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

Puget Sound Energy
2021 Service Quality Program and Electric Service Reliability Filing

Attachment A:
Service Quality and Electric Service Reliability Report

Puget Sound Energy
2021
Service Quality and Electric Service Reliability Report

Filed on March 29, 2022

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" or the "Company") 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.

In 2021, several record-breaking and other unusual weather events caused many more outages and impacted PSE's electric service performance results. The on-going COVID-19 pandemic has affected PSE operations and changed some of the ways that PSE does business for the safety of customers and employees. In addition to the first Crisis Affected Customer Assistance Program ("CACAP")[1] that was available to customers at the beginning of the COVID-19 pandemic, PSE created two more bill payment assistance programs to aid customers who have lost their jobs or are underemployed due to the pandemic. Detailed discussions about the extreme weather events that occurred in 2021 and the detrimental COVID-19 pandemic are included in the *Unusual Events* section.

The report provides PSE's 2021 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 2021 Service Quality Reporting year, PSE met six of nine benchmarks for the Service Quality Indices ("SQI"). PSE did not meet the benchmarks for the average frequency and length of non-major-storm power outages, per year, per customer (SQI #3 and SQI #4, respectively) and the Electric Safety Response Time (SQI #11). This was mainly due to the numerous unusual weather

[1] Dockets UE-200331 and UG-200332, electric and natural gas Schedules 129, Low Income Program

events throughout the year; such as, record-breaking heat in the summer, exceptional precipitation in the fall, and extreme cold and snow in the winter; that primarily impacted vegetation and caused outages through equipment failure. There was also large increases in vandalism, vehicle accidents and animal caused outages. The surge in these unplanned outages throughout 2021 also increased the workload levels placed on the electric first response workforce and exacerbated the average SQI #11 response time resulting from resource constraints. The penalty for SQI #4 is $129,808. There is no SQI penalty associated with SQI #3.[2] The potential penalty for SQI #11 is $613,636, which may be reduced if the Washington Utilities and Transportation Commission ("UTC", "WUTC", or the "Commission") grants PSE's penalty mitigation petition, which has been filed concurrently with this report.

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." [3] The SQ Program has been further extended[4] with various modifications to demonstrate PSE's continuous commitment to customer protection and quality service.

Service Quality Program

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 2021 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

[2] The SQI #3 SAIDI penalty mechanics has been replaced since July 30, 2016 by PSE's 24-Hour Restoration Service Guarantee available under PSE's Schedule 131, Restoration Service Guarantees, where a $50 credit is applied to customers' accounta if they experienced certain prolong outages as prescribed in Schedule 131.

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

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

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 2021 annual UTC SQ and Electric Service Reliability Report filing is PSE's 2021 Critical Infrastructure Security Annual Report, which contains a discussion of PSE's cybersecurity and physical security policies and related information for 2021.

SQI and Electric Service Reliability Report

This *Puget Sound Energy 2021 SQ and Electric Service Reliability Report* meets PSE's SQ Program reporting requirements[5] and the electric service reliability reporting requirements set forth by the UTC.[6,7] To facilitate external review of PSE's SQ and Electric Service Reliability performance, the two reports were combined starting with the 2010 reporting year.[8]

Overview of Performance

Table 1a summarizes PSE's 2021 SQ and Electric Service Reliability performance, along with relevant service providers' performance metrics and the three service guarantees. PSE met only six of nine Service Quality Indices under PSE's Service Quality Program largely because of the vast number electric service outages caused by the series of extreme weather events throughout the year. Discussions about these events are included in the Unusual Events section of Chapter 1.

PSE did not meet the benchmark for SQI #3 System Average Interruption Duration Index, ("SAIDI"), and the benchmark for SQI #4 System Average Interruption Frequency Index, ("SAIFI"). There is no performance penalty associated with this SQI #3[9] but there is penalty of $129,808 for missing SQI #4. Chapter 3 of this report on PSE's electric service reliability provides further details about SAIDI and SAIFI and other electric service reliability measurement results, as well as PSE initiatives and actions to maintain or enhance electric service reliability.

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[5] 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.

[6] 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.

[7] Two PSE commitments regarding the preparation of the Electric Service Reliability section, as outlined in Section F, Reporting of Customer Complaint 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.

[8]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.

[9] The SQI #3 SAIDI penalty mechanics has been replaced since July 30, 2016 by PSE's 24-Hour Restoration Service Guarantee available under PSE's Schedule 131, Restoration Service Guarantees, where a $50 credit is applied to customers' account if they experienced certain prolong outages as prescribed in Schedule 131.

PSE did not meet the benchmark for SQI #11 Electric Safety Response Time because of resource constraint and significant increase in the Electric First Response ("EFR") workload occurring during the extreme weather events throughout the year of 2021. PSE is petitioning with the UTC for the mitigation of the $613,636 penalty. The standard to be applied for such a mitigation petition is that the penalty is due to unusual or exceptional circumstances for which PSE's level of preparedness and response was reasonable.

Without any penalty relief, the total 2021 SQI penalties is $743,444 or $0.67 per electric customers. Per the SQ Program mechanics approved by the UTC, when the annual penalty dollars are less than the equivalent of $12 per customer, the annual penalty will be allocated to PSE's low income bill assistance program, the Home Energy Lifeline Program ("HELP"). However there will be no allotment to natural gas HELP as both SQI #4 and #7 pertain to electric service only. Appendix C of this report details the penalty calculation and allotment.

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

Key Measurement	Type of Metric	Benchmark/Description	2021 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	0.10	☑
Customer Access Center transactions customer satisfaction	Service Quality Index #6	At least 90% satisfied (rating of 5 or higher on a 7-point scale)	95%	☑
Field service operations transactions customer satisfaction	Service Quality Index #8	At least 90% satisfied (rating of 5 or higher on a 7-point scale)	96%	☑
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[10]	82%	☑
Operations Services—*Appointments*				
Appointments kept	Service Quality Index #10	At least 92% of appointments kept	99%[11]	☑
Service provider appointments kept—Quanta Electric	Service Provider Index #3B[12]	At least 92% of appointments kept	99%	☑
Service provider appointments kept—Quanta Gas	Service Provider Index #3C	At least 92% of appointments kept	100%[13]	☑
Customer Service Guarantee	Service Guarantee #10	A $50 credit to customers when PSE fails to meet a scheduled SQI appointment	$15,200	--

[10] Benchmark revision per UTC Dockets UE-170033 and UG-170034 Order 08, dated December 5, 2017, for SQI #5 annual performance from 2021 and years after.

[11] Missed appointments by type are detailed in Appendix F: *Customer Service Guarantee Performance Detail*.

[12] There were no results for Service Provider Indices (SPI) #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, Quanta Electric and Quanta Gas, respectively, which were applicable in prior years' reports, have been terminated since the 2013 reporting period.

[13] Actual performance results were rounded from 99.56%.

Key Measurement	Type of Metric	Benchmark/Description	2021 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	55 minutes	☑
Service provider standards compliance—Quanta Gas	Service Provider Index #1C[14]	Level 1 ≤ 8 dev/1000 Level 2 ≤ 15 dev/1000 Level 3 ≤ 12 dev/1000	Level 1 7.38 Level 2 8.44 Level 3 3.95	☑
Operations Services—*Electric*				
Electric safety response time	Service Quality Index #11	Average 55 minutes or less from customer call to arrival of field technician	65 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	242 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	265 minutes	☑
Service provider standards compliance—Quanta Electric	Service Provider Index #1B[15]	Level 1 ≤ 15 dev/1000 Level 2 ≤ 25 dev/1000 Level 3 ≤ 25 dev/1000	Level 1 3.12 Level 2 4.12 Level 3 8.94	☑
120-Consecutive –hour power outage restoration guarantee	Service Guarantee #2	A $50 credit to eligible customers when experienced power outage is longer than 120 consecutive hours	$0	--
24-Consecutive-hour non-major storm power outage restoration guarantee	Service Guarantee #3	A $50 credit to eligible customers when experienced power outage is longer than 24 consecutive hours during non-major storms	$18,100	--

[14] 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.

[15] See Footnote 10.

Key Measurement	Type of Metric	Benchmark/Description	2021 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**	**2.27 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**	**1.78 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**	**1.35 interruptions**	**☐**
$SAIFI_{IEEE}$ IEEE Non-Major-Storm (T_{MED}) SAIFI	**Reliability**	**Power interruptions per customer per year, excluding days exceeding the T_{MED} threshold**	**1.26 interruptions**	**--**
$SAIDI_{Total}$ Total (all outages current year) Outage Duration– System Average Interruption Duration Index (SAIDI)	**Reliability**	**Outage minutes per customer per year, including all types of outage event**	**849 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**	**546 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**	**245 minutes**	**--**
$SAIDI_{IEEE}$ IEEE Non-Major-Storm (T_{MED}) SAIDI	**Reliability**	**Outage minutes per customer per year, excluding days exceeding the T_{MED} threshold**	**207 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**	**207 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, certified 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[16].
- **Appendix C: Penalty Calculation**—This appendix shows SQI #4 and SQI #11 penalty calculations and allocation of SQI penalties between electric and natural gas HELP funding.
- **Appendix D: Proposed Customer Notice (Report Card**)—This appendix presents PSE's proposed 2021 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 presents 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 presents the terms and definitions found in this report.
- **Appendix I: Electric Reliability Data Collection Process and Calculations**—This appendix details data collection methods and issues. It explains how the various data was collected.
- **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.

[16] 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 K: Current Year Electric Service Outage by Cause by Area**—This appendix details the 2021 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 2021 proposed projects and vegetation-management mileage.
- **Appendix P: Reliability Program Category Descriptions**— This appendix provides reliability program work completed in 2021 and planned for 2022 by category along with descriptions for each category.

Customer Notice of SQI Performance

Appendix D: **Proposed Customer Notice (Report Card**) is the proposed draft customer notice of PSE's 2021 SQI performance. After consultation with the UTC staff and Public Counsel, PSE will begin distributing the final SQI report card by June 1, 2022, as part of the customer billing package.

Data and Reporting Issues

There was no data gathering or reporting difficulty in 2021 that impacted the SQI performance categories, or their results. PSE has altered its data gathering procedures and reporting source resulting from a transition to a mobile workforce platform (see further details in the *Continuing to Improve Customer Experience* section below). The transition for PSE Gas First Responders ("GFR") took place in 2020. In 2021, PSE's Electric First Responders ("EFR") and meter operations also completed their transition to Integrated Work Management ("IWM"). New reporting processes have been established and validated to ensure that data is captured correctly, and consistently, with legacy procedures. Data and reporting source changes have no effect on the performance results for SQI #11, Electric safety response time, and the ability of the first responders and meter operations personnel to meet requirements of SQI #10, Kept appointments.

Unusual Events

As a provider of an essential service, PSE has been working to support employees, customers and communities as Extreme Weather Events and the COVID-19 pandemic impact the region (Unusual Events). This section discusses measures that were taken to mitigate the unusual events.

Extreme Weather Events

Washington State experienced many unusual weather events in 2021, including the record-breaking heat in summer and a streak of record-breaking snowfall near the end of the year. Seattle Times in its December 31, 2021 article, "From record high temperatures to bitter cold days, Western Washington's year of extreme weather" [17], identified the following five significant weather events:

1. Significant wind and rainstorm in January
2. Heavy snow in February
3. Record-breaking June heat
4. Wettest fall on record
5. November-December atmospheric rivers

After days of rains at the beginning of January 2021, starting from January 12th, strong winds with gusts from around 50 mph in the lowlands and around 80 mph in the mountains visited the state. These winds toppled trees and resulted in almost 50 percent of PSE customers being without electric service.

