funds, the Association worked to implement a tool that would help utilities better understand the true cost of outages, which would help utilities discern the cost value of increased reliability and resiliency.

What is the ICE Calculator?

The Interruption Cost Estimate (ICE) Calculator, or better known as "ICE Calculator," is a tool developed to help utilities, government organizations, and others estimate the benefits associated with reliability improvements.¹ Through funding from the Office of Delivery and Energy Reliability at DOE and the Lawrence Berkeley National Laboratory (LBNL) developed this reliability planning tool for public use. The model was developed using survey data to determine how to characterize the cost of an interruption to a utility customer.

What is the Interruption Cost Report² in the eReliability Tracker?

Through the cooperative agreement with DOE, the Association was able to take the model from the ICE calculator and embed it into a report in the eReliability Tracker. The report applies the model to your utility's real outage data to calculate an estimated cost. The report provides the user with two tables: the first table shows the worst performing circuits when ranked by estimated customer interruption cost and the other shows the worst outage events when ranked by estimated customer cost. These tables, while estimates, are intended to help utilities better prioritize their reliability-related expenditures.

What is the utility-wide cyber incident simulation?

The report contains a feature that allows utilities to simulate the cost of a utility-wide cyber incident on their particular utility. This is designed to provide interruption cost-based

¹ <http://www.icecalculator.com/>

information by simulating the impact from a known cyber event as if it resulted in a utility-wide electric outage. The factors used in this simulation include:

- Start Date: December 23
- Day Quartile: Afternoon (3:35 PM)
- Season: Winter
- Minutes (duration): 180 minutes
- Customers: The total number of customers served and the customer concentration percentages (i.e. % commercial, industrial, and residential) per circuit at the utility.

Example simulation of a utility-wide cyber incident:

eReliability Tracker Home Outages Reports Manage tesster ▾

Monthly Statistics IEEE 1366 Statistics Circuit Ranking Causes Pie Chart Interruption Cost

Interruption Cost Report for TESST APPA Utility

Start Date: 01/01/2016 End Date: 12/31/2016

Minimum Outage Duration: (in minutes) Maximum Outage Duration: 960
This interruption cost estimate does not include outages lasting longer than 16 hours

Substation: [Dropdown] Circuit: [Dropdown]

Top Level Cause: [Dropdown] Exclude Loss of supply: Failure of Greater Transmission, Loss of Generating Unit

Generate Report Simulate Utility-Wide Cyber Incident

Circuit Name	Res.	Com.	Ind.	Substation Name	Customer Interruptions	Customer Minutes of Interruption	Estimated Cost
NS Circuit 1	55%	30%	15%	North Substation	55	9,900	\$116,163
Circuit 5	5%	15%	80%	Central Substation	10	1,800	\$78,729
Circuit 121	50%	40%	10%	East Substation	34	6,120	\$63,735
Circuit 6	20%	50%	30%	Central Substation	12	2,160	\$47,843
Circuit 4	90%	9%	1%	South Substation	100	18,000	\$30,798
Circuit 2	80%	10%	10%	North Substation	12	2,160	\$14,126
Circuit 3	80%	10%	10%	South Substation	10	1,800	\$11,772
NS Circuit 1 Gold Hill	90%	5%	5%	North Substation	10	1,800	\$5,910
Circuit 7	98%	2%	0%	Central Substation	44	7,920	\$2,255
Circuit 4	100%	0%	0%	Central Substation	12	2,160	\$57

Event Name	Circuit Name	Substation Name	Customer Interruptions	Customer Minutes of Interruption	Estimated Cost
Utility-Wide Cyber Incident	All Circuits	All Substations	299	53,820	\$371,388

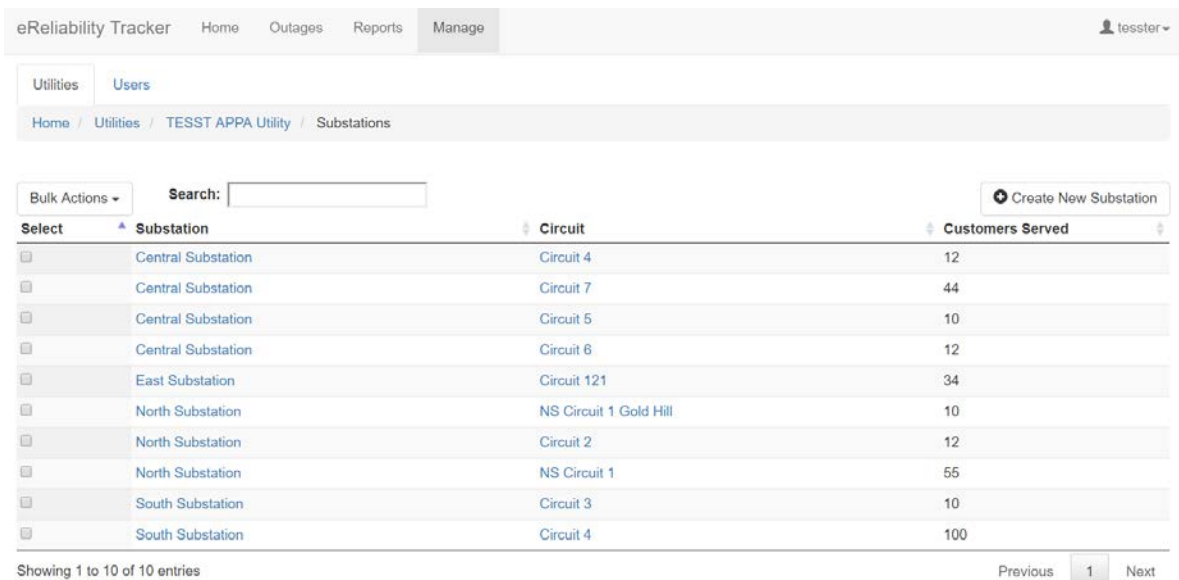
Who should use the Interruption Cost Report?

