



**Oregon Investor-owned Utilities**

**Seven-Year Electric Service  
Reliability Statistics Summary**

**2011-2017**

April 2019

Report available at <http://www.puc.state.or.us> (Click on "Safety", then click on "Reports")

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## Introduction

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Part of the mission of the Public Utility Commission of Oregon (“Commission or OPUC”) is ensure that rate payer receive safe and reliable electric service at a reasonable cost. How electric utility reliability is measured and evaluated for individual customers at the distribution level has changed over the years. After restructuring of electric utilities in the late 1990’s, the Commission implemented different regulations that are intended for utility operations, namely OAR 860 Divisions 23, 24, and 28. As a result, the overall robustness and integrity of the distribution systems in Oregon today are far superior than they used to be 20 years ago. Although today’s wide variety of home and business electronics makes our lives better, they make us increasingly dependent on high quality, reliable electric service, which makes the expectations and needs of the average electric customer continue to become higher. 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)<sup>1</sup> 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.

OAR 860-023-0101 requires utilities to collect and report reliability data. Accurate data allows meaningful comparisons year-to-year and utility-to-utility, even though the systems and the areas served are very different. Additionally, accurate data allows the utility to direct operations and maintenance expenditures in a more efficient manner, based on solid facts related to the condition and performance of each individual circuit. OAR 860-023-0081 thru 0161 contain OPUC’s electric reliability rules. These rules conform to the nation’s industry standard (i.e. ANSI/IEEE Standard 1366-2012) to evaluate utilities’ reliability performance accurately and consistent with practice that other utilities across the nation exercise.

Included in this report are graphical representations of reliability trends of Oregon IOU’s based on four reliability indices. These 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.

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<sup>1</sup> 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.

## General Information

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### This report:

- A. Compares three IOU's whose service territories are different in nature:

**Portland General Electric (PGE):** Has a compact urban and suburban service territory in northwestern Oregon. Average customer per line/trench mile is about 45<sup>2</sup>.

**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 1366-2012 formulas to calculate data points:

#### **SAIFI** - System Average Interruption Frequency Index

SAIFI indicates how often the average customer experiences a sustained interruption over a predefined period of time. (Note: This does not include automatic operations or "blinks." See MAIFI<sub>E</sub>, below.) Mathematically,

$$SAIFI = \frac{\sum \text{Total Number of Customers Interrupted}}{\text{Total Number of Customers Served}}$$

#### **SAIDI** - System Average Interruption Duration Index

SAIDI indicates the total duration of interruption for the average customer during a predefined period of time. Mathematically,

$$SAIDI = \frac{\sum \text{Total Duration of Interruption}}{\text{Total Number of Customers Served}}$$

#### **MAIFI<sub>E</sub>** – 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.

$$MAIFI_E = \frac{\sum \text{Total Number of Customer Momontary Interruption Events}}{\text{Total Number of Customers Served}}$$

#### **CAIDI** – Customer Average Interruption Duration Index

CAIDI represents the average time required to restore service. Mathematically,

$$CAIDI = \frac{\sum \text{Customer Duration of Interruption}}{\sum \text{Total Number of Customers Interrupted}} = \frac{SAIDI}{SAIFI}$$

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<sup>2</sup> These are approximate customer/high voltage line miles and include transmission and distribution, both overhead and underground.

### C. Other

In this report, some of the statistics are shown excluding and including major events<sup>3</sup>.

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.

## **Data Collection Methodologies**

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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

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<sup>3</sup> The definition of "major event" is interpreted differently by various electric utilities and other state regulatory commissions across the nation. Prior to incorporating IEEE 1366 into Oregon's Electric Service Reliability reporting in 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.

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 (MAIFI<sub>E</sub>) 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, approximately 75% are equipped with SCADA and more than 20% are equipped with MV90. The remaining 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.