On February 13, 2021, 8.9 inches of snow were recorded at the Sea-Tac airport, which marked the snowiest single day recorded in the month of February at the airport.

The heat wave during the period of June 24th through June 28th set many records for the Seattle area, including three straight days at 100 degrees or hotter and the all-time hottest temperature of 108 degrees on June 28th.

In the fall, a series of storms brought heavy rain and strong winds to the region and Gov. Jay Inslee declared a severe weather emergency because of landslides and severe flooding. The National Weather Service said that the 19.04 inches of rain which fell in Seattle between September 1st and November 30th broke a record set in 2006. Bellingham also broke its wettest fall record set in 1990 with 23.55 inches of rain for the same period. Two weeks of rain beginning on November 18th caused near-record flooding at the Skagit and Nooksack rivers in Whatcom County and blocked portions of Interstate 5 south of Bellingham and many roads on the Olympic Peninsula.

[17] Cartridge, Christine. "From record high temperatures to bitter cold days, Western Washington's year of extreme weather", Seattle Times, Dec. 31, 2021 at 6:00 am and Updated Dec. 31, 2021 at 2:52 pm. https://www.seattletimes.com/seattle-news/weather/the-seattle-areas-5-most-extreme-weather-events-of-2021/

The year ended with a cold snap. On December 26th, the 20 degrees low temperature at the Sea-Tac Airport reset the lowest temperature record of 22 degrees for that date in 1948. December 27th became a second day of record-breaking lows for the date. The three-day period of December 26th through December 28th is the longest stretch of subfreezing weather since 1998.

In addition to the above five significant weather events related outages, the following table summarizes, by month and by weather cause, the significant outage events that PSE's electric first responders responded to in 2021 and the affected number of the customers. These events had great impact on PSE resources and customers. They are major events where 5 percent or more of PSE electric customers were without electric service or localized emergency outage events that required the dispatching of all available electric first responders to the affected local area to respond to outages ("Significant Outage Events"). The totals below do not include "blue sky" outages. The table is based upon the supplemental reporting Attachment A of Electric Safety Response Time (SQI #11)[18] of Appendix A to this report where PSE is required to account for electric first responders and crews deployment status during any Significant Outage Events by day.[19]

Month	Type of Event	No. of SQI #11 Significant Outage Events	No. of Customers Affected
Jan	Wind	163	31,479
	Wind/Rain	1,952	447,144
Feb	Heavy Snow	263	39,622
	Wind/Snow	128	19,240
Mar	Wind/Snow	82	10,020
May	Wind	102	18,884
Jun	Extreme Heat	531	78,063
	Wind	14	4,990
Aug	Wind	29	5,281
Sep	Wind	30	2,922
	Wind/Rain	652	166,773
Oct	Wind/Rain	921	260,856
Nov	Wind/Rain	320	301,048
Dec	Snow/Ice	312	51,129
	Wind	236	54,268

[18] See the "Electric Safety Response Time (SQI #11)" section at page 32 of this report for further details about SQI #11.

[19] See Attachments A and B to Appendix A SQI Monthly performance. Attachments A and B report SQI #11 performance measurement suspension days by day and local area.

COVID-19 Pandemic

The COVID-19 pandemic continued to be one of the biggest stories of 2021. In Washington State, the Delta variant arrived in summer driving a record-breaking fifth wave of new COVID-19 infections. The Omicron variant arrived in early December 2021 and has since become the state's dominant coronavirus strain. However, as more people had been inoculated and receiving their booster shots, many COVID-19 safety protocols and restrictions have been gradually lifted.[20]

As a provider of an essential service, PSE has been working to support employees, customers and communities as the COVID-19 pandemic and related governmental restrictions[21] impact the region. PSE has implemented the following measures in 2020 and 2021 (and continued into 2022):

- PSE has worked with customers by providing options such as payment plans and choosing a new bill due date.
- PSE has not disconnected customers for non-payment during the pandemic.
- PSE received approval from the UTC for a waiver that allows for suspension of late fees.
- PSE has an energy assistance portal to facilitate access to funds available to income qualified customers.

PSE's Bill Assistance Programs Launched in Responding to COVID-19

The COVID-19 pandemic has had a significant impact on PSE's residential and business customers, particularly those individuals who either lost employment or saw reduced wages, and those small businesses in industries where COVID-19 mitigation efforts necessitated closures or restrictions in operations. Since the start of the COVID-19 pandemic in March 2020, PSE has implemented three separate bill assistance programs: 1) the Crisis-Affected Customer Program ("CACAP"), 2) COVID-19 Bill Assistance Program, and 3) Supplemental CACAP. All three programs were designed to get assistance to customers quickly and easily by removing as many barriers as possible with a streamlined application process or completely automatic enrollment. As of December 31, 2021, these programs have resulted in processing more than 89,000 applications with $53 million dollars of assistance to pay their PSE bills.

To help its customers and communities recover from the COVID-19 pandemic, PSE implemented the CACAP from April 2020 through April 2021. The initial CACAP provided a one-time bill credit for impacted customers equal to the cost of energy used based on a 2019 baseline for their PSE energy bills. Customers at or below 250 percent of federal poverty level

[20] On June 30, 2021, Washington State reopened under the Washington Ready plan. All industry sectors previously covered by the Roadmap to Recovery or the Safe Start plan (with the limited exceptions noted below) may return to usual capacity and operations. https://www.governor.wa.gov/issues/issues/COVID-19-resources/COVID-19-reopening-guidance

[21] Proclamations by Washington State Governor Inslee: 20-05, 20-25, 20-25.1, 20-25.2, 20-25.3, and 20-25.4 https://www.governor.wa.gov/sites/default/files/20-25.4%20-%20COVID-19%20Safe%20Start.pdf

who recently became unemployed, partially unemployed, or could not work due to the COVID-19 pandemic were eligible. PSE distributed $9.1 million to 15,851 customers in 2020.

In April 2021, PSE launched the COVID-19 Bill Assistance Program and made available $27 million dollars to help income eligible customers whose income level is less than 200 percent of federal poverty level with past due balances of their PSE energy bills. As of December 31, 2021, 27,004 customers have been served through the COVID-19 Bill Assistance Program with over $17.9 million distributed. PSE will continue the COVID-19 Bill Assistance Program until funds are exhausted.

PSE was authorized to implement its Supplemental CACAP on November 12, 2021 to provide customers with further bill assistance during this on-going COVID-19 pandemic. The program enables PSE to reach customers who were struggling to pay their PSE bills, but had previously never applied for bill assistance from PSE. In this program, PSE leveraged the estimated household income information from its credit service provider and the US Census data on household size to identify the customers with past due balances and who are also likely to be at or below 200 percent of federal poverty level. PSE then automatically provides arrearage relief bill credit for up to $2,500 to these customers' PSE accounts. As of December 31, 2021, PSE has distributed $26.4 million to 46,633 customers under this program.

PSE's COVID-19 Safety Protocols and Measures

To limit exposure and help the community get through the COVID-19 pandemic safely, the following are the measures PSE has taken specifically for its employees and facilities:

- Mobilized the Corporate Crisis Management Team, which consisted of PSE representatives from various departments: Business Continuity, Central Stores, Corporate Communications, Facility Services, Human Resources, Information Technology, Safety, Operations, and Performance Excellence.
- Limited access to facilities that provide emergency/critical operations.
- Required that all staff who can work from home do so until further notice.
- Requested that employees postpone all non-essential domestic and international airline business travel.
- Postponed all non-essential events and meetings, both within PSE and in the public.
- Conducted frequent briefing calls to PSE leaders to provide situational awareness, published 113 Situation Reports, and produced more than 80 communications providing guidance to keep PSE's leaders, employees, families and customers safe among the ever-changing conditions.
- Coordinated facility closures in response to possible COVID-19 exposures to reduce risk of transmission to employees, and performed contact tracing and directed exposed employees to self-isolate.
- Increased sanitation services at public spaces within PSE facilities.
- Conducted virtual webinars to equip employees with knowledge and awareness of resources for maintaining mental health, supporting the well-being of employees, and making informed decisions about vaccination and on-site activities.

- Supported employees in procuring ergonomic work from home equipment and provided stipends for temporary internet service upgrades.
- Organized the administration of paid time off for employees impacted by the virus (including for child and elder care) including time for getting vaccinated and recovering from side effects if needed.
- Supported employees in locating COVID-19 testing locations, and contracted for testing services to be used in the event testing was unavailable through healthcare providers or public health agencies
- Developed unique and innovative applications for employee convenience, like the pre-shift health screen and voluntary vaccine attestation form.

In addition to the above measures, during 2021, PSE has also adopted its day-to-day operations and emergency response procedures for the safety of customers and employees. The following sections describe the impact of the COVID-19 pandemic and related governmental restrictions on PSE's operations for emergency response, construction services, and customer service.

Emergency Response

During the course of the COVID-19 pandemic, PSE has continued its traditional essential services, and responded to electric and natural gas emergencies promptly and safely. PSE continues to adapt to the evolving guidelines from the CDC and state agencies. COVID-19 specific safety protocols have been implemented to provide for the highest degree of safety for employees and the public. Safety protocols include the following:

- Limited access to facilities that provide emergency/critical operations.
- Required employees to perform a pre-shift screening, wear approved face coverings while working inside a facility, maintain social distancing, and wash/sanitize hands often.
- Required employees to use N95 masks when inside customers' homes and businesses.
- Developed a process for employees to report a potential or confirmed case of COVID-19 exposure.
- Performed contact tracing when an employee reported a potential/confirmed case of COVID-19 exposure.
- Utilized mass notification capabilities to inform all employees that certain facilities were closed for cleaning purposes.
- Modified storm response processes to improve employee safety, which included the Emergency Coordination Center working remotely, assigning only one, rather than two, employees per vehicle to assess system damage, decentralizing employee and material staging practices to improve social distancing and providing a COVID-19 supervisor to staging areas to ensure face-covering and social distance guidelines were followed.

These procedures take extra time for emergency responders before and after every job. During the COVID-19 pandemic, PSE had to frequently and quickly move emergency responders to meet the needs of other areas where responders were in quarantine due to a possible exposure. Resource availability was directly impacted during periods of active employee illness or employee quarantining due to potential and confirmed exposures and infections. Additionally, resource availability was impacted by increased voluntary separations in 2021, in

particular early retirements. Safety protocols, such as exposure identification and preventative actions, along with daily health screening prior to shifts, were implemented to prevent outbreaks that would inhibit PSE's ability to have the necessary qualified resources to respond to electric and natural gas emergencies.

Construction Services

Construction of an essential facility, as defined by Washington Governor Inslee, continued forward during the COVID-19 pandemic. However, construction site activities of new line and service connections to homes and businesses, which are deemed as non-essential services, were on hold in response to Washington Governor Inslee's March 23, 2020 proclamation "Stay Home – Stay Healthy".

