Dockets UE-170033 and UG-170034 (consolidated) and Dockets UE-072300 and UG-072301 (consolidated)

Puget Sound Energy
2019 Service Quality Program and Electric Service Reliability Filing

Attachment A:
Service Quality and Electric Service Reliability Report

Puget Sound Energy

2019

Service Quality and Electric Service Reliability Report

Filed on March 25, 2020

PUGET SOUND ENERGY

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CHAPTER 1

INTRODUCTION

Executive Summary

As Washington State's oldest and largest energy utility, with a 6,000-square-mile service territory stretching across 10 counties, Puget Sound Energy (PSE) serves more than 1.1 million electric customers and over 800,000 natural gas customers primarily in the Puget Sound region of Western Washington. PSE meets the energy needs of its customer base through cost-effective energy efficiency measures, procurement of sustainable energy resources and far-sighted investment in the energy-delivery infrastructure. PSE employees are dedicated to providing quality customer service and to delivering energy that is safe, dependable, efficient and environmentally responsible.

The report provides PSE's 2019 performance and results for the following areas: Customer Service Guarantee, Restoration Service Guarantees, service quality of PSE and its service providers, and electric service reliability.

For the 2019 Service Quality Reporting year, PSE met its benchmarks for all of the Service Quality Indices.

Background

PSE first implemented its Service Quality Program (the SQ Program) when the Washington Utilities and Transportation Commission (UTC, WUTC, or the Commission) authorized the merger of Washington Natural Gas Company and Puget Sound Power & Light Company in 1997. The stated purpose of the SQ Program was to "provide a specific mechanism to assure customers that they will not experience deterioration in quality of service" and to "protect customers of PSE from poorly-targeted cost cutting." [1] The SQ Program has been further extended[2] with various modifications to demonstrate PSE's continuous commitment to customer protection and quality service.

Service Quality Program

[1] Under consolidated Dockets UE-951270 and UE-960195.

[2] Under Dockets UE-011570 and UG-011571 (consolidated), UE-072300 and UG-072301 (consolidated), and Dockets UE-170033 and UG-170034 (consolidated).

The Service Quality Program includes three components:

- **Service Quality Index (SQI)**—PSE reports annually to the UTC on the final performance of these nine SQIs. This document explains the SQIs, how they are calculated and PSE's performance on each of the SQIs for the 2019 reporting year. PSE also provides preliminary SQI results to the UTC semi-annually.
- **Customer Service Guarantee (CSG)**—The Customer Service Guarantee provides for a $50 credit when PSE misses an SQI #10 appointment. This appointment guarantee has been available to all customers since the inception of PSE's Service Quality Program in 1997.
- **Restoration Service Guarantees (RSG)**—The Restoration Service Guarantees provides for a $50 credit to a qualified PSE electric customer based upon the conditions and exceptions outlined in PSE's electric Schedule 131 Restoration Service Guarantees. There are two RSGs: the 120-hour guarantee during any storm event and the 24-hour guarantee during a non-major storm event. The 120-hour guarantee was established in 2008. The 24-hour guarantee became effective on January 1, 2017.

In addition to these three components, the SQ Program also prescribes reporting requirements for PSE's primary service providers. Several Service Provider Indices (SPIs) benchmark performances in areas of construction standards compliance, reliability/service restoration and kept appointments.

The SQ Program also includes PSE's natural gas emergency response plans for outlying areas, which are filed concurrently with this Report as Attachment B to the annual UTC SQ and Electric Service Reliability filing.

Attachment C to the 2019 annual UTC SQ and Electric Service Reliability Report filing is PSE's 2019 Critical Infrastructure Security Annual Report, which contains a discussion of PSE's cybersecurity and physical security policies and related information for 2019.

SQI and Electric Service Reliability Report

This *Puget Sound Energy 2019 SQ and Electric Service Reliability Report* meets PSE's SQ Program reporting requirements[3] and the electric service reliability reporting requirements set forth by the UTC.[4,5] To facilitate external review of PSE's SQ and Electric Service Reliability performance, the two reports were combined starting with the 2010 reporting year.[6]

Overview of Performance

Table 1a summarizes PSE's 2019 SQ and Electric Service Reliability performance, along with relevant service providers' performance metrics and the two service guarantees. PSE met all nine of the Service Quality Indices under PSE's Service Quality Program.

[3] The performance benchmark, calculation and reporting of each of the Service Quality Indices (SQIs) in this Report reflect all modifications regarding SQI mechanics stipulated in the Twelfth Supplemental Order of Dockets UE-011570 and UG-011571; Orders 1 and 2 of UE-031946; Orders 12, 14, 16, 17, 18, 19, 20, 21, 23, and 29 of consolidated Dockets UE-072300 and UG-072301; and Order 8 of Dockets UE-170033 and UG-170034.

[4] The Electric Service Reliability section of this Report reflects all of PSE's electric service reliability reporting requirements outlined in Docket UE-110060 and in the following sections of the electric service reliability WAC:

- WAC 480-100-388, Electric service reliability definitions,
- WAC 480-100-393, Electric service reliability monitoring and reporting plan,
- WAC 480-100-398, Electric service reliability reports.

[5] Two PSE commitments regarding the preparation of the Electric Service Reliability section, as outlined in Section F, Reporting of Customer Compliant Information, of Appendix D to Order 12 of consolidated Dockets UE-072300 and UG-072301 (Section F), are also satisfied in this annual report. 1) Chapter 3 Customer Electric Reliability Complaints section describes how the customer complaint information is used in PSE's circuit reliability evaluation. Appendix M details PSE's actions to resolve these complaints. 2) Prior to the filing of each annual report, PSE used to invite UTC Staff and the Public Counsel Section of the Washington State Attorney General's Office ("Public Counsel") to discuss the format and content of the Electric Service Reliability section since the adoption of Order 12. However, as agreed to by Public Counsel, UTC Staff and PSE at the March 13, 2012 meeting, an annual external review meeting of PSE's reliability results, prior to the filing, is not required. If, however, an external meeting on the format and content of PSE's Electric Service Reliability section is called for by an external party or PSE, then Public Counsel should be invited.

[6]The annual reporting of the Service Quality Program and the electric service reliability was due separately before the UTC by February 15 and March 31 of each year, respectively. To facilitate external review, PSE filed a petition in October 2010 to consolidate the two reporting requirements, among other petition requests. The UTC granted PSE's petition in November 2010 (Order 17 of consolidated Dockets UE-072300 and UG-072301) and the reporting consolidation became effective for the 2010 performance periods and each report thereafter.

Table 1a: SQ and Electric Service Reliability and Service Provider Performance Metrics

Key Measurement	Type of Metric	Benchmark/Description	2019 Performance Results	Achieved
Customer Satisfaction				
WUTC complaint ratio	Service Quality Index #2	No more than 0.40 complaints per 1,000 customers, including all complaints filed with WUTC	0.16	☑
Customer Access Center transactions customer satisfaction	Service Quality Index #6	At least 90% satisfied (rating of 5 or higher on a 7-point scale)	92%	☑
Field service operations transactions customer satisfaction	Service Quality Index #8	At least 90% satisfied (rating of 5 or higher on a 7-point scale)	95%	☑
Customer Service				
Customer Access Center answering performance	Service Quality Index #5	At least 80% of calls answered by a live representative within 60 seconds of request to speak with live operator[7]	81%	☑
Operations Services—*Appointments*				
Appointments kept	Service Quality Index #10	At least 92% of appointments kept	100%[8]	☑
Service provider appointments kept—Quanta Electric	Service Provider Index #3B[9]	At least 92% of appointments kept	99%	☑
Service provider appointments kept—Quanta Gas	Service Provider Index #3C	At least 92% of appointments kept	99%	☑
Customer Service Guarantee	Service Guarantee #10	A $50 credit to customers when PSE fails to meet a scheduled SQI appointment	$14,850	--

[7] Benchmark revision per UTC Dockets UE-170033 and UG-170034 Order 08, dated December 5, 2017, for SQI #5 annual performance from 2019 and years after.

[8] Results shown are rounded from 99.7% to the nearest whole percentage per UTC order. However, the 100% 2019 annual performance result does not reflect that PSE and its service providers met all the appointments during the reporting period. Numbers of missed appointments by appointment type are detailed in Appendix F: *Customer Service Guarantee Performance Detail*.

[9] There was no result for Service Provider Indices #1A, #2A, #3A and #4A. These indices were assigned to a service provider, Pilchuck, which no longer works for PSE. PSE transitioned all natural gas construction and maintenance work to Quanta Gas as of April 30, 2011. Service Provider Indices #2B and #2C, Service Provider Customer Satisfaction for Quanta Electric and Quanta Gas, respectively, were applicable in the prior years' reporting had been ended since the 2013 reporting period.

Key Measurement	Type of Metric	Benchmark/Description	2019 Performance Results	Achieved
Operations Services—*Gas*				
Gas safety response time	Service Quality Index #7	Average 55 minutes or less from customer call to arrival of field technician	32 minutes	☑
Secondary safety response time—Quanta Gas	Service Provider Index #4D	Within 60 minutes from first response assessment completion to second response arrival	50	☑
Service provider standards compliance—Quanta Gas	Service Provider Index #1C[10]	Level 1 ≤ 8 dev/1000 Level 2 ≤ 15 dev/1000 Level 3 ≤ 12 dev/1000	Level 1 2.73 Level 2 6.11 Level 3 1.41	☑
Operations Services—*Electric*				
Electric safety response time	Service Quality Index #11	Average 55 minutes or less from customer call to arrival of field technician	54 minutes	☑
Secondary Core-Hours, Non-Emergency Safety Response and Restoration Time—Quanta Electric	Service Provider Index #4B	Within 250 minutes from the dispatch time to the restoration of non-emergency outage during core hours	234 minutes	☑
Secondary Non-Core-Hours, Non-Emergency Safety Response and Restoration Time—Quanta Electric	Service Provider Index #4C	Within 316 minutes from the dispatch time to the restoration of non-emergency outage during non-core hours	262 minutes	☑
Service provider standards compliance—Quanta Electric	Service Provider Index #1B[11]	Level 1 ≤ 15 dev/1000 Level 2 ≤ 20 dev/1000 Level 3 ≤ 20 dev/1000	Level 1 3.53 Level 2 8.69 Level 3 13.51	☑
120-Consecutive –hour power outage restoration guarantee	Service Guarantee #2	A $50 credit to eligible customers when experienced a power outage is longer than 120 consecutive hours	$50	--
24-Consecutive-hour non-major storm power outage restoration guarantee	Service Guarantee #3	A $50 credit to eligible customers when experienced a power outage is longer than 24 consecutive hours during non-major storms	$10,650	--

[10] Level 1: Deviation from PSE Standards and/or current regulatory expectations that provide immediate and significant risk to product quality, safety or system integrity; or a combination/repetition of Level 2 deficiencies that indicate a critical failure of systems.
Level 2: Deviation from PSE Standards and/or current regulatory expectations that provide a potentially significant risk to product quality, safety or system integrity; or could potentially result in significant observations from a regulatory agency; or a combination/repetition of Level 3 deficiencies that indicate a failure of system(s).
Level 3: Observations of a less serious or isolated nature that are not deemed Level 1 or 2, but require correction or suggestions on how to improve systems or procedures that may be compliant but would benefit from improvement.

[11] See Footnote 10.

Key Measurement	Type of Metric	Benchmark/Description	2019 Performance Results	Achieved
Electric Service Reliability—*SAIFI & SAIDI*				
$SAIFI_{Total}$ Total (all outages current year) Outage Frequency—System Average Interruption Frequency Index (SAIFI)	**Reliability**	**Power interruptions per customer per year, including all types of outage event**	**1.57 interruptions**	**--**
$SAIFI_{Total\ 5\text{-}year\ Average}$ Total (all outages five-year average) SAIFI	**Reliability**	**Five years average of the power interruptions per customer per year, including all types of outage event**	**1.76 interruptions**	**--**
$SAIFI_{5\%}$ <5% Non-Major-Storm (<5% customers affected) SAIFI	**Service Quality Index #4**	**No more than 1.30 interruptions per year per customer**	**0.98 interruptions**	**☑**
$SAIFI_{IEEE}$ IEEE Non-Major-Storm (T_{MED}) SAIFI	**Reliability**	**Power interruptions per customer per year, excluding days exceeding the T_{MED} threshold**	**0.96 interruptions**	**--**
$SAIDI_{Total}$ Total (all outages current year) Outage Frequency–System Average Interruption Duration Index (SAIDI)	**Reliability**	**Outage minutes per customer per year, including all types of outage event**	**550 minutes**	**--**
$SAIDI_{Total\ 5\text{-}year\ Average}$ Total (all outages five-year average) SAIDI	**Reliability**	**Outage minutes per customer per year, including all types of outage event five-year average**	**434 minutes**	**--**
$SAIDI_{5\%}$ <5% Non-Major-Storm (<5% customers affected) SAIDI	**Reliability**	**Outage minutes per customer per year, excluding outage events that affected 5% or more customers**	**132 minutes**	**--**
$SAIDI_{IEEE}$ IEEE Non-Major-Storm (T_{MED}) SAIDI	**Reliability**	**Outage minutes per customer per year, excluding days exceeding the T_{MED} threshold**	**136 minutes**	**--**
$SAIDI_{SQI}$ SQI IEEE Non-Major-Storm (T_{MEDADJ}) SAIDI	**Service Quality Index #3**	**No more than 155 minutes per customer per year Outage minutes, excluding days exceeding the T_{MEDADJ} threshold with catastrophic day adjustment**	**136 minutes**	**☑**

Detailed SQI monthly performance results and supplemental information can be found in the following appendices:

- **Appendix A: Monthly SQI Performance**—This appendix details monthly PSE SQI performance and the relevant performance of PSE's service providers. The attachments to this appendix provide information on the major outage event and localized electric emergency event days and the natural gas reportable incidents and control time. This appendix has three attachments:
  - **Attachment A to Appendix A**—Major Event and Localized Emergency Event Days (Affected Local Areas Only),
  - **Attachment B to Appendix A**—Major Event and Localized Emergency Event Days (Non Affected Local Areas Only), and
  - **Attachment C to Appendix A**—Gas Reportable Incidents and Control Time.
- **Appendix B: Certification of Survey** Results—The independent survey company, EMC Research, certify that all SQI-related customer surveys were conducted with applicable guidelines and the results are unbiased and valid in accordance with the survey procedures established in consolidated Dockets UE-011570 and UG-011571[12].
- **Appendix C: Penalty Calculation**—This appendix shows penalty calculations and allocation if PSE incurs any SQI penalty. For the 2019 reporting year, PSE met all the performance benchmarks with potential penalty assessment, therefore PSE did not incur any penalty associated with its service quality index performance.
- **Appendix D: Proposed Customer Notice (Report Card**)—This appendix presents PSE's proposed 2019 customer service performance report. The Customer Service Performance Report Card is designed to inform customers of how well PSE delivers its services in key areas to its customers.
- **Appendix E: Disconnection Results**—This appendix provides the number of disconnections per 1,000 customers for non-payment of amounts due when the UTC disconnection policy would permit service curtailment.
- **Appendix F: Customer Service Guarantee Performance Detail**—This appendix details annual and monthly Kept Appointments and Customer Service Guarantee payment results by appointment type.
- **Appendix G: Customer Awareness of Service Guarantee**—This appendix discusses the ways PSE makes customers aware of its Customer Service Guarantee and the results of the survey.

Detailed Electric system and reliability information is found in the following appendices:

- **Appendix H: Electric Reliability Terms and** Definitions—This appendix discusses the terms and definitions found in this report.
- **Appendix I: Electric Reliability Data Collection Process and Calculations**—This appendix discusses data collection methods and issues. It explains how the various data were collected.

[12] PSE's compliance filing pursuant to paragraph 13 of Order 21 of Dockets UE-072300 and UG-072301 (consolidated), Granting in Part, and Denying in Part, Puget Sound Energy's Petition for Waiver and Suspension of Service Quality Index Nos. 6 AND 8 (June 21, 2013)

- **Appendix J: 1997-Current Year PSE SAIFI and SAIDI Performance by Different Measurements**—This appendix presents PSE SAIFI and SAIDI performance from 1997 through the current year using different measurements.
- **Appendix K: Current Year Electric Service Outage by Cause by Area**—This appendix details the 2019 Outage Cause by County.
- **Appendix L: Historical SAIDI and SAIFI by Area**—This appendix details the three-year history of SAIDI and SAIFI data by county.
- **Appendix M: Areas of Greatest Concern with Action Plan**— This appendix details the areas of greatest concern with an action plan.
- **Appendix N: Current-Year Commission and Rolling-Two-Year PSE Customer Electric Service Reliability Complaints with Resolutions**—This appendix lists the current-year UTC and rolling two- year PSE customer electric service reliability complaints with resolutions.
- **Appendix O: Current Year Geographic Location of Electric Service Reliability Customer Complaints on Service Territory Map with Number of Next Year's Proposed Projects and Vegetation-Management Mileage**— This appendix illustrates current-year geographic location of electric service reliability customer complaints on service territory map with the number of 2020 proposed projects and vegetation-management mileage.
- **Appendix P: Reliability Program Category Descriptions**— This appendix provides reliability program work completed in 2019 and planned for 2020 by category along with descriptions for each category.

Customer Notice of SQI Performance

Appendix D: **Proposed Customer Notice (Report Card)** is PSE's proposed customer notice of PSE's 2019 SQI performance. After consultation with the UTC staff and Public Counsel, PSE will begin distributing the final SQI report card by June 27, 2020, as part of the customer billing package.

Data and Reporting Issues

There was no data gathering or reporting difficulty in 2019 that impacted the SQI performance categories, or their results, in any way.

Service Quality Program Changes

There were no program changes for 2019.

Continuing to Improve Customer Experience

Get to Zero

PSE is continuing a long-term initiative called Get to Zero. PSE's goal for the technology and business processes advanced by the Get to Zero initiative is to anticipate customer needs and provide solutions to address those needs. The Get to Zero initiative further improves customer experience with PSE by providing more self-service options that customers have been requesting, by developing new ways to proactively communicate with customers and by creating seamless, integrated operations to tie PSE's business processes together. Some of the key highlights that were completed within 2019 include:

- **Visual Interactive Voice Response (V-IVR)—**The V-IVR capability allows customers to opt-in to a visual self-service experience when calling PSE's Customer Access Center from a smartphone. Customers who opt-in receive a text message with a link to the web self-service to complete transactions such as start, stop or move service and outage reporting.
- **Auto Call Categorization** — Implementation of new technology improved access to customer call interaction data through the IVR system. Call recordings are analyzed and categorized based on customer actions, and allow for better insight into the customer IVR experience.
- **Remote Connect/Disconnect (RCD) Capability** — RCD capability allows customer requested disconnect and reconnect commands to be sent remotely to electric AMI meters. Enabled for residential customers, RCD applies to move in and move out requests, and customer requested disconnects and reconnects. Customers can now expect a seamless move out and move in process that automatically triggers service disconnection and reconnection in near to real-time. The RCD also allows PSE to perform remote connect and disconnect of meters with unauthorized energy usage.
- **Bill Alerts** — A new notification feature, Bill Alerts, leverages real-time usage data from the Advanced Meter Infrastructure (AMI) and Automatic Meter Reading (AMR) networks to give customers more control over their energy usage. After setting an initial budget threshold, customers receive an email and/or text notification if their costs are forecasted to exceed their budgeted amount during the current billing period. Customers then have the opportunity to make adjustments to their usage before being surprised by a high bill.
- **EnergyHelp** – EnergyHelp is a portal on pse.com that improves self-service options for low-income customers. Created in ongoing partnership with 11 Community Action Partnership agencies, the Washington State Department of Commerce and the vendor Avertra, EnergyHelp allows customers to pre-qualify for energy assistance and connect with their appropriate agency online.
- **Data Governance** —Data Governance framework establishes new data related policies and procedures to improve governance of PSE customer and asset data domains. This includes training and business process integration on data management practices that allows PSE to create and govern data-driven insights.
- **Platform of Insights** — The Platform of Insights (POI) is a new platform that connects data sources across the company through virtual views of original data in a central location. The POI makes it easier to access customer account, demographic and interaction data in order to help guide improvements to the customer experience.

- **Web 2.0** — Improves the ability of pse.com to handle large outage events, enhanced security for pse.com and the myPSE app, and adds a high bill analysis tool for customers, as well as provides additional optimization for digital self-service tools.
- **Transitioning to a Mobile Workforce**— PSE's meter network services teams were transitioned to new mobile tools, allowing them to consolidate existing tools, and begin to move from paper processes to digital forms. This increases the efficiency of field employees and reduces the need for paperwork to be completed within the office.
- **Operational Efficiencies for Work Force Optimization and Field Payments**—PSE implemented field payments to allow customer payments received in field to automatically post to customer accounts as well as a new work management functionality to streamline time entry through timesheet automation for PSE's meter network services teams. This functionality can be leveraged for other payment taking business units in the future.

CHAPTER 2

CUSTOMER SERVICES, CUSTOMER SATISFACTION, AND OPERATIONS SERVICES

PSE has been meeting the Puget Sound region's energy needs for more than 145 years. PSE proudly embraces the responsibility of providing customers with safe, reliable, and reasonably-priced energy service.

This section summarizes the 2019 results of PSE's seven service quality indices (SQIs) related to customer services, customer satisfaction, and operations services:

- WUTC Complaint Ratio (SQI #2)
- Customer Access Center Answering Performance (SQI #5)
- Customer Access Center Transactions Customer Satisfaction (SQI #6)
- Gas Safety Response Time (SQI #7)
- Field Service Operations Transactions Customer Satisfaction (SQI #8)
- Appointments Kept (SQI #10)
- Electric Safety Response Time (SQI #11)
- Service Provider Performance
- Service Guarantees

WUTC Complaint Ratio (SQI #2)

Table 2a: WUTC Complaint Ratio for 2019

Key Measurement	Type of Metric	Benchmark/Description	2019 Performance Results	Achieved
Customer Satisfaction				
WUTC complaint ratio	**Service Quality Index #2**	**No more than 0.40 complaints per 1,000 customers, including all complaints filed with WUTC**	**0.16**	☑

Overview

Each year the WUTC receives complaints from PSE customers on a variety of topics. In 2019, there were a total of 326 complaints, up from 325 in 2018. The 2018 SQI #2 complaint ratio was 0.16, while the 2019 complaint ratio was also 0.16.

About the Benchmark

The WUTC complaint ratio is calculated by dividing the sum of all natural gas and electric complaints reported to the WUTC by the average monthly number of PSE customers. The quotient is then multiplied by 1,000. The formula follows:

$$WUTC\ complaint\ ratio = \frac{electric\ and\ natural\ gas\ complaints\ recorded\ by\ WUTC}{average\ monthly\ number\ of\ electric\ and\ natural\ gas\ customers} X\ 1{,}000$$

The average monthly customer count is the average of the total number of PSE customers, per month, during the reporting period.

Going Forward

PSE will continue identifying potential issues that could trigger customer complaints. The focus is on prevention of the cause of these issues through timely and accurate support for each customer. Areas of focus for 2020 include:

- Continue to focus on the WUTC "Consumer Upheld" complaint dispositions to identify root cause, to establish preventive and corrective actions, and follow-up to determine the effectiveness of the actions.
- Continue to improve PSE's company-wide customer experience by using knowledge gained in managing escalated complaints for training and education of others in PSE.
- Continue to work with the WUTC staff to make complaint response and resolution processes more efficient for the WUTC and PSE.

Customer Access Center Answering Performance (SQI #5)

Table 2b: Customer Access Center Answering Performance for 2019

Key Measurement	Benchmark	2019 Performance Results	Achieved
Customer Service			
Customer Access Center answering performance (SQI #5)	**At least 80% of calls answered by a live representative within 60 seconds of request to speak with live operator**	**81%**	☑

Overview

PSE's Customer Care Center (i.e. Customer Access Center) receives all of PSE's customer general inquiries and typically represents PSE to customers. Customers calling PSE have the option of going into an Interactive Voice Response (IVR) system where they are able to perform self-serve transactions or to speak with a representative. PSE's customer service representatives (CSRs) answer calls promptly providing customers with the information or assistance they require, including natural gas and electric emergencies. In 2019, the CSRs answered 81 percent of the calls within 60 seconds of customer requests.

About the Benchmark

The Customer Care Center call answering performance is measured from the time the customer initiated a request to speak with a CSR until a CSR arrived on the line. The annual performance is determined by the average of the 12 monthly call answering performance percentages. The calculation of the monthly answering performance is demonstrated through the following formula:

$$\textit{Monthly call answering performance} = \frac{\textit{aggregate number of calls answered by a company rep within 60 seconds}}{\textit{aggregate number of calls received}}$$

Busy Calls and Call Abandonment

PSE's phone system is configured with a backup system to handle overflow customer calls to 1-888-Call-PSE. Overflow calls, from PSE's main IVR system, are routed to a separate IVR system provided by PSE's phone service vendor that enables customers to contact PSE through a different channel. All 2.6 million calls received in 2019 to 1-888-Call-PSE went through either the main phone system or the overflow phone backup system. Among the 2.6 million calls, 3% of the calls were abandoned by customers.

A report from PSE's telecommunication vendor, CenturyLink" indicated that there was one busy call for 2019. This call originated from 717-785-XXXX occurred on November 24, 2019. However, CenturyLink wasn't able to provide specific information on why the call received busy call treatment. CenturyLink stated in general that calls can receive this treatment due to switching, networking or capacity issues. PSE's phone system used in the

Customer Care Center did not experience any issues and the call volumes on November 24, 2019, were below the capacity that PSE's phone system can handle at the time of the call.

Going Forward

PSE is engaged in initiatives to further the Customer Care Center's answering performance and ensure that the new SQI #5 benchmark of 80% of calls being answered within 60 seconds will be achieved. In 2020, PSE will:

- Continue to deliver on-going agent training to improve proficiency and elevate the customer experience
- Through the Get to Zero initiative, continue to improve self-service options and allow the customers to complete various transactions online, 24 hours a day.
- Continue to improve processes to optimize efficiency and leverage the information systems and technology.
- Continue to improve the quality of each customer contact through the ongoing collaboration within the Customer Care Center.
- Continue to improve upon the debt collection and disconnection processes to ensure the customer is well served as sound business practices are followed.

Customer Access Center Transactions Customer Satisfaction (SQI #6)

Table 2c: Customer Access Center Transactions Customer Satisfaction for 2019

Key Measurement	Type of Metric	Benchmark/Description	2019 Performance Results	Achieved
Customer Satisfaction				
Customer Access Center transactions customer satisfaction	**Service Quality Index #6**	**At least 90% satisfied (rating of 5 or higher on a 7-point scale)**	**92%**	☑

Overview

Most of the telephone calls to PSE's general customer help phone number 1-888-CALL-PSE are handled by PSE's Customer Care Center (i.e. Customer Access Center). EMC Research, an independent research company for PSE's Service Quality Program[13], conducted telephone surveys with PSE customers and prepared monthly and semi-annual reports on customer satisfaction regarding Customer Access Center transactions during the 2019 SQ Program reporting year. The independent survey-results found that 92% of customers surveyed were satisfied with the Customer Access Center's overall transaction performance (SQI #6). This is a decrease of 2% from 2018.