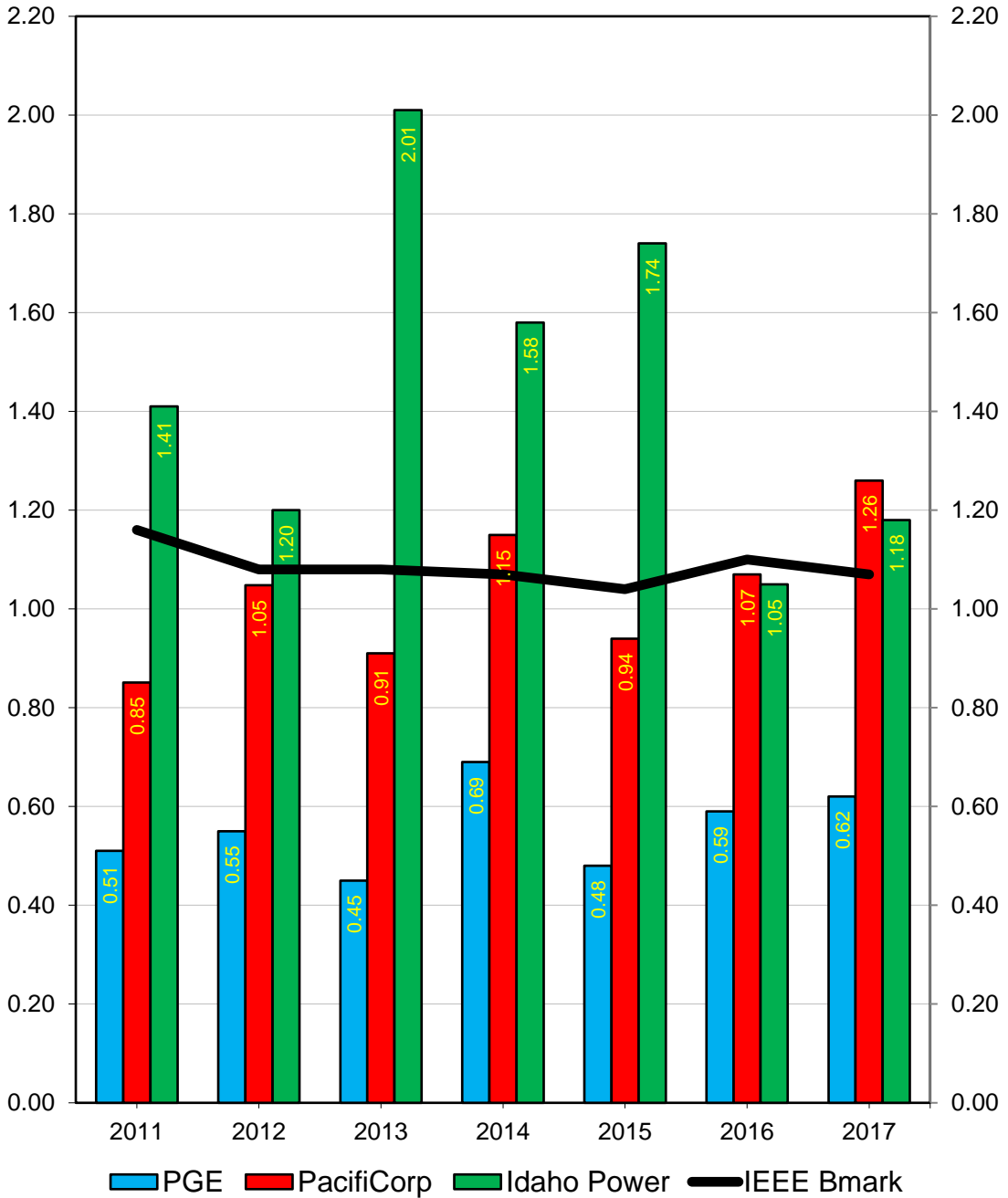
### **Oregon Electric Reliability Compared to the rest of the nation**

This report is an attempt to evaluate how Oregon IOU's are doing as compared to IOU's in other states. For the purposes of this report the IEEE Distribution Reliability Working Group's annual Benchmark Survey that was released in August 2018 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.