For construction, PSE observed the following protocols throughout 2021:

- Limited access to facilities that provide emergency/critical operations.
- Required employees to perform a pre-shift screening, maintain social distancing, and wash/sanitize hands often.
- Practiced social distancing in the field by deploying sandwich boards on work sites.
- Encouraged the public to keep their distance from crews and increased distance between field staff.
- Adjusted PSE practices for planned outages to minimize impact to residential customers and neighborhoods, as customers are now working from home and some students are continuing their education virtually.
- Increased sanitization of work vehicles and facilities that field staff utilize.

Customer Service

During the course of this COVID-19 pandemic, PSE halted non-payment disconnections, beginning in March of 2020 and has likewise offered customer assistance through various CACAP bill payment assistance programs. The COVID-19 specific safety protocols have also been implemented to provide for the highest degree of safety for employees and the public, and continued to adapt to the evolving guidelines from the CDC and state agencies.

Since the start of this pandemic, PSE has been experiencing delays due to the impact of the pandemic and related restrictions on PSE supply chain and workforce. Overall, PSE has constructed fewer new services.

Continuing to Improve Customer Experience

Get to Zero

PSE is nearing completion of a long-term initiative called Get to Zero ("GTZ"). 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 them. The Get to Zero initiative targets further improvement in customer experience with PSE by providing more self-service options that

customers have requested. PSE has developed new ways to proactively communicate with customers and create seamless, integrated operations to tie business processes together. IWM completed the rollout to Electric Operations and the key highlights for 2021 include:

Integrated Work Management

1. **Improvements to cost management of fieldwork:** Changes to modules in PSE's enterprise information system, Systems Applications and Products ("SAP"), to enable full lifecycle financial tracking of work order/operation pairs for work.
2. **Improvements to work management of fieldwork:** Changes to the plant maintenance module in SAP to enable better planning and tracking of a work order/operation for fieldwork.
3. **Improvements to workforce scheduling of field work:** Implementation of scheduling and dispatch processes and technology for fieldwork. This includes the scheduling, dispatch, and optimization of work order/operation to crews or individuals; resource loaded schedules with specific dates and times; the ability to match job requirements to available crew skills; and use of priorities to ensure most important work takes precedence.
4. **Workforce Mobility:** Implementation of electronic mobile capabilities for PSE field employees to receive, provide status updates, and report on work activities. This also includes timesheet functionality.

Technology and Business Process Changes to Mitigate the Impact of the COVID-19 Pandemic

PSE continued to utilize the platforms implemented by GTZ (Energy Portal, PSE.com, PSE app, the Sendgrid communications platform and Platform of Insights) to complete the following additional technical development work in 2021 to meet customer needs:

- Maintained suspension of:
  - Collection of reconnection and late payment fees in the billing system
  - Deposit requirement for customers creating new accounts
  - PSE.com and PSE App display of dunning/disconnect activities

- Extended payment arrangement durations from 3 months to 18 months which required a change in how auto-pay customers are processed

- Set remote or manual disconnect fees and reconnect fees to $0 during the COVID-19 pandemic, and for an additional six months after the moratorium ends, so the two-tiered fee structure put into place would be overridden

- Created and maintained customer-facing COVID-19 informational pages on PSE.com and the PSE app in 6 languages (English, Chinese, Spanish, Hindu, Russian and Vietnamese)

- Created and distributed required notices to customers regarding the end of the disconnect moratorium

Service Quality Program Changes

There were no SQ Program changes for 2021.

CHAPTER 2

CUSTOMER SERVICES, CUSTOMER SATISFACTION, AND OPERATIONS SERVICES

PSE has been meeting the Puget Sound region's energy needs for nearly 150 years. PSE proudly embraces the responsibility of providing customers with safe, reliable, and reasonably-priced energy service.

This section summarizes the 2021 results of PSE's seven SQIs related to customer service, 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 2021

Key Measurement	Type of Metric	Benchmark/Description	2021 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**	**0.10**	☑

Overview

Each year the WUTC receives complaints from PSE customers on a variety of topics. In 2021, there were 213 complaints, up from 207 in 2020. The 2020 SQI #2 complaint ratio was 0.10, while the 2021 complaint ratio was also 0.10.

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:

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

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 2022 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.

Impact of Unusual Events on SQI #2

Due to the impact of the COVID-19 pandemic, the WUTC placed a moratorium on non-payment disconnects. PSE also stopped the collection of late payment fees and deposits. As a result, PSE received fewer disconnect and deposit complaints in 2021. The state disconnect moratorium ended September 30, 2021. Effective October 1, 2021, PSE follows the requirements in the Disconnect Guidance Notice detailed in docket U-200281 prior to disconnecting service.

The collection of late payment fees, deposits, and reconnect and disconnect fees can resume 180 days after September 30, 2021, the disconnect moratorium end date.

Please see the Unusual Events section for further details.

Customer Access Center Answering Performance (SQI #5)

Table 2b: Customer Access Center Answering Performance for 2021

Key Measurement	Benchmark	2021 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**	**82%**	☑

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 2021, the CSRs answered 82 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. Among the 2.1 million calls PSE received during 2021, 3% of the calls were abandoned by customers. All the 2.1 million 1-888-CALL-PSE calls received went through either the main phone system or the overflow phone backup system.

Going Forward

PSE is engaged in initiatives to further the Customer Care Center's answering performance and ensure that the SQI #5 benchmark of 80% of calls being answered within 60 seconds will be achieved. In 2022, PSE will:

- Continue to deliver on-going agent training to improve proficiency and elevate the customer experience
- Continue to personalize the customer experience on PSE's website, presenting relevant self-service options and actionable information
- Continue to improve PSE's self-service options using customer data, allowing 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

Impact of Unusual Events on SQI #5

The COVID-19 pandemic and the severe weather events did not have an impact upon PSE Customer Care Center service levels.

Customer Access Center Transactions Customer Satisfaction (SQI #6)

Table 2c: Customer Access Center Transactions Customer Satisfaction for 2021

Key Measurement	Type of Metric	Benchmark/Description	2021 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)**	**95%**	☑

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[22], conducted telephone surveys with PSE customers and prepared monthly and semi-annual reports on customer satisfaction regarding Customer Access Center transactions during the 2021 SQ Program reporting year. The independent survey-results found that 95% of customers surveyed were satisfied with the Customer Access Center's overall transaction performance (SQI #6). This is an increase of 1% from 2020.

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 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:

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

[22] 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.

Impact of Unusual Events on SQI #6

The COVID-19 pandemic and the severe weather events did not have an impact upon PSE's level of customer satisfaction, as the SQI #6 survey results increased from 94% to 95% overall satisfaction.

Gas Safety Response Time (SQI #7)

Table 2d: Gas Safety Response Time for 2021

Key Measurement	Type of Metric	Benchmark/Description	2021 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 2021, PSE responded to more than 20,000 emergency calls concerning natural gas safety. PSE responded to 95% of these gas emergencies within sixty minutes. 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 new customer meter service activation, including meter turn-ons and appliance light-ups; various natural gas system maintenance and inspection activities; adjusts and performs minor repairs on customer equipment; and monitors third-party construction excavation when it occurs near certain underground facilities.

The *Data and Reporting Issues* section describes the change in the collection and reporting of SQI #7 Gas safety response time. The *Unusual Events* section explains the impact of the COVID-19 pandemic and related governmental restrictions on PSE's emergency operations.

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 process is continually assessed and improved where possible. Overall scheduling optimization that supports SQI #7 continues post-IWM implementation. Additionally, PSE is implementing a revised process for after-hours emergency response call-outs that will improve dispatch cycle time and create better distribution of work across the workforce.

Impact of Unusual Events on SQI #7

As discussed in the *Unusual Events* section, PSE continued to implement COVID-19 safety procedures to keep employees and customers safe during emergency calls and customer work that involved a visit inside a customer's house to relight/inspect/repair natural gas equipment. The procedures took extra time for first responders before and after every job but there were no significant impacts to SQI #7 performance as a result of these efforts.

Field Service Operations Transactions Customer Satisfaction (SQI #8)

Table 2e: Field Service Operations Transactions Customer Satisfaction for 2021

Key Measurement	Type of Metric	Benchmark/Description	2021 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)**	**96%**	☑

Overview

EMC Research[23], an independent research company, conducts telephone surveys with PSE customers who have requested and received natural gas field service. In 2021, these surveys found that 96% 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 "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:

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

[23] 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

Moving into 2022, natural gas field service appointments will be able to be booked in two-hour increments during core business hours up to the limit of resource availability. The workforce continues to learn about the capabilities of the new system, and identify improvement opportunities for future implementation.

Impact of Unusual Events on SQI #8

The impact of the COVID-19 pandemic on natural gas field service continues to be felt on a daily basis. While much of PSE's customer base has adapted to the circumstances generated by the COVID-19 pandemic, each interaction with a customer continues to involve an element of risk assessment by Gas Operations personnel. The rate of employee infection and illness, and subsequent lost time and productivity has been tangible, but the company has been able to adjust in real time to the changing circumstances to limit disruption to the customers. As a result, there has not been a noticeable drop in customer satisfaction due to the COVID-19 pandemic.

Extreme weather, particularly the snowfall in the Puget Sound toward the end of the year, had an impact on GFR's ability to respond in a timely manner. Although the volume of calls was not high enough to impact yearly averages, average response times to emergency calls were extended during that week. In addition, PSE experienced a higher than normal call volume for no-heat calls from customers, leading to extended availability windows to schedule appointments.

Appointments Kept (SQI #10)

Table 2f: Appointments Kept for 2021

Key Measurement	Type of Metric	Benchmark/Description	2021 Performance Results	Achieved
Operations Services				
Appointments kept	**Service Quality Index #10**	**At least 92% of appointments kept**	**99%**	☑

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 2021, PSE achieved a result of 99% for this appointments kept metric. Data on the 1% of the missed appointments and other appointment information by service type is 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:

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

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[24] 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

Continue to review the reasons for missed appointments and work to find solutions so that PSE can meet all its customer commitments

Impact of Unusual Events on SQI #10

Overall, the total number of SQI #10 appointments decreased drastically in 2021: There were 91,536 SQI #10 appointments in 2019 but only 37,773 in 2020 and 34,356 in 2021. In 2021, PSE halted disconnections due to non-payment per the WUTC moratorium on disconnects. As a result, PSE received fewer electric and natural reconnect requests. These reductions did not affect the SQI #10 Kept appointments results.

[24] Major Events occur 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 2021

Key Measurement	Type of Metric	Benchmark/Description	2021 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**	**65 minutes**	☐

Overview

PSE responded to more than 16,000 electric incidents in 2021. Increased outages, adverse weather, impacts to electric first responder resource levels and an overall increased trend in electric first response workload affected the response time in 2021. PSE's 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.

PSE was not able to meet the SQI #11 benchmark because of the unprecedented stress on the EFR workforce due to the combination of the staggering workload along with the uncontrollable external factors throughout the year of 2021. The extreme weather events and the on-going COVID-19 pandemic significantly impacted PSE's SQI #11 performance levels. These unusual circumstances were outside PSE's control and was exacerbated by the workload levels placed on the electric first response workforce to serve customers. On average, each EFR employee worked over 1,000 additional hours of overtime to meet all commitments in 2021.