About the Benchmark

An independent research company conducts phone surveys to customers who have made calls to PSE and asks the following questions:

> "Overall, how would you rate your satisfaction with this call to Puget Sound Energy? Would you say 7-completely satisfied, 1-not at all satisfied or some number in between?"

A customer is considered to be satisfied if they responded 5, 6 or 7. The annual performance is determined by the weighted monthly average percent of satisfied customers. The formula for the monthly percentage follows:

$$\textit{Monthly percentage of satisfied customers} = \frac{\textit{aggregate number of survey responses of 5, 6 or 7}}{\textit{aggregate number of survey responses of 1, 2, 3, 4, 5, 6 or 7}}$$

[13] Per Order 21 in Dockets UE-072300 and UG-072301 (consolidated) issued by WUTC on April 8, 2013, EMC Research Inc. has been the exclusive survey company conducting and preparing the survey results for SQI #6 and #8. The methodology and procedures used by EMC Research Inc. was validated by Dr. MacLachlan of University of Washington as "being of high validity and reliability" as indicated in the Attachment A to PSE's compliance filing under Order 21 on June 21, 2013.

Going Forward

PSE recognizes that continuous improvements are required to maintain customer satisfaction.

- PSE will continue to focus on improvement in customer satisfaction through quality assurance processes and technology enhancements, as well as on-going training and customer initiatives.

Gas Safety Response Time (SQI #7)

Table 2d: Gas Safety Response Time for 2019

Key Measurement	Type of Metric	Benchmark/Description	2019 Performance Results	Achieved
Operations Services				
Gas Safety Response Time	**Service Quality Index #7**	**Average 55 minutes or less from customer call to arrival of field technician**	**32 minutes**	☑

Overview

The primary responsibility of PSE's Gas First Response (GFR) team is to respond to natural gas emergencies. In 2019, PSE responded to more than 22,000 emergency calls concerning natural gas safety. These emergencies include reports of odors, third-party damage to PSE's system, and leaks and carbon monoxide concerns. The GFR team also supports local and state first-response organizations, such as fire departments. PSE has GFR personnel located throughout its service territory. These responders are available on a 24/7/365 basis.

In addition to responding to natural gas emergencies, the GFR team performs various natural gas system maintenance and inspection activities, adjusts and performs minor repairs on customer equipment and monitors construction excavation when it occurs near certain underground facilities.

About the Benchmark

The natural gas safety response time is calculated by logging the time each customer service call is created and the time the natural gas field technician arrives on site. The calculated response time for each service call is averaged for all emergency calls during the performance year to determine the overall annual performance.

$$\textit{Gas safety response time annual performance} = \frac{\textit{sum of all natural gas emergency response times}}{\textit{annual number of natural gas emergency calls received}}$$

Going Forward

- PSE's natural gas emergency response processes have been assessed and improved where possible as PSE ramps toward going live with Integrated Work Management (IWM) tools for Gas First Response in 2020. The objective of the IWM is to improve PSE field operations work processes and tools to support greater efficiency and improved customer experience. The focus of the transformation is on greater integration and streamlining across the work lifecycle, optimization of work scheduling, and facilitating real time updates to and from the field through mobile workforce tools.

Field Service Operations Transactions Customer Satisfaction (SQI #8)

Table 2e: Field Service Operations Transactions Customer Satisfaction for 2019

Key Measurement	Type of Metric	Benchmark/Description	2019 Performance Results	Achieved
Customer Satisfaction				
Field Service Operations transactions customer satisfaction	**Service Quality Index #8**	**At least 90% satisfied (rating of 5 or higher on a 7-point scale)**	**95%**	☑

Overview

EMC Research[14], an independent research company, conducts telephone surveys with PSE customers who have requested and received natural gas field service. In 2019, these surveys found that 95% of customers were satisfied with PSE's field service operations transaction performance.

About the Benchmark

Every week, EMC Research contacts randomly-selected customers who have called PSE the previous week and received natural gas field service. The firm prepares monthly and semi-annual reports on PSE's field service operations transaction performance.

Customers are asked a number of questions including the following question for the purpose of SQI #8:

> "Thinking about the entire service, from the time you first made the call until the work was completed, how would you rate your satisfaction with Puget Sound Energy? Would you say 7- completely satisfied, 1- not at all satisfied or some number in between?"

A customer is considered to be "satisfied" if they responded 5, 6 or 7.

The annual performance is determined by the weighted monthly average of percent of satisfied customers. The formula for the monthly percentage follows:

$$\textit{Monthly percent of satisfied customers} = \frac{\textit{aggregate number of survey responses of 5, 6 or 7}}{\textit{aggregate number of survey responses of 1, 2, 3, 4, 5, 6 or 7}}$$

[14] SQI-related customer surveys were conducted with applicable guidelines and the results are unbiased and valid in accordance with the survey procedures established in consolidated Dockets UE-011570 and UG-011571. EMC Research and the survey procedures used by EMC Research met these guidelines as detailed in PSE's compliance filing pursuant to the paragraph 13 of Order 21 of Dockets UE-072300 and UG-072301 (consolidated), Granting in Part, and Denying in Part, Puget Sound Energy, Inc's Petition for Waiver and Suspension of Service Quality Index Nos. 6 AND 8 (June 21, 2013).

Going Forward

In 2020 PSE will focus on the following:

- The Integrated Work Management system was expected to be introduced to GFR in 2019, but was delayed. It will now become operational in early Spring of 2020 and will make response to customer calls more streamlined and efficient.

Appointments Kept (SQI #10)

Table 2f: Appointments Kept for 2019

Key Measurement	Type of Metric	Benchmark/Description	2019 Performance Results	Achieved
Operations Services				
Appointments kept	**Service Quality Index #10**	**At least 92% of appointments kept**	**100%**[15]	☑

Overview

PSE provides its customers with a variety of scheduled service appointments including:

- **Permanent service**—Permanent natural gas service from an existing main or permanent electric secondary voltage service from existing secondary lines
- **Reconnection of existing service**—Reconnection following move-out, move-in or disconnection for non-payment
- **Natural gas diagnostic service request**—For water heater, furnace checkup, furnace not operating, other diagnostic or repair or follow-up appointments

Service appointments that involve safety do not require scheduling and are performed on a 24/7/365 basis. These non-scheduled services include restoring electric service or responding to a reported gas odor.

When a natural gas or electric customer requests a scheduled field service, PSE provides the customer with either a guaranteed appointment date and time-frame or a guaranteed commitment to provide service on or before a specified date.

In 2019, PSE achieved a result of 100% for this appointments kept metric. Data on the 0.3% of the missed appointments and other appointment information by service type is detailed in Appendix F: *Customer Service Guarantee Performance Detail.*

[15] Results shown are rounded from 99.7% to the nearest whole percentage per UTC order. However, the 100% 2019 annual performance result does not reflect that PSE and its service providers met all the appointments during the reporting period. Numbers of missed appointments by appointment type are detailed in Appendix F: *Customer Service Guarantee Performance Detail*.

About the Benchmark

The appointments kept SQI is calculated by dividing the number of appointments kept by the total number of appointments made. The formula follows:

$$Appointments\ kept = \frac{annual\ appointments\ kept}{annual\ appointments\ missed + annual\ appointments\ kept}$$

Appointments are considered missed when PSE does not arrive during the time period or on the agreed upon date except when the appointments have been missed due to the following reasons:

- The customer fails to keep the appointment
- The customer calls PSE to specifically request the appointment be rescheduled
- PSE reschedules the appointment because conditions at the customer site make it impractical to perform the service
- The appointment falls during an SQI Major Event[16] period

These types of appointments are not considered missed appointments but "excused" appointments.

Appointments that were canceled by the customer, regardless of the customer's reason, will be considered "canceled" appointments.

Excused and canceled appointments are not counted as either kept or missed appointments.

Additional appointments to complete repairs are considered new appointments.

Going Forward

In 2020 PSE will focus on the following:

- Continue to review the reasons for missed appointments and work to find solutions so that PSE can meet all its customer commitments
- Continue to evaluate tools and technologies that would enable a higher level of customer service and convenience through PSE's Get to Zero initiative by offering better ways for self-service options, including scheduling of field services

[16] Major Event Days when 5% or more electric customers are without power during a 24 hour period and associated carry-forward days that it will take to restore electric service to these customers, which are excluded from the performance calculations of SQI #4-SAIFI and SQI #11-Electric safety response time.

Electric Safety Response Time (SQI #11)

Table 2g: Electric Safety Response Time for 2019

Key Measurement	Type of Metric	Benchmark/Description	2019 Performance Results	Achieved
Operations Services				
Electric Safety Response Time	**Service Quality Index #11**	**Average 55 minutes or less from customer call to arrival of field technician**	**54 minutes**	☑

Overview

PSE responded to more than 13,500 electric incidents in 2019. PSE's Electric First Response (EFR) team has the primary responsibility of responding to electric outages and electric emergencies. Examples of the types of outages and emergency events that PSE responds to include: downed wires, equipment failures, car-pole accidents, bird and animal-related outages, trees or limbs on lines, third-party dig-ins, etc.

EFR personnel are located throughout PSE's service territory and are available to respond on a 24/7/365 basis. EFR's priority is to ensure public and worker safety and then to restore service to customers. After addressing safety concerns, service restoration is made through temporary or permanent repairs or reconfiguration of the electric system. If the repair is beyond the capability of EFR personnel, construction crews are called in to make permanent repairs.

About the Benchmark

The electric safety response time for emergency incidents is calculated by logging the time of each customer service call and the time the EFR personnel arrives on site. The annual performance is determined by the average number of minutes from the time a customer calls to the arrival of the EFR personnel for electric safety incidents occurring during the performance year. The formula follows:

$$\textit{Annual electric safety response time} = \frac{\textit{sum of all response times}}{\textit{annual number of electric safety incidents}}$$

Certain incidents are excluded from the measurement if they occurred during the following days:

- Major Event Days when 5% or more electric customers are without power during a 24-hour period and associated carry-forward days that it will take to restore electric service to these customers.
- Localized emergency event days when all available EFR in a local area are dispatched to respond to service outages or safety incidents.

Going Forward

In 2020, PSE will continue its efforts to reduce electric safety incident response time. The efforts include:

- PSE will continue to evaluate staffing levels to ensure adequate support and response.
- The ongoing deployment of PSE's 'Advanced Metering Infrastructure' over the next several years will improve customer outage confirmation capability.

Service Provider Performance

Table 2h: Service Provider Performance for 2019

Key Measurement	Type of Metric	Benchmark/Description	2019 Performance Results	Achieved
Customer Services and Satisfaction and Operations Services				
Service provider standards compliance—Quanta Electric	**Service Provider Index #1B[17]**	**Level 1 ≤ 15 dev/1000 Level 2 ≤ 20 dev/1000 Level 3 ≤ 20 dev/1000**	**Level 1 3.53 Level 2 8.69 Level 3 13.51**	☑
Service provider standards compliance—Quanta Gas	**Service Provider Index #1C[18]**	**Level 1 ≤ 8 dev/1000 Level 2 ≤ 15 dev/1000 Level 3 ≤ 12 dev/1000**	**Level 1 2.73 Level 2 6.11 Level 3 1.41**	☑
Service provider appointments kept—Quanta Electric	**Service Provider Index #3B[19]**	**At least 92% of appointments kept**	**99%**	☑
Service provider appointments kept—Quanta Gas	**Service Provider Index #3C**	**At least 92% of appointments kept**	**99%**	☑
Secondary safety response time—Quanta Gas	**Service Provider Index #4D**	**Within 60 minutes from first response assessment completion to second response arrival**	**50 minutes**	☑
Secondary Core-Hours, Non-Emergency Safety Response and Restoration Time—Quanta Electric	**Service Provider Index #4B**	**Within 250 minutes from the dispatch time to the restoration of non-emergency outage during core hours**	**234 minutes**	☑
Secondary Non-Core-Hours, Non-Emergency Safety Response and Restoration Time—Quanta Electric	**Service Provider Index #4C**	**Within 316 minutes from the dispatch time to the restoration of non-emergency outage during non-core hours**	**262 minutes**	☑

[17] Level 1: Deviation from PSE Standards and/or current regulatory expectations that provide immediate and significant risk to product quality, safety or system integrity; or a combination/repetition of Level 2 deficiencies that indicate a critical failure of systems.
Level 2: Deviation from PSE Standards and/or current regulatory expectations that provide a potentially significant risk to product quality, safety or system integrity; or could potentially result in significant observations from a regulatory agency; or a combination/repetition of Level 3 deficiencies that indicate a failure of system(s).
Level 3: Observations of a less serious or isolated nature that are not deemed Level 1 or 2, but require correction or suggestions on how to improve systems or procedures that may be compliant but would benefit from improvement.

[18] See Footnote 17.

[19] There were no results for Service Provider Indices (SPI) #1A, #2A, #3A and #4A. These indices were assigned to a service provider, Pilchuck that no longer works for PSE. PSE transitioned all natural gas construction and maintenance work to Quanta Gas as of April 30, 2011. Service Provider Indices #2B and #2C, Service Provider Customer Satisfaction, Quanta Electric and Quanta Gas, respectively, which were applicable in prior years' reports, have been terminated since the 2013 reporting period.

Overview

This section details the service provider metrics relevant to PSE's SQ Program. PSE monitors and assesses the performance of its primary natural gas and electric service providers (Quanta Gas and Quanta Electric). The metrics address PSE standards compliance, new construction service appointments, and safety response and restoration time. Each measure is designed to monitor and improve PSE's service.

About the Benchmark

- **Service Provider Standards Compliance (SPI #1)—**Service providers must achieve a level of conformance to PSE Standards, where the metric is segregated across three relative risk levels assigned to the construction inspection items to support the establishment of continuous improvement activities according to risk.

  At Level 1, the deviation from PSE Standards and/or current regulatory expectations that provide immediate and significant risk to product quality, safety or system integrity; or a combination/repetition of Level 2 deficiencies that indicate a critical failure of systems. At Level 2, the deviation from PSE Standards and/or current regulatory expectations that provide a potentially significant risk to product quality, safety or system integrity; or could potentially result in significant observations from a regulatory agency; or a combination/repetition of Level 3 deficiencies that indicate a failure of system(s). Level 3 includes the observations of a less serious or isolated nature that are not deemed Level 1 or 2, but require correction or suggestions on how to improve systems or procedures that may be compliant but would benefit from improvement.

  These benchmarks for the three levels are as follows:

  - Quanta Gas
    - For Level 1 inspection items: ≤ 8 deviations/1000 items inspected
    - For Level 2 inspection items: ≤ 15 deviations/1000 items inspected
    - For Level 3 inspection items: ≤ 12 deviations/1000 items inspected
  - Quanta Electric
    - For Level 1 inspection items: ≤ 15 deviations/1000 items inspected
    - For Level 2 inspection items: ≤ 20 deviations/1000 items inspected
    - For Level 3 inspection items: ≤ 20 deviations/1000 items inspected
- **Service Provider New Customer Construction Appointments Kept (SPI #3)**—Quanta Gas and Quanta Electric must keep at least 92% of their new customer construction appointments.
- **Secondary Safety Response Time (SPI #4)**—This SPI consists of three sub-indices:
  - **Service Provider Indices #4B and #4C**—Quanta Electric's secondary safety response and restoration time during core and non-core hours, respectively. Quanta Electric must respond and complete power restoration in less than 250 minutes on average during core hours (SPI #4B) and less than 316 minutes on average during non-core hours (SPI #4C). Core hours are 7:00 a.m.–3:30 p.m., Monday through Friday, except holidays. Restoration time is measured from the time a Quanta Electric crew is dispatched to the time the problem causing the interruption has been resolved and the line has been re-energized. Both the core-hours and non-core-hours measurements exclude emergency events and significant storm events.

- **Service Provider Index #4D**—Secondary safety response time—Quanta Gas. Quanta Gas must respond within 60 minutes on average from PSE's Gas First Response assessment completion to the service provider's secondary response arrival.

Service Provider Appointments and Related Penalties

Table 2i shows the number of new customer construction appointments completed by PSE service providers and the amount of penalties paid due to missed appointments.

Table 2i: Service Provider Appointments and Missed Appointment Penalties for 2019

Service Provider Appointments				Missed Appointment Penalties		
Service Provider	Electric	Natural Gas	Total	Electric	Natural Gas	Total
Quanta Gas	N/A	8,956	8,956	N/A	$4,000	$4,000
Quanta Electric	8,306	N/A	8,309	$2,700	N/A	$2,700
Total	***8,306***	***8,956***	***17,262***	***$2,700***	***$4,000***	***$67,000***

Going Forward

PSE and our service providers will continue the following initiatives for 2020:

- Continue to collaborate with internal customers on development and implementation of process and operating model improvements.
- Develop new opportunities to digitize records and documents throughout the process.
- Implement tool tracking software for calibrated instrumentation.
- Publish an as-built standard with maps and records to improve work sketch quality.
- Partner with jurisdictions on defining requirements for PSE crew shiftwork response to comply with jurisdiction permit requirements.
- Improvements to the scheduling and release of system work to maintain consistent and adequate resources throughout the year.

Service Guarantees

Overview

PSE offers two types of service guarantees to its customers: Customer Service Guarantee (Service Guarantee #1) for a scheduled appointment and Restoration Service Guarantees (Service Guarantee #2 and Service Guarantee #3) for electric service restoration.

PSE promotes its Customer Service Guarantee and the Restoration Service Guarantees on pse.com, the back of billing stock, and on the billing/return envelope. It is also highlighted in the customer newsletter[20] as part of customer bill inserts. These promoting efforts are detailed in Appendix F: Customer Service Guarantee Performance Detail.

PSE also surveys its customers monthly about the Customer Service Guarantee. Appendix G discusses the ways PSE has made customers aware of its Customer Service Guarantee and the results of the customer awareness survey.

Customer Service Guarantee

The Customer Service Guarantee (CSG) is designed to give customers a $50 missed appointment credit if PSE or its service providers fail to arrive by the mutually agreed upon time and date to provide one of the following types of service:

- **Permanent service**—Permanent natural gas service from an existing main or permanent electric secondary voltage service from existing secondary lines
- **Reconnection**—Reconnection following move-out, move-in or disconnection for non-payment
- **Natural gas diagnostic service request**—For water heater, furnace checkup, furnace not operating, other diagnostic or repair or follow-up appointments

This service appointment guarantee applies in the absence of Major Storms, earthquakes, supply interruptions or other adverse events beyond PSE's control. In these cases, PSE will reschedule service appointments as quickly as possible.

The number of CSG by energy, service type, and month is detailed in Appendix F: *Customer Service Guarantee Performance Detail*. For additional details on the promotion and communication of CSG, see Appendix G: *Customer Awareness of Service Guarantee.*

[20] SQI settlement requirement: "A promotion of the customer service guarantee will be included in the customer newsletter, "EnergyWise," at least three times per year."

Restoration Service Guarantees

PSE has two Restoration Service Guarantees (RSG) under the conditions of electric Schedule 131 that provides a $50 credit to a qualified customer who experiences a prolonged outage during a non-storm outage for more than 24 consecutive hours or is out of electric service for at least 120 consecutive hours for any outage. To receive the RSG credit, affected customers must report the outage or request the credit within seven days of their service restoration. The 120-hour Restoration Service Guarantee has been effective since November 1, 2008. The 24-hour Restoration Service Guarantee became effective on January 1, 2017, which was established to replace the SQI #3 SAIDI penalty mechanism.

Both Restoration Service Guarantees will be suspended if PSE lacks safe access to its facilities to perform the needed repair work. To receive either or both the service guarantee payments, affected customers must report the outage or apply within 7 days after the restoration of their electric service.

The maximum credit payment to customers for the 120-hour Restoration Service Guarantee is $1.5 million. There is no limit of PSE's 24-hour Restoration Service Guarantee credit payment to customers.

The availability of the 120-hour Restoration Service Guarantee is emphasized and messaged in PSE's phone system when customers call and report their outage during a major outage event, when 5% or more PSE electric customers are without power, or when PSE opens its Emergency Operations Center in response to a significant outage event.

2019 Service Guarantee Credits

Customer Service Guarantee Credits

In 2019, PSE credited customers a total of $14,850 for missing 297 of the 91,536 SQI #10 appointments. Table 2j provides summary values of Service Guarantee counts and payments to customers in 2019 by service type.

Table 2j: 2019 PSE SQI #10 Appointment Count and Customer Service Guarantee Credits

	SQI #10 Appointment Counts			Customer Service Guarantee Payments to Customers		
Service Type	Electric	Natural Gas	Total	Electric	Natural Gas	Total
Permanent Service	8,177	8,935	17,112	$2,700	$4,000	$6,700
Reconnection	37,142	14,927	52,069	$5,300	$1,200	$6,500
Diagnostic	N/A	22,355	22,355	N/A	$1,650	$1,650
Total	***45,319***	***46,217***	***91,536***	***$8,000***	***$6,850***	***$14,850***

Appendix F: *Customer Service Guarantee Performance Detail* provides additional detail on missed appointments along with the credits paid by month and appointment service type as of December 31, 2019.

Restoration Service Guarantee Credits

PSE is committed to reviewing all prolonged outages that may trigger the Restoration Service Guarantees and any customer requests for the RSG credit within 30 days of a request. The following table summarizes payments to customers in 2019.

Key Measurement	Type of Metric	Benchmark/Description	No. of Customers	Restoration Service Guarantee Payments to Customers
120-Consecutive – hour power outage restoration guarantee	**Service Guarantee #2**	**A $50 credit to eligible customers when experienced a power outage is longer than 120 consecutive hours**	**1**	**$50**
24-Consecutive-hour non-major storm power outage restoration guarantee	**Service Guarantee #3**	**A $50 credit to eligible customers when experienced a power outage is longer than 24 consecutive hours during non-major storms**	**213**	**$10,650**
Total			*214*	*$10,700*

CHAPTER 3

ELECTRIC SERVICE RELIABILITY

Executive Summary

As required by WAC 480-100-393 and 480-100-398, this is PSE's Electric Service Reliability Annual Report. Providing safe, reliable and efficient electric service at a reasonable cost is a top priority for PSE. To continually improve and provide reliable electric service and modernize the electric grid throughout its service area, PSE uses a three prong balanced approach to deliver a Reliable, Resilient, Smart and Flexible grid. This report focuses on the reliability component of PSE's grid modernization vision of the future. The lower left corner of the triangle in **Figure 3a** identifies how the information in this report fits into that vision.

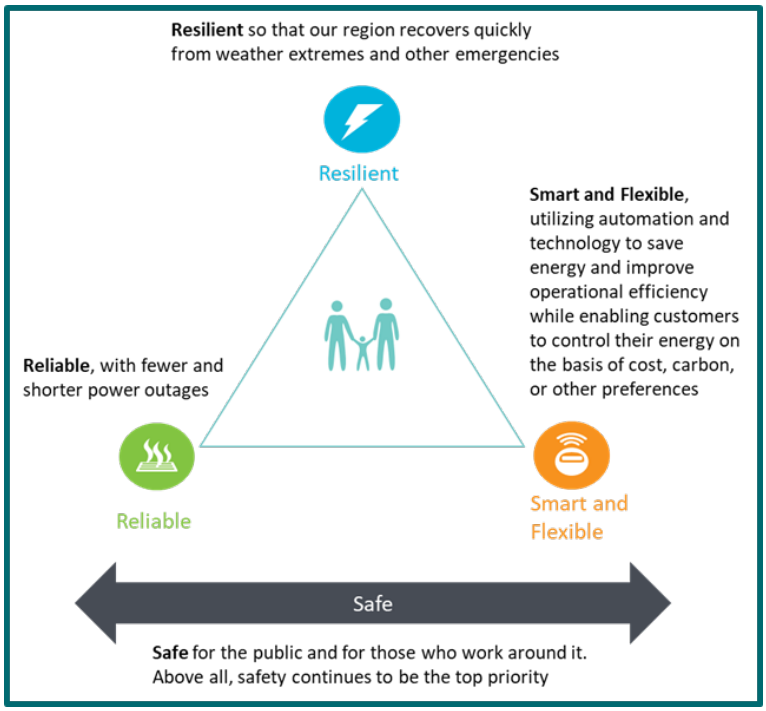

Figure 3a: PSE's grid modernization vision

This executive summary provides an overview of the analysis in the report while the following sections reflect the organization of information as outlined in PSE's Monitoring Plan. **Appendices H – O** satisfy the

requirements of the Monitoring Plan, while additional appendices following Appendix O provide further details referenced throughout the rest of the report.

The two most common industry methods for measuring reliability performance, and the metrics designated in this report as SQI #3 and #4, are System Average Interruption Duration Index (SAIDI) and System Average Interruption Frequency Index (SAIFI). Those, along with Customers Experiencing Multiple Interruptions (CEMI) and customer complaints are used to measure changes in reliability at PSE and are described in this report. Though imperfect, these metrics can show the progress of PSE's electric system reliability over a period of years.

In 2019, SAIDI and SAIFI beat their SQI targets as PSE customers experienced a high degree of reliability compared to previous years, which fits into a trend of continued reliability improvement. SAIDI was 136 minutes and SAIFI was 0.98 interruptions.

Summary of Current SQI #3 SAIDI Performance

In 2019, SAIDI for PSE was 136 minutes compared to a target for SAIDI of 155 minutes. **Figure 3b** shows the SAIDI results starting from 2014 when PSE's Outage Management System (OMS) went operational.[21]

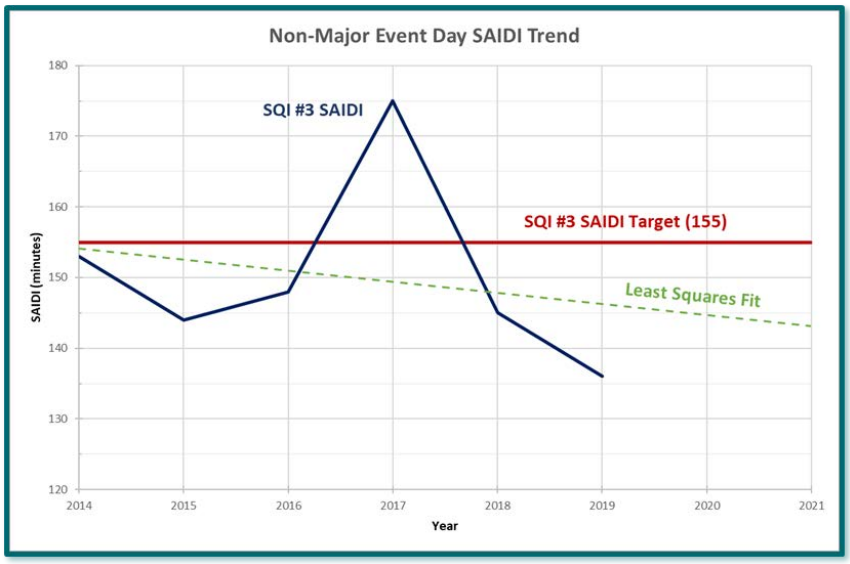

Figure 3b: Trend in non-storm SAIDI

Overall, Figure 3b shows that, though there can be great volatility in results from year to year, the multi-year trend shows continually improving reliability, according to the least squares fit line. The majority of the volatility is due to the number and severity of weather events (wind, heavy snow, lightning…etc.) that do not qualify as major event days, but have a significant impact nonetheless. PSE is working to continue this trend in improved reliability with a long term target for SAIDI between 110 and 125 minutes.