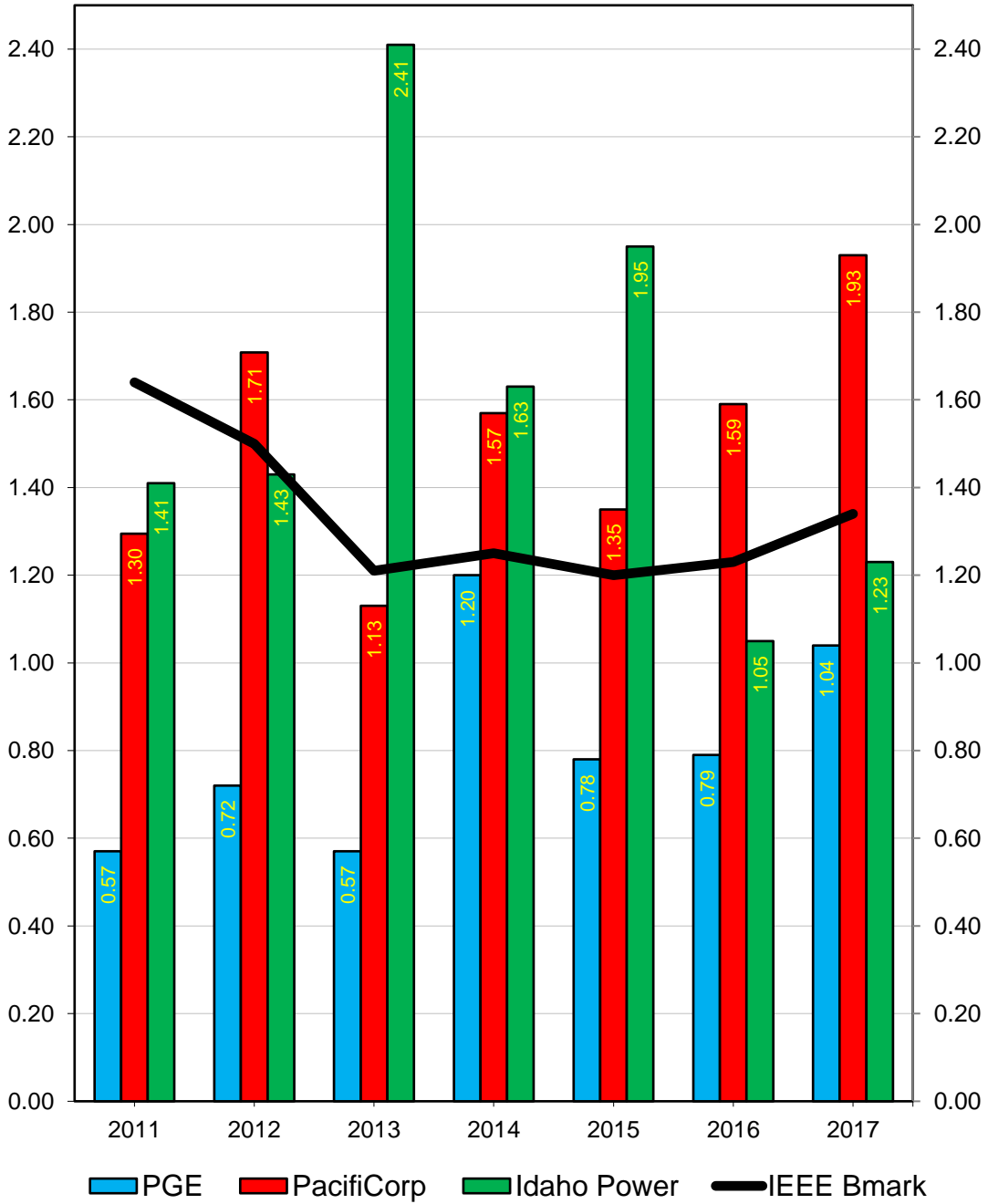
The IEEE data comes from utilities across North America; it represents a good comparison with Oregon public utilities because the responses are voluntary and represent electric energy suppliers that are actively working to improve their reliability, which should be one of the goals of every well-managed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