Electric emergency response time is comprised of two components: dispatch time and on-site time. The time to dispatch an emergency is based on the required time to identify and secure a qualified electrical employee. The dispatch time in 2021 was impacted in relation to the adverse impacts experienced with resource availability and capacity. On-site times are a measure of the drive time needed to get a qualified resource to the location of the electric emergency. However, this can be impacted by resource availability and starting location, the primary factors that affect this measure are traffic levels and traffic profiles. EFR drive times are also impacted by the weather itself-flooding, snow, fallen trees- reducing access and/or requiring rerouting to sites. As the state and counties continue to recover from the COVID-19 pandemic, traffic profiles in 2021 had an adverse

impact on the travel times. In 2021, PSE experienced a 15% increase in on-site times over the preceding 7-year average.

Before and throughout the year of 2021, PSE has been taking steps to achieve the optimum levels of EFR staffing through hiring and retention efforts and to be more efficient through adopting new work management technology and business processes. The SQI #11 penalty mitigation petition filed concurrently with this report provides further details about SQI #11 performance.

The *Unusual Events* section explains the impact of the COVID-19 pandemic and related governmental restrictions on PSE's emergency operations and the extreme weather events.

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 Events 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

- 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.

Impact of Unusual Events on SQI #11

PSE responded quickly to the on-going COVID-19 pandemic to ensure electric first response capabilities. Safety protocols, such as exposure identification and preventative actions, along with daily health screening prior to shifts, were implemented to prevent outbreaks that would inhibit PSE's ability to have the necessary qualified resources to respond to electric emergencies. As a result, EFR had very low COVID-19 health incident cases (potential and confirmed exposures) in 2021. However, EFR availability has been uncertain due to these safety protocols. These procedures take extra time for electric emergency responders before and after every job. During the COVID-19 pandemic, PSE has to frequently and quickly move emergency responders to meet the needs of other areas where responders were in quarantine due to a possible exposure. Resource availability was directly impacted during periods of active employee illness or employee quarantining due to potential and confirmed exposures and infections. Additionally, resource availability was also impacted by increased voluntary separations in 2021, in particular early retirements.

Chapter 1 in the Unusual Events section and Chapter 3 Electric Service Reliability provide in depth discussions about the impacts of the record-breaking weather events that occurred throughout 2021. The numerous unusual weather events resulted in abnormal numbers of outages in 2021 and challenged PSE's efforts to meet its SQI electric service reliability related indices, including SQI #11. Moreover, the surge of these unplanned outages throughout 2021 also increased the workload levels placed on the EFR workforce and exacerbated the average SQI #11 response time resulting from resource constraints as discussed in the Overview section above.

Service Provider Performance

Table 2h: Service Provider Performance for 2021

Key Measurement	Type of Metric	Benchmark/Description	2021 Performance Results	Achieved
Customer Services and Satisfaction and Operations Services				
Service provider standards compliance—Quanta Electric	Service Provider Index #1B[25]	Level 1 ≤ 15 dev/1000 Level 2 ≤ 25 dev/1000 Level 3 ≤ 25 dev/1000	Level 1 3.12 Level 2 4.12 Level 3 8.94	☑
Service provider standards compliance—Quanta Gas	Service Provider Index #1C[26]	Level 1 ≤ 8 dev/1000 Level 2 ≤ 15 dev/1000 Level 3 ≤ 12 dev/1000	Level 1 7.38 Level 2 8.44 Level 3 3.95	☑
Service provider appointments kept—Quanta Electric	Service Provider Index #3B[27]	At least 92% of appointments kept	99%	☑
Service provider appointments kept—Quanta Gas	Service Provider Index #3C	At least 92% of appointments kept	100%[28]	☑
Secondary safety response time—Quanta Gas	Service Provider Index #4D	Within 60 minutes from first response assessment completion to second response arrival	55 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	242 minutes	☑
Secondary Non-Core-Hours, Non-Emergency Safety Response and	Service Provider Index #4C	Within 316 minutes from the dispatch time to the restoration of non-	265 minutes	☑

[25] 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.

[26] See Footnote 17.

[27] There were no results for Service Provider Indices (SPI) #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, Quanta Electric and Quanta Gas, respectively, which were applicable in prior years' reports, have been terminated since the 2013 reporting period.

[28] Actual performance results were rounded from 99.56%.

Restoration Time—Quanta Electric		emergency outage during non-core hours		

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.

The *Unusual Events* section explains the impact of the COVID-19 pandemic and related governmental restrictions on PSE's construction services. The *Impact of Unusual Events on Service Provider Performance* section below indicates the specific impact on service provider performance.

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.

The 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: ≤ 25 deviations/1000 items inspected
- For Level 3 inspection items: ≤ 25 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 2021

Service Provider Appointments[29]				Missed Appointment Penalties		
Service Provider	Electric	Natural Gas	Total	Electric	Natural Gas	Total
Quanta Gas	N/A	8,397	8,397	N/A	$2,400	$2,400
Quanta Electric	8,273	N/A	8,273	$1,850	N/A	$1,850
Total	*8,273*	*8,397*	*16,670*	*$1,850*	*$2,400*	*$4,250*

Going Forward

- Identify areas of improvement to meet core-hour benchmark of 250 minutes
- Partner with large municipalities to improve the permitting process
- Identify and implement improvements to customer scheduling for new construction

[29] 98 Excused appointments (82 electric and 16 natural gas) are not included in the totals shown in Table 2i. Missed appointments exclude appointments that are "excused" per APPENDIX 2 to Exhibit J (consolidated Dockets UE-011570 and UG-011571) as updated in the compliance filing per Order 25 of Consolidated Dockets UE-072300 and UG 072301.

Impact of Unusual Events on Service Provider Performance

PSE engaged early with its service providers and while the severe weather events impacted scheduled work early on, as those resources were dedicated to restoration efforts, our service provider engaged other resources immediately and were able to meet PSE's requirements for completed scheduled work and delivered on their performance metric.

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[30] 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.*

[30] 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 event 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 seven days after the restoration of their electric service. Outages caused or restorations impeded by Customer equipment are not eligible. If PSE cannot safely access its facilities, the 24-hour or 120-hour period begins when safe access is made available for personnel and equipment.

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.

2021 Service Guarantee Credits

Customer Service Guarantee Credits

In 2021, PSE credited customers a total of $15,200 for missing 304 of the 34,356 Customer Service Guarantee applicable appointments (i.e., SQI #10 appointments). While there were less applicable appointments, the number of Customer Service Guarantee Credits paid to customers is about the same. In 2019, PSE credited customers a total of $14,850 for missing 297 of the 91,536 SQI #10 appointments whereas 284 appointments were missed, for a total of $14,200 credited in 2020. There were 37,773 SQI #10 appointments for 2020.

Table 2j provides summary values of Service Guarantee counts and payments to customers in 2021 by service type.

Table 2j: 2021 PSE SQI #10 Appointment Count and Customer Service Guarantee Credits

	SQI #10 Appointment Counts[31]			Customer Service Guarantee Payments to Customers		
Service Type	**Electric**	**Natural Gas**	**Total**	**Electric**	**Natural Gas**	**Total**
Permanent Service	**8,273**	**8,397**	**16,670**	**$1,850**	**$2,400**	**$4,250**
Reconnection	**4,448**	**4,006**	**8,454**	**$1,6500**	**$3,200**	**$4,850**
Diagnostic	**N/A**	**9,232**	**9,232**	**N/A**	**$6,100**	**$6,100**
Total	***12,721***	***21,635***	***34,356***	***$3,500***	***$11,700***	***$15,200***

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, 2021.

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. In 2021, some customers experienced an extended outage and received a $50 RSG credit because PSE field personnel took longer to locate and repair the bad unground service or waited longer for the arrival of needed equipment or delayed the restoration due to poor weather conditions.

The winter was harsh in the mountain regions and snow caused delays. If a crew left due to harsh conditions or needed other materials/equipment to complete the task and chose to go down for rest before returning – these affected customers are eligible for the RSG. When it comes to underground facility outages--failing concentric neutrals that hamper fault locations for direct buried primary or unmarked/poorly mapped handholes for secondary connections that hamper restoration efforts-- these affected customers are also eligible for the RSG. Stacked crews reaching work limits and not re-assigning to another crew is also a reason to payout if beyond 24 hours for restoration.

The following table summarizes payments to customers in 2021.

[31] 98 Excused appointments (82 electric and 16 natural gas) are not included in the totals shown in Table 2i. Missed appointments exclude appointments that are "excused" per APPENDIX 2 to Exhibit J (consolidated Dockets UE-011570 and UG-011571) as updated in the compliance filing per Order 25 of Consolidated Dockets UE-072300 and UG 072301.

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**	**0**	**$0**
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**	**362**	**$18,100**
Total			***362***	***$18,100***

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. This executive summary provides an overview of performance results. The body of the report contains further analysis and information as required in PSE's Monitoring Plan[32]. **Appendices H – O** also satisfy the requirements of the Monitoring Plan and the appendices following Appendix O provide further details referenced throughout the rest of the report.

To improve electric service for our customers, PSE is modernizing the grid through an interconnected set of plans and actions that provide energy that is reliable, resilient, clean, smart and flexible. **Figure 3a** on the following page illustrates PSE's grid modernization approach as a triangle of the identified service characteristics. While this report focuses on reliability performance, plans discussed within also drive the multiple values of the adjacent characteristics.

[32] Docket UE-110060

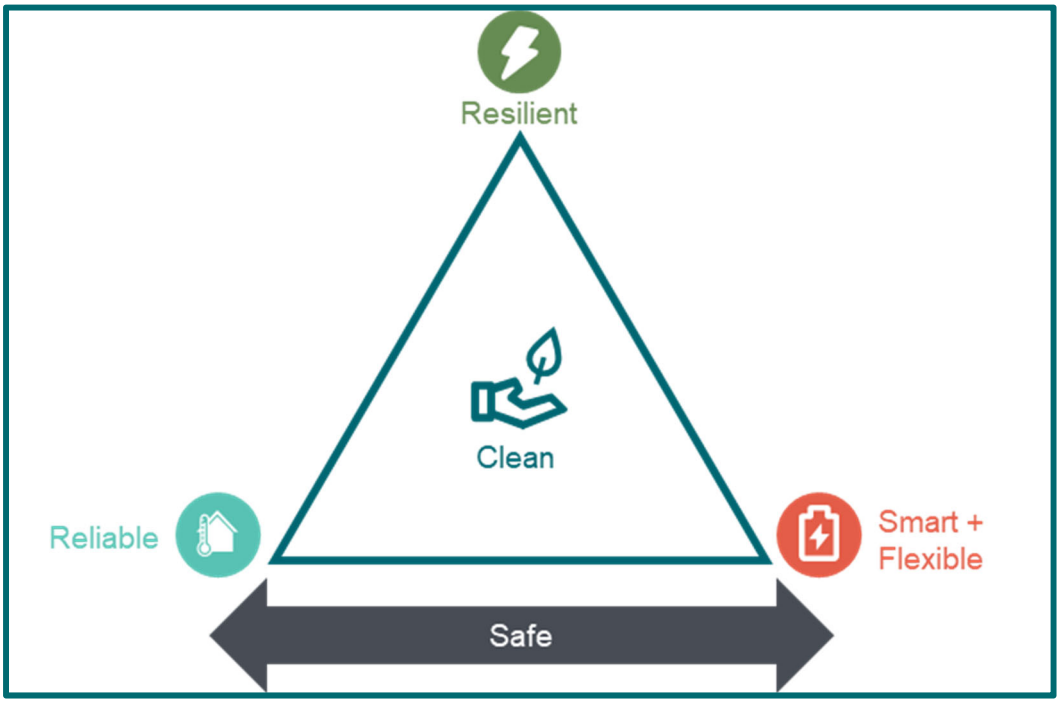

Figure 3a: PSE's grid modernization vision

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"). These metrics, along with Customers Experiencing Multiple Interruptions ("CEMI") and Customer Complaint metrics help PSE to understand the different ways customer experience reliability and changes in this reliability associated with PSE electric system. Though imperfect, reviewing these metrics over a period of years, indicate trends and progress PSE is making to improve the electric system reliability.