[21] The primary driver for the decline in SAIDI performance for 2017 was the higher than average tree related outages impacting customers in Whatcom, Skagit and Island Counties.

Summary of Current SQI #4 SAIFI Performance

In 2019, SAIFI was 0.98 interruptions compared to a target for SAIFI of 1.30 interruptions. **Figure 3c** shows how the results from 2019 compare with historical values.[22] As with SAIDI, a least squares fit line is used to determine the multi-year trend for SAIFI.

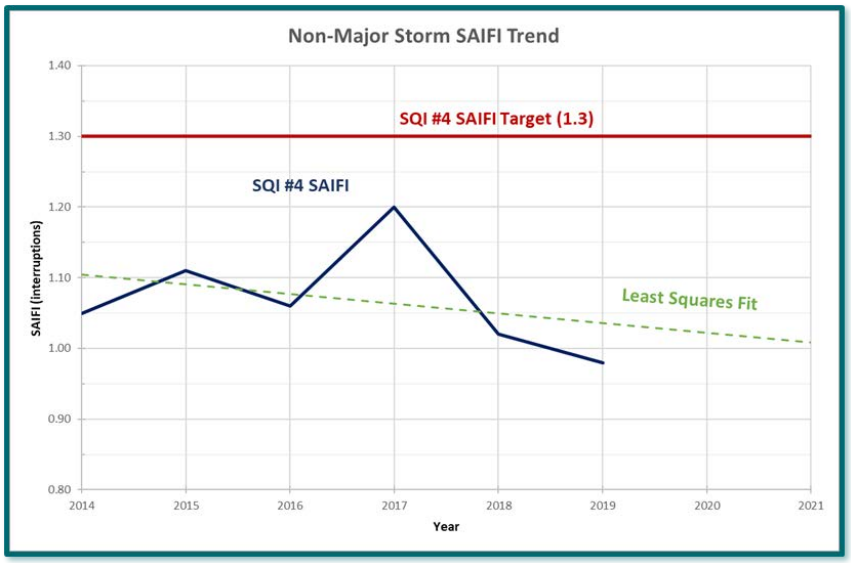

Figure 3c: Trend in non-storm SAIFI

Similar to the results for SAIDI, the multi-year trend for SAIFI shows continually improving reliability. As seen in **Figure 3c**, SAIFI results have historically beat the 1.30 interruptions target. Many of the programs that PSE implements to improve SAIDI also impact SAIFI, therefore this trend reducing SAIFI is likely to continue.

[22] The primary driver for the decline in SAIFI performance for 2017 was the higher than average tree related outages impacting customers in Whatcom, Skagit and Island Counties.

Summary of Current CEMI Performance

As agreed to in Dockets UE-072300 and UG-072301 Order 29, PSE began tracking and reporting on CEMI in 2019. **Figure 3d** shows results for both 2018 and 2019.

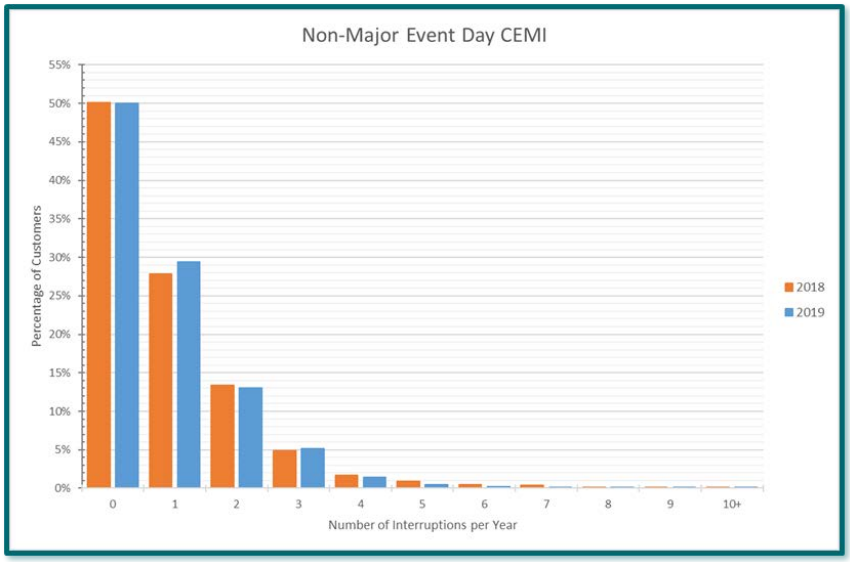

Figure 3d: 2018 and 2019 non-storm CEMI results

Drawing conclusions about reliability performance is difficult using CEMI. In general, PSE wants to reduce the number of customers experiencing a high frequency of interruptions though that will result in an increase in the number of customers experiencing a lower frequency of interruptions as customers are moved from a higher frequency category to a lower one. The percentage of customers experiencing a specific number of interruptions decreased in most cases from 2018 to 2019, however, a 2 year comparison does not necessarily provide a meaningful trend. The information is most useful in identifying customers experiencing poor reliability that might not be seen in system-wide or circuit level metrics.

Summary of Customer Complaints

In 2019 PSE counted a total of 56 reliability complaints; 33 via the WUTC and 23 via directly contacting PSE. **Figure 3e** shows how the results from 2019 compare to previous years.[23] Note that customers may have submitted a complaint both with PSE and the WUTC.

Figure 3e: Trend in customer complaints

The multi-year trend in Figure 3e shows a decrease in customer complaints. The number of complaints is very small compared to the number of PSE customers (0.005%). Relatively large changes in the number of complaints can occur depending on where and when storms occur. For this trend to be meaningful, many years of data are required. As with CEMI, this information is most useful for PSE as a tool to identify customers with reliability concerns that might not be seen in system-wide or circuit level metric analysis.

Summary of Plan Moving Forward

SAIDI and SAIFI results indicate that PSE's efforts are improving reliability and will continue to result in improved reliability. In addition to continuing to implement well-established electric system improvements such as cable replacement, treewire and distribution automation, PSE will continue to identify and evaluate new reliability improving technologies such as transmission line automatic switching, single phase reclosers and fault locating technologies. Through PSE's budget optimization process, specific reliability projects will continue to be chosen for implementation that maximize value for customers.

PSE's processes for evaluating, designing and implementing reliability improvements are intended to drive SAIDI into the 110 – 125 minute range over the next 10 years. Over time, customer preferences and program costs may change which could impact these targets. With increasing electric vehicle and distributed energy

[23] The increase in complaints in 2016 was due to organized neighborhood groups calling PSE to complain about electric reliability in their area, specifically customers in Kenmore.

resource adoption, PSE expects customers to likely demand better reliability over time. Continuing to invest in grid modernization will help to meet future customer expectations for reliability as well as maximize customer benefit from larger adoption of these technologies as they mature.

SAIDI (SQI #3) [24]

Overview[25]

SAIDI measures the average number of interruption minutes per customer per year. Most electric utilities use this measurement in reviewing the reliability of their electrical system, excluding events that cause interruptions to a significant portion of their customer base due to extreme weather or unusual events.

SAIDI is similar to SAIFI, but SAIDI measures the average duration of customer interruptions while SAIFI measures the average number of customer interruptions. See **Appendix H**: *Electric Reliability Terms and Definitions* for the SAIDI definition.

The 2019 results based on the recorded outages are reported in **Table 3a**.

Table 3a: 2019 SAIDI Results

	Key Measurement	Benchmark	Baseline	Current Year Results	Achieved
$SAIDI_{Total}$	**Total (all outages current year) Outage Frequency–System Average Interruption Duration Index (SAIDI)**	**n/a**	**532**	**550**	**--**
$SAIDI_{Total\ 5\text{-}year\ Average}$	**Total (all outages five-year average) SAIDI**	**n/a**	**326**	**434**	**--**
$SAIDI_{5\%}$	**<5% Non-Major-Storm (<5% customers affected) SAIDI**	**n/a**	**132**	**132**	**--**
$SAIDI_{IEEE}$	**IEEE Non-Major-Storm (T_{MED}) SAIDI**	**n/a**	**107**	**136**	**--**
$SAIDI_{SQI\text{-}3}$	**IEEE Non-Major Storm (T_{MEDADJ}) SAIDI**	**No more than 155 minutes per customer per year**	**n/a**	**136**	☑

Appendix J: *1997-Current Year PSE SAIFI and SAIDI Performance by Different Measurements* reports the historical results of the four measurements from 1997 through the current reporting year. See **Appendix I**: *Electric Reliability Data Collection Process and Calculations* and the section on electric service reliability measurements and baseline statistics for details on the established baseline used for comparison.

What Influences SAIDI[26]

[24] This section meets a requirement of Attachment B of Docket No. UE-110060.

[25] This section meets a requirement of Attachment B of Docket No. UE-110060.

[26] This section meets a requirement of Attachment B of Docket No. UE-110060.

PSE tracks outages by cause codes and groups. **Figure 3f** illustrates the impact of tree-related outages, accounting for the majority of customer minutes, across the $SAIDI_{Total}$ and $SAIDI_{SQI-3}$ measurements.

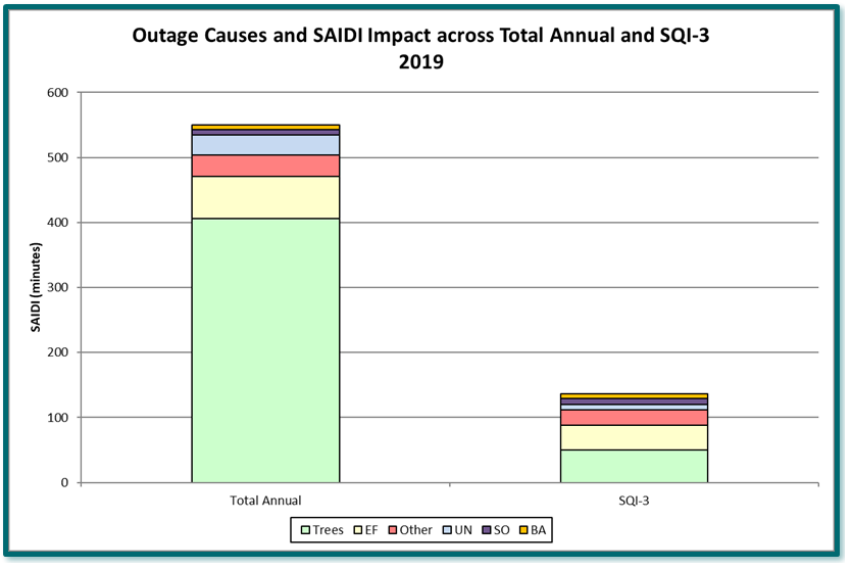

Figure 3f: Outage Causes and SAIDI Impact across Total Annual and SQI-3 in 2019

Despite PSE's best efforts to minimize tree-related outages, these outages can greatly influence SAIDI performance. Falling trees can damage the infrastructure and require a specialized tree removal crew to remove fallen trees before field personnel can begin restoration efforts, producing prolonged interruptions. A fallen tree or large limb will damage the line and may also tear down supporting structures, cross arms and poles.

Other cause categories with a large impact on SAIDI include equipment failure (EF), unknown (UN) and the other (Other) cause category. The equipment failures category is used when a device is suspected of failing for reasons not related to external causes and the unknown category covers those outages when electric first response (EFR) personnel were unable to determine the cause of the outage. The Other category includes 20 cause codes that PSE tracks, such as underground dig-ups, vehicle-related outages (vehicle impacting pole, padmounted switch, guy wire, etc.) and errors in operating the electric system.

Historical Trends for SAIDI

Table 3b shows the SQI SAIDI from 2015 to 2019.

Table 3b: SQI SAIDI from 2015 to 2019

	2015[27]	2016	2017	2018	2019
SAIDI **(SQI #3)**	**272**	**148**	**175**	**145**	**136**
Benchmark	**320 minutes per customer per year, all outage events**	**155 minutes per customer per year, Non-Major Event Days**			

Though results can vary widely from year to year, the multi-year trend shows a reduction in SAIDI. In any given year, weather events can have a large impact on SAIDI. 2019 had fewer of these events than in 2017 and 2018. This, in combination with the reliability improvements PSE has been implementing, resulted in 2019 seeing the lowest SAIDI in the last 5 years. For more detail see **Appendices J**: *1997-Current Year PSE SAIFI and SAIDI Performance by Different Measurements*, **K**: *Current Year Electric Service Outage by Cause by Area* and **L**: *Historical SAIDI and SAIFI by Area.*

[27] Pre IEEE 1366 calculation mutual agreement.

SAIFI (SQI #4) [28]

Overview[29]

SAIFI measures the number of interruptions per customer per year. Most electric utilities use this measurement in reviewing the reliability of their electrical system, excluding major interruption events that cause interruptions to a significant portion of their customer base.

SAIFI is similar to SAIDI, but SAIFI measures the average number of customer interruptions while SAIDI measures the average duration of customer interruptions. See **Appendix H**: *Electric Reliability Terms and Definitions* for the SAIFI definition.

The 2019 results based on the recorded interruptions are reported in **Table 3c**.

Table 3c: 2019 SAIFI Results

	Key Measurement	Benchmark	Baseline	Current Year Results	Achieved
$SAIFI_{Total\ Annual}$	**Total (all outages current year) Outage Frequency -- System Average Interruption Frequency Index (SAIFI)**	**n/a**	**1.24**	**1.57**	☑
$SAIFI_{Total\ 5\text{-}year\ Average}$	**Total (all outages five-year average) SAIFI**	**n/a**	**1.37**	**1.76**	**--**
$SAIFI_{5\%}$	**<5% Non-Major-Storm (<5% customers affected) SAIFI**	**n/a**	**0.80**	**0.98**	**--**
$SAIFI_{IEEE}$	**IEEE Non-Major-Storm (TMED) SAIFI**	**n/a**	**0.71**	**0.96**	**--**

Appendix J: *1997-Current Year PSE SAIFI and SAIDI Performance by Different Measurements* reports the historical results of the four measurements from 1997 through the current reporting year. See **Appendix I**: *Electric Reliability Data Collection Process and Calculations* and the section on electric service reliability measurements and baseline statistics for details on the established baseline used for comparison.

[28] This section meets a requirement of Attachment B of Docket No. UE-110060.

[29] This section meets a requirement of Attachment B of Docket No. UE-110060.

What Influences SAIFI[30]

PSE tracks outages by cause codes and groups. As with SAIDI, system damage caused by trees and vegetation continue to impact the most customers in 2019, which is consistent with previous years. This is followed by equipment failure (EF), other (Other) and unknown (UN) having the greatest impact on SAIFI. See section on SAIDI for more details on these cause categories.

Figure 3g shows the common causes for the recorded outages in 2019 and their impact on customers across $SAIFI_{Total}$ and $SAIFI_{5\%}$ measurements.

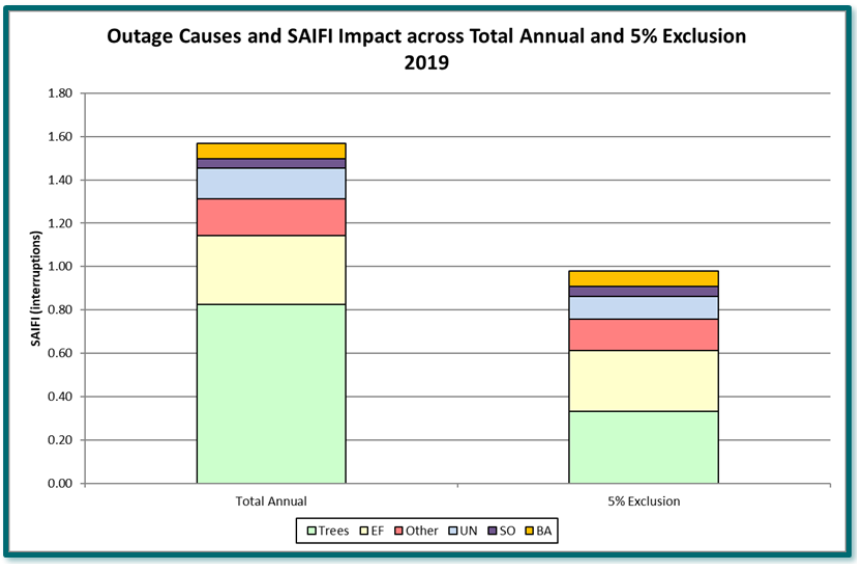

Figure 3g. Common Outage Causes and SAIFI Impact a across Total Annual and 5% Exclusion in 2019

[30] This section meets a requirement of Attachment B of Docket No. UE-110060.

Historical Trends for SAIFI[31]

Table 3d shows SQI SAIFI from 2015 to 2019.

Table 3d: SQI SAIFI from 2015 to 2018 (excluding 5% Major Events)

	2015	2016	2017	2018	2019
$SAIFI_{5\%}$ **(SQI #4)**	**1.11**	**1.06**	**1.20**	**1.02**	**0.98**
Benchmark	**1.30 interruptions per year per customer**				

As with SAIDI, SAIFI results can vary widely from year to year. 2019 was a relatively mild weather year and this, in combination with the reliability improvements PSE has been implementing, resulted in 2019 seeing the lowest SAIFI in the last 5 years. As shown in **Table 3e**, the SQI SAIFI requirements have been met annually for the past five years and the multi-year trend shows continued improvement. For more details see **Appendices J**: *1997-Current Year PSE SAIFI and SAIDI Performance by Different Measurements*, **K**: *Current Year Electric Service Outage by Cause by Area* and **L**: *Historical SAIDI and SAIFI by Area.*

[31] This section meets a requirement of Attachment B of Docket No. UE-110060.

Customer Experiencing Multiple Interruptions

Overview

Starting in 2019, PSE agreed to report on Customers Experiencing Multiple Interruptions (CEMI) as part of Dockets UE-072300 and UG-072301 Order 29. Whereas SAIDI and SAIFI are an average measure of customer experience, CEMI provides the range of customer experiences related to interruption frequency. Metrics like SAIDI and SAIFI are useful for tracking system-wide progress but may hide customer level reliability concerns. CEMI fills this gap, however, instead of describing it as a unique specific measure, it is expressed here as a range. This gives an overall profile of multiple interruptions experience by PSE customers.

CEMI measures the percentage of customers who have experienced zero to multiple sustained interruptions. It is calculated by totaling the number of non-major event day interruptions experienced by each customer. Then the number of customers who had the set number of interruptions is totaled and divided by the average annual number of electric customers.

Results

Figure 3h shows the percentage of PSE customers experiencing varying numbers of interruptions. For example, 50% of customers experienced no sustained interruptions while 29% of customers experienced one sustained interruption.

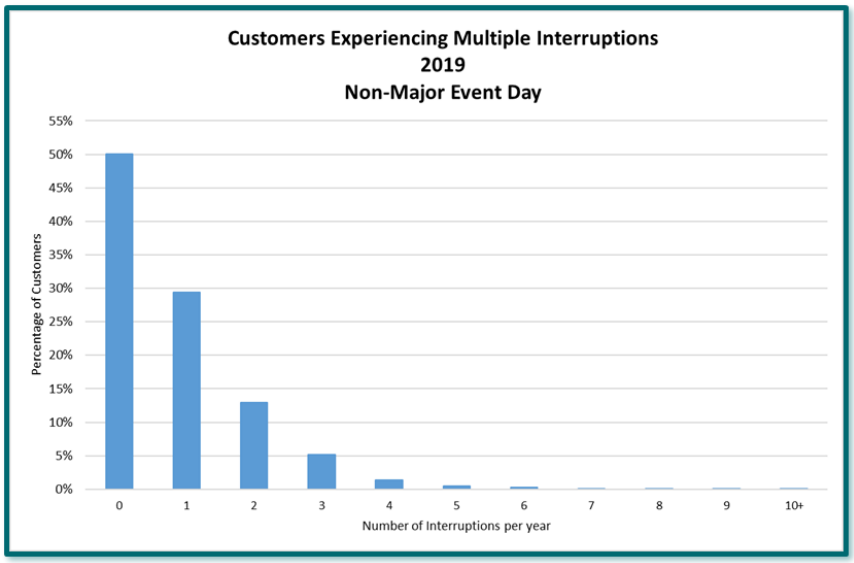

Figure 3h: Customers Experiencing Multiple Interruptions in 2019

About Electric Service Reliability Measurements and Baseline Statistics[32]

Overview

As required by PSE's Electric Service Reliability Plan (UE-110060), PSE reports the SAIFI and SAIDI performance results in many key measurements. Each measurement is based on specific criteria, as noted in the respective SAIFI (SQI #4) and SAIDI (SQI #3) sections. Standard formulas are used to calculate each of the measurements but with one critical difference that showcases a particular area of electric service reliability performance. The formula for each measurement is defined in **Appendix H**: *Electric Reliability Terms and Definitions*.

Baseline Year

To meet UTC requirements, PSE established 2003 as its baseline year. As data collection methods have changed, comparisons between current performance and a 16-year old baseline are no longer meaningful. PSE believes a multi-year trend using data collected with similar methods provides a more accurate representation of the direction of reliability performance. While the result tables given in the SAIDI and SAIFI sections above provide the 2003 baseline numbers for comparison to current results, the charts in the executive summary showing SAIDI and SAIFI trends over multiple years represent a more meaningful assessment of current reliability performance.

Major Events

PSE has multiple major event definitions that apply to SAIFI (also referred to as 5% SQI Exclusion) or SAIDI metrics. For SAIFI, major events are defined as days when 5% or more of the electric customer base in a 24-hour period experiences power interruption and the days following (carried-forward days), until all those customers have service restored. The days that meet that criterion are excluded from that metric.

For the purpose of measuring SQI SAIDI, days that exceed the annual adjusted Major Event Day Threshold are excluded from the performance calculation. Starting in the 2016 reporting year, PSE's SQI SAIDI calculation is based on the industry standard IEEE 2.5 Beta methodology and PSE is allowed to adjust catastrophic days. A catastrophic day is defined as any day that exceeds the 4.5 Beta threshold. In addition, PSE also calculates SAIDI using the IEEE 1366 2.5 Beta methodology without adjusting for catastrophic days, referred to IEEE SAIDI.

[32] This section meets a requirement of Attachment B of Docket No. UE-110060.

In 2019, PSE experienced the following major storm events that met the SQI SAIDI, 5% SQI exclusion, or the IEEE Standard 1366 exclusion criteria:

- A January 6th event that affected customers in King, Pierce and Thurston Counties.
- A February 4th event that affected customers in Whatcom, Skagit and Island Counties.
- A February 8th event that affected customers throughout PSE's Western Washington service territory.

Table 3e details the dates, causes and exclusion criteria for the SQI SAIDI, IEEE, and 5% exclusion events in 2019. Typically, an event that meets the 5% Exclusion Major Event Day criteria will also exceed the SQI SAIDI T_{MEDADJ} and IEEE T_{MED} criteria. Since the initial reporting of the IEEE methodology in 2003, all 5% Exclusion Major Event Days have met the IEEE T_{MED}. With the addition of reporting SQI SAIDI events in 2017, all 5% Exclusion Major Event Days met the SQI SAIDI T_{MEDADJ} as well.

IEEE T_{MED} and SQI SAIDI are based on the customer minutes rather than the number of customers impacted. Therefore, if PSE experiences a storm event that is isolated to a small geographic area or a less populated county, it is possible that events exceed the IEEE T_{MED} and SQI SAIDI but not meet the 5% exclusion criteria. In 2019, one of the IEEE T_{MED} and SQI SAIDI events did not meet the 5% Exclusion Major Event Day criteria.

Table 3e: 2019 SQI SAIDI, IEEE T_{MED} and SQI SAIFI Exclusion Events[33]

SQI SAIDI Exclusion Date	IEEE TMED Exclusion Dates	Daily SAIDI	Exceed T_{CAT}	5% Customers Out Exclusion	Cause	Span of 5% Customers Out Exclusion Dates
1/6/2019	1/6/2019	234.62	☑	28.11%	Wind, Snow	1/6/2019 1:00 AM - 1/10/2018 4:00:00 AM
2/4/2019	2/4/2019	7.25		n/a	Wind, Snow	n/a
2/9/2019	2/9/2019	67.02		11.18%	Snow, Wind, Ice	2/8/2019 6:30 PM - 2/15/2019 11:00 PM
2/11/2019	2/11/2019	59.32				
2/12/2019	2/12/2019	38.96				

Areas of Greatest Concern[34]

PSE's system planning personnel (Planners) investigate multiple "areas-of-concern" and propose projects that will improve the reliability for customers being served by those circuits. As noted in Docket UE-110060, PSE "areas of greatest concern" are the Top 50 distribution circuits over the past five years that consistently contributed the most customer-minute interruptions (CMI). Each circuit is ranked by the total CMI seen by the circuit for each of the previous five years and those with the highest ranking are considered the Top 50 Worst Performing Circuits.

[33] The 2019 T_{MEDADJ} is 6.00 minutes. The 2019 T_{MED} is 6.91 minutes.

[34] This section meets a requirement of Attachment B of Docket No. UE-110060.

Based upon reviewing the interruption history, number of customers impacted, outage location and other factors, Planners propose projects that are designed to improve reliability on these circuits. The collective Top 50 circuits saw a 30% improvement in SAIDI from 2018 to 2019. **Appendix M**: *Areas of Greatest Concern with Action Plan* details the Year End 2019 Top 50 list along with PSE's completed or future plan for system improvements on each circuit. It is a multi-year process as it will take a number of years to plan, approve, design and build the necessary improvements.

The Planners also monitor performance on circuits that do not meet the areas of greatest concern criteria to ensure the reliability performance does not falter in other parts of the system. The Planners review interruption history, number of customers impacted, interruption location and customer complaints, as well as receiving feedback from field personnel to identify and propose reliability improvement projects. Collectively, the information gathered is used to establish a project benefit which is compared to the overall cost of the improvement resulting in a benefit-to-cost (B/C) ratio.