# SAIFI (with Major Events excluded)

Average Number of Outages Per Customer



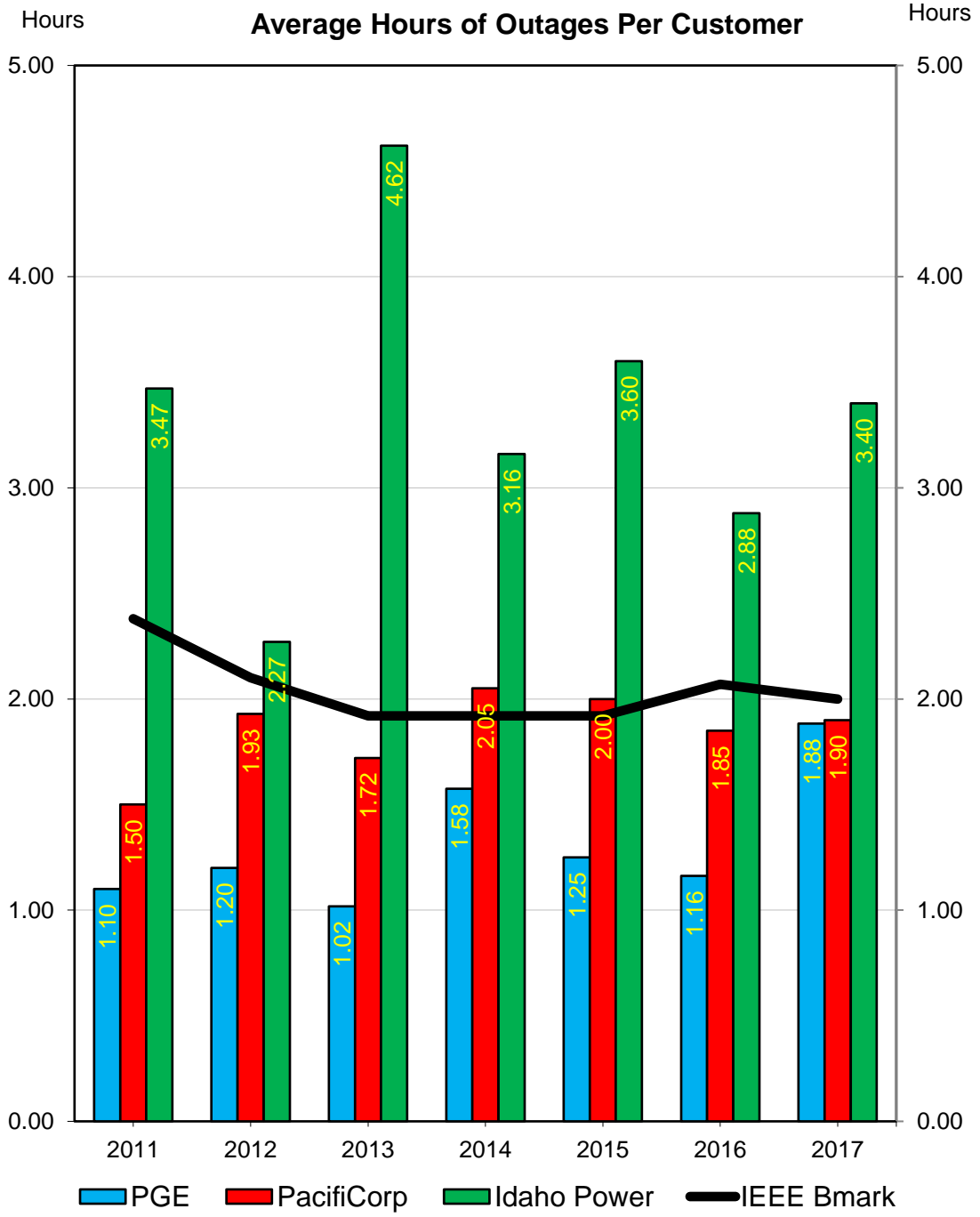
**SAIFI**  
**(with Major Events included)**  
**Average Number of Outages Per Customer**





