Oregon Investor-owned Utilities

Seven-Year Electric Service Reliability Statistics Summary

2010-2016

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Introduction

Safe and reliable electric power at a reasonable cost is part of the mission of the Oregon Public Utility Commission. How electric utility reliability is measured and evaluated for individual customers at the distribution level has changed over the years. The overall robustness and integrity of the distribution systems today are far superior to the systems serving Oregonians 15 or 20 years ago. And yet, the expectations and needs of the average electric customer, whether urban or rural, continue to be higher and higher. Today’s wide variety of home and business electronics makes our lives better, but also make us increasingly dependent on high quality, reliable electric service. The challenge is to find the right balance between low cost and high service quality.

Utility operators need to know how their systems are performing with accurate and up-to-date information. Regular system inspections are important for knowing the general condition of the system. For more immediate information, Oregon’s three Investor-Owned Utilities (IOUs) have a variety of monitoring and control systems. PacifiCorp initiated its Computer Aided Distribution Operations System (CADOPS) in Oregon in 2002. Portland General Electric has augmented its Supervisory Control and Data Acquisition (SCADA) system with information from a meter based data collection system. Idaho Power is expanding its Smart Grid Monitor (Sentry) program to now include devices capable of recording system voltage and weather, in addition to outages. Advanced Metering Infrastructure (AMI) systems with real time communication capabilities offer prompt utility notification in case of outages and promise better system performance analysis tools. Of course, all of this comes with a price tag.

Reliability data collection and reporting is required by OAR 860-023-0080 through 0161. Accurate data allows meaningful comparisons year-to-year and utility-to-utility, even though the systems and the areas served are very different. Accurate data also allows the utility to direct operations and maintenance funds in a more efficient manner, based on solid facts related to what customers on a given circuit are experiencing. OPUC’s electric reliability rules (in OAR 860-023-0081 thru 0161) have been modified to be in conformance with the nation’s industry standard (i.e. ANSI/IEEE Standard 1366-2003\(^1\)). With the adoption of this standard, customers, utilities and regulators are better able to evaluate electric utility reliability performance with more accuracy and consistency across the nation.

The multi-year graphs give a good idea of what customers are experiencing in Oregon. The comparisons in performance in this report give a variety of ways of looking at the same general subject. The report does focus on the system outages, only a portion of which are attributable to “failures”, but it is important to know that most Oregon customers of these three utilities are receiving safe and reliable service.

Note: IOU means Investor-Owned Utility, which are fully regulated by the Oregon Public Utility Commission. These utilities, Portland General Electric, Pacific Power and Light (PacifiCorp), and Idaho Power, serve almost 74 percent of Oregon’s electric customers.

\(^1\) Minor changes in IEEE 1366 were adopted in 2012; no changes to key definitions or calculations in Oregon Administrative Rules resulted from that version.
General Information

This report:

A. Compares three utilities whose customer base and service territories are very different in nature:

   - **Portland General Electric** (PGE) - has a compact service territory with a fairly urban and suburban character in N.W. Oregon. Average customer per line/trench mile is about 45*.
   - **PacifiCorp** (PAC) - includes some larger Oregon cities but serves several separate areas and is more rural. Average customer per line/trench mile in Oregon is about 26*.
   - **Idaho Power** (IPC) - covers a rural part of Eastern Oregon, including some remote areas. Average customer per line/trench mile in Oregon is about 6.8*.

B. Uses standard IEEE 1366 formulas to calculate data points:

   - **SAIFI** - System Average Interruption Frequency Index
     The average number of times that an average customer experiences a service interruption during a year. SAIFI is an indicator of utility network performance. (Note: This does not include automatic operations or “blinks.” See MAIFIe, below.)

   - **SAIDI** - System Average Interruption Duration Index
     The average total amount of time that an average customer does not have power during a year. SAIDI generally measures the operating performance of the utility in restoring system interruptions.

   - **MAIFIe** – Momentary Average Interruption Event Frequency Index
     The average number of times that an average customer experiences momentary interruption events during a year. This does not include events immediately preceding a sustained interruption.

   - **CAIDI** – Customer Average Interruption Duration Index
     The average length of a customer outage, CAIDI = SAIDI / SAIFI. CAIDI is an indication of how quickly a utility restores service to a customer.

   For further information, see OAR 860-023-0081.

C. Other

   In this report, some of the statistics are shown excluding and including major events.

   A major event is an outage event that:

   a. May exceed the reasonable design and or operational limits of the electric power system;

   b. Contains at least one Major Event Day (MED) as defined by IEEE 1366.

Note: The definition of “major event” is calculated differently by various electric utilities and other state regulatory commissions across the nation. IEEE 1366 was incorporated into Oregon’s Electric Service Reliability reporting starting with 2012 data. Prior to 2012, PGE and PacifiCorp had different definitions of a major event and Idaho Power did not report major events separately. Starting with 2012, all three utilities must use the IEEE 1366 definition of Major Event Day (MED) which has been incorporated into OAR 860-023.

*These are approximate customer/high voltage line miles and include transmission and distribution, both overhead and underground.