As more customer level reliability reporting, such as CEMI, is developed, smaller pockets of customers with reliability issues are identified and evaluated for improvements. This complements the areas of greatest concern analysis to provide a comprehensive approach to reviewing reliability performance for all customers. As system management tools improve and new technologies, such as Advanced Metering Infrastructure (AMI), are implemented, the accuracy of this reporting will improve and allow for ever more efficient targeting of reliability improvement projects.

Customer Electric Reliability Complaints[35]

Customer complaints and jurisdictional concerns about electric reliability and power quality are additional metrics that measure PSE's success in delivering safe and reliable electric service.

PSE Complaints

PSE responds to customer inquiries concerning outage frequency or duration and/or power quality. Most of the first inquiries are adequately addressed in the initial response and the customer does not contact PSE again. However, when two or more customer inquiries on outage frequency or duration and/or power quality have been recorded from the same customer, during the current and prior reporting year, PSE considers this combination as a complaint.

[35] This section meets a requirement of Attachment B of Docket No. UE-110060.

Figure 3i illustrates the 2014 – 2019 number of recorded PSE complaints.[36] During the rolling two-year period of 2018–2019, PSE received complaints from 23 customers relating to reliability and power quality concerns as compared to 30 complaints recorded in the rolling two year period of 2017-2018. This number represents less than 0.002% of PSE's customers and the trend shows PSE complaints to be steadily decreasing since 2015-2016. PSE's complaint process and the change in data collection are described in **Appendix I**: *Electric Reliability Data Collection Process and Calculations*. The 2018-2019 complaints are shown in tabular form in **Table N1** of **Appendix N**: *Current-Year Commission and Rolling-Two-Year PSE Customer Electric Service Reliability Complaints with Resolutions*.

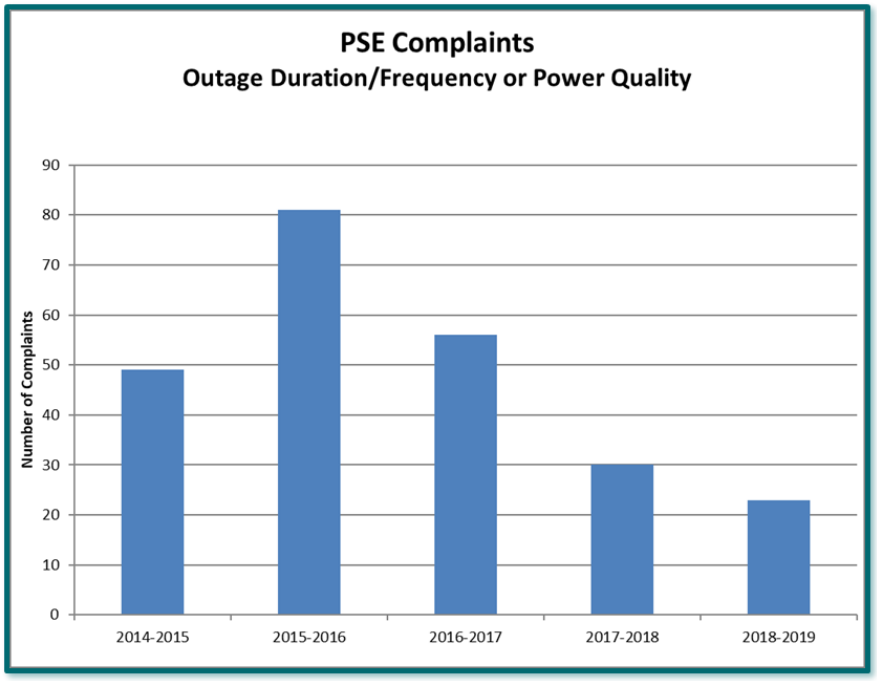

Figure 3i: Five Year History of PSE Complaints

[36] The increase in complaints in 2016 was due to organized neighborhood groups calling PSE to complain about electric reliability in their area, specifically customers in Kenmore.

UTC Complaints

The number of electric service quality complaints received by the UTC in regards to interruption duration or frequency and/or power quality is another important indicator to measure PSE's electric service reliability success. **Figure 3j** illustrates 2015 – 2019 number of UTC electric service quality complaints in regards to interruption duration or frequency and/or power quality. In 2019, the UTC received 33 complaints relating to PSE's electric service quality as compared to 20 in 2018.[37] The 2019 complaints are shown in **Table N2** of **Appendix N**: *Current-Year Commission and Rolling-Two-Year PSE Customer Electric Service Reliability Complaints with Resolutions*.

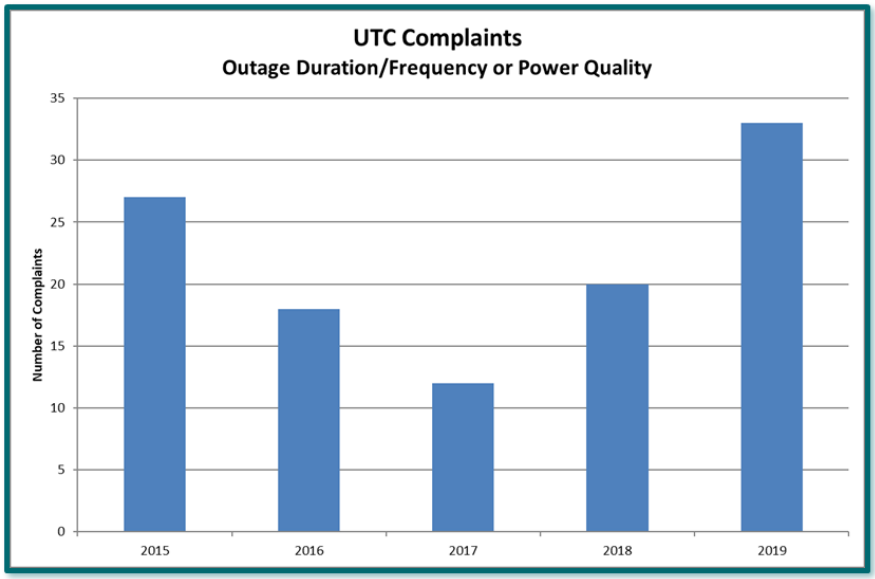

Figure 3j: Five Year History of UTC Complaints

In addition to the customer inquiries and UTC complaints, jurisdictions also have concerns about electric service reliability. Oftentimes, this is a result of constituents initiating contact with their local government entity to act as a unified voice to PSE. PSE works with these jurisdictions to address the reliability concerns.

PSE investigates these customer inquiries, UTC complaints and jurisdictional concerns, and tracks service issues. Customers receive follow-up correspondence from PSE that address their specific concern, as well as PSE's plan for resolution. The interruption surrounding each of these customer inquiries and complaint is reviewed for the overall circuit reliability and then an appropriate plan for resolution is prepared and communicated.

Depending on the nature of the circuit reliability, the plan for resolution could be continued monitoring of the circuit or a Planner may propose projects which will improve the circuit reliability. The map in **Appendix O**: *Current Year Geographic Location of Electric Service Reliability Customer Complaints on Service Territory Map with Number of Next Year's Proposed Projects and Vegetation-Management Mileage* summarizes the number of complaints by county for

[37] The main driver for the increase in UTC complaints in 2019 was a master complaint from one neighborhood in Whatcom County.

2019.

Working to Uphold Reliability[38]

PSE continues to implement well-established programs and processes to improve the reliability of the electric system. This section discusses PSE's processes for identifying issues, developing solutions and validating that solutions provide the intended benefits.

Using metrics such as SAIDI and SAIFI, in addition to other inputs such as customer complaints and equipment condition, PSE first analyzes the electric system for potential problem areas. Next, projects solutions and alternatives are developed for areas that may need improvement. PSE has multiple strategies and methodologies to resolve reliability issues, such as, rebuilding/re-routing existing infrastructure, installing tree-wire conductors, converting overhead conductors to underground, adding new sectionalizing devices or adding automation to the system. The descriptions of these reliability programs can be found in **Appendix P**: *Reliability Program Category Descriptions*. The number of projects of each type that were completed in 2019 can be found in the same appendix in **Table P1**.

Following implementation of solutions, PSE performs a reliability improvement verification analysis to determine whether projects provided the predicted benefit. In order to collect a sufficient amount of data for an analysis, projects are typically reviewed 3 or more years after implementation with a focus on programs that are ongoing. The results for the analysis of projects implemented in 2015 are shown in **Table 3f,** on the following page. For each program the percentage of actual performance compared to predicted performance is reported for SAIDI and SAIFI, thus 100% means that the project achieved all of the intended benefits. Note that due to changes to the system over time, not all projects have 3 or more years of consistent data to analyze.

[38] This section meets a requirement of Attachment B of Docket No. UE-110060.

Table 1f. Reliability improvement verification analysis of project benefits actual vs predicted

Program	Total Projects completed in 2015	Number of projects reviewed	SAIDI	SAIFI
#6 Copper Replacement	8	6	100%	100%
Cable Remediation	180	30	100%	100%
Distribution Pole Replacement	14	14	100%	100%
Overhead Rebuild	6	4	100%	99%
Recloser	37	14	95%	56%[39]
Tree Wire	32	27	100%	100%
Underground Conversion	1	1	100%	100%
Underground Upgrade	2	1	100%	100%
Totals	**288**	**102**		

The reliability improvement verification analysis information can be used to adjust predicted benefits for future projects and can help to identify where there might be issues with benefit assumptions, project implementations, system operation or data accuracy. PSE also performs detailed root cause analysis on a sample of large interruptions each year to determine whether processes and system components are operating as intended. In 2019, PSE performed this analysis on 28 separate interruption events, which together accounted for nearly 6% of $SAIDI_{SQI-3}$. The root cause analysis and reliability improvement verification analysis practices form a feedback loop that allows PSE to continually improve the process of identifying reliability issues and opportunities and making adjustments to optimize the design, construction and operation of the electric system.

Going Forward[40]

Current SAIDI and SAIFI results as well as program benefit validation from the reliability improvement verification analysis indicate that continuing to implement electric system improvements will continue to result in improved reliability. An analysis using data from the IEEE reliability benchmarking study, the econometric benchmarking study initiated by the UTC staff and results from the Interruption Cost Estimate (ICE) Calculator, developed by Lawrence Berkeley National Laboratory and Nexant Inc, suggests that achieving a SAIDI of 110 – 125 minutes and maintaining SAIFI at or below 1.00 interruptions should be PSE's long term goal. This increase in reliability will also position PSE's electric system to maximize the benefits from new technologies

[39] Reclosers are primarily intended to improve SAIDI, though their performance is tracked for SAIFI as well. The discrepancy in SAIFI performance is due to the expectation that past outages predict future outages more accurately than they actually do. This prediction will improve and better match actual results as more data is collected.

[40] This section meets a requirement of Attachment B of Docket No. UE-110060.

such as electric vehicles and distributed energy resources.

To achieve these long term goals, PSE evaluates new technologies and process improvements in addition to applying existing reliability solutions to areas with reliability issues. Examples of new technologies currently being piloted include single phase reclosing and transmission line automatic switching. These are described in **Appendix P**: *Reliability Program Category Descriptions*. Future technologies that may improve reliability but are not yet being piloted for reliability improvements include an Advanced Distribution Management System (ADMS), Advanced Metering Infrastructure (AMI) and advanced fault locating technologies. Once established, these new technologies will broaden the options for addressing reliability concerns and further improve the reliability of the system.

Solutions being applied to current areas of concern can be found in **Appendix M**: *Areas of Greatest Concern with Action Plan* and a summary of planned reliability projects for 2020 can be found in **Table P1** in **Appendix P:** *Reliability Program Category Descriptions*. These projects are expected to provide a 14 SAIDI minutes/year benefit.

Appendices

This section contains the following appendices:

- A: Monthly SQI Performance
  - Attachment A to Appendix A—Major Event and Localized Emergency Event Days (Affected Local Areas Only)
  - Attachment B to Appendix A—Major Event and Localized Emergency Event Days (Non Affected Local Areas Only)
  - Attachment C to Appendix A—Natural Gas Reportable Incidents and Control Time
- B: Certification of Survey Results
- C: Penalty Calculation
- D: Proposed Customer Notice (Report Card)
- E: Disconnection Results
- F: Customer Service Guarantee Performance Detail
- G: Customer Awareness of Customer Service Guarantee
- H: Electric Reliability Terms and Definitions
- I: Electric Reliability Data Collection Process and Calculations
- J: 1997-Current Year PSE SAIFI and SAIDI Performance by Different Measurements
- K: Current Year Electric Service Outage by Cause by Area
- L: Historical SAIDI and SAIFI by Area
- M: Areas of Greatest Concern with Action Plan
- N: Current-Year Commission and Rolling Two Year PSE Customer Electric Service Reliability Complaints with Resolutions
- O: Current Year Geographic Location of Electric Service Reliability Customer Complaints on Service Territory Map with Number of Next Year's Proposed Projects and Vegetation Management Mileage
- P: Reliability Program Category Descriptions

A
Monthly SQI Performance

Appendix A consists of Tables A1 and A2 that provide monthly details on the nine service quality indices.

It also contains the following attachments:

Attachment A to Appendix A—Major Event and Localized Emergency Event Days (Affected Local Areas Only)

Attachment B to Appendix A—Major Event and Localized Emergency Event Days (Non-Affected Local Areas Only)

Attachment C to Appendix A—Natural Gas Reportable Incident and Control Time

Table A1: PSE Monthly SQI Performance

Category of Service	SQI No.	Description	Annual Benchmark	Jan 2019	Feb 2019	Mar 2019	Apr 2019	May 2019	Jun 2019	Jul 2019	Aug 2019	Sep 2019	Oct 2019	Nov 2019	Dec 2019
Customer Satisfaction	2	WUTC Complaint Ratio	0.40 complaints per 1000 customers, including all complaints filed with WUTC	0.022	0.017	0.015	0.014	0.016	0.013	0.010	0.011	0.015	0.012	0.008	0.008
	6	Telephone Center Transactions Customer Satisfaction	90% satisfied (rating of 5 or higher on a 7-point scale)	93%	93%	93%	93%	91%	95%	93%	93%	92%	92%	89%	93%
	8	Field Service Operations Transactions Customer Satisfaction	90% satisfied (rating of 5 or higher on a 7-point scale)	96%	94%	96%	97%	95%	95%	97%	97%	94%	96%	92%	94%
Customer Services	5	Customer Access Center Answering Performance	80% of calls answered by a live representative within 60 seconds of request to speak with live operator	57%	69%	75%	82%	85%	88%	94%	78%	63%	92%	90%	94%
Operations Services	4	SAIFI	1.30 interruptions per year per customer	0.930	0.090	0.060	0.080	0.100	0.080	0.080	0.070	0.110	0.100	0.070	0.080
	3	SAIDI	155 minutes per customer per year	15	13	8	9	9	11	12	9	16	12	9	13
	7	Gas Safety Response Time	Average of 55 minutes from customer call to arrival of field technician	31	34	30	29	31	30	31	30	30	32	32	36
	10	Kept Appointments[Note]	92% of appointments kept	100%	99%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	11	Electric Safety Response Time	Average of 55 minutes from customer call to arrival of field technician	52	58	50	51	51	52	54	56	57	60	55	51

Note: Results shown are rounded to the nearest whole percentage per UTC order. However, these 100% monthly performance results do not reflect that PSE and its service providers met all the appointments during the reporting period. Numbers of PSE missed appointments, including the new customer construction appointments carried out the service providers are detailed in Appendix F: Customer Service Guarantee Performance Detail.

Table A2: Service Providers Monthly Service Quality Performance

Category of Service	Index	Service Provider	Annual Benchmark Description	Jan 2019	Feb 2019	Mar 2019	Apr 2019	May 2019	Jun 2019	Jul 2019	Aug 2019	Sep 2019	Oct 2019	Nov 2019	Dec 2019
Operations Services	Service Provider New Customer Construction Appointments Kept[Note1]	Quanta Electric	At least 92% of appointments kept [Note 1]	98%	99%	100%	99%	99%	99%	100%	99%	99%	99%	100%	99%
		Quanta Gas	At least 92% of appointments kept [Note 1]	98%	100%	100%	100%	100%	99%	100%	98%	99%	98%	99%	97%
	Service Provider Standards Compliance	Quanta Electric	Achieve a level of QA/QC compliance rate conformance to PSE Standards as follows: Level 1 inspection items: ≤ 15 deviations/1000 items inspected	0.00	5.36	6.30	7.12	3.77	3.32	2.14	8.22	1.45	0.00	0.00	4.68
		Quanta Electric	Level 2 inspection items: ≤ 20 deviations/1000 items inspected [Note 2]	9.31	4.17	10.01	15.15	16.30	6.23	4.19	8.31	9.17	2.73	10.13	8.60
		Quanta Electric	Level 3 inspection items: ≤ 20 deviations/1000 items inspected [Note 2]	15.40	13.45	15.43	19.76	12.85	12.82	11.25	15.00	13.24	10.30	10.50	12.06
		Quanta Gas	Achieve a level of QA/QC compliance rate conformance to PSE Standards as follows: Level 1 inspection items: ≤ 8 deviations/1000 items inspected [Note 2]	1.20	0.00	1.85	3.32	1.11	1.04	4.42	1.13	4.05	4.39	1.65	8.52
		Quanta Gas	Level 2 inspection items: ≤ 15 deviations/1000 items inspected [Note 2]	4.85	3.85	11.12	10.24	5.61	1.97	2.99	4.78	15.90	2.47	7.13	2.46
		Quanta Gas	Level 3 inspection items: ≤ 12 deviations/1000 items inspected [Note 2]	1.96	0.00	3.73	2.21	0.00	1.47	1.50	2.89	3.24	0.00	0.00	0.00
	Secondary Safety Response and Restoration Time-CoreHour	Quanta Electric	Within 250 minutes from the dispatch time to the restoration of non-emergency outage during core hours	247	203	197	215	242	209	238	259	256	256	229	255
	Secondary Safety Response and Restoration Time-NonCore-Hour	Quanta Electric	Within 316 minutes from the dispatch time to the restoration of non-emergency outage during non-core hours	269	243	241	215	259	242	265	276	276	274	297	285
	Secondary Safety Response Time	Quanta Gas	Within 60 minutes from first response assessment completion to second response arrival	51	48	58	50	48	46	46	49	54	49	52	51

Note 1: Results shown are rounded to the nearest whole percentage per UTC order. However, these 100% monthly performance results do not reflect that the service providers met all the new construction appointments during the reporting period. Numbers of PSE missed appointments, including the new customer construction appointments carried out the service providers are detailed in Appendix F: Customer Service Guarantee Performance Detail.

Note 2:

- Level 1 Deviation from PSE Standards and/or current regulatory expectations that provide immediate and significant risk to product quality, safety or system integrity; or a combination/repetition of Level 2 deficiencies that indicate a critical failure of systems.
- Level 2 Deviation from PSE Standards and/or current regulatory expectations that provide a potentially significant risk to product quality, safety or system integrity; or could potentially result in significant observations from a regulatory agency; or a combination/repetition of Level 3 deficiencies that indicate a failure of system(s).
- Level 3 Observations of a less serious or isolated nature that are not deemed Level 1 or 2, but require correction or suggestions on how to improve systems or procedures that may be compliant but would benefit from improvement.

Table A3: Attachment A to Appendix A—Major Event and Localized Emergency Event Days (Affected Local Areas Only)

This Attachment A to Appendix A provides detail on Major Event and localized emergency event days (Affected local areas only).

PUGET SOUND ENERGY

SQI #11 Supplemental Reporting Major Event And Localized Emergency Event Days Affected Local Areas Only

Date	Type of Event	Local Area	Duration (Days)	No. of Customers Affected	No. of Customers in Area	% of Customers Affected	No. of Outage Events	Resource Utilization (for the event, EFR Count only)	>5% Customer Affected or SAIDI Tmed Event	Comments[41]
1/6/2019	Wind	Northern	5	7,229	204,390	3.5%	55	15 of 15	Yes	15 Event Duty, 5 Line Crew, 2 Tree Crew
1/6/2019	Wind	North King	5	98,361	320,933	30.6%	445	22 of 22	Yes	22 Event Duty, 35 Line Crew, 14 Tree Crew
1/6/2019	Wind	South King	5	140,462	245,265	57.3%	483	13 of 13	Yes	13 Event Duty, 32 Line Crew, 15 Tree Crew
1/6/2019	Wind	Southern	5	105,068	256,124	41.0%	416	16 of 16	Yes	16 Event Duty, 26 Line Crew, 14 Tree Crew
1/6/2019	Wind	Western	5	10,499	129,228	8.1%	72	12 of 12	Yes	12 Event Duty, 6 Line Crew, 3 Tree Crew
2/3/2019	Wind/Snow	Northern	1	12,196	204,658	6.0%	39	8 of 15	No	8 Event Duty, 2 PTO, 5 Reg Day Off, 8 Line Crew, 7 Tree Crew
2/3/2019	Wind/Snow	Western	1	1,174	129,319	0.9%	12	7 of 12	No	7 Event Duty, 5 Reg Day Off, 5 Line Crew
2/4/2019	Wind/Snow	Northern	1	21,600	204,658	10.6%	83	11 of 15	No	11 Event Duty, 3 PTO, 1 Reg Day Off, 8 Line Crew, 7 Tree Crew
2/4/2019	Wind/Snow	South King	1	4,413	245,420	1.80%	23	9 of 12	No	9 Event Duty, 1 PTO, 2 Reg Day Off, 6 Line Crew
2/4/2019	Wind/Snow	Western	1	10,571	129,319	8.17%	56	11 of 12	No	11 Event Duty, 1 Reg Day Off, 5 Line Crew, 2 Tree Crew

Table continues on next page.

[41] **EFR**—Electric First Responder, **PTO**—Paid Time Off, **Reg day-off**—Regular day-off, **STD**—Short-Term Disability, **SP**—Service Provider

Table A3: Attachment A to Appendix A—Major Event and Localized Emergency Event Days (Affected Local Areas Only)

Date	Type of Event	Local Area	Duration (Days)	No. of Customers Affected	No. of Customers in Area	% of Customers Affected	No. of Outage Events	Resource Utilization (for the event, EFR Count only)	>5% Customer Affected or SAIDI Tmed Event	Comments[42]
2/8/2019	Wind/Snow	Northern	8	38,293	204,658	18.7%	265	15 of 15	Yes	15 Event Duty, 8 Line Crew, 9 Tree Crew
2/8/2019	Wind/ Snow	North King	8	98,037	321,384	30.5%	540	22 of 22	Yes	22 Event Duty, 39 Line Crew, 12 Tree Crew
2/8/2019	Wind/ Snow	South King	8	48,982	245,420	20.0%	301	13 of 13	Yes	13 Event Duty, 20 Line Crew, 8 Tree Crew
2/8/2019	Wind/ Snow	Southern	8	103,524	256,407	40.4%	643	16 of 16	Yes	16 Event Duty, 12 Line Crew, 15 Tree Crew
2/8/2019	Wind/ Snow	Western	8	78,899	129,319	61.0%	529	12 of 12	Yes	12 Event Duty, 38 Line Crew, 15 Tree Crew
2/26/2019	Wind	South King	1	7,991	245,420	3.3%	25	12 of 12	No	12 Event Duty, 5 Line Crew, 1 Tree Crew
4/27/2019	Wind	Northern	1	2,286	205,168	1.1%	18	7 of 15	No	7 Event Duty, 1 PTO, 7 Reg Day Off, 7 Line Crew, 1 Tree Crew
6/5/2019	Wind	Western	1	128	129,863	0.1%	14	9 of 12	No	9 Event Duty, 3 PTO, 5 Line Crew, 2 Tree Crew
9/7/2019	Wind	Northern	1	8,829	206,225	4.3%	52	11 of 15	No	11 Event Duty, 1 STD, 3 Reg Day Off, 9 Line Crew
9/7/2019	Wind	Southern	1	7,878	258,901	3.0%	31	5 of 12	No	5 Event Duty, 7 Reg Day Off, 6 Line Crew, 1 Tree Crew
9/7/2019	Wind	South King	1	3,890	247,109	1.57%	33	9 of 11	No	9 Event Duty, 1 STD, 1 Reg Day Off, 6 Line Crew

Table continues on next page.

[42] **EFR**—Electric First Responder, **PTO**—Paid Time Off, **Reg day-off**—Regular day-off, **STD**—Short-Term Disability, **SP**—Service Provider

Table A3: Attachment A to Appendix A—Major Event and Localized Emergency Event Days (Affected Local Areas Only)

Date	Type of Event	Local Area	Duration (Days)	No. of Customers Affected	No. of Customers in Area	% of Customers Affected	No. of Outage Events	Resource Utilization (for the event, EFR Count only)	>5% Customer Affected or SAIDI Tmed Event	Comments[43]
9/8/2019	Wind	Northern	1	4,078	206,225	2.0%	51	11 of 15	No	11 Event Duty, 1 STD, 3 Reg Day Off, 9 Line Crew
9/8/2019	Wind	South King	1	45	247,109	0.02%	18	7 of 11	No	7 Event Duty, 1 PTO, 1 STD, 2 Reg Day Off, 6 Line Crew
9/8/2019	Wind	Western	1	131	130,155	0.10%	25	8 of 12	No	8 Event Duty, 4 PTO, 5 Line Crew
9/15/2019	Wind	Northern	1	4,333	206,225	2.1%	20	10 of 15	No	10 Event Duty, 1 STD, 4 Reg Day Off, 9 Line Crew
9/17/2019	Wind	Southern	1	783	7,878	9.9%	23	13 of 15	No	13 Event Duty, 2 STD, 4 Line Crew, 5 Tree Crew
9/28/2019	Wind	Western	1	1,309	3,230	40.5%	11	4 of 12	No	4 Event Duty, 8 Reg Day Off, 6 Line Crew, 1 Tree Crew
10/8/2019	Wind	Western	1	1,311	130,305	1.0%	13	10 of 12	No	10 Event Duty, 2 PTO, 7 Line Crew
10/26/2019	Wind	Western	1	12,002	130,305	9.2%	18	8 of 12	No	8 Event Duty, 4 PTO, 7 Line Crew, 1 Tree Crew
10/29/2019	Wind	South King	1	5,018	247,317	2.0%	37	8 of 11	No	8 Event Duty, 1 PTO, 2 STD, 6 Line Crew
11/27/2019	Wind	Southern	1	13,273	260,387	5.1%	23	14 of 16	No	14 Event Duty, 2 PTO, 7 Line Crew, 4 Tree Crew
12/20/2019	Wind	Western	1	830	130,782	0.6%	14	11 of 12	No	11 Event Duty, 1 LTD, 8 Line Crew, 1 Tree Crew
12/31/2019	Wind	Western	1	4,580	130,782	3.5%	28	10 of 11	No	10 Event Duty, 1 PTO, 8 Line Crew, 1 Tree Crew

[43] **EFR**—Electric First Responder, **PTO**—Paid Time Off, **Reg day-off**—Regular day-off, **STD**—Short-Term Disability, **LTD**—Long-Term Disability, **SP**—Service Provider

Table A4: Attachment B to Appendix A—Major Event and Localized Emergency Event Days (Non-Affected Local Areas Only)

This Attachment B to Appendix A provides detail on Major Event and localized emergency event days (Non-affected local areas only).