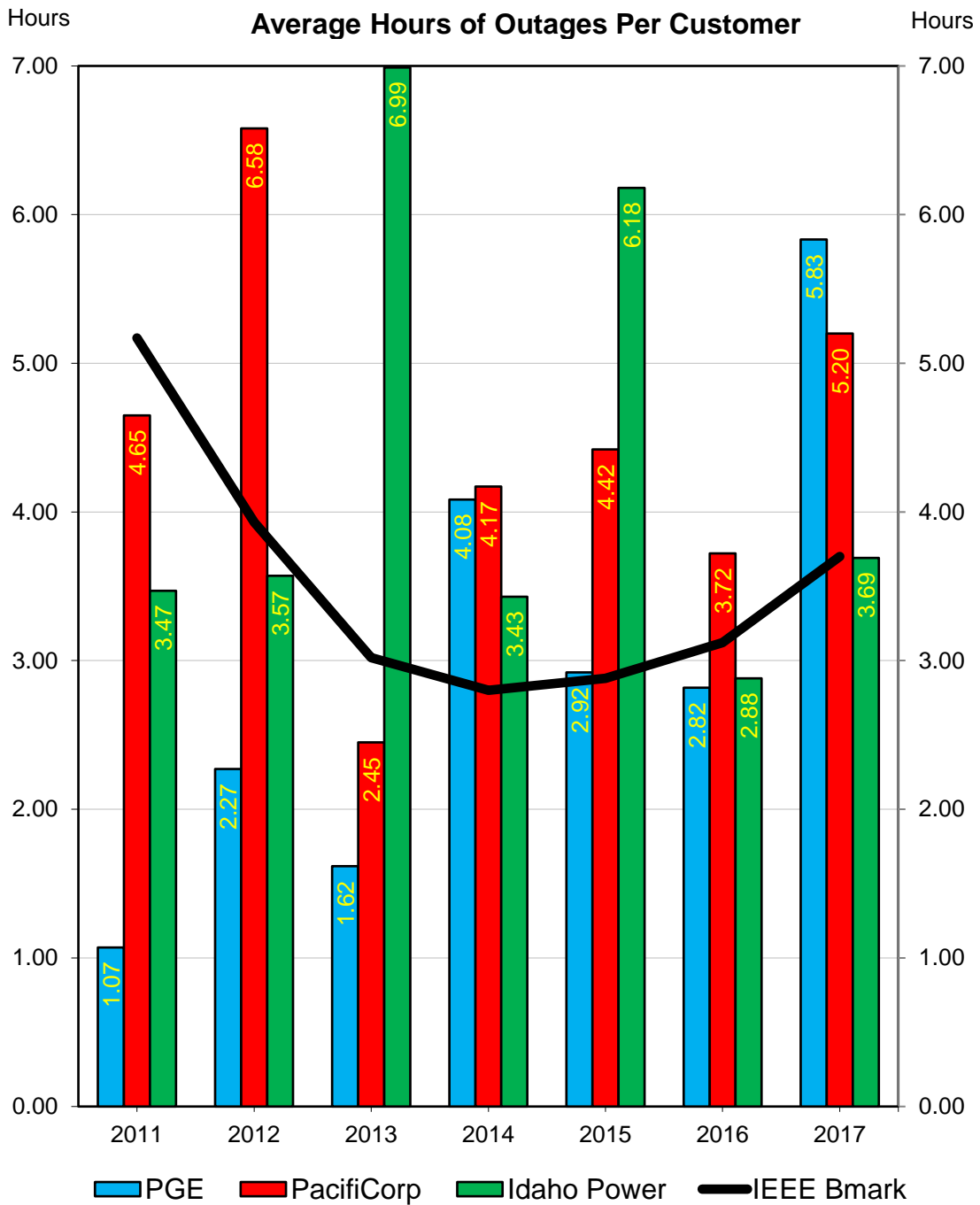
# SAIDI (with Major Events excluded)