Note: Staff’s emphasis on the safety and reliability of electrical utility systems can also be found in the Commission Safety Rules (OAR 860-024) and the National Electrical Safety Code.
Data Collection Methodologies

Each of the three electric utility companies use somewhat different data collection methods for reliability reporting:

**Idaho Power Company**

Idaho Power Company (IPC) gathers data for the Oregon Annual Electric Service Reliability Report (AESRR) through an Outage Management System (OMS) and dispatch entry process. The OMS receives trouble orders in real time from the Customer Relations and Billing (CR&B) System as they are entered by call center staff. The OMS analyzes the call pattern and predicts the potential extent of each outage. The Mobile Workforce operators (located in the dispatch center) perform switching real-time on an electronic map in the OMS to reflect all distribution switching performed in the field and any SCADA operations. Transmission events are entered in the Operations Working Log (OWL) system.

Dispatchers also enter any sustained interruption or switching on a Switching Log. OMS records and switching logs are compared and reconciled each evening by dispatch center personnel, to ensure accuracy and consistency. Momentaries are gathered from the SENTRY monitoring system and automatically stored in the SENTRY database. Archived OMS and SENTRY data are used to report reliability statistics for sustained and momentary outages.

The information from several events, performance data, outage causes, SENTRY data, equipment and statistical reports from OMS are run on IPC’s Oregon operating area and each Oregon circuit. The reports are used to create Excel tables and charts and geographic information system (GIS) maps for the AESRR.

Idaho Power’s service territory includes one operating area in Eastern Oregon.

**PacifiCorp**

PacifiCorp operates automated outage management and reporting systems. Customer trouble calls and SCADA events are interfaced with the Company’s real-time network connectivity model, its CADOPS system; when a SCADA event records a momentary loss of voltage which was successfully cleared (i.e. Trip and Reclose), that operation is recorded and no additional response is required. By overlaying the sustained outages (those which were not able to be successfully cleared) onto the network model, the program infers outages at the appropriate devices (such as a transformer, fuse, or other interrupting device) for all customers down line of the interrupting device. The outage is then routed to appropriate field operations’ staff for restoration, and the outage event is recorded in the Company’s Prosper/US outage repository. In addition to this real-time model of the system’s electrical flow, the Company relies heavily upon the SCADA system that it has in place to
perform calculations that comply with IEEE 1366-2012 for determining momentary interruption indices. This includes the Dispatch Log System (an SQL database application) which serves to collect all events on SCADA-operable circuits. All data is then analyzed for momentary interruptions to establish state-level momentary interruption indices.

PacifiCorp service territory in Oregon includes 21 operating areas. The operating areas include: Albany, Central Oregon (Bend/Redmond/Prineville/Madras), Clatsop (Astoria), Coos Bay/Coquille, Corvallis, Cottage Grove/Junction City, Dallas/Independence, Enterprise, Grants Pass, Hermiston, Hood River, Klamath Falls, Lakeview, Lebanon, Lincoln City, Medford, Milton-Freewater, Pendleton, Portland, Roseburg/Myrtle Creek, and Stayton.

**Portland General Electric**

PGE’s Outage Management System (OMS) logs and tracks outages on their system. The OMS utilizes the CIS (Customer Information Systems), GIS (Geospatial Information System), IVR (Interactive Voice Response), AMI, and SCADA data to evaluate and generate outage records when trouble calls come in. This data is reviewed in the OMS on a daily basis to ensure that the information is as accurate as possible. The outage information is then used to calculate SAIDI, SAIFI, and other information presented in PGE’s Annual Reliability Report.

Momentary outages (MAIFIe) are logged and reported for the stations equipped with SCADA and MV90 (a meter-based data collection system) except for circuits where reclosing is disabled. Out of PGE’s 153 distribution substations, 75.8% are equipped with SCADA and 21.6% are equipped with MV90. The remaining 2.6% of distribution substations with neither SCADA nor MV90 have readings collected on a monthly basis.

PGE’s service territory includes three operating areas in Northwest Oregon. They are the Eastern Region, Southern Region, and Western Region.

**Oregon Electric Reliability Compared to the rest of the nation**

Starting with the 2009 to 2015 report, an attempt was made to see how Oregon is doing as compared to other states. For the purposes of this report the IEEE Distribution Reliability Working Group’s annual Benchmark Survey was used. We were able to plot North American median data (identified on the charts as “IEEE bmark”) for SAIDI, SAIFI, and CAIDI on some of the graphs, which are included in this report.

The IEEE data comes from utilities across North America; it represents a good comparison with Oregon public utilities because the responses are voluntary and represent electric energy suppliers that are actively working to improve their reliability, which should be one of the goals of every well-managed utility.

(IEEE data for 2016 was not available when this report was written).
SAIFI
(with Major Events included)

Average Number of Outages Per Customer

Number of Occurrences


- PGE
- PacifiCorp
- Idaho Power
- IEEE Bmark
SAIDI
(with Major Events included)

Average Hours of Outages Per Customer
MAIFIe
(with Major Events excluded)

Average Number of Momentary* Outages Per Customer

*Interruptions under five minutes.
Note: PacifiCorp and PGE revised their customer counts in 2016 to reflect a more accurate meter count. The AMI programs of both companies enable a much more accurate count of active meters now than was possible in the past, when customer counts were often estimated for each feeder and then summed to get a system total.