PUGET SOUND ENERGY	SQI #11 Supplemental Reporting Major Event And Localized Emergency Event Days Non-Affected Local Areas Only									
Date	Type of Event	Local Area	Duration (Days)	No. of Customers Affected	No. of Customers in Area	% of Customers Affected	No. of Outage Events	Resource Utilization (for the event, EFR Count only)	>5% Customer Affected or SAIDI Tmed Event)	Comments
2/3/2019	Wind/ Snow	North King	1	52	321,384	0.02%	6	Local	No	
2/3/2019	Wind/ Snow	South King	1	12	245,420	0.00%	1	Local	No	
2/3/2019	Wind/ Snow	Southern	1	685	256,407	0.27%	6	Local	No	
2/4/2019	Wind/ Snow	North King	1	2,178	321,384	0.68%	18	Local	No	
2/4/2019	Wind/ Snow	Southern	1	2,129	256,407	0.83%	20	Local	No	
2/26/2019	Wind	Northern	1	144	204,658	0.07%	5	Local	No	
2/26/2019	Wind	North King	1	2,296	321,384	0.71%	8	Local	No	
2/26/2019	Wind	Southern	1	205	256,407	0.08%	7	Local	No	
2/26/2019	Wind	Western	1	3,113	129,319	2.41%	8	Local	No	
4/27/2019	Wind	North King	1	600	322,858	0.19%	11	Local	No	
4/27/2019	Wind	South King	1	50	245,994	0.02%	3	Local	No	

Table continues on next page.

Table A4: Attachment B to Appendix A—Major Event and Localized Emergency Event Days (Non-Affected Local Areas Only)

Date	Type of Event	Local Area	Duration (Days)	No. of Customers Affected	No. of Customers in Area	% of Customers Affected	No. of Outage Events	Resource Utilization (for the event, EFR Count only)	>5% Customer Affected or SAIDI Tmed Event)	Comments
4/27/2019	Wind	Southern	1	328	257,159	0.13%	11	Local	No	
4/27/2019	Wind	Western	1	89	129,591	0.07%	5	Local	No	
6/5/2019	Wind	Northern	1	111	205,663	0.05%	8	Local	No	
6/5/2019	Wind	North King	1	577	323,868	0.18%	12	Local	No	
6/5/2019	Wind	South King	1	200	246,449	0.08%	6	Local	No	
6/5/2019	Wind	Southern	1	1,276	257,889	0.49%	5	Local	No	
9/7/2019	Wind	North King	1	4,875	325,556	1.50%	17	Local	No	
9/7/2019	Wind	Western	1	3,230	130,155	2.48%	14	Local	No	
9/8/2019	Wind	North King	1	4,265	325,556	1.31%	14	Local	No	
9/8/2019	Wind	Southern	1	95	258,901	0.04%	20	Local	No	
9/15/2019	Wind	North King	1	542	325,556	0.17%	9	Local	No	
9/15/2019	Wind	South King	1	1,625	247,109	0.66%	12	Local	No	
9/15/2019	Wind	Southern	1	607	258,901	0.23%	8	Local	No	
9/15/2019	Wind	Western	1	329	130,155	0.25%	4	Local	No	

Table continues on next page

Table A4: Attachment B to Appendix A—Major Event and Localized Emergency Event Days (Non-Affected Local Areas Only)

Date	Type of Event	Local Area	Duration (Days)	No. of Customers Affected	No. of Customers in Area	% of Customers Affected	No. of Outage Events	Resource Utilization (for the event, EFR Count only)	>5% Customer Affected or SAIDI Tmed Event	Comments
9/17/2019	Wind	Northern	1	838	206,225	0.41%	8	Local	No	
9/17/2019	Wind	North King	1	190	325,556	0.06%	8	Local	No	
9/17/2019	Wind	South King	1	31	247,109	0.01%	10	Local	No	
9/17/2019	Wind	Western	1	631	130,155	0.48%	7	Local	No	
9/28/2019	Wind	Northern	1	7,128	206,225	3.46%	24	Local	No	
9/28/2019	Wind	North King	1	188	325,556	0.06%	9	Local	No	
9/28/2019	Wind	South King	1	50	247,109	0.02%	8	Local	No	
9/28/2019	Wind	Southern	1	94	258,901	0.04%	7	Local	No	
10/8/2019	Wind	Northern	1	195	206,442	0.09%	8	Local	No	
10/8/2019	Wind	North King	1	518	326,078	0.16%	16	Local	No	

Table continues on next page

Table A4: Attachment B to Appendix A—Major Event and Localized Emergency Event Days (Non-Affected Local Areas Only)

Date	Type of Event	Local Area	Duration (Days)	No. of Customers Affected	No. of Customers in Area	% of Customers Affected	No. of Outage Events	Resource Utilization (for the event, EFR Count only)	>5% Customer Affected or SAIDI Tmed Event	Comments
10/8/2019	Wind	South King	1	342	247,317	0.14%	8	Local	No	
10/8/2019	Wind	Southern	1	953	259,323	0.37%	5	Local	No	
10/26/2019	Wind	Northern	1	307	206,442	0.15%	4	Local	No	
10/26/2019	Wind	North King	1	5,206	326,078	1.60%	9	Local	No	
10/26/2019	Wind	South King	1	260	259,323	0.11%	5	Local	No	
10/26/2019	Wind	Southern	1	1,055	130,305	0.41%	4	Local	No	
10/29/2019	Wind	Northern	1	112	207,048	0.05%	7	Local	No	
10/29/2019	Wind	North King	1	3,335	327,639	1.02%	13	Local	No	
10/29/2019	Wind	Southern	1	216	247,833	0.08%	12	Local	No	
10/29/2019	Wind	Western	1	1,613	130,681	1.24%	7	Local	No	

Table continues on next page

Table A4: Attachment B to Appendix A—Major Event and Localized Emergency Event Days (Non-Affected Local Areas Only)

Date	Type of Event	Local Area	Duration (Days)	No. of Customers Affected	No. of Customers in Area	% of Customers Affected	No. of Outage Events	Resource Utilization (for the event, EFR Count only)	>5% Customer Affected or SAIDI Tmed Event	Comments
11/27/2019	Wind	Northern	1	6,688	207,048	3.23%	33	Local	No	
11/27/2019	Wind	North King	1	274	327,639	0.08%	8	Local	No	
11/27/2019	Wind	South King	1	71	247,833	0.03%	8	Local	No	
11/27/2019	Wind	Western	1	905	130,681	0.69%	4	Local	No	
12/20/2019	Wind	Northern	1	1,530	207,349	0.74%	15	Local	No	
12/20/2019	Wind	North King	1	1,267	328,330	0.39%	22	Local	No	
12/20/2019	Wind	South King	1	1,601	248,029	0.65%	21	Local	No	
12/20/2019	Wind	Southern	1	791	260,936	0.30%	31	Local	No	
12/31/2019	Wind	Northern	1	4,346	207,349	2.10%	41	Local	No	
12/31/2019	Wind	North King	1	9,401	328,330	2.86%	23	Local	No	
12/31/2019	Wind	South King	1	1,589	248,029	0.64%	17	Local	No	
12/31/2019	Wind	Southern	1	4,882	260,936	1.87%	28	Local	No	

Table A5: Attachment C to Appendix A—Natural Gas Reportable Incidents and Control Time

This Attachment C to Appendix A provides detail on each natural gas reportable incident and response times.[44]

Natural Gas Reportable Incidents and Control Time (in Hours : Minutes)						
Date	City	Address	1st Notice to PSE	First PSE Arrival	Emergency Controlled	Emergency Control Time
1/5/2019	Seattle	3408 Woodland Park Ave N	9:43	10:11	10:43	0:32
1/6/2019	Issaquah	25807 SE 152nd St	9:38	10:55	19:44	8:49
1/12/2019	Renton	2127 Davis Ave S	11:10	11:41	13:40	1:59
2/6/2019	Seattle	5503 Seaview Ave NW	13:10	13:52	18:40	4:48
2/12/2019	North Bend	SE 128th Pl & Mt Si	6:01	6:45	18:07	11:22
2/12/2019	Redmond	20217 NE Redmond Rd	6:01	7:57	8:10	0:13
2/27/2019	Seattle	7542 1st Ave NE	15:03	15:09	15:13	0:04
3/2/2019	Bonney Lake	7506 192nd Ave E	12:19	12:36	13:14	0:38
3/15/2019	Duvall	15420 Main St	13:50	13:58	14:15	0:17
3/16/2019	Snohomish	21406 114th Ave SE	16:31	17:05	17:12	0:07
3/26/2019	Bothell	3129 212th St	17:15	18:09	18:23	0:14
3/27/2019	Redmond	9125 Willows Rd NE #B	15:06	15:24	16:15	0:51
3/27/2019	Lakewood	7701 Custer Rd W	16:28	16:50	17:00	0:10

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[44] Report of the time duration from first arrival to control of gas emergencies, for incidents subject to reporting under the 2003 edition of WAC 480-93-200 and WAC 480-93-210, Order R-374, Docket UG-911261.

Natural Gas Reportable Incidents and Control Time (in Hours : Minutes)						
Date	City	Address	1st Notice to PSE	First PSE Arrival	Emergency Controlled	Emergency Control Time
4/1/2019	SeaTac	4428 S 166th St	16:58	17:08	17:17	0:09
4/8/2019	Fife	1403 34th Ave E	15:45	16:04	20:57	4:53
4/10/2019	Tukwila	16830 Southcenter Pkwy	17:45	18:20	18:32	0:12
4/11/2019	Lakewood	10333 Bridgeport Way SW	14:32	14:45	1:39	10:54
4/22/2019	Seattle	10364 Rainier Ave S	8:35	8:35	10:38	2:03
4/29/2019	Lynnwood	3105 Alderwood Mall Blvd	8:33	8:59	9:11	0:12
5/3/2019	Tacoma	2616 N Proctor St	14:32	14:52	15:10	0:18
5/10/2019	Olympia	315 Jefferson St NE	8:59	9:12	9:12	0:00
5/11/2019	Seattle	1317 6th Ave N #402	18:14	18:20	18:20	0:00
5/16/2019	Renton	259 SW 41st St	15:36	15:44	15:47	0:03
5/21/2019	Renton	13907 SE 158th St	17:16	17:53	18:02	0:09
5/22/2019	Tacoma	2106 Pacific Ave	15:08	15:24	15:29	0:05
6/1/2019	Tacoma	3724 N 22nd St	14:54	15:03	15:07	0:04
6/3/2019	Puyallup	10537 191st St	17:38	18:15	18:15	0:00
6/14/2019	Gig Harbor	6609 Silver Springs Dr	8:44	9:45	12:54	3:09
6/17/2019	Lacey	2406 College St SE	12:12	12:24	15:20	2:56
6/20/2019	Mercer Island	8218 SE 30th St	11:14	11:37	11:40	0:03
6/21/2019	Mukilteo	12118 Cyrus Way	12:08	12:21	12:53	0:32

Table continues on next page.

Natural Gas Reportable Incidents and Control Time (in Hours : Minutes)						
Date	City	Address	1st Notice to PSE	First PSE Arrival	Emergency Controlled	Emergency Control Time
6/27/2019	Seattle	3715 NE 77th St	10:48	11:00	11:08	0:08
6/28/2019	Seattle	6748 Dibble Ave NW	12:04	12:19	12:26	0:07
7/2/2019	Redmond	17640 NE 65th St	11:19	11:46	1:02	13:16
7/18/2019	Tacoma	1208 Sunset Dr	12:49	13:11	13:15	0:04
7/20/2019	Tacoma	5314 176th St E	0:00	0:21	0:24	0:03
7/26/2019	Des Moines	25436 16th Ave S	2:18	3:07	3:53	0:46
7/29/2019	Seattle	1819 NE 47th St	7:44	8:01	8:01	0:00
7/29/2019	Tacoma	807 S Verde St	2:27	2:47	2:55	0:08
8/3/2019	Lynnwood	20327 37th Ave W	9:40	10:05	10:16	0:11
8/11/2019	Brier	3691 232nd Ct SW	7:29	7:58	8:15	0:17
8/17/2019	Des Moines	21841 Pacific Hwy S	10:12	13:18	15:24	2:06
8/22/2019	Marysville	8100 72nd Dr NE	9:14	9:29	9:50	5:35
8/22/2019	Centralia	1105 F St	15:25	15:44	16:05	0:21
8/26/2019	Redmond	3635 157th Ave NE	9:40	10:13	10:25	0:12
8/26/2019	Olympia	222 State Ave NE	14:30	14:40	15:01	0:21
8/29/2019	Sammamish	2416 201st Ave SE	1:43	2:39	3:28	0:49
9/8/2019	Shoreline	17903 10th Ave NE	0:53	1:39	1:48	0:09

Table continues on next page.

Natural Gas Reportable Incidents and Control Time (in Hours : Minutes)						
Date	City	Address	1st Notice to PSE	First PSE Arrival	Emergency Controlled	Emergency Control Time
9/13/2019	Seattle	5519 Airport Way S	14:36	14:57	15:05	0:08
9/16/2019	Kirkland	9209 126th Ave NE	13:34	14:35	15:32	0:57
9/17/2019	Everett	1923 33rd St	9:42	10:01	10:44	0:43
9/18/2019	Sumner	15118 Elm St E #4	0:49	1:21	1:48	0:27
10/11/2019	Seattle	10315 Midvale Ave N	10:38	10:55	12:10	1:15
10/11/2019	Renton	4615 NE 22nd Pl	18:36	18:39	2:32	7:53
10/14/2019	Centralia	1103 Borthwick St	9:29	9:53	10:24	0:31
10/14/2019	Olympia	2505 Bucker St SE	10:15	10:30	11:07	0:37
10/14/2019	Seattle	4500 Brooklyn Ave NE	13:47	14:10	17:10	3:00
10/24/2019	Kirkland	11220 NE 95th St	9:32	9:56	10:43	0:47
10/30/2019	Mukilteo	11601 Cyrus Way	13:09	13:20	16:00	2:40
11/1/2019	Seattle	4141 39th Ave SE	12:27	12:35	12:48	0:13
11/12/2019	Lake Stevens	1820 Lake Stevens Rd	9:49	10:10	12:02	1:52
11/27/2019	Kirkland	324 7th Ave	11:40	12:01	12:49	0:48
12/6/2019	Sammamish	24710 SE 46th Pl	9:11	9:28	12:15	2:47
12/6/2019	Seattle	155 Dorffel Dr E	9:46	10:04	10:57	0:53
12/13/2019	Seattle	13501 Aurora Ave N	7:41	7:58	8:05	0:07

Table continues on next page.

Natural Gas Reportable Incidents and Control Time (in Hours : Minutes)						
Date	City	Address	1st Notice to PSE	First PSE Arrival	Emergency Controlled	Emergency Control Time
12/31/2019	Bothell	22612 Bothell Everett Hwy	8:37	8:58	9:30	0:32
12/31/2019	Seattle	13717 Greenwood Ave N	7:28	7:41	10:32	2:51
12/31/2019	Seattle	612 NW 65th St	5:22	5:56	7:34	3:48
12/31/2019	Seattle	220 Nickerson St	10:36	11:03	11:12	0:09
					Average Control Time for 2019	**1:38**

B

Certification of Survey Results

TO: Eric Haechrel, Puget Sound Energy
FR: Andrew Thibault, EMC Research, Inc.
DT: February 2020
RE: PSE Service Quality Index Research

This memo constitutes certification by EMC Research, Inc. that the tabulations and underlying surveys were conducted and prepared in accordance with the procedures established in Docket Nos. UE-011570 and UG-011571.

These procedures, data collection methods, and quality controls are consistent with industry practices and, we believe, ensure that the data collected and information produced in the surveys is unbiased and valid.

We are glad to answer any questions about the research methodology and provide any additional information you may need.

Sincerely,

Andrew Thibault, Principal
EMC Research Inc.

C
Penalty Calculation

For the 2019 reporting year, PSE met all the performance benchmarks therefore PSE did not incur any penalties.

D
Proposed Customer Notice (Report Card)

2018 Service Quality Report Card

The Customer Service Performance Report Card is designed to inform customers of how well PSE delivers its services in key areas to its customers. The Report Card will be distributed to customers only after adequate consultation with Staff and Public Counsel, but no later than 90 days after PSE files its annual SQ and Electric Service Reliability Report.

Figure D1 shows PSE's proposed Customer Service Performance Report Card.

Figure D1: Draft 2019 Service Quality Report Card

2019 Service Quality Report Card

Key measurement	Benchmark	2019 Performance	Achieved
Customer Satisfaction			
Percent of customers satisfied with our Customer Care Center services, based on survey	At least 90 percent	92 percent	✓
Percent of customers satisfied with field services, based on survey	At least 90 percent	95 percent	✓
Number of complaints to the WUTC per 1,000 customers, per year	Less than 0.40	0.16	✓
CUSTOMER SERVICES			
Percent of calls answered live within 60 seconds by our Customer Care Center	At least 80 percent	81 percent	✓
OPERATIONS SERVICES			
Frequency of non-major-storm power outages, per year, per customer	Less than 1.30 outages	0.98 outages	✓
Length of power outages per year, per customer*	Less than 2 hours, 35 minutes	2 hours, 12 minutes	✓
Time from customer call to arrival of field technicians in response to electric system emergencies	No more than 55 minutes	54 minutes	✓
Time from customer call to arrival of field technicians in response to natural gas emergencies	No more than 55 minutes	32 minutes	✓
Percent of service appointments kept	At least 92 percent	100 percent **	✓

* There is no penalty associated with this measurement

**Percent in table rounded up from 99.7 percent result.

Each year Puget Sound Energy measures service-quality benchmarks established in cooperation with the Washington Utilities and Transportation Commission (UTC), the Public Counsel Section of the Attorney General's Office and other parties to gauge how well we deliver our services to you and all of our customers. Failure to achieve all nine service-quality measurements in a reporting year would have put us at risk of a penalty up to $12 million, or $1.5 million per measurement.

2019 Performance Highlights

In 2019 we met all nine service metrics (see chart above). In fact, compared to 2018, we improved our own record in frequency of non-major-storm power outages and length of power outages, per year, per customer. Reducing the length of power outages by 13 minutes from 2018 was a great success for PSE. In addition to the above performance, we saw a large increase in digital communication with our customers, providing 77% of our total customers with a digital notification regarding outages. For these results we credit the efforts of all our employees and contractors.

We had three service guarantees in 2019. We credit your bill $50 if we fail to meet these guarantees.

- Keeping scheduled appointments

- If your power is out for 120 consecutive hours or longer during any power outage.
- If your power is out for 24 consecutive hours or longer during a non-major-storm power outage.

We credited customers a total of $14,850 for missing 297, or 0.3 percent, of our total 91,536 scheduled appointments.

We credited one customer $50 for not restoring electric service within 120 consecutive hours of a power outage.

Starting from 2017, we added a new service guarantee with a $50 credit if your power is out for longer than 24 hours, barring a major storm or event. For 2019, we gave 213 customers the $50 credit for not restoring electric service within 24 consecutive hours during certain non-major-storm power outages.

Every day our employees continually aim to achieve new levels of providing safe, dependable and efficient service to meet your expectations of us.

E
Disconnection Results

Tables E1 and E2 provide the annual and monthly number of disconnections per 1,000 customers for non-payment of amounts due when the UTC disconnection policy would permit service curtailment.

Table E1: Annual Disconnection Results from 2014 to 2018 per 1,000 Customers

2015	2016	2017	2018	2019
50	42	53	48	42

Table E2: Monthly Disconnection Results per 1,000 Customers for 2019

Month	Disconnections per 1,000 Customers
January	3
February	1
March	4
April	4
May	3
June	4
July	4
August	4
September	3
October	5
November	4
December	3

F
Customer Service Guarantee Performance Detail

This appendix provides detail on SQI #10, Appointments Kept, performance and customer service guarantee payment by service type and month.

Definition of the Categories:

Canceled—Appointments canceled by either customers or PSE

Excused—Appointments missed due to customer reasons or due to SQI Major Events

Manual Kept—Adjusted missed appointments resulting from review by the PSE personnel

Missed Approved—Appointments missed due to PSE reasons and customers are paid the $50 Customer Service Guarantee payment

Missed Open—Appointments not yet reviewed by PSE for the $50 Service Guarantee payment

Customer Service Guarantee Payment—Total for the $50 Customer Service Guarantee payments made to customers for each missed approved appointment

System Kept—Appointments in which PSE arrived at the customer site as promised

Total Appointments (Excludes Canceled and Excused)—Sum of Total Missed and Total Kept

Total Kept—Total number of Manual Kept and System Kept

Total Missed—Total number of Missed Approved, Missed Denied, and Missed Open

Table F1: SQI #10 and Customer Service Guarantee Payment Annual Summary for 2019

	Total Appointments (Exclude Canceled and Excused)	Missed Approved	Missed Open	Total Missed	Manual Kept	System Kept	Total Kept	Canceled	Excused	Customer Service Guarantee Payment	Percent Kept (Exclude Canceled and Excused) [45]
Electric											
Permanent Service	8,177	54	-	54	61	8,062	8,123	-	129	$2,700	99%
Reconnection	37,142	106	-	106	103	36,933	37,036	-	6	$5,300	100%
Subtotal	**45,319**	**160**	**-**	**160**	**164**	**44,995**	**45,159**	**-**	**135**	**$8,000**	**100%**
Natural Gas											
Diagnostic	22,355	33	-	33	841	21,481	22,322	-	-	$1,650	100%
Permanent Service	8,935	80	-	80	270	8,585	8,855	-	21	$4,000	99%
Reconnection	14,927	24	-	24	294	14,609	14,903	-	-	$1,200	100%
Subtotal	**46,217**	**137**	**-**	**137**	**1,405**	**44,675**	**46,080**	**-**	**21**	**$6,850**	**100%**
Grand Total	**91,536**	**297**	**-**	**297**	**1,569**	**89,670**	**91,239**	**-**	**156**	**$14,850**	**100%**

[45] Results shown are rounded to the nearest whole percentage per UTC order for performance calculation and comparison to the benchmark. However, these 100% performance results do not reflect that PSE met all its appointments during the reporting period.

Table F2: SQI #10 and Customer Service Guarantee Payment Annual Details for 2018

2018 SQI #10 and Customer Service Guarantee Payment Monthly Details												
Month	Fuel	Type	Total Appointments (Exclude Canceled and Excused)	Missed Approved	Missed Open	Total Missed	Manual Kept	System Kept	Total Kept	Canceled	Excused	Customer Service Guarantee Payment
Jan-19	Electric	Permanent Service	667	9	0	9	11	647	658	0	59	$450
Jan-19	Electric	Reconnection	2,611	6	0	6	9	2,596	2,605	0	2	$300
Jan-19	Gas	Diagnostic	2,325	2	0	2	95	2,228	2,323	0	0	$100
Jan-19	Gas	Permanent Service	781	13	0	13	22	746	768	0	0	$650
Jan-19	Gas	Reconnection	1,212	2	0	2	22	1,188	1,210	0	0	$100
Jan-19 Total			**7,596**	**32**	**0**	**32**	**159**	**7,405**	**7,564**	**0**	**61**	**$1,600**
Feb-19	Electric	Permanent Service	451	5	0	5	4	442	446	0	68	$250
Feb-19	Electric	Reconnection	1,653	17	0	17	6	1,630	1,636	0	4	$850
Feb-19	Gas	Diagnostic	2,366	5	0	5	93	2,268	2,361	0	0	$250
Feb-19	Gas	Permanent Service	466	2	0	2	77	387	464	0	18	$100
Feb-19	Gas	Reconnection	675	2	0	2	22	651	673	0	0	$100
Feb-19 Total			**5,611**	**31**	**0**	**31**	**202**	**5,378**	**5,580**	**0**	**90**	**$1,550**
Mar-19	Electric	Permanent Service	636	3	0	3	9	624	633	0	0	$150
Mar-19	Electric	Reconnection	3,317	13	0	13	11	3,293	3,304	0	0	$650
Mar-19	Gas	Diagnostic	1,680	2	0	2	55	1,623	1,678	0	0	$100
Mar-19	Gas	Permanent Service	721	1	0	1	20	700	720	0	1	$50
Mar-19	Gas	Reconnection	784	0	0	0	27	757	784	0	0	$0
Mar-19 Total			**7,138**	**19**	**0**	**19**	**122**	**6,997**	**7,119**	**0**	**1**	**$950**

Table continues on next page.

2018 SQI #10 and Customer Service Guarantee Payment Monthly Details												
Month	Fuel	Type	Total Appointments (Exclude Canceled and Excused)	Missed Approved	Missed Open	Total Missed	Manual Kept	System Kept	Total Kept	Canceled	Excused	Customer Service Guarantee Payment
Apr-19	Electric	Permanent Service	672	2	0	2	9	661	670	0	0	$100
Apr-19	Electric	Reconnection	3,061	12	0	12	8	3,041	3,049	0	0	$600
Apr-19	Gas	Diagnostic	1,233	1	0	1	48	1,184	1,232	0	0	$50
Apr-19	Gas	Permanent Service	771	3	0	3	26	742	768	0	0	$150
Apr-19	Gas	Reconnection	1,232	0	0	0	21	1,211	1,232	0	0	$0
Apr-19 Total			**6,969**	**18**	**0**	**18**	**112**	**6,839**	**6,951**	**0**	**0**	**$900**
May-19	Electric	Permanent Service	713	10	0	10	6	697	703	0	0	$500
May-19	Electric	Reconnection	3,400	10	0	10	6	3,384	3,390	0	0	$500
May-19	Gas	Diagnostic	1,080	0	0	0	39	1,041	1,080	0	0	$0
May-19	Gas	Permanent Service	729	1	0	1	12	716	728	0	0	$50
May-19	Gas	Reconnection	984	1	0	1	16	967	983	0	0	$50
May-19 Total			**6,906**	**22**	**0**	**22**	**79**	**6,805**	**6,884**	**0**	**0**	**$1,100**
Jun-19	Electric	Permanent Service	653	4	0	4	7	642	649	0	0	$200
Jun-19	Electric	Reconnection	3,539	11	0	11	11	3,517	3,528	0	0	$550
Jun-19	Gas	Diagnostic	862	0	0	0	27	835	862	0	0	$0
Jun-19	Gas	Permanent Service	716	1	0	1	19	696	715	0	0	$50
Jun-19	Gas	Reconnection	1,244	0	0	0	22	1,222	1,244	0	0	$0
Jun-19 Total			**7,014**	**16**	**0**	**16**	**86**	**6,912**	**6,998**	**0**	**0**	**$800**

Table continues on next page.