## Average Hours of Outages Per Customer



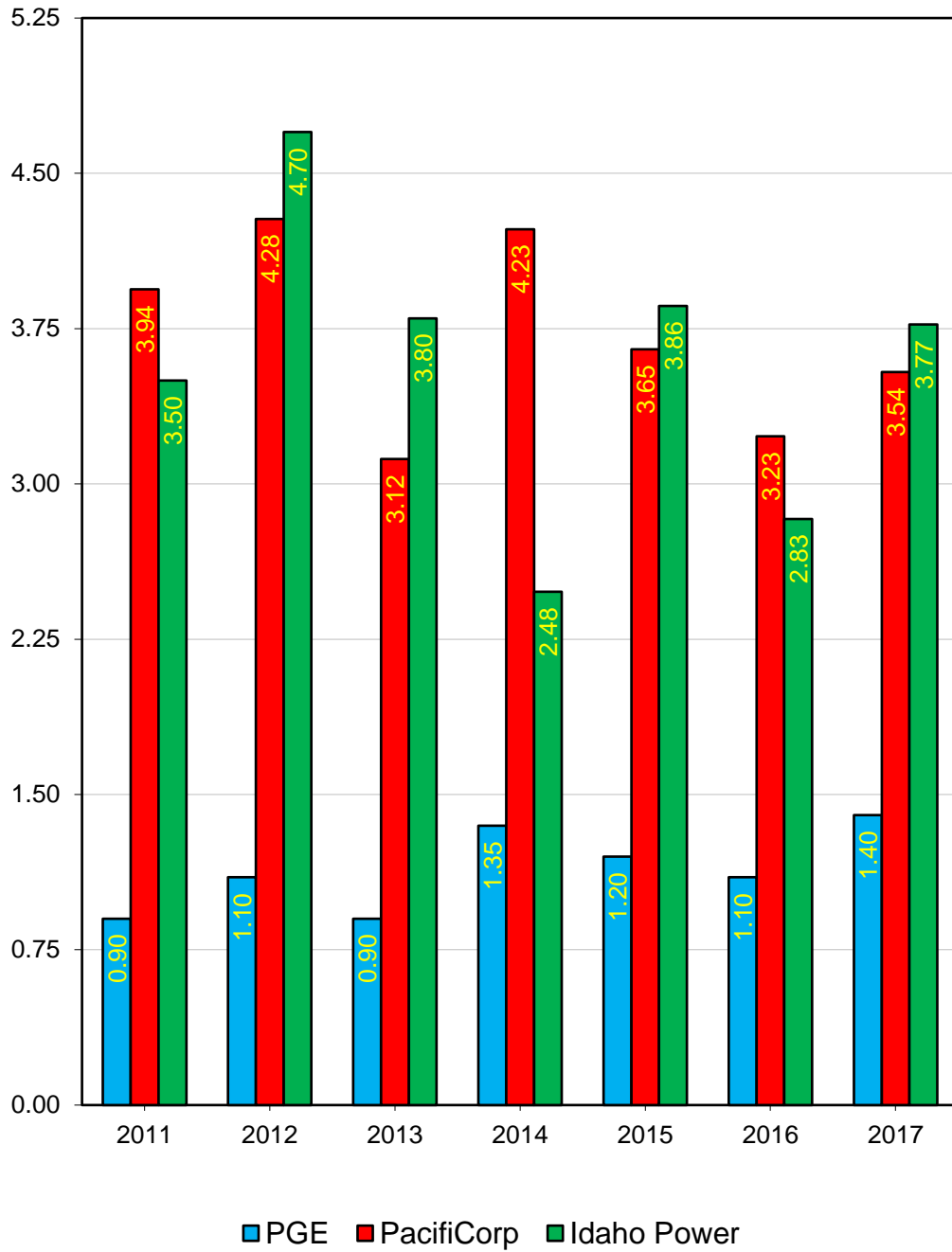
# SAIDI (with Major Events included)

## Average Hours of Outages Per Customer



### MAIFI<sub>E</sub> (with Major Events excluded)

Average Number of Momentary\* Outages Per Customer



\* Momentary outages are interruptions under five minutes.

# CAIDI (with Major Events excluded)