Both SAIDI and SAIFI generally vary greatly from year to year due to a number of factors, primarily differences in weather. PSE's system reliability degraded in 2021 compared to 2020 due to multiple extreme weather events, SQI #3 SAIDI increased to 207 and SQI #4 SAIFI increased to 1.35.

Summary of Current SQI #3 SAIDI Performance

In 2021, PSE's SQI #3, Non-Major Event Day SAIDI, was 207 minutes compared to a target for SQI #3 of 155 minutes. **Figure 3b** shows PSE's SQI #3 SAIDI results from 2014.

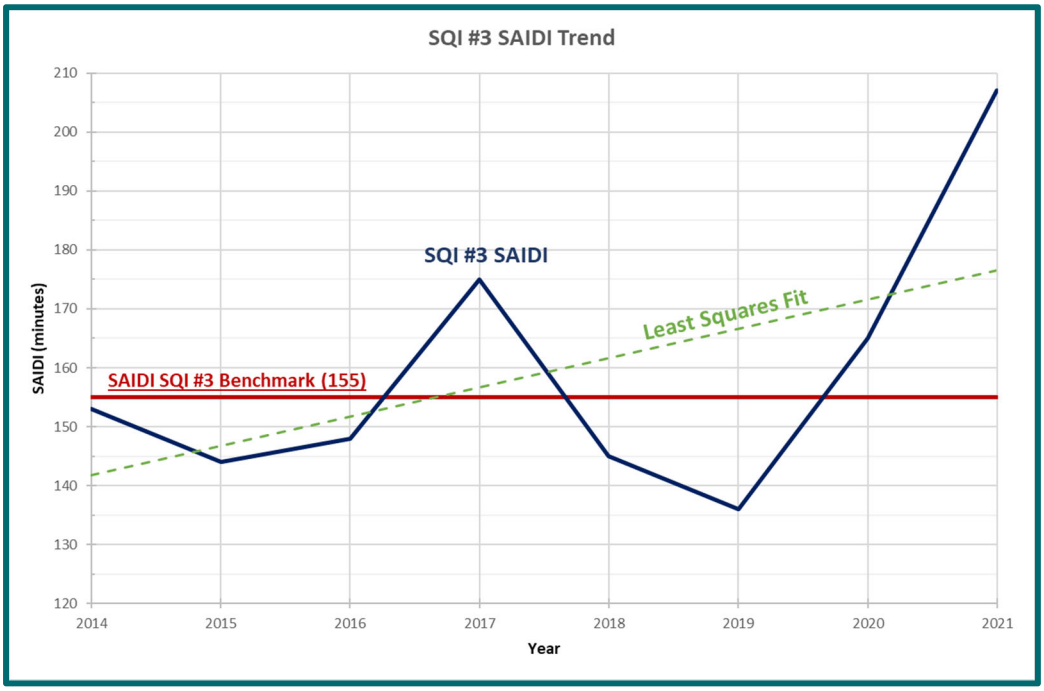

Figure 3b: Trend in SQI #3 SAIDI

Figure 3b shows the volatility in SQI #3 SAIDI results that often occurs from year to year. The majority of this volatility is typically due to the number and severity of weather events that are not excluded from the metric because they do not qualify as Major Event Days ("MED") but have a significant impact nonetheless. PSE's territory experienced an unusual number of abnormal weather events in 2021 including record heat in June, heavy precipitation in the fall (September – November) and bitter cold temperatures and heavy snow in December. The heat event in June caused equipment such as transformers to exceed their thermal operating ratings which resulted in a large number of failed equipment that caused outages. Excessive heat, and drought in some areas, caused additional tree related outages that would not normally be experienced during blue sky weather days. Record precipitation in the fall, particularly in November, saturated the soil causing further vegetation issues as trees were more easily uprooted when strong winds passed through PSE's service territory. Heavy snow in December resulted in more tree failures and access issues that prevented restoration to customers and cold temperatures increased line loading and limited PSE's ability to reroute power around damaged areas to serve customers without overloading equipment.

Figure 3c shows how the cumulative 2021 SQI #3 SAIDI exceeded PSE's cumulative 5 year average SAIDI, impacted by these 2021 events with the June heat being the event that initiated the diversion from the 5 year average.

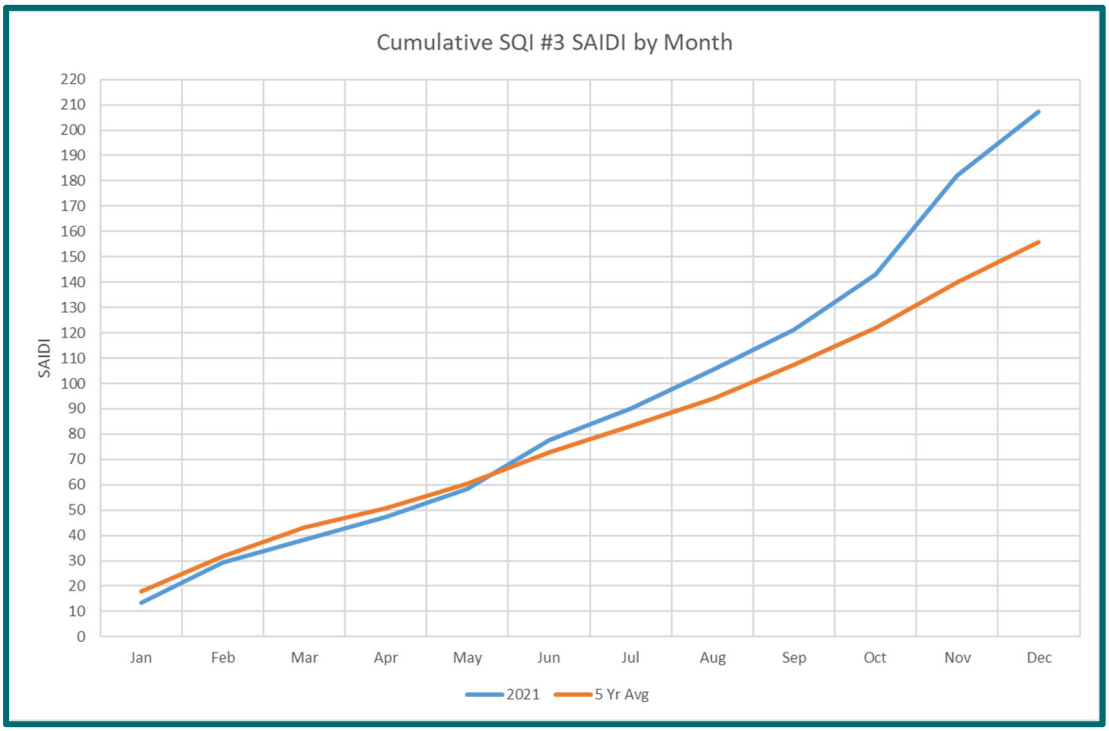

Figure 3c: 2021 cumulative SQI #3 SAIDI compared with 5 year average

In addition to extreme weather events, PSE experienced a number of other unique reliability challenges. For example, the largest single non-MED SAIDI outage event since 2013 was due to vandalism that occurred on November 1, 2021, causing an outage as a result of a pole being cut down in an attempt to steal copper conductor. The 5.4 SAIDI minute event was exacerbated by having to wait for a train at a railroad crossing as well as an abnormal system configuration due to a large public improvement transportation project in progress. Outages due to vehicle accidents also increased in 2021, however there is no clear reason. The Seattle Times reported that while 2021 was the deadliest on Washington roads in 15 years, experts cannot point to a single reason why nor can they say with any confidence whether the trend will continue. Additionally, the increase in response time, as reported in Chapter 2 relative to Electric Safety Response Time (SQI #11), is estimated to have contributed 6 minutes to SQI #3 SAIDI. Finally, PSE's 2021 threshold for determining Major Event Days was higher than in 2020, which increased SQI #3 SAIDI by 12 minutes in 2021, a result of less events meeting the exclusion threshold.

Figure 3d shows the most significant increases and decreases in 2021 SAIDI minutes associated with outage cause categories as compared to the 5 year average. Vegetation and equipment failures, primarily affected by extreme weather events, as well as vandalism, animals and vehicle accidents were responsible for the vast majority of the increase to 2021 SAIDI.

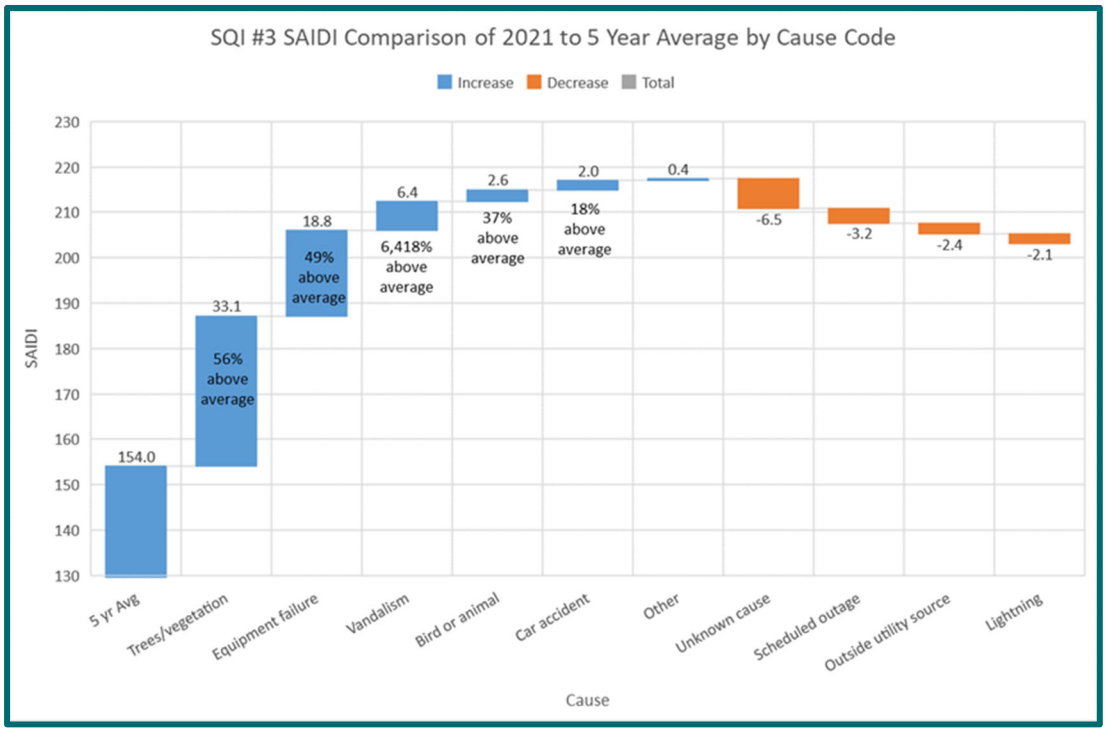

Figure 3d: 2021 SQI #3 SAIDI contribution by cause compared to the 5 year average

Summary of Current SQI #4 SAIFI Performance

In 2021, PSE's SQI #4 SAIFI was 1.35 interruptions compared to a target for SQI #4 of 1.30 interruptions. **Figure 3e** shows PSE's SQI #4 SAIFI results from 2014.