2018 SQI #10 and Customer Service Guarantee Payment Monthly Details												
Month	Fuel	Type	Total Appointments (Exclude Canceled and Excused)	Missed Approved	Missed Open	Total Missed	Manual Kept	System Kept	Total Kept	Canceled	Excused	Customer Service Guarantee Payment
Jul-19	Electric	Permanent Service	**735**	3	0	3	2	730	732	0	0	$150
Jul-19	Electric	Reconnection	**3,744**	4	0	4	5	3,735	3,740	0	0	$200
Jul-19	Gas	Diagnostic	**938**	1	0	1	32	905	937	0	0	$50
Jul-19	Gas	Permanent Service	**807**	2	0	2	13	792	805	0	0	$100
Jul-19	Gas	Reconnection	**1,006**	3	0	3	23	980	1,003	0	0	$150
Jul-19 Total			**7,230**	**13**	**0**	**13**	**75**	**7,142**	**7,217**	**0**	**0**	**$650**
Aug-19	Electric	Permanent Service	**721**	3	0	3	2	716	718	0	0	$150
Aug-19	Electric	Reconnection	**3,608**	2	0	2	14	3,592	3,606	0	0	$100
Aug-19	Gas	Diagnostic	**893**	2	0	2	28	863	891	0	0	$100
Aug-19	Gas	Permanent Service	**755**	14	0	14	17	724	741	0	0	$700
Aug-19	Gas	Reconnection	**1,209**	0	0	0	21	1,188	1,209	0	0	$0
Aug-19 Total			**7,186**	**21**	**0**	**21**	**82**	**7,083**	**7,165**	**0**	**0**	**$1,050**
Sep-19	Electric	Permanent Service	**698**	4	0	4	2	692	694	0	0	$200
Sep-19	Electric	Reconnection	**3,066**	4	0	4	7	3,055	3,062	0	0	$200
Sep-19	Gas	Diagnostic	**2,065**	4	0	4	57	2,004	2,061	0	0	$200
Sep-19	Gas	Permanent Service	**749**	5	0	5	14	730	744	0	0	$250
Sep-19	Gas	Reconnection	**1,427**	5	0	5	20	1,402	1,422	0	0	$250
Sep-19 Total			**8,005**	**22**	**0**	**22**	**100**	**7,883**	**7,983**	**0**	**0**	**$1,100**

Table continues on next page.

2018 SQI #10 and Customer Service Guarantee Payment Monthly Details												
Month	Fuel	Type	Total Appointments (Exclude Canceled and Excused)	Missed Approved	Missed open	Total Missed	Manual Kept	System Kept	Total Kept	Canceled	Excused	Customer Service Guarantee Payment
Oct-19	Electric	Permanent Service	**877**	4	0	4	0	873	873	0	2	$200
Oct-19	Electric	Reconnection	**3,822**	8	0	8	6	3,808	3,814	0	0	$400
Oct-19	Gas	Diagnostic	**3,800**	7	0	7	157	3,636	3,793	0	0	$350
Oct-19	Gas	Permanent Service	**921**	15	0	15	17	889	906	0	0	$750
Oct-19	Gas	Reconnection	**2,205**	6	0	6	36	2,163	2,199	0	0	$300
Oct-19 Total			**11,625**	**40**	**0**	**40**	**216**	**11,369**	**11,585**	**0**	**2**	**$2,000**
Nov-19	Electric	Permanent Service	**673**	4	0	4	3	666	669	0	0	$200
Nov-19	Electric	Reconnection	**2,858**	13	0	13	12	2,833	2,845	0	0	$650
Nov-19	Gas	Diagnostic	**2,503**	2	0	2	93	2,408	2,501	0	0	$100
Nov-19	Gas	Permanent Service	**761**	8	0	8	18	735	753	0	1	$400
Nov-19	Gas	Reconnection	**1,704**	3	0	3	43	1,658	1,701	0	0	$150
Nov-19 Total			**8,499**	**30**	**0**	**30**	**169**	**8,300**	**8,469**	**0**	**1**	**$1,500**
Dec-19	Electric	Permanent Service	**681**	3	0	3	6	672	678	0	0	$150
Dec-19	Electric	Reconnection	**2,463**	6	0	6	8	2,449	2,457	0	0	$300
Dec-19	Gas	Diagnostic	**2,610**	7	0	7	117	2,486	2,603	0	0	$350
Dec-19	Gas	Permanent Service	**758**	15	0	15	15	728	743	0	1	$750
Dec-19	Gas	Reconnection	**1,245**	2	0	2	21	1,222	1,243	0	0	$100
Dec-19 Total			**7,757**	**33**	**0**	**33**	**167**	**7,557**	**7,724**	**0**	**1**	**$1,650**
Grand Total			**91,536**	**297**	**0**	**297**	**1,569**	**89,670**	**91,239**	**0**	**156**	**$14,850**

G
Customer Awareness of Service Guarantees

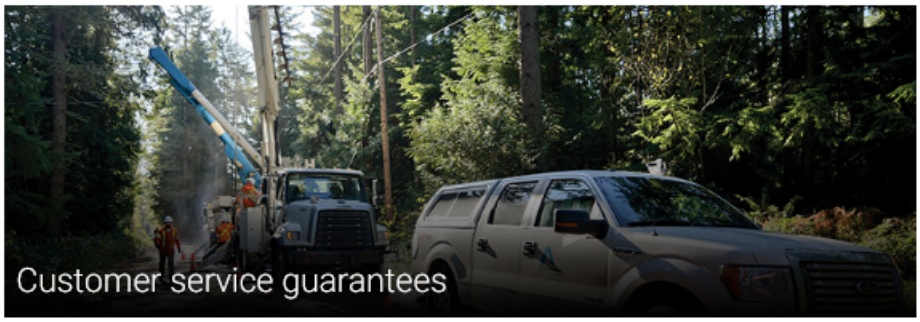
In 2019, Puget Sound Energy made customers aware of the three service guarantees through the following efforts:

1. PSE Customer Care Center and Customer Service Office representative received training about the Service Guarantee and the follow this script:

   If we miss your customer service guarantee appointment under normal operating conditions, we will automatically credit your energy account with $50—guaranteed.
2. An online job aid that explains the circumstances for notifying customers about the Customer Service Guarantee is available to all representatives and field employees.
3. Every customer new to PSE service receives the *Your customer rights and responsibilities* brochure, which is also posted year-round on pse.com.

The samples below illustrate some of the communications used to raise awareness about PSE's three Service Guarantees.

4. PSE.com, posted year-round
   https://www.pse.com/pages/customer-service-guarantees



Customer service guarantees

We stand behind our service to you. We're continually tracking how we're doing and using your feedback to improve. And we'll credit your bill if we fail to meet our service guarantees.

Appointment service guarantee

We'll credit your bill $50 if we don't keep an appointment to install new service, reconnect existing service or inspect natural gas equipment.

Certain maintenance work, including exchanges related to the Meter Upgrade project, are not eligible. Please see links below for qualifications and exclusions.

- Electric appointment service guarantee
- Natural gas appointment service guarantee

24 hour power outage restoration guarantee

You may be eligible for a $50 credit if your power is out for longer than 24 hours, barring a major storm or other event. Conditions apply and you must either report your outage to PSE or request the credit within seven (7) calendar days following restoration.

Guarantee effective as of Jan. 1, 2017

- The consecutive 24-hour period begins when PSE is first notified of the outage. In the event PSE cannot safely access its facilities, the consecutive 24-hour period begins when safe access is made available for the company's personnel and standard equipment
- The guarantee is not applicable in the following circumstances:
  - The outage is associated with a major storm or event, which includes subsequent days;
  - Restoration is prevented by an action or default by someone outside PSE's control (other than a company employee or agent);
  - PSE does not have safe access to its facilities in order to perform the needed repair;
  - PSE verifies that there was no outage as reported by the customer;
  - The customer's equipment has caused the outage; or
  - The customer's system has not received the proper electrical inspections and certifications.

- All qualifications and conditions

120 hour power outage restoration guarantee

You may be eligible for a $50 credit if your power is out for 120 consecutive hours or longer. Qualifications apply and you must either report your outage to PSE or request the credit within seven (7) calendar days following restoration.

- All qualifications and conditions

Your customer rights and responsibilities

Puget Sound Energy wants to make sure you know your rights and responsibilities regarding your electric and/or natural gas service.

- Rights and responsibilities

Tracking our performance

Every year we set goals for improving our service. These performance report cards show how we're doing in areas such as customer satisfaction, appointment scheduling, response time, field services and more. We also track the effectiveness of our energy efficiency programs.

2018 Service Quality report card

2017 Service Quality report card

2016-17 Electric energy efficiency report card

2016-17 Natural gas energy efficiency report card

Previous years

Service Quality: 2016, 2015, 2014, 2013

Energy Efficiency: 2014-15

Table G1: Customer Awareness of Customer Service Guarantee

Field Service Operations Transactions Customer Satisfaction Survey		Jan 2019	Feb 2019	Mar 2019	Apr 2019	May 2019	Jun 2019	Jul 2019	Aug 2019	Sep 2019	Oct 2019	Nov 2019	Dec 2019
Q26A. When you called to make the appointment for a service technician to come out, did the customer service representative tell you about PSE $50 Service Guarantee?	Yes	60	76	104	62	72	67	60	76	88	76	80	80
	No	93	91	97	101	130	96	113	124	86	86	84	128
	Don't Know	46	33	49	37	47	40	26	50	26	38	36	41
	Refused Response	1	-	-	-	-	-	1	-	-	-	-	1
	Total Customers Surveyed	**200**	**200**	**250**	**200**	**249**	**203**	**200**	**250**	**200**	**200**	**200**	**250**
Q26C. Which of the following best fits your understanding of how the service guarantee works if a scheduled appointment has to be changed by PSE.	You are given the $50 service guarantee if the rescheduled time causes you inconvenience.	26	33	41	26	25	20	28	44	29	37	38	38
	Whenever PSE changes an appointment, you are given the $50.	30	26	36	25	31	28	26	27	42	31	36	32
	You have no understanding or expectations about this part of the service guarantee plan.	106	98	116	104	147	128	125	155	110	89	96	100
	Don't Know	36	43	57	43	43	25	19	22	16	43	29	76
	Refused Response	2	-	-	2	3	2	2	2	3	-	1	4
	Total Customers Surveyed	**200**	**200**	**250**	**200**	**249**	**203**	**200**	**250**	**200**	**200**	**200**	**250**

Table continues on next page.

		Jan 2019	Feb 2019	Mar 2019	Apr 2019	May 2019	Jun 2019	Jul 2019	Aug 2019	Sep 2019	Oct 2019	Nov 2019	Dec 2019
Field Service Operations Transactions Customer Satisfaction Survey													
Q26D. Did your appointment have to be rescheduled or did it occur as planned?	It occurred as planned.	197	189	237	187	227	193	190	234	186	189	193	223
	It was rescheduled.	2	7	5	6	12	8	6	6	9	6	4	12
	Technician arrived but was late.	-	1	1	3	-	-	1	-	2	1	2	-
	Don't Know	1	3	5	3	10	2	2	6	3	4	-	12
	Refused Response	-	-	2	1	-	-	1	4	-	-	1	3
	Total Customers Surveyed	**200**	**200**	**250**	**200**	**249**	**203**	**200**	**250**	**200**	**200**	**200**	**250**
Q26E. Who initiated rescheduling your appointment?	Myself (Customer Initiated)	2	3	3	5	4	3	2	3	2	1	1	1
	Puget Sound Energy Initiated	-	4	2	1	8	5	4	3	7	3	3	11
	Don't Know	-	-	-	-	-	-	-	-	-	2	-	-
	Refused Response	-	-	-	-	-	-	-	-	-	-	-	-
	Total Customers Surveyed	**2**	**7**	**5**	**6**	**12**	**8**	**6**	**6**	**9**	**6**	**4**	**12**

H

Electric Reliability Terms and Definitions

Terms and Definitions

Area of Greatest Concern— Top 50 worst-performing distribution circuits over the past five years that consistently contributed the most customer-minute interruptions. An area targeted for specific actions to improve the level of service reliability or quality.

Blue-sky Days—Days when the energy-delivery system operates as normal.

Catastrophic Event Days —Days when the daily SAIDI is greater than the annual catastrophic event day threshold (T_{CAT}).

Cause Codes—Codes used to identify PSE's best estimation of what caused a Sustained Interruption to occur. The codes are listed below:

Code	Description	Code	Description
AO	Accident Other, with Fires	**FI**	Faulty Installation
BA	Bird or Animal	**LI**	Lightning
CP	Car Pole Accident	**SO**	Scheduled Outage (was WR − Work Required)
CR	Customer Request	**TF**	Tree − Off Right-of-Way
DU	Dig Up Underground	**TO**	Tree − On Right-of-Way
EF	Equipment Failure	**TV**	Trees/Vegetation
EO	Electrical Overload	**UN**	Unknown Cause (unknown equipment involved only)
EQ	Earthquake	**VA**	Vandalism

$CEMI_n$—Customers Experiencing Multiple Interruptions—This index indicates the ratio of individual customers experiencing n or more sustained interruptions to the total number of customers served. The performance result is calculated based on the below formula:

$$\mathbf{CEMI_n} = \frac{Total\ Number\ of\ Customers\ that\ experienced\ more\ than\ n\ sustained\ interruptions}{Average\ Annual\ Electric\ Customer\ Count}$$

Commission Complaint—Any single-customer electric-service reliability complaint filed by a customer with the Washington Utilities and Transportation Commission (UTC).

Customer Complaint—Repeated customer inquiries relating to dissatisfaction with the resolution or explanation of a concern related to a Sustained Interruption or Power Quality. This is indicated by two or more recorded contacts in PSE's customer information system during current and prior year.

Customer Count—The number of electric customers per the outage reporting system that is a part of SAP, PSE's work management, customer information and financial information system.

Customer Inquiry—An event whereby a customer contacts the Customer Care Center to report a Sustained Interruption or Power Quality concern.

Duration of Sustained Interruption—The period beginning when PSE is first informed that service to a customer has been interrupted, and ending when the problem which caused the interruption has been resolved and the line has been re-energized (measured in minutes, hours or days).

Equipment Codes

Code	Description	Code	Description
OCN	Overhead Secondary Connector	**OTF**	Overhead Transformer Fuse
OCO	Overhead Conductor	**OTR**	Overhead Transformer
OFC	Overhead Cut − Out	**UEL**	Underground Elbow
OFU	Overhead Line Fuse / Fuse Link	**UFJ**	Underground J – Box
OJU	Overhead Jumper Wire	**UPC**	Underground Primary Cable
OPO	Distribution Pole	**UPT**	Padmount Transformer
OSV	Overhead Service	**USV**	Underground Service

iDOT— Investment Decision Optimization Tool—An analysis tool that helps to identify a set of projects that will create maximum value by comparing the relative costs and benefits of each project.

IEEE 1366—IEEE Standard 1366-2003, a guide approved and published by the Institute of Electrical and Electronics Engineers that defines electric power reliability indices and factors that affect their calculations.

Interruption— The total loss of electric power on one or more normally energized conductors to one or more customers connected to the distribution or transmission portion of the system. This does not include any of the power quality issues such as: sags, swells, impulses, or harmonics.

Major Event—An event, such as a storm, that causes serious reliability problems. PSE utilizes three Major Event criteria to evaluate its reliability performance: $SAIDI_{SQI}$ Exclusion Major Event Days and $SAIFI_{SQI}$ Exclusion Major Event Days and IEEE 1366 T_{MED} Exclusion Major Event Days.

Major Event Days—Days when outage events can be excluded from the reliability performance calculation. The three types of Major Event Days are:

$SAIDI_{SQI}$ Major Event Days—Any day in which the daily system SAIDI exceeds the threshold value, T_{MEDADJ}.

5% Exclusion Major Event Days—Days that five percent or more of electric customers are experiencing an electric outage during a 24-hour period and subsequent days when the service to those customers is being restored.

IEEE 1366 T_{MED} Exclusion Major Event Days—Any days in which the daily system SAIDI exceeds the threshold value, T_{MED}.

Momentary Interruption: The brief loss of power delivery to one or more customers caused by the opening and closing of an interrupting device.

$SAIDI_{SQI}$ – any interruption five minutes or shorter

$SAIFI_{SQI}$ – any interruption one minute or shorter

Outage—The state of a system component when it is not available to perform its intended function, due to some event directly associated with that component. For the most part, a component's unavailability is considered an outage when it causes a Sustained Interruption of service to customers. The system component can be transmission, distribution or customer owned if it causes a Sustained Interruption to other customers.

Power Quality—Industry standards are not broad enough to define power quality or how and when to measure it. For purposes of this plan, power quality includes all other physical characteristics of electrical service except for Sustained Interruptions, including momentary outages, voltage sags, voltage flicker, harmonics and voltage spikes.

SAIDI—System Average Interruption Duration Index—This index is commonly referred to as customer-minutes of interruption (CMI) or customer hours, and is designed to provide information about the average time the customers are interrupted. The measurements used in PSE's Plan and reporting include Total methodology ($SAIDI_{Total}$), Total with five-year-rolling average methodology ($SAIDI_{Total\ 5\text{-}year\ Average}$), 5% exclusion methodology ($SAIDI_{5\%}$), IEEE methodology ($SAIDI_{IEEE}$) and SQI methodology ($SAIDI_{SQI}$). The performance result for each of the measurements is calculated based on the below formula:

$$\textbf{SAIDI} = \frac{\Sigma\, Customer\ Minute\ Interruptions}{Average\ Annual\ Electric\ Customer\ Count}$$

$SAIDI_{Total}$: the numerator includes all customer minute interruptions on outages one minute or longer.

$SAIDI_{Total\ 5\text{-}year\ Average}$:Rolling five-year average of current year Annual $SAIDI_{Total}$ and prior four years Annual $SAIDI_{Total}$ results, excluding any exclusion that has been approved by the UTC. Exclusions for an entire year will be replaced by the preceding Annual $SAIDI_{Total}$ performance results until there are five years included in the calculation of current year $SAIDI_{Total\ 5\text{-}year\ Average.}$ Exclusions for an event will not be included in the Annual $SAIDI_{Total}$ performance results.

$SAIDI_{5\%}$: the numerator includes customer minute interruptions during non-5% Exclusion Major Event Days. Outages one minute and longer are included in this metric.

$SAIDI_{IEEE}$= the numerator includes customer minute interruptions during non-IEEE 1366 T_{MED} Exclusion Major Event Days. Outages that are longer than 5 minutes are included in this metric.

$SAIDI_{SQI\text{-}3}$: the numerator includes customer minute interruptions during non-SQI SAIDI T_{MEDADJ} Exclusion Major Event Days. Outages that are longer than 5 minutes are included in this metric.

SAIFI—System Average Interruption Frequency Index—This index is designed to give information about the average frequency of Sustained Interruptions per customers (CI). The measurements used in PSE's Plan and reporting include Total methodology, SQI-4 methodology and IEEE SAIFI methodology. The performance results for each of the measurement will be calculated according to the following:

$$\textbf{SAIFI} = \frac{\Sigma Number\ of\ Customer\ Interruptions}{Average\ Annual\ Electric\ Customer\ Count}$$

$SAIFI_{Total}$: the numerator includes all customer interruptions on outages one minute or longer.

$SAIFI_{Total\ 5\text{-}year\ Average}$:Rolling five-year average of current year Annual $SAIFI_{Total}$ and prior four years Annual $SAIFI_{Total}$ results, excluding any exclusion that has been approved by the UTC. Exclusions for an entire year will be replaced by the preceding Annual $SAIFI_{Total}$ performance results until there are five years included in the calculation of current year $SAIFI_{Total\ 5\text{-}year\ Average}$. Exclusions for an event will not be included in the Annual $SAIFI_{Total}$ performance results.

$SAIFI_{5\%}$: the numerator includes customer interruptions during non-5% Exclusion Major Event Days. Outages one minute and longer are included in this metric.

$SAIFI_{IEEE}$= the numerator includes customer interruptions during non-IEEE 1366 T_{MED} Exclusion Major Event Days. Outages that are longer than 5 minutes are included in this metric.

SQ—PSE's Service Quality Program was first established per conditions of the Puget Power and Washington Natural Gas merger in 1997 under Docket UE-960195. The SQ Program has been since extended and modified in Dockets UE-011570 and UG-011571 (consolidated), Docket UE-031946, and Dockets UE-072300 and UG-072301 (consolidated).

Step Restoration—The restoration of service to blocks of customers in an area until the entire area or feeder is restored.

Sustained Interruption—Any interruption not classified as momentary.

$SAIDI_{SQI}$ - Any interruption longer than five minutes

$SAIFI_{SQI}$ - Any interruption longer than one minute

T_{CAT}—The Catastrophic Event Day identification threshold value that is calculated at the end of each reporting year for use during the next reporting year. It is determined by reviewing the past five years of daily system SAIDI, and using a 4.5 beta methodology of the IEEE Standard 1366 in calculating the catastrophic threshold value. Any days having a daily system SAIDI greater than T_{CAT} are days on which the energy-delivery system experienced catastrophic stresses, which are classified as Catastrophic Event Days.

$T_{CAT} = e^{(\alpha + 4.5\beta)}$ where α is the log-average of the data set and β is the log-standard deviation of the data set

T_{MED}—The Major Event Day identification threshold value that is calculated at the end of each reporting year for use during the next reporting year. It is determined by reviewing the past five years of daily system SAIDI, and using the IEEE 1366 2.5 beta methodology in calculating the threshold value. Any days having a daily system SAIDI greater than T_{MED} are days on which the energy-delivery system experienced stresses beyond those normally expected, which are classified as Major Event Days.

$T_{MED} = e^{(\alpha + 2.5\beta)}$ where α is the log-average of the data set and β is the log-standard deviation of the data set.

T_{MEDADJ}—The SQI-3 SAIDI Major Event Day identification threshold value that is calculated at the end of each reporting year for use during the next reporting year. It is determined by reviewing the past five years of daily system SAIDI. Any catastrophic event day (T_{CAT}) daily SAIDI is replaced with the previous five year monthly average daily SAIDI. A T_{MEDADJ} is then calculated using the IEEE 1366 2.5 beta methodology to determine threshold value. Any days having a daily system SAIDI greater than T_{MEDADJ} are days on which the energy-delivery system experienced stresses beyond those normally expected, which are classified as SQI-3 Major Event Days.

$T_{MEDADJ} = e^{(\alpha + 2.5\beta)}$ where α is the log-average of the data set and β is the log-standard deviation of the data set.

I
Electric Reliability Data Collection Process and Calculations

Data Collection – Methods and Issues

This appendix discusses data collection methods and issues. It explains how the various data were collected. Changes in methods from prior reporting periods are highlighted and the impact of the new method on data accuracy is discussed.

In April 2013, PSE implemented the new OMS and CIS replacing a legacy system. With the legacy system, the Automated Meter Reading (AMR) System had provided some of the data to indicate when a Sustained Interruption began or ended but this functionality was not implemented in the OMS. Today, the AMR System is integrated to OMS for the purpose of validating outage status through meter pings. In 2017, PSE performed an analysis to determine if the outage data integrity from the AMR was robust enough to enhance PSE's current processes for identifying the start and end times of an interruption. The study results indicated that AMR data was not robust enough and PSE did not pursue additional integration of the AMR System with OMS.

Methods for Identifying when a Sustained Interruption Begins

The following methods are used to determine the beginning point of an interruption:

- A customer calls to PSE's Customer Care Center, either through the automated voice response unit or talking with a customer representative.
- A customer calls to a PSE employee rather than through the Customer Care Center.
- A customer logging into their online PSE account and reporting an outage.
- A substation breaker operation that is reflected in the OMS based on a SCADA interface.

Possible Causes of Data Inconsistencies:

- If service to a customer affected by a service interruption remains out after the interruption has been corrected, a follow-up call from the customer may be reported as a new incident.
- Data entry mistakes can create inconsistencies.
- During a major storm event, the focus is on ensuring a safe environment for the responders and restoring customers as quickly as possible. While outage information is recorded, given the magnitude of the event and number of outages, the records may not accurately report the extent of the outage or if customers were systematically restored.

Methods to Specify When the Duration of a Sustained Interruption Ends

The following methods are used to determine the ending point of an interruption:

- PSE Service personnel will log the time when customers are restored.
- SCADA provides a signal to the OMS that a substation breaker has been restored.

Possible Causes of Data Inconsistencies:

- Multiple layers of issues may be contributing to a Sustained Interruption for a specific customer as described in the definition of Duration of Sustained Interruption.
- Data entry errors can affect the accuracy of the information.
- Getting consistent feedback from the field personnel responding to the outage.
- During a major storm event, the focus is on ensuring a safe environment for the responders and restoring customers as quickly as possible. While outage information is recorded, given the magnitude of the event and number of outages, the records may not accurately report the extent of the outage or if customers were systematically restored.

Recording Cause Codes

Outage cause codes are reported by the PSE service personnel responding to the outage location.

Possible Causes of Data Inconsistencies:

- During a major storm event, the focus is on ensuring a safe environment for the responders and restoring customers as quickly as possible. While outage information is recorded, given the magnitude of the event and number of outages, the records may not accurately report the extent of the outage or if customers were systematically restored.
- Restoration efforts take precedence over pinpointing the exact cause and location of the outage, especially in cross-country terrain or in darkness.

Recording and Tracking Customer Complaints

The CSR in PSE's Customer Care Center handling the call listens for key words and then categorizes the customer comments accordingly.

- The CSR creates a Service Miscellaneous request for the appropriate PSE personnel to contact the customer and discuss their concerns.
- All contact is tracked as an interaction record in PSE's Customer Information System and Service Miscellaneous Notification in PSE's work management system, SAP, and counted as a customer inquiry for electric reliability reporting purposes.
- When two or more customer inquiries on outage frequency or duration and/or power quality have been recorded in SAP from a customer during current and prior reporting year, these customer inquiries together will be considered as a PSE "Customer Complaint."

Possible Causes of Data Inconsistencies:

- Data entry errors from the initial inquiry or during the feedback loop can affect the accuracy of the information.
- High volumes of customer inquiries, during storms for example, may increase likelihood of data entry errors.

Change in Definitions and Calculations

This section describes the methodology used in defining and calculating reliability metrics, which are then used to evaluate performance. The UTC in WAC 480-100-398 (2) requires a utility to report changes made in this methodology including data collection and calculation of reliability information after the initial baselines are set. The utility must explain why the changes occurred and how the change is expected to affect comparisons of the newer and older information.

Change to Include the IEEE Methodology

In the 2004 Annual Electric Service Reliability Report, PSE indicated that starting in 2005, reliability metrics using the IEEE Standard 1366 methodology as a guideline would be included. This change and other modifications for monitoring and reporting electric service reliability information were adopted by PSE in UE-060391. The purpose for moving to the IEEE Standard 1366 methodology is to:

- Provide uniformity in reliability indices
- Identify factors which affect these indices
- Aid in consistent reporting practices among utilities

T_{MED} (Major Event Day Threshold) is the reliability index that facilitates this consistency. A detailed equation for calculating T_{MED} is provided in **Appendix H**: *Electric Reliability Terms and Definitions*.