The Interruption Cost Report in the eReliability Tracker is intended for all users of the eReliability Tracker. The purpose is to give utilities an additional point of information to consider when they evaluate their system to prioritize improvements. It is possible that the estimates provided by the first iteration of implementing the ICE Calculator in the eReliability Tracker report will differ from what might be reasonably expected due to the national, and in some cases limited, nature of the survey data used in the ICE Calculator's development. The Association would like users to run the report under different scenarios and provide feedback in how the estimate compares to a reasonably expected cost of outages for your utility. The Association plans to use the feedback to improve the calculation for the next iteration of the ICE model and the in-system report.

What steps do I need to take to run the Interruption Cost Report appropriately?

There are a few in-system data requirements that need to be checked prior to running the report:

- Circuit information – in the eReliability Tracker, you must have your circuit and substation information entered.



The screenshot shows the eReliability Tracker interface. At the top, there is a navigation bar with 'eReliability Tracker', 'Home', 'Outages', 'Reports', and 'Manage'. A user profile 'lesster' is visible in the top right. Below the navigation bar, there are tabs for 'Utilities' and 'Users'. A breadcrumb trail reads 'Home / Utilities / TESST APPA Utility / Substations'. The main content area features a 'Bulk Actions' dropdown, a search box, and a 'Create New Substation' button. A table lists substations and their associated circuits with the number of customers served.

Select	Substation	Circuit	Customers Served
<input type="checkbox"/>	Central Substation	Circuit 4	12
<input type="checkbox"/>	Central Substation	Circuit 7	44
<input type="checkbox"/>	Central Substation	Circuit 5	10
<input type="checkbox"/>	Central Substation	Circuit 6	12
<input type="checkbox"/>	East Substation	Circuit 121	34
<input type="checkbox"/>	North Substation	NS Circuit 1 Gold Hill	10
<input type="checkbox"/>	North Substation	Circuit 2	12
<input type="checkbox"/>	North Substation	NS Circuit 1	55
<input type="checkbox"/>	South Substation	Circuit 3	10
<input type="checkbox"/>	South Substation	Circuit 4	100

Showing 1 to 10 of 10 entries

Previous 1 Next

- Detailed information for each of your utility's circuits:
 - Classification percentages – within each of your utility's circuits, you must know and enter the percentage of residential, commercial, and industrial customers on each circuit.
 - Total customers served – within each utility's circuits, you must define the total number of customers that circuit serves.

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Utilities Users

Home / Utilities / TESST APPA Utility / Substations / Central Substation / Circuits / Edit Circuit

Edit Circuit

Name:

Total Customers Served:

Percent Residential:

Percent Commercial:

Percent Industrial:

- Outages must be attributed to the appropriate circuits – the outages entered in the eReliability Tracker need to specify which circuit is affected during the interruption. If no circuits have outages, that piece of the report will not produce any results.

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Edit Outage

Location of Outage

Address:

Substation:

Circuit:

Cause of Outage

Primary Cause:

Details of Outage

Number of customers without power:

Time outage began (Use military time):

Date outage began:

Time outage ended (Use military time):

Date outage ended:

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Record Outage Outages Events Export Import

Bulk Actions Search:

Create New Outage

Select	Address	Utility	Substation	Circuit	Customers Out	Start Date	Duration (Minutes)
<input type="checkbox"/>	1234 Reliability Road	TESST APPA Utility	Central Substation	Circuit 4	105	10/12/2017	5.0
<input type="checkbox"/>	1234 Reliability Road	TESST APPA Utility	Central Substation	Circuit 4	105	09/20/2017	5.5
<input type="checkbox"/>	S Cloverdale St & Renton Av S	TESST APPA Utility	North Substation	None	19	07/22/2017	47.0
<input type="checkbox"/>	123 Reliability Road	TESST APPA Utility	Central Substation	None	2	07/22/2017	50.0
<input type="checkbox"/>	S Cloverdale St & Renton Av S	TESST APPA Utility	North Substation	None	19	06/22/2017	47.0
<input type="checkbox"/>	123 Reliability Road	TESST APPA Utility	Central Substation	None	2	06/22/2017	50.0

Future implementation in the Tracker for utilities that have meter-level data:

- The Association plans to build the appropriate interface for meter-level data during the next iteration of the ICE Calculator Report. We plan on providing subscribers with the ability to track their meter data as well as run the report on a more granular level.
- To do so, classification percentages of residential, commercial, and industrial is still required, but with meter-level data in place, there will be an “auto-fill” feature that can fill in the concentration levels based on the real meter data.
- The “has meter data” switch in your utility profile must be set to ‘True’ once you have fully entered your meter data.
- Outages must have attribution to the appropriate circuit/substation and related meters.

What parameters are being taken into consideration in the calculation of interruption cost?

- Outage Duration
- Customer Type – [Commercial, Industrial, Residential]
- Season
- Time of Day – [Morning, Afternoon, Evening]
- Probability of backup generation or power conditioning

Questions? Email Reliability@PublicPower.org