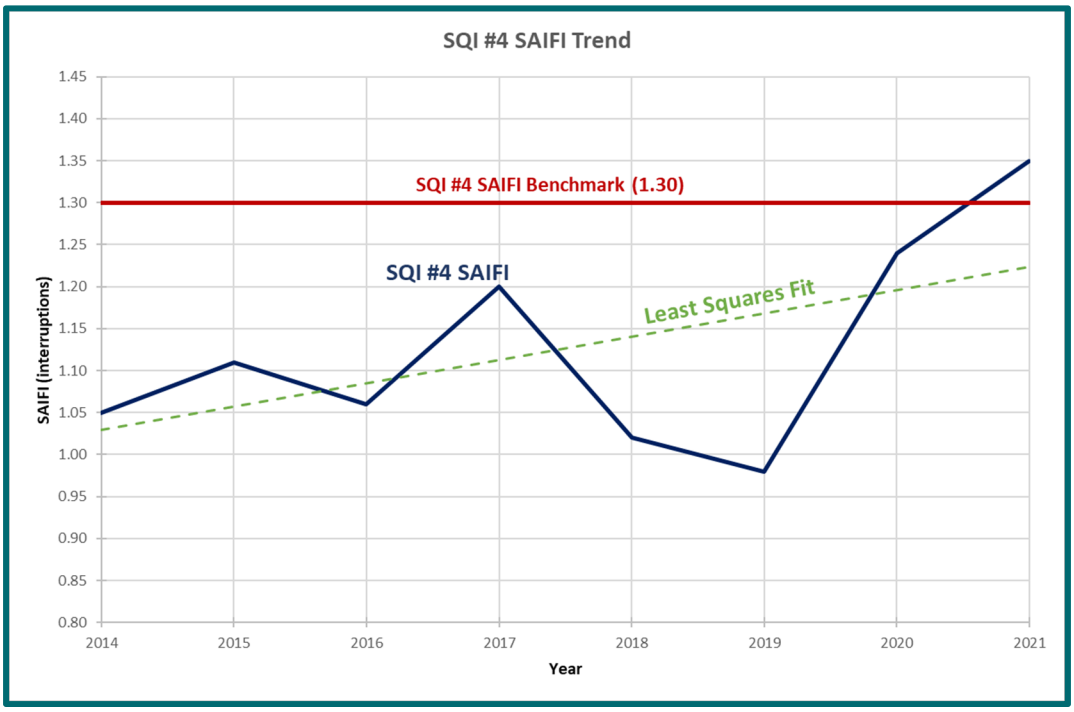

Figure 3e: Trend in SQI #4 SAIFI

Figure 3e shows SQI #4 SAIFI increased in 2021 and was higher than any year since 2014 as was the case for SQI #3 SAIDI. SAIDI and SAIFI are strongly correlated and typically follow the same trend. Many of the issues that caused an increase in SAIDI in 2021 caused an increase in SAIFI. **Figure 3f** on the following page shows how the cumulative 2021 SAIFI exceeded PSE's cumulative 5 year average SAIFI, impacted by these 2021 events including the June heat wave which caused equipment failures and the impact of vegetation caused interruptions in December. But from the very start of the year, PSE exceeded the 5 year average triggered by equipment failure related interruptions in January.

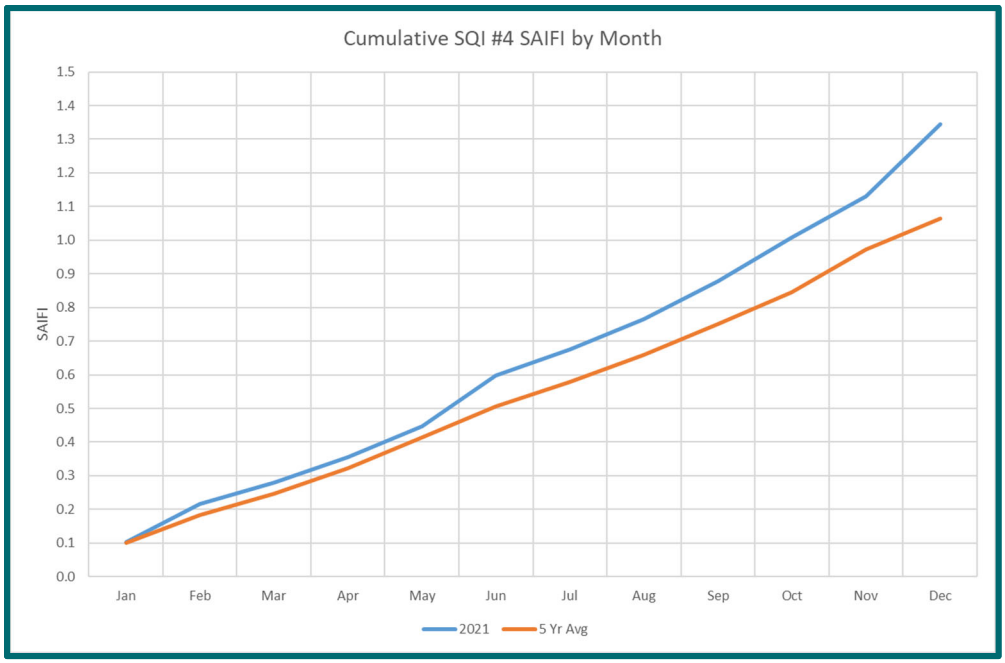

Figure 3f: 2021 cumulative SQI #4 SAIFI compared with 5 year average

Figure 3g shows the most significant increases and decreases in 2021 SQI #4 SAIFI minutes associated with outage cause categories as compared to the 5 year average. Vegetation and equipment failures, primarily affected by extreme weather events, as well as vandalism and animals were responsible for the vast majority of the increase to 2021 SQI #4 SAIFI.

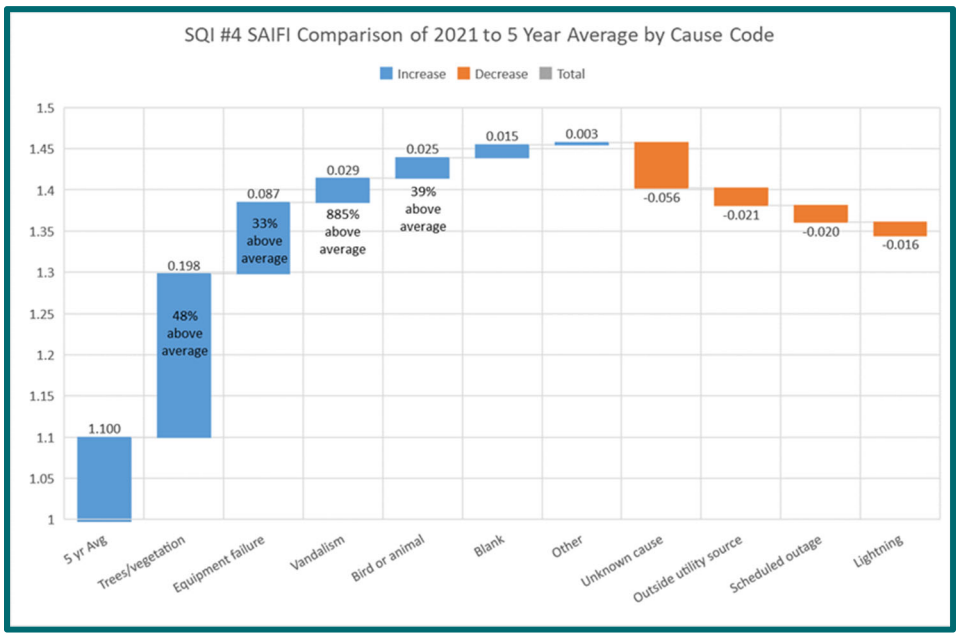

Figure 3g: 2021 SQI #4 SAIFI contribution by cause compared to the 5 year average

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 2018. **Figure 3h** shows PSE's Non-MED CEMI results from the inception of this metric.

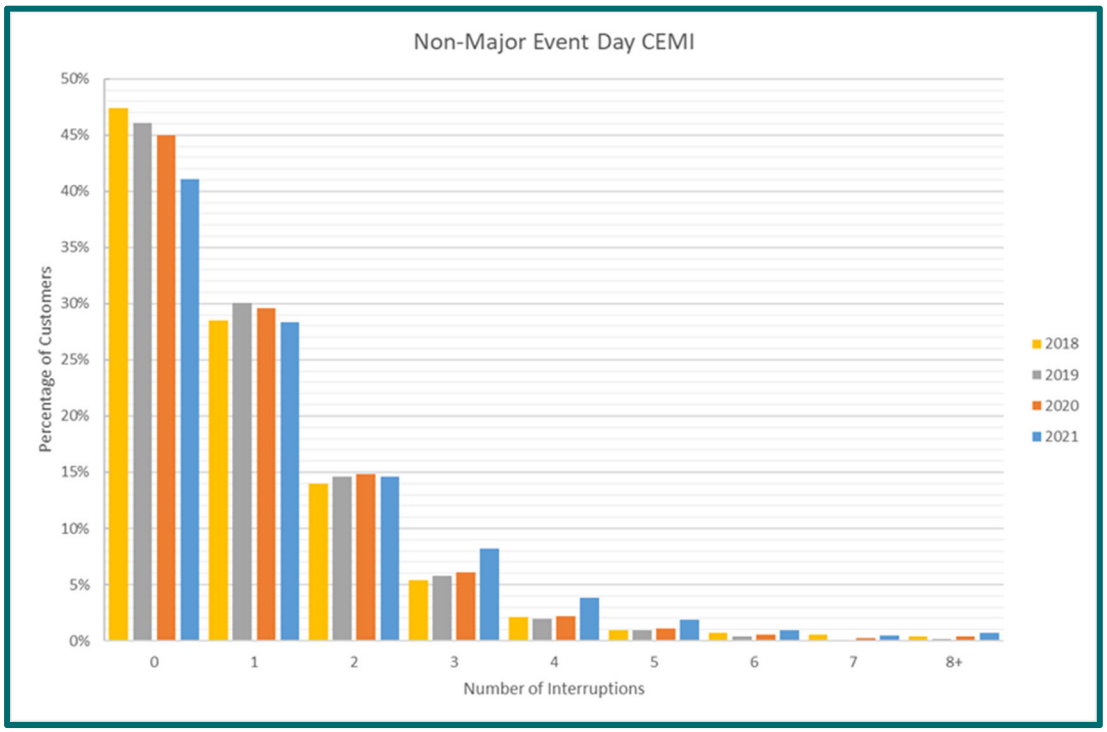

Figure 3h: Trend in Non-Major Event Day CEMI

The results of 2021 show a trend of less customers experiencing no outages shifting towards a higher percentage of customers in the higher frequency categories than previous years, as would be expected given the SAIDI and SAIFI trends. In general, PSE wants to reduce the percentage of customers experiencing a high frequency of interruptions. This metric is useful for PSE in identifying specific pockets of customers experiencing poor reliability that might not surface at system-wide or circuit level metrics.