While the IEEE guidelines provide a standard for the industry, companies can create a variety of definitions of an outage or sustained outage.

- PSE defines sustained outages as those lasting longer than one minute for SQI SAIFI
- PSE utilizes the IEEE definition of a sustained outage to be longer than five minutes for SQI SAIDI

Changes for 2010 and Subsequent Years Reporting

In 2010, PSE met with the UTC staff to enhance the format of the Electric Service Reliability report and the reliability statistics information provided. Specific enhancements included clarification of baseline statistics and detailed comparison of and expanded set of reliability metrics. This annual report reflects all these reporting enhancements and the SQI SAIDI performance and benchmark calculation changes approved by the UTC.

Baseline Data Reliability Statistics

Pursuant to the WAC Electric Service Reliability requirements, PSE establishes 2003 as its baseline year as the performance from the year was about average for each of the reliability

measurements. However, PSE would rather develop a baseline using multiple years to mitigate the fluctuation of weather conditions and other external factors. PSE feels there is limited usefulness in designating one specific year's information as a "baseline" and cautions against the use of a single year's data to assess year-to-year system reliability trends.

Timing of Annual Report Filings

PSE will be reporting data and information on a calendar year basis. PSE's annual Electric Service Reliability report will be filed as part of the annual SQ and Electric Service Reliability report with the UTC no later than the end of March of each year.[46]

Tree-related Outage Codes

PSE conducted a review of tree-related outages and the use of the tree on-right-of-way (TO) and tree off-right-of-way (TF) cause codes on outage notifications. However, it was found that during an outage it was difficult for field personnel to accurately assess the correct use of TF and TO cause codes.

As a result, PSE created a new outage cause code, Trees/Vegetation (TV) and revised the tree-related outage coding process. After a tree-related outage has occurred on a transmission line or causes a complete distribution circuit outage, a certified arborist field-verifies if the tree was on or off right-of-way and the correct code is added to the outage notification. All other tree-related outages are coded as TV.

PSE complaints

The business process for recording customer inquiries changed with the new CIS implementation in March 2013. For the 2014 reporting, PSE used the service notification records pertaining to outage duration/frequency or power quality for reporting the number of PSE complaints for the last two calendar years. PSE feels that using this new method of data collection provides a more complete assessment of customer inquiries pertaining to reliability and power quality concern.

[46] Order 17 of consolidated Dockets UE-072300 and UG-072301, page 10, section 26.

Changes for 2017 and Subsequent Years Reporting

SQI SAIDI Benchmark and Calculation Methodology

PSE, the Washington State Public Counsel Unit personnel, and the UTC staff met throughout 2015 and 2016 to determine a new SQI SAIDI benchmark and calculation methodology. On June 17, 2016, in Order 29 of consolidated Dockets UE-072300 and UG-072301 (Order 29), the UTC adopted the changes on how PSE will calculate SQI SAIDI results using the IEEE Standard 1366 for 2016 and subsequent reporting years. The new SQI SAIDI benchmark is 155 minutes. Also a part of the Order 29, PSE will not be penalized if the SQI SAIDI benchmark is missed but PSE has new non-major event 24-hour Restoration Service Guarantee.

The Electric Reliability Terms and Definitions appendix was expanded to include the new terms and definitions as a result of the SQI SAIDI changes per Order 29. In addition, the SAIDI and SAIFI definitions and formulas were streamlined for ease of reading.

Areas of Greatest Concern

This section of the annual reporting includes information on specific areas PSE is targeting for specific actions to enhance the level of service reliability. For the 2018 Electric Service Reliability Report, PSE continues to designate the Areas of Greatest Concern as the Top 50 worst-performing circuits[47] over the previous five years that rank worst in terms of customer interruption minutes.

- Each circuit is first ranked by the annual total customer interruption minutes seen by the circuit for each of the previous five years.
- The yearly ranking results are then averaged to determine the overall Top 50 worst-performing circuits over the past five years.

The following information will be reported on each of these areas:

- Identification of each Area of Greatest Concern.
- Explanation of the specific actions PSE plans to take in each Area of Greatest Concern to improve the service in each area during the coming year.

Exclusion Events

Per Dockets UE-072300 and UG-072300 (consolidated), from 2010 through 2015 PSE petitioned to exclude certain annual results or outage minutes from the performance calculation for the current year and years following that will be affected. PSE demonstrated that event was unusual or extraordinary and that PSE's level

[47] This definition of Areas of Concern became effective in 2012 considering the trend in system performance based on circuits that exceed the SQI, number of customers affected by those circuits and the number of complaints.

of preparedness and response was reasonable. The UTC granted the following events to be considered extraordinary:

- Total SAIDI results for 2006
- January 2012 storm event
- August 2015 storm event
- November 2015 storm event

In June 2016, Order 29 sets forth an objective approach in identifying catastrophic events. Catastrophic days are identified based on the 4.5 Beta of the IEEE Standard 1366. Any days having a daily system SAIDI greater than T_{CAT} is considered a catastrophic event for purposes of the SQI SAIDI mechanics. While these catastrophic days are excluded from the annual SQI SAIDI results, these days negatively impact the standard 2.5 beta threshold value in the next year and the following four years. Per Order 29, the daily system SAIDI value for that day is replaced with the five year average of that month's previous daily SAIDI. The major event day threshold value is then calculated using the adjusted data (T_{MEDADJ}). The following days are considered catastrophic:

- March 13, 2016
- February 6, 2017
- December 20, 2018
- January 6, 2019

J
1997-current year PSE SAIDI and SAIFI Performance by Different Measurements[48]

This appendix presents PSE SAIDI and SAIFI performance from 1997 through the current year using different measurements.

1997-2019 PSE SAIDI Performance in Different Measurements
(Average number of outage minutes per customer per year)

Calendar Year	(a) Annual SAIDI Excluding Any Days That 5% or More Customers Are w/o Power	(b) Annual IEEE SAIDI Excluding Daily Results over T_{MED}	(c) Annual Total SAIDI Results: No Exclusions	(d) Annual Total SAIDI Results with Exclusions	(e) Total SAIDI 5-Year Rolling Annual Average with Exclusions	(f) Annual SQI SAIDI excluding Daily Results over T_{MEDADJ} (SQI-3)
1997	105	109	202	202		
1998	117	119	383	383		
1999	131	118	388	388		
2000	103	111	253	253		
2001	147	110	240	240	293	
2002	106	99	215	215	296	
2003	132	106	532	532	326	
2004	114	115	302	302	308	
2005	128	124	192	192	296	
2006	213	163	2,636			
2007	167	143	312	312	311	
2008	163	155	202	202	308	
2009	190	145	215	215	245	
2010	129	124	512	512	287	
2011	144	144	163	163	281	
2012	134	120	1,400	134[1]	245	
2013	122	125	209	209	247	
2014	173	154	540	540	312	
2015	180	163	760	313[2]	272	
2016	148	154	391	391	317	148
2017	222	175	477	477	386	175
2018	148	145	438	438	432	145
2019	132	136	550	550	434	136

Figure J1: 1997–2019 SAIDI Performance by Different Measurement

[48] This section meets a requirement of Attachment B of Docket No. UE-110060.

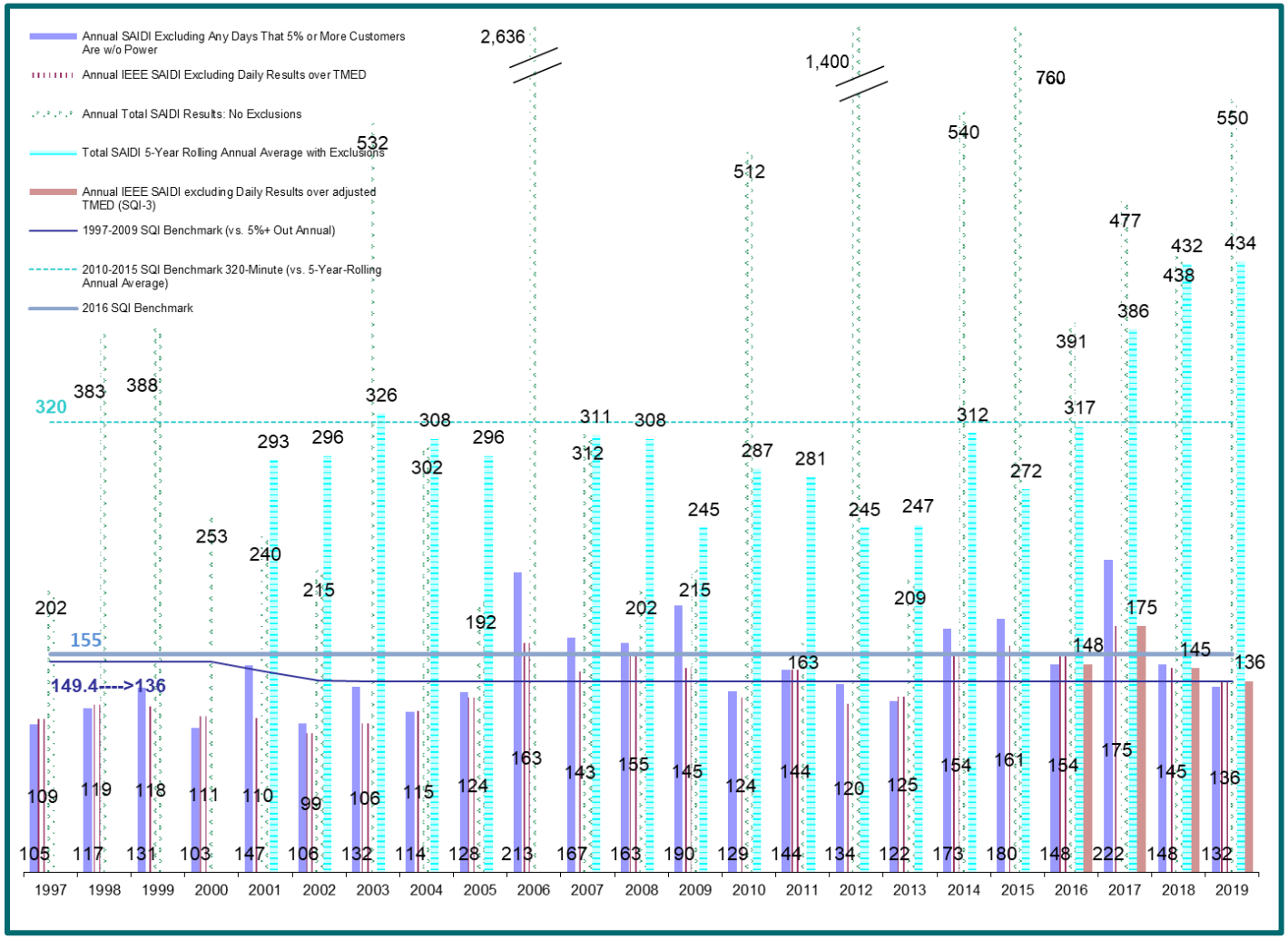


Figure J2: 1997–2019 SAIDI Performance by Different Measurements

1997-2019 PSE SAIFI Performance in Different Measurements
(Average number of interruptions per year per customer)

Calendar Year	(a) Annual SAIFI Excluding Any Days That 5% or More Customers Are w/o Power	(b) Annual IEEE SAIFI Excluding Daily Results over T_{MED}	(c) Annual Total SAIFI Results: No Exclusions	(d) Annual Total SAIFI Results with Exclusions	(e) Total SAIFI 5-Year Rolling Annual Average with Exclusions
1997	1.04	1.11	1.53	1.53	
1998	0.85	0.92	1.42	1.42	
1999	0.98	0.96	1.88	1.88	
2000	0.85	0.91	1.32	1.32	
2001	0.98	0.79	1.34	1.34	1.50
2002	0.83	0.80	1.07	1.07	1.41
2003	0.80	0.71	1.24	1.24	1.37
2004	0.77	0.77	1.09	1.09	1.21
2005	0.94	0.93	1.18	1.18	1.18
2006	1.23	1.05	2.52		
2007	0.98	0.91	1.42	1.42	1.20
2008	1.01	0.98	1.12	1.12	1.21
2009	1.09	0.94	1.24	1.24	1.22
2010	0.86	0.87	1.59	1.59	1.31
2011	1.02	1.02	1.07	1.07	1.29
2012	0.92	0.83	1.62	0.92	1.19
2013	0.86	0.86	1.13	1.13	1.19
2014	1.05	1.00	1.89	1.89	1.32
2015	1.11	1.04	2.18	2.18	1.44
2016	1.06	1.02	1.70	1.70	1.56
2017	1.20	1.12	1.80	1.80	1.74
2018	1.02	0.99	1.57	1.57	1.83
2019	0.98	0.96	1.57	1.57	1.76

Figure J3: 1997–2019 SAIFI Performance by Different Measurements

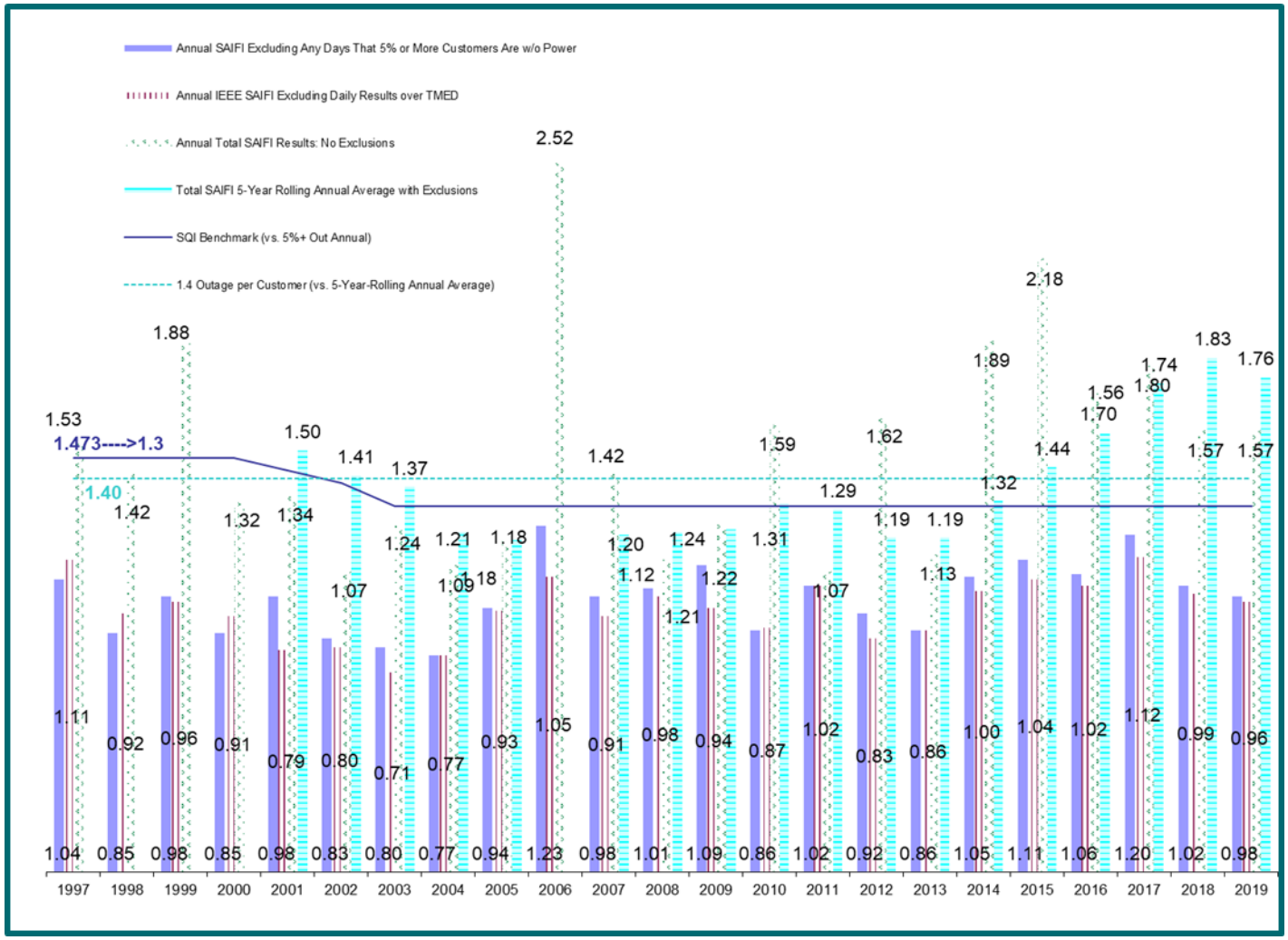


Figure J4: 1997–2019 SAIFI Performance by Different Measurements

K
Current Year Electric Service Outage by Cause by Area[49]

This appendix details the 2019 Outage Cause by County. In Tables K1 through K3 color codes indicate which major outage category the outage cause is grouped into. The Cause Code definitions can be found in **Appendix H**: *Electric Reliability Terms and Definitions*.

Table K1: Color Code Legend

Color Code Legend
Preventable
Third Party (Non-Tree)
Tree-related

Table K2: Total Outages by Cause

	Northern			King/Kittitas		Southern/Western			
	Whatcom	Skagit	Island	King	Kittitas	Pierce	Thurston	Kitsap	Total
AO	47	36	9	122	7	26	24	27	298
BA	197	93	64	724	32	114	168	274	1,666
CP	35	29	15	109	9	32	52	41	322
CR	1	2	1	0	0	0	0	0	4
DU	17	10	3	65	10	19	19	24	167
EF	695	307	259	1,961	161	403	719	421	4,926
EO	0	0	0	1	0	0	1	0	2
EQ	1	0	0	0	0	0	0	0	1
FI	8	2	3	40	1	7	3	6	70
LI	57	23	13	67	9	43	37	40	289
SO	255	90	87	837	45	127	239	287	1,967
TF	0	0	0	0	0	0	0	0	0
TO	0	0	0	1	0	0	1	0	2
TV	371	204	168	2,409	39	351	960	900	5,402
UN	102	64	29	501	20	60	74	119	969
VA	1	0	0	13	0	2	3	2	21
Misc*	19	15	16	125	16	40	25	23	279
Total	1,806	875	667	6,975	349	1,224	2,325	2,164	16,385

*Miscellaneous causes are included in both Preventable and Third Party (Non-Tree) categories

[49] This section meets a requirement of Attachment B of Docket No. UE-110060.

Table K3: SQI SAIDI Outages by Cause

	Northern			King/Kittitas		Southern/Western			
	Whatcom	Skagit	Island	King	Kittitas	Pierce	Thurston	Kitsap	Total
AO	46	35	9	120	7	25	24	22	288
BA	196	93	64	723	31	114	168	273	1,662
CP	35	29	13	106	9	31	52	39	314
CR	1	2	1	0	0	0	0	0	4
DU	17	10	3	65	10	19	19	24	167
EF	639	294	252	1,899	159	380	673	408	4,704
EO	0	0	0	1	0	0	1	0	2
EQ	1	0	0	0	0	0	0	0	1
FI	8	1	3	39	1	7	3	6	68
LI	57	23	13	66	9	43	37	40	288
SO	252	90	87	832	45	125	236	286	1,953
TF	0	0	0	0	0	0	0	0	0
TO	0	0	0	1	0	0	1	0	2
TV	237	172	141	1,230	33	181	392	529	2,915
UN	81	62	29	436	20	52	56	103	839
VA	1	0	0	13	0	2	3	2	21
Misc*	13	13	14	104	15	29	17	21	226
Total	1,584	824	629	5,635	339	1,008	1,682	1,753	13,454

*Miscellaneous causes are included in both Preventable and Third Party (Non-Tree) categories.

L
Historical SAIDI and SAIFI by Area[50]

This appendix details in Table L1, the three year history of SAIDI and SAIFI data by county.

Table L1: SAIDI and SAIFI Data for the Past Three Years by County [Note]

Region/County	Year	Total SAIFI	SAIFI 5%	Total SAIDI	SQI SAIDI
Northern					
Whatcom	**2019**	**1.91**	**1.62**	**309**	**191**
	2018	1.44	0.87	590	134
	2017	1.95	1.25	701	287
Skagit	**2019**	**1.02**	**0.92**	**203**	**157**
	2018	2.32	1.62	949	333
	2017	2.05	1.69	467	283
Island	**2019**	**1.20**	**1.06**	**196**	**164**
	2018	3.84	1.97	2541	316
	2017	2.07	1.44	468	238
King/Kittitas					
King	**2019**	**1.51**	**0.84**	**593**	**117**
	2018	1.15	0.86	202	109
	2017	1.57	0.95	399	131
Kittitas	**2019**	**2.24**	**2.07**	**464**	**358**
	2018	1.43	1.51	260	256
	2017	1.84	1.84	238	237

Note: Reported figures are based on most current SAP outage data, as of February 2020.

Table continues on next page

[50] This section meets a requirement of Attachment B of Docket No. UE-110060.

Region/County	Year	Total SAIFI	SAIFI 5%	Total SAIDI	SQI SAIDI
Southern/Western					
Pierce	**2019**	**1.12**	**0.61**	**623**	**88**
	2018	0.96	0.68	118	89
	2017	1.31	1.15	227	129
Thurston	**2019**	**1.89**	**0.91**	**784**	**159**
	2018	1.52	1.14	303	146
	2017	2.06	1.59	635	216
Kitsap	**2019**	**1.93**	**1.38**	**525**	**157**
	2018	2.78	1.42	929	216
	2017	2.73	1.54	745	204

County Trends from 2018 to 2019:

- Skagit, Island and Kitsap Counties saw an improvement across all four measures due to fewer customers impacted by tree related outage, bird/animal outage, and equipment failures.
- Whatcom County saw an improvement in one measure and a decline in the other three measures.
    - The Total SAIFI and SAIFI 5% performance declined primarily due to more customers affected by equipment failures.
    - The improvement in Total SAIDI performance was primarily driven by fewer tree related outages during major storms.
    - SQI SAIDI performance declined primarily due to an increase in scheduled outages, equipment failures and a late summer lightning storm.
- Pierce County performance improved in two measures and declines in the other two measures.
    - There were not any primary drivers for the slight improvement in SAIFI 5% and SQI SAIDI.
    - Total SAIFI and Total SAIDI performance declined due to more customers impacted by equipment failures and tree related outages.
- King County saw an improvement in one measure and a decline in the other three measures.
    - There was not any primary driver for the slight improvement in SAIFI 5%.
    - Total SAIFI, Total SAIDI, and SQI SAIDI performance declined due to an increase in tree related outages and equipment failures.

M
Areas of Greatest Concern with Action Plan[51]

This appendix details the areas of greatest concern with the 2019 and 2020 action plan.

Table M1 provides the 2019 list of the Top 50 Circuits with the highest minutes interrupted in the PSE territory.

CMI refers to Customer Minutes Interruptions.

[51] This section meets a requirement of Attachment B of Docket No. UE-110060.