Summary of Customer Complaints

In 2021, PSE received a total of 86 reliability complaints; 43 that came through the Washington Utilities and Transportation Commission (18 of which came from 2 neighborhoods), and 43 that came directly to PSE. **Figure 3i** shows the customer complaint trend from 2014.[33] Note that customers may have submitted a complaint with both PSE and the WUTC.

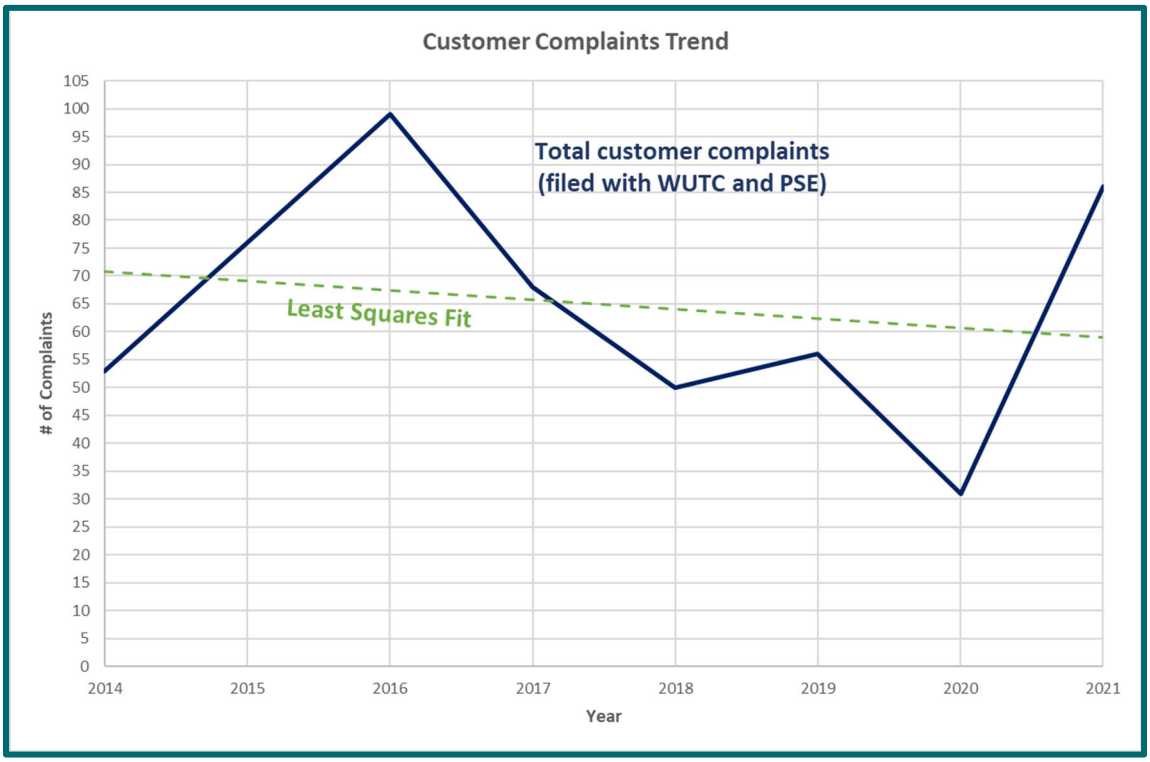

Figure 3i: Trend in Customer Complaints

While the number of complaints increased in 2021, the multi-year trend shows decreasing complaints and the number of complaints is very small compared to the number of PSE customers (0.007%). Because the number of complaints is so small and because relatively large changes in the number of complaints can occur depending on where and when storms occur, changes in complaints are not well correlated to SAIDI or SAIFI. This metric is useful for PSE in identifying customer concerns that might not surface at system-wide or circuit level metrics.

[33] 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.

Summary of Plan Moving Forward

While metrics such as SQI #3 SAIDI, SQI #4 SAIFI and CEMI are the industry standards for measuring reliability performance, they are not perfect. Year to year comparisons can sometimes be a better measure of changes in environmental factors than a measure of a utility's efforts. Understanding and mitigating a rapidly changing operating environment such as with increases in the number and type of extreme weather events, vehicle accidents and vandalism takes time and requires tools beyond standard system-wide metrics. PSE uses several methods to help with this.

One such tool is a project validation process internally referred to as backcasting, which measures reliability performance. The results typically show that reliability is improved in a project's vicinity. However impacts to reliability on the rest of the system may be larger than the sum of location specific project benefits for a given year resulting in an increase in system-wide metrics. This may imply that the quantity of reliability issues are beginning to outpace reliability improvement investments or that the characteristic of reliability issues has changed and new or different solutions are needed. PSE also employs a root cause analysis program to dig deeper into the causes of large events and identify potential future risks and opportunities for improvement. These programs provide feedback mechanisms that allow PSE to adjust solutions and investments to changing circumstances.

PSE's long range plan is to continue to implement well-established electric system improvements such as cable replacement, overhead upgrades, and distribution automation to drive improvements in reliability. PSE will also continue to analyze other reliability improving technologies and programs such as a refreshed aggressive hazard tree removal program which was implemented between from 1999-2005 and resulted in significant reliability benefits for many years afterwards. This may help to address emerging environmental challenges and the resulting increasing tree caused outages. Through PSE's budget optimization process, specific reliability projects will continue to be chosen for implementation in a way that maximizes value for customers.

SAIDI (SQI #3)[34]

Overview[35]

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 2021 results based on the recorded outages are reported in **Table 3a**.

Table 3a: 2021 SAIDI Results

	Key Measurement	Benchmark	Baseline	Current Year Results	Achieved
$SAIDI_{Total}$	**Total (all outages current year) Outage Duration–System Average Interruption Duration Index (SAIDI)**	**n/a**	**532**	**849**	**--**
$SAIDI_{Total\ 5\text{-}year\ Average}$	**Total (all outages five-year average) SAIDI**	**n/a**	**326**	**546**	**--**
$SAIDI_{5\%}$	**<5% Non-Major-Storm (<5% customers affected) SAIDI**	**n/a**	**132**	**245**	**--**
$SAIDI_{IEEE}$	**IEEE Non-Major-Storm (T_{MED}) SAIDI**	**n/a**	**107**	**207**	**--**
$SAIDI_{SQI\text{-}3}$	**IEEE Non-Major Storm (T_{MEDADJ}) SAIDI**	**No more than 155 minutes per customer per year**	**n/a**	**207**	**☐**

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.

[34] This section meets a requirement of Attachment B of Docket UE-110060.

[35] This section meets a requirement of Attachment B of Docket UE-110060.

What Influences SAIDI[36]

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

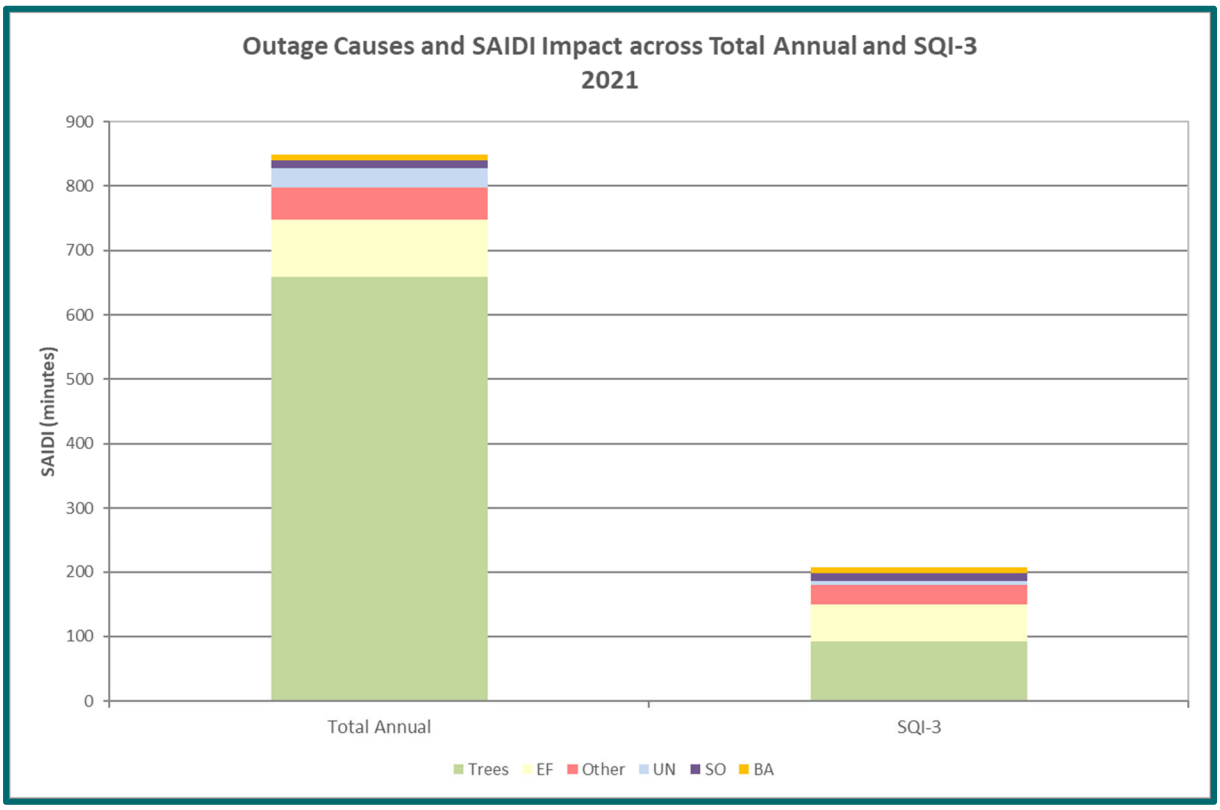

Figure 3j: Outage Causes and SAIDI Impact across Total Annual and SQI-3 in 2021

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

[36] This section meets a requirement of Attachment B of Docket UE-110060.

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 2017 to 2021.

Table 3b: SQI SAIDI from 2016 to 2021

	2017	2018	2019	2020	2021
SAIDI (SQI #3)	**175**	**145**	**136**	**165**	**207**
Benchmark	**155 minutes per customer per year, Non-Major Event Days**				

SQI #3 SAIDI results vary widely from year to year. The large increase in SQI #3 SAIDI in 2021 was the result of multiple issues including abnormal weather events such as record breaking heat in the summer, heavy precipitation in the fall and bitter cold temperatures and heavy snow in the winter that primarily impacted vegetation and equipment failure caused interruptions. Additionally, 2021 saw large increases in vandalism, vehicle accidents and animal caused outage events. **Figure 3k** shows 2021 SQI #3 monthly performance against the 5 previous year average.