Table M1: 2019 Areas of Greatest Concern

Circuit	County	2019 Year End 5 Year Avg Rank	2019 Year End 5 Year Average Total CMI	2018 Year End 5 Year Avg Rank	2018 Year End 5 Year Average Total CMI	Action by PSE	5 Yr CMI Trend
Chico-12	Kitsap	1	5,456,595	1	5,937,671	Four underground cable replacement projects and one Distribution Automation project completed in 2019.	▼
Nugents Corner-26	Whatcom	2	3,703,653	9	3,539,663	One underground conversion project planned for 2020.	▲
Baker River Switch-24	Skagit	3	3,693,876	4	3,579,924	Planning is continuing to monitor for improvements.	▼
Cottage Brook-13	King	4	3,005,323	7	2,893,645	One tree wire project and one underground cable replacement project planned for 2020.	▲
Fernwood-17	Kitsap	5	3,297,006	17	2,687,799	One Distribution Automation project completed in 2019. One underground cable replacement project planned for 2020.	▼
Big Rock-15	Skagit	6	3,191,674	3	3,490,764	One overhead feeder tie planned for 2020.	▼
Norway Hill-15	King	7	2,061,529	50	1,739,255	One tree wire project planned for 2020.	▲
Sherwood-18	King	8	2,087,338	Not on 2018 list		One underground cable replacement project completed in 2019. One overhead system upgrade project planned for 2020.	▲
Fragaria-15	Kitsap	9	2,388,265	6	2,896,176	One tree wire project completed in 2019. One Distribution Automation project planned for 2020.	▼

Table continues on next page

Circuit	County	2019 Year End 5 Year Avg Rank	2019 Year End 5 Year Average Total CMI	2018 Year End 5 Year Avg Rank	2018 Year End 5 Year Average Total CMI	Action by PSE	5 Yr CMI Trend
Fernwood-16	Kitsap	10	2,217,418	23	2,206,734	One Distribution Automation project and one underground cable replacement project completed in 2019. Three underground cable replacement projects planned for 2020.	▲
Langley-16	Island	11	2,577,736	10	4,055,241	One tree wire project completed in 2019. One tree wire project and one underground conversion project planned for 2020.	▼
Kendall-12	Whatcom	12	3,473,489	25	3,476,327	Planning is continuing to monitor for improvements.	▼
Vashon-13	King	13	2,281,378	29	2,199,214	One tree wire project and four underground cable replacement projects completed in 2019. One underground cable replacement project planned for 2020.	▲
Inglewood-13	King	14	2,801,500	Not on 2018 list		A Distribution Automation upgrade project planned for 2020.	▲
Fragaria-16	Kitsap	15	2,671,361	22	2,700,404	Planning is continuing to monitor for improvements.	▼
Slater-16	Whatcom	16	1,909,037	19	2,168,725	One tree wire project, one Distribution Automation project and one underground cable replacement project planned for 2020.	▼
Vashon-23	King	17	1,566,067	20	1,948,886	One underground cable replacement project completed in 2019. One feeder tie project and one underground cable replacement project planned for 2020.	▼

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Circuit	County	2019 Year End 5 Year Avg Rank	2019 Year End 5 Year Average Total CMI	2018 Year End 5 Year Avg Rank	2018 Year End 5 Year Average Total CMI	Action by PSE	5 Yr CMI Trend
Vashon-12	King	18	2,327,858	30	2,366,509	One tree wire project and two underground cable replacement projects completed in 2019. One tree wire project planned for 2020.	▼
Duvall-15	King	19	1,875,402	34	1,895,104	One underground cable replacement project completed in 2019. Two tree wire projects, two feeder tie projects and one underground cable replacement project planned for 2020.	▼
Brooks Hill-15	Island	20	3,117,122	13	3,411,009	One underground cable replacement project planned for 2020.	▼
Freeland-12	Island	21	2,649,599	8	3,473,555	One tree wire project completed in 2019. One tree wire project and one underground conversion project planned for 2020.	▼
Longmire-25	Thurston	22	1,489,038	27	1,759,230	One underground cable replacement project planned for 2020.	▼
Port Madison-15	Kitsap	23	2,091,549	Not on 2018 list		Two underground replacement projects completed in 2019.	▲
Longmire-17	Thurston	24	2,587,221	2	3,924,514	One feeder tie project planned for 2020.	▼
Griffin-13	Thurston	25	2,198,160	Not on 2018 list		Planning is continuing to monitor for improvements.	▲
Kendall-13	Whatcom	26	1,471,924	Not on 2018 list		Planning is continuing to monitor for improvements.	▲

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Circuit	County	2019 Year End 5 Year Avg Rank	2019 Year End 5 Year Average Total CMI	2018 Year End 5 Year Avg Rank	2018 Year End 5 Year Average Total CMI	Action by PSE	5 Yr CMI Trend
Miller Bay-23	Kitsap	27	1,875,817	40	1,885,273	One underground conversion project completed in 2019. One tree wire project and one underground conversion project planned for 2020.	▼
Hobart-15	King	28	1,897,590	42	1,609,621	Two tree wire projects planned for 2020.	▲
Greenwater-16	King	29	2,319,102	15	3,205,235	One underground conversion project planned for 2020.	▼
Winslow-15	Kitsap	30	1,629,829	Not on 2018 list		One underground cable replacement project completed in 2019. One underground cable replacement project planned for 2020.	▲
Winslow-13	Kitsap	31	1,751,180	Not on 2018 list		Planning is continuing to monitor for improvements.	▲
Fernwood-13	Kitsap	32	2,325,468	43	2,321,731	Two underground cable replacement projects completed in 2019.	▲
Eastgate-12	King	33	1,515,046	Not on 2018 list		One Distribution Automation project planned for 2020.	▲
Long Lake-23	Kitsap	34	1,484,946	Not on 2018 list		One Distribution Automation project planned for 2020.	▲
Silverdale-15	Kitsap	35	3,197,849	28	3,658,644	One underground cable replacement project and one tree wire project completed in 2019. One underground conversion project planned for 2020.	▼

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Circuit	County	2019 Year End 5 Year Avg Rank	2019 Year End 5 Year Average Total CMI	2018 Year End 5 Year Avg Rank	2018 Year End 5 Year Average Total CMI	Action by PSE	5 Yr CMI Trend
Fragaria-12	Kitsap	36	1,312,767	Not on 2018 list		One underground cable replacement project completed in 2019. One tree wire project planned for 2020.	▲
Port Gamble-13	Kitsap	37	2,036,350	24	2,400,153	One underground cable replacement project completed in 2019. One underground cable replacement project planned for 2020.	▼
Winslow-12	Kitsap	38	1,706,997	Not on 2018 list		One underground cable replacement project completed in 2019.	▲
Cottage Brook-15	King	39	1,410,634	Not on 2018 list		One overhead system improvement project planned for 2020.	▲
Skykomish-25	King	40	1,700,506	36	1,878,693	One underground system improvement project planned for 2020.	▼
Hickox-16	Skagit	41	1,645,109	18	2,051,955	One underground cable replacement project planned for 2020.	▼
Port Madison-12	Kitsap	42	2,680,478	45	2,715,858	One underground cable replacement project completed in 2019. One underground cable replacement project, one feeder tie project, one underground conversion project, and one Distribution Automation project planned for 2020.	▼
Birch Bay-13	Whatcom	43	1,656,751	Not on 2018 list		One tree wire project completed in 2019.	▲
Kingston-24	Kitsap	44	2,921,935	5	3,638,149	Planning is continuing to monitor for improvements.	▼
Fragaria-13	Kitsap	45	1,645,917	26	1,970,140	One tree wire project completed in 2019.	▼

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Circuit	County	2019 Year End 5 Year Avg Rank	2019 Year End 5 Year Average Total CMI	2018 Year End 5 Year Avg Rank	2018 Year End 5 Year Average Total CMI	Action by PSE	5 Yr CMI Trend
Long Lake-21	Kitsap	46	1,389,530	49	1,432,248	One underground cable replacement project completed in 2019.	▼
Hamilton-15	Skagit	47	2,602,470	11	2,934,759	One tree wire project planned for 2020.	▼
Clover Valley-16	Island	48	1,989,834	44	2,091,307	Two underground cable replacement projects completed in 2019. One underground cable replacement project planned for 2020.	▼
Tolt-15	King	49	2,076,255	Not on 2018 list		One underground cable replacement project completed in 2019. One underground cable replacement project and one overhead reconductor project planned for 2020.	▲
Langley-12	Island	50	2,488,867	14	2,978,425	One underground conversion project and one underground cable replacement project planned for 2020.	▼

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Current-Year Commission and Rolling-Two Year PSE Customer Electric Service Reliability Complaints with Resolutions[52]

This appendix lists in Tables N1 and N2, the current year UTC and rolling two-year PSE customer electric service reliability complaints with resolutions.

Table N1: Current Year Commission Complaints

No.	Complaint Type	Date of Complaint	Location	Closing Date	Case Resolution
1	Reliability	1/9/2019	Issaquah	4/22/2019	Company upheld
2	Reliability	1/14/2019	Lacey	10/17/2019	Consumer upheld
3	Reliability	1/15/2019	Issaquah	1/25/2019	Company upheld
4	Reliability	1/30/2019	Kirkland	5/21/2019	Company upheld
5	Reliability	2/4/2019	Renton	6/25/2019	Company upheld
6	Reliability	2/12/2019	Olympia	3/5/2019	Company upheld
7	Reliability	2/20/2019	Olympia	3/25/2019	Company upheld
8	Reliability	3/4/2019	Bainbridge Island	3/20/2019	Company upheld
9	Reliability	4/9/2019	Redmond	4/26/2019	Company upheld
10	Reliability	5/3/2019	Olympia	6/25/2019	Company upheld
11	Reliability	6/14/2019	Bellevue	6/28/2019	Company upheld
12	Reliability	7/18/2019	Olympia	8/6/2019	Company upheld
13	Reliability	7/22/2019	Tumwater	7/25/2019	Company upheld
14	Reliability	8/26/2019	Olympia	8/30/2019	Company upheld
15	Reliability	9/3/2019	Tumwater	9/9/2019	Company upheld
16	Reliability	9/30/2019	Pacific	10/3/2019	Company upheld

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[52] This section meets a requirement of Attachment B of Docket No. UE-110060.

No.	Complaint Type	Date of Complaint	Location	Closing Date	Case Resolution
17	Reliability	10/2/2019	Redmond	10/17/2019	Company upheld
18	Reliability	10/22/2019	Maple Valley	11/8/2019	Company upheld
19	Reliability	11/25/2019	Kirkland	11/27/2019	Company upheld
20	Power Quality	1/10/2019	Bellingham	1/22/2019	Company upheld
21	Power Quality	1/10/2019	Bellingham	1/22/2019	Company upheld
22	Power Quality	1/10/2019	Bellingham	1/22/2019	Company upheld
23	Power Quality	1/10/2019	Bellingham	1/22/2019	Company upheld
24	Power Quality	1/10/2019	Bellingham	1/22/2019	Company upheld
25	Power Quality	1/11/2019	Bellingham	1/22/2019	Company upheld
26	Power Quality	1/15/2019	Bellingham	1/22/2019	Company upheld
27	Power Quality	1/16/2019	Bellingham	1/22/2019	Company upheld
28	Power Quality	2/4/2019	Bainbridge Island	2/14/2019	Company upheld
29	Power Quality	2/20/2019	Lakewood	4/19/2019	Company upheld
30	Power Quality	5/20/2019	Bellingham	7/24/2019	Company upheld
31	Power Quality	5/22/2019	Kent	5/31/2019	Company upheld
32	Power Quality	9/9/2019	Port Orchard	9/20/2019	Company upheld
33	Power Quality	9/10/2019	Port Orchard	9/20/2019	Company upheld

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Table N2: Rolling Two-Year PSE Customer Electric Service Reliability Complaints with Resolutions (Sorted by County)

No.	County	Date of Complaint	Location	Complaint Type	Circuit	Response
1	Island	Dec-18 Feb-19	Clinton	Reliability	Langley-16	Contacted customer to address concerns
2	King	Dec-18 Dec-18	Auburn	Reliability	Sherwood-18	Reported in 2018, no new inquiries in 2019
3	King	Feb-18 Jun-19	Bellevue	Reliability	Eastgate-12	Contacted customer to address concerns
4	King	Jul-18 Sep-18	Bellevue	Reliability	Somerset-13	Reported in 2018, no new inquiries in 2019
5	King	Jan-18 Mar-18	Carnation	Reliability Power Quality	Klahanie-15	Reported in 2018, no new inquiries in 2019
6	King	Aug-18 Feb-19	Covington	Reliability	Pipe Lake-22	Contacted customer to address concerns
7	King	Dec-18 Jan-19 Sep-19	Issaquah	Reliability	Fall City-13	Contacted customer to address concerns
8	King	Nov-18 Jan-19 Jun-19	Kent	Reliability	Boeing Aerospace-13	Contacted customer to address concerns
9	King	Jan-18 Dec-18	Kent	Reliability	Boeing Aerospace-13	Reported in 2018, no new inquiries in 2019

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No.	County	Date of Complaint	Location	Complaint Type	Circuit	Response
10	King	Nov-18 Dec-18	Kent	Reliability	Boeing Aerospace-13	Reported in 2018, no new inquiries in 2019
11	King	Feb-19 Feb-19	Kirkland	Reliability	Crestwood-22	Contacted customer to address concerns
12	King	Nov-18 Feb-19	Kirkland	Reliability	Crestwood-23	Contacted customer to address concerns
13	King	Feb-19 Dec-19	Renton	Reliability	Fairwood-17	Contacted customer to address concerns
14	King	Apr-18 May-18	Sammamish	Reliability	Plateau-22	Reported in 2018, no new inquiries in 2019
15	King	Feb-18 Mar-18	Snoqualmie	Reliability	Snoqualmie-17	Reported in 2018, no new inquiries in 2019
16	King	Sep-18 Sep-19	Vashon	Reliability	Vashon-12	Contacted customer to address concerns
17	Kitsap	Feb-19 Feb-19	Port Orchard	Reliability	Long Lake-21	Contacted customer to address concerns
18	Kitsap	Mar-18 Nov-18	Poulsbo	Reliability	Serwold-14	Reported in 2018, no new inquiries in 2019
19	Kitsap	Jun-18 Jun-19	Silverdale	Power Quality	Silverdale-15	Contacted customer to address concerns
20	Kittitas	Sep-18 Jul-19	Thorp	Reliability	Woldale-15	Contacted customer to address concerns

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No.	County	Date of Complaint	Location	Complaint Type	Circuit	Response
21	Thurston	Feb-18 Feb-18	Lacey	Power Quality Reliability	Mcallister Springs-16	Reported in 2018, no new inquiries in 2019
22	Whatcom	Nov-18 Jul-19	Deming	Reliability	Nugents Corner-26	Contacted customer to address concerns
23	Whatcom	Jan-18 Nov-19	Point Roberts	Reliability	Point Roberts-16	Contacted customer to address concerns

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Current Year Geographic Location of Electric Service Reliability Customer Complaints on Service Territory Map with Number of Next Year's Proposed Projects and Vegetation-Management Mileage[53]

This appendix illustrates current-year geographic location of the 2019 electric service reliability customer complaints on service territory map with the number of 2020 proposed projects and vegetation-management mileage.

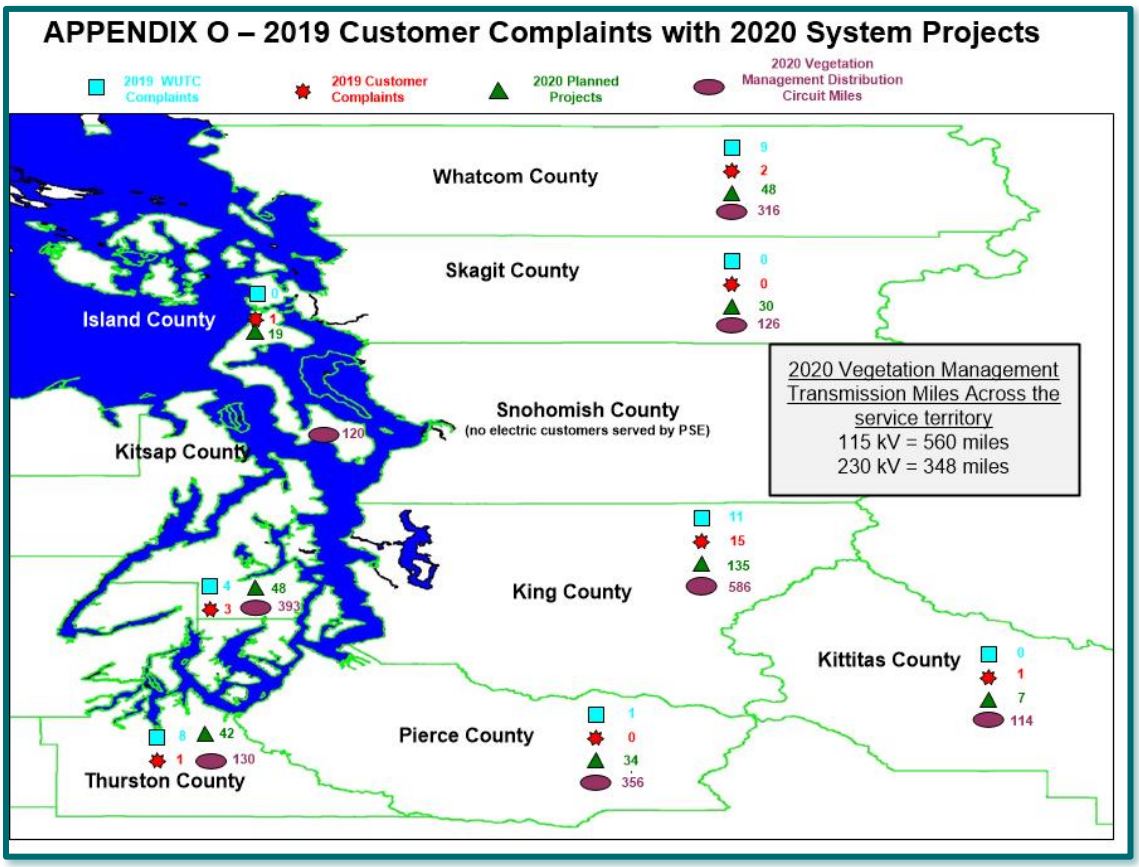

Figure O1: 2019 Customer Complaints with 2020 System Projects

[53] This section meets a requirement of Attachment B of Docket No. UE-110060.

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Reliability Program Category Descriptions

This appendix provides reliability program work completed in 2019 and planned for 2020 by category along with descriptions for each category.

Table P1: Reliability program completed work and future plans

Program Category	Outage Cause Each Program Addresses						2019 Completed	2020 Plan
	Trees	BA	EF	SO	UN	Other		
Vegetation Management								
Cyclical Programs	✓						2,560 miles	3,048 miles
TreeWatch	✓						8,976 trees	15,000 trees
Tree Replanting	✓						On-going	On-going
Substation Landscape Renovation	✓						Monitor	250 trees
Targeted Reliability Improvements								
Worst Performing Circuits	✓	✓	✓			✓	21 projects	33 projects
Tree Wire	✓	✓					5 projects	9 projects
Distribution Sectionalizing Devices	✓	✓	✓	✓		✓	1 projects	0 projects
High Value System Reliability Projects	✓	✓	✓			✓	6 projects	7 projects
Distribution Automation	✓	✓	✓	✓	✓	✓	6 projects	12 projects
Transmission & Distribution SCADA	✓	✓	✓		✓	✓	21 projects	24 projects
Pilot Projects								
Single Phase Reclosers	✓	✓	✓			✓	Assessment	Pilot
Transmission Line Automatic Switching	✓	✓	✓			✓	Pilot	5 projects
Aging Infrastructure								
Cable Remediation			✓			✓	203 projects	188 projects
Pole Inspection and Treat and Replacement			✓				30,432 poles	36,273 poles
Substation Equipment Replacement			✓				59 projects	47 projects
Substation Maintenance			✓				2,780 projects	2,967 projects

Vegetation Management

Outages related to trees and vegetation continues to be a major factor in the SAIDI and SAIFI performance. Trees remain a vital element of the region's quality of life, but they are also a major cause of customer interruptions. To mitigate trees and limbs growing into electric power lines, PSE performs vegetation maintenance based on a cyclical schedule. The maintenance programs focus on achieving a safe and reliable electric system. Vegetation management involves a variety of practices and techniques designed to keep trees and limbs from coming in contact with power lines and causing outages. Less than 10% of tree-related outages are caused by tree growth, illustrating an effective vegetation management program.

Cyclical Programs

PSE has a cyclical vegetation management program to reduce outages in its overhead electric distribution, high-voltage distribution and transmission systems.

- **Overhead distribution system**—Usually trees are trimmed every four years for distribution lines in urban areas and every six years for lines in rural areas. Danger trees, trees that are an imminent threat of falling into power lines, are removed in these rights-of-way or within 12 feet of the system at the same time that trees are trimmed.
- **55/115kV transmission corridor system**—Trees are trimmed every three years on PSE's 55/115kV transmission rights-of-way. Spray and mowing activities are performed and danger trees are removed along the edge of these corridors, typically within 12 feet of the system at the same time trees are trimmed.
- **230kV transmission corridor system**—Trees are trimmed annually in transmission corridor system over 200kV. Spray and mowing activities are performed and danger trees are removed along the edge of these corridors, typically within 16 feet of the system at the same time trees are trimmed. These maintenance activities are compliance driven per the North American Electric Reliability Corporation (NERC) clearing requirements.
- **Hotspotting—**occurs yearly on the overhead distribution and 55/115kV transmission systems. Hotspotting, or unscheduled trimming or removal, is driven by PSE field technicians or customer requests.

TreeWatch Program

PSE also manages vegetation impacts from beyond the 12 foot right of way with its TreeWatch program. Within this program, certified arborists work with communities and property owners to identify and remove "at-risk" trees on private property that are more than 12 feet away from power lines located beyond the limits of normal cyclical vegetation management standards. The trim and removal numbers vary year to year due to the size and complexity of the trees targeted to be trimmed and removed.

Tree Replanting Program

PSE replants trees in PSE's service area to prevent future reliability concerns from developing. In addition, PSE developed and makes available to customers a vegetation planning handbook called *Energy Landscaping*. The handbook helps customers evaluate landscaping opportunities and is a how-to for planting trees and shrubs and tree-care solutions. It also lists recommended trees and shrubs to plant near power lines.

Substation Landscape Renovation

PSE may renovate the areas around select substations in an effort to reduce the risk of future interruptions. This may include removing trees, removing the tops of trees and replanting vegetation less likely to cause damage resulting in an interruption to customers.

Targeted Reliability Improvements

In addition to vegetation management programs, PSE has implemented other programs to reduce the frequency and duration of outages on the transmission and interruptions on the distribution systems. These programs include the Worst Performing Circuits, replacing existing overhead distribution wire with tree wire or spacer cable to prevent tree limb outages, installing more sectionalizing devices (some which are remotely monitored and control), adding distribution automation and enhancing the transmission and distribution Supervisory Control and Data Acquisition (SCADA) devices.

Worst Performing Circuits

PSE's Planners investigate the Worst Performing Circuits and propose projects that will improve the reliability for customers being served by those circuits. Different reliability strategies are applied to these circuits, including tree wire, spacer cable, underground conversions, overhead rebuilds, adding new feeder ties and distribution automation and more recently considering non wires alternatives, i.e., energy storage solutions.

Tree Wire

The vast majority of tree wire, a thick-coated power line, is installed at locations where there has been a previous history of outages related to tree branches and a field assessment confirms that installing tree wire would reduce the likelihood of outages. Tree wire improvements also provide a benefit to reduce the number of bird or animal caused outages. PSE is also looking to use spacer cable which is a more robust coated overhead conductor than tree wire in selected situations to help improve reliability related to tree related outages.

Distribution Sectionalizing Devices

Installation of reclosers has been an effective tactic to improve reliability. These devices are an improvement over conventional fuses. With a conventional fuse, a temporary fault, typically a branch brushing against the power line, causes the fuse to blow open and de-energize the line. Service is not restored until EFR personnel patrols the line and manually replaces the blown fuse using a bucket truck.

In comparison, reclosers sense the fault on the power line and automatically attempt to re-energize the line. If the recloser no longer senses the fault, it will reclose and re-energize the line. If the fault is not temporary, the recloser can isolate the damaged section of the line and customers upstream from the recloser do not experience an outage. Another effective tactic implemented is the installation of gang-operated switches. Gang-operated switches provide the ability to simultaneously disconnect the three-phase lines rather than disconnecting one phase at a time, and to better isolate damaged infrastructure so more customers can continue to be served.

High Value System Reliability Projects

This category of projects can include copper conductor replacements, overhead system rebuilds, underground system relocations, feeder ties and overhead to underground system conversions. These projects may also include components of other project types such as treewire or SCADA. Because each project is unique and isn't associated with a specific targeted reliability program, these projects are grouped together in an "other" category.

Distribution Automation

Distribution automation automates outage restoration on the distribution grid by using sensors to locate faults, remotely operate switches to isolate faulted sections and to restore power to the non-faulted sections. A computer control system automates this action by collecting information from grid devices and determining the optimal switching to restore power to the largest number of customers in less than five minutes. The faulted section will still remain without power until crews can repair the damage.

Transmission and Distribution SCADA

Supervisory Control and Data Acquisition (SCADA) is an important aspect of managing the electric transmission and distribution power systems. SCADA is a system used for monitoring and controlling electrical equipment that will provide situational awareness for PSE's operators and enable faster restoration of power to the customers. Approximately 99% of PSE's feeder breakers have loading visibility and indication only, while 45% of PSE's feeder breakers have loading visibility, indication and supervisory control.

Pilot Projects

In addition to these ongoing targeted reliability improvement programs, PSE continues to monitor pilot projects still in the evaluation phase.

Single-Phase Reclosers

Tripsavers are single-phase reclosing devices that can replace 100T lateral overhead fuses. The tripsavers help reduce temporary outages related to tree limbs and animal contact, similar to a recloser, but at a reduced cost. In the 2016-2017 pilot program, 245 tripsavers were installed in 106 locations and PSE estimates that they could

prevent 44 outages per year, which would have lasted about 120 minutes each. During the pilot, several design and operational issues came to light. PSE is taking this opportunity to evaluate and compare the tripsaver device to another similar product known as a "fuse saver" from a different vendor.

Transmission Line Automatic Switching

Currently, PSE has existing automation schemes on PSE's transmission system. These schemes were developed back in the 1970's, and were state-of-the-art technology for that time. Using local sensors, and multiple reclosing at either end of the transmission line, a logic scheme was set up to restore the maximum number of customers and isolate the faulted section of the transmission line. Though the restoration of customers is typically optimized, the existing automatic schemes do not cover every scenario, thus leaving a potential for extended outages to one or more substations on a particular transmission line. This pilot project will provide a solution that automatically locates a transmission line fault, isolates the fault, and reconfigure the system to restore the power to the maximum number of customers. The project is currently being evaluated for system-wide use.

Aging Infrastructure

Cable Remediation

For an underground electric-distribution system, age and moisture make buried cable vulnerable to failures and prolonged outages, particularly the commonly installed high molecular weight ("HMW") bare concentric neutral direct-bury cable installed prior to 1965. Since 1989, PSE has managed a cable remediation program that considers two remediation options: silicone injection or cable replacement.

- Silicone injection extends the life of underground power cable for 20 years by restoring the cable's insulating properties. This alternative is only used on single phase cables which have been pre-tested to verify the condition. Due to cost of testing and implementing on three phase cables there is more value in replacement.
- Cable replacement has an expected life that exceeds 30 years.

Pole Inspection and Treat and Replacement

In an overhead electric system, the failure of a utility pole can cause an outage that could affect thousands of customers. To minimize the risk of a large outage, PSE has a pole inspection, treatment, reinforcement and replacement program for both transmission and distribution wood poles.

PSE assesses each wood pole's condition by excavating around the base to determine the extent of below-ground decay and by boring into the pole to assess decay within the pole. The remaining strength of the pole is calculated based on the measurements of decay. Poles with remaining strength that still meets the National Electric Safety Code (NESC) guidelines are treated with an internal fumigant, which extends its serviceable life. Poles not meeting NESC guidelines are scheduled for replacement or reinforcement.

Industry data shows that the average serviceable life of a wood pole in the Pacific Northwest without remedial treatment is 43 years. Poles which have received routine treatment throughout their life last significantly longer. Industry data suggests the average life could be around 100 years.

In addition to the programmatic investment in pole replacement and reinforcement, PSE also replaces poles identified as near failure during the year and in storm restoration efforts which are not included in these numbers.

Substation Equipment Replacement

Substations are the key hubs connecting high-voltage power lines and the electric distribution power lines that serve customers. Substations typically serve between 500 and 5,000 customers and contain major pieces of electric system equipment, technology to monitor and operate the system, and backup systems. Substations are inspected monthly and maintenance programs are in place to ensure performance and efficiently maintain expensive equipment.

As PSE continues adding more infrastructure, reliability measures are incorporated into the design. For example, building a substation requires the installation of the transmission and distribution lines; to enhance reliability and operational flexibility, the power lines typically connect to adjacent substations. New substations enable the operational ability to shift customers to the neighboring substations during an outage.

Upgrades to the substations and equipment are important strategies for reliability and overall asset management. Specific types of equipment are proactively replaced under replacement programs to maintain system reliability, reduce operational costs and offset impacts from aging infrastructure.

Substation Maintenance

In addition to the planned replacements, PSE administers planned diagnostics which determines the condition based maintenance in order to improve performance and increase the asset life. The transmission and distribution substation maintenance program utilizes low cost, non-intrusive diagnostic tasks to identify problems that could result in equipment failure. Several diagnostic tests on substation major equipment which help to determine equipment needs are:

- Infrared scans, performed every other year to identify problem areas on the electrified portion of the station
- Dissolved gas analysis in oil to determine overheating or arcing
- Breaker profiling to evaluate the quality of mechanism operation
- SF6 gas testing to determine insulation integrity
- Monthly inspections for a visual evaluation

Depending on diagnostic testing and time since last maintenance the portfolio of planned maintenance is scheduled each year to more thoroughly evaluate the condition and administer maintenance tasks per the manufacturer recommendation. The current substation maintenance program includes maintenance activities for:

- Large substation equipment (transformer, breaker, regulator, etc.), which includes the equipment required by Western Electric Coordinating Council (WECC), per the Transmission Maintenance and Inspection Plan

- Station batteries
- Protective relays, which includes transmission line & transformer relays (required per NERC compliance) and distribution transformer, feeder and line recloser relays
- Transmission automatic switch controllers