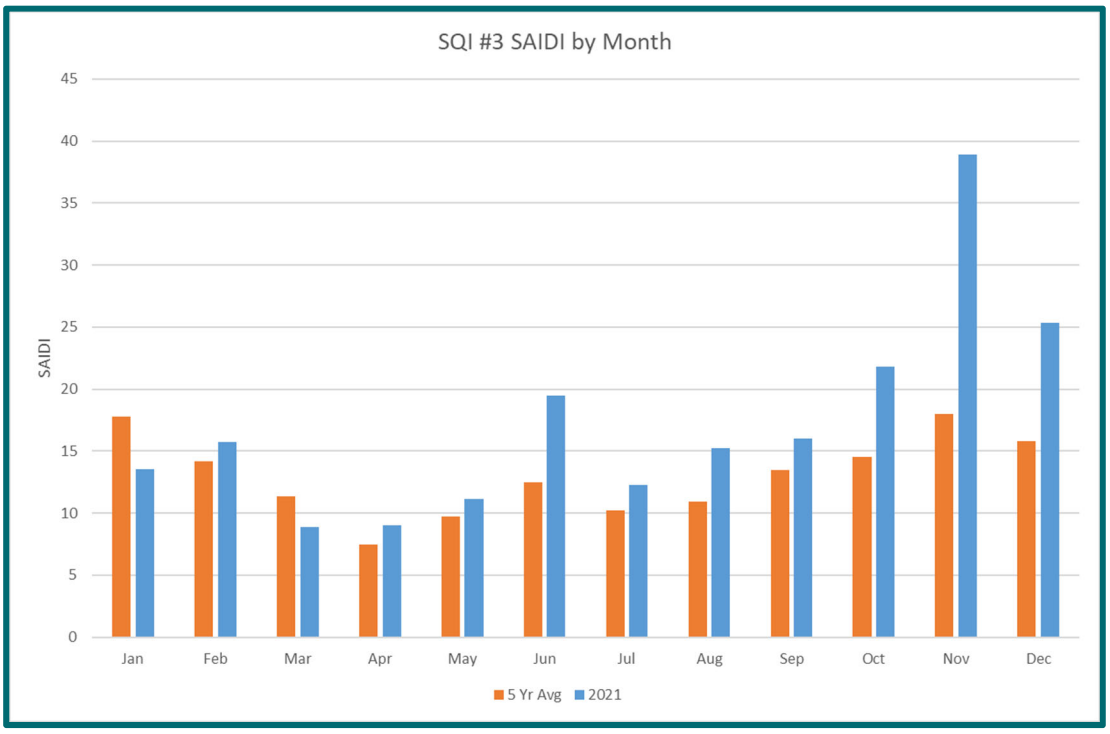

Figure 3k: 2021 SQI-3 comparison to 5 year average by month

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*.

Impact of Unusual Events on SQI SAIDI

As was the case in 2020, the impacts of the COVID-19 pandemic on reliability in 2021 are not clear. Disruptions to working environments from distancing and quarantine requirements and recommendations as well as delays from permitting agencies may have had some effect, but their impact on reliability cannot be measured. The extreme weather events had significant impact to SQI #3 SAIDI as discussed in the previous section.

SAIFI (SQI #4) [37]

Overview[38]

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 2021 results based on the recorded interruptions are reported in **Table 3c**.

Table 3c: 2021 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**	**2.27**	**--**
$SAIFI_{Total\ 5\text{-}year\ Average}$	**Total (all outages five-year average) SAIFI**	**n/a**	**1.37**	**1.78**	**--**
$SAIFI_{5\%}$	**<5% Non-Major-Storm (<5% customers affected) SAIFI**	**1.30**	**0.80**	**1.35**	**☐**
$SAIFI_{IEEE}$	**IEEE Non-Major-Storm (TMED) SAIFI**	**n/a**	**0.71**	**1.26**	**--**

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.

[37] This section meets a requirement of Attachment B of Docket UE-110060.

[38] This section meets a requirement of Attachment B of Docket UE-110060.

What Influences SAIFI[39]

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 2021, 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 3l shows the common causes for the recorded outages in 2021 and their impact on customers across $SAIFI_{Total}$ and $SAIFI_{5\%}$ measurements.

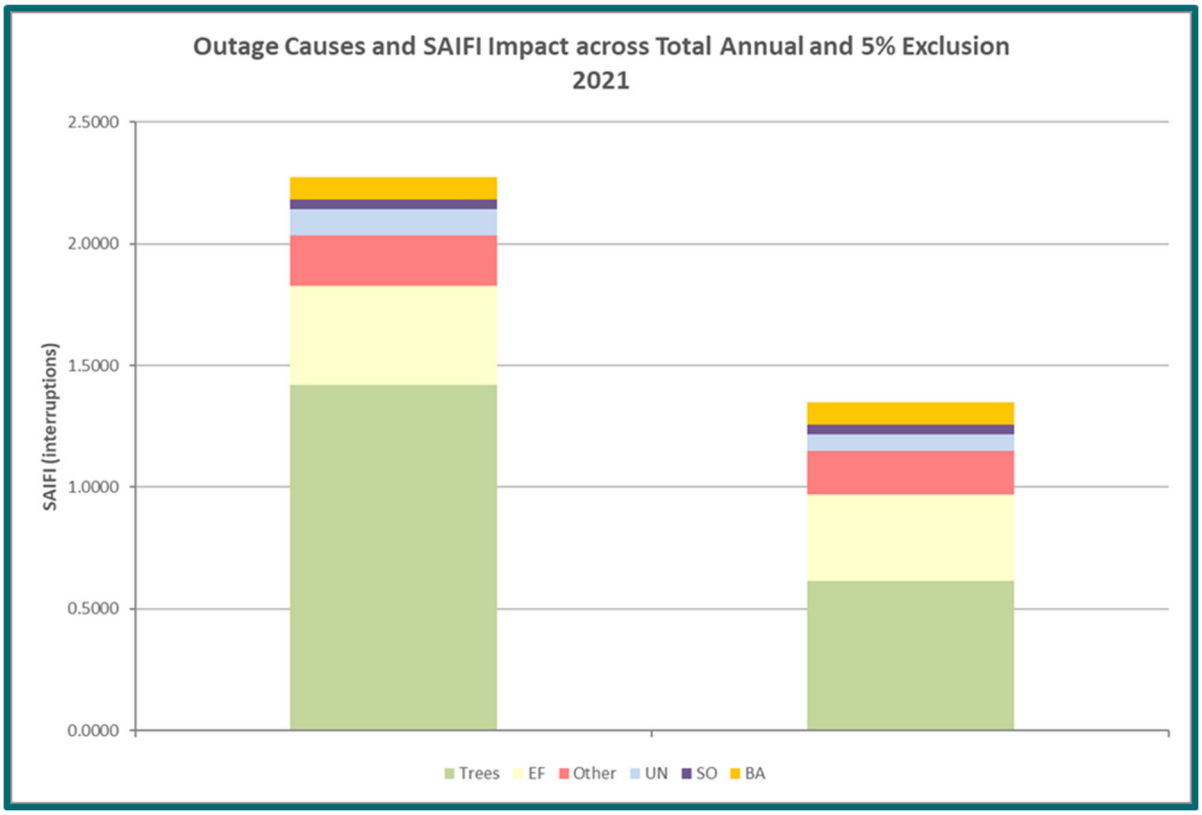

Figure 3l: Common Outage Causes and SAIFI Impact a across Total Annual and 5% Exclusion in 2021

[39] This section meets a requirement of Attachment B of Docket UE-110060.

Historical Trends for SAIFI[40]

Table 3d shows SQI SAIFI from 2017 to 2021.

Table 3d: SQI SAIFI from 2016 to 2021 (excluding 5% Major Events)

	2017	2018	2019	2020	2021
$SAIFI_{5\%}$ **(SQI #4)**	**1.20**	**1.02**	**0.98**	**1.24**	**1.35**
Benchmark	**1.30 interruptions per year per customer**				

As was the case with SQI #3 SAIDI, the large increase in SQI #4 SAIFI in 2021 was the result of multiple issues including abnormal weather events such as record breaking heat in the summer, heavy precipitation in the fall and bitter cold temperatures and heavy snow in the winter that primarily impacted vegetation and equipment failure caused interruptions. Additionally, 2021 saw large increases in vandalism and animal caused outage events. **Figure 3m** shows 2021 SQI #4 monthly performance against the 5 previous year average.

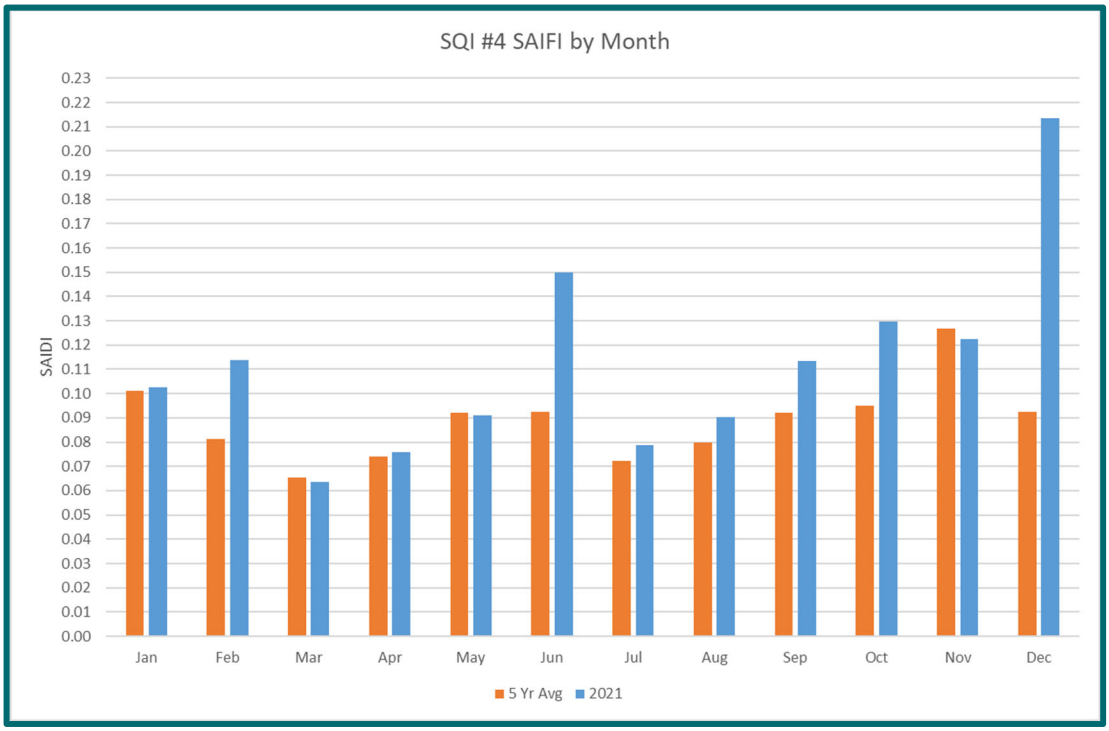

Figure 3m: 2021 SQI-4 comparison to 5 year average by month For more details see **Appendices J**: *1997-Current Year PSE SAIFI and SAIDI Performance by Different Measurements*, **K**: *Current Year Electric Service Outage by Cause by Area* and **L**: *Historical SAIDI and SAIFI by Area.*

[40] This section meets a requirement of Attachment B of Docket UE-110060.

Impact of Unusual Events on SQI SAIFI

As was the case in 2020, the impacts of the COVID-19 pandemic on reliability in 2021 are not clear. Disruptions to working environments from distancing and quarantine requirements and recommendations as well as delays from permitting agencies may have had some effect, but their impact on reliability cannot be measured. The extreme weather events had significant impact to SQI #4 SAIFI as discussed in the previous section.

Customers Experiencing Multiple Interruptions

Overview

Starting in 2018, 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 experienced 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

Figure3n shows the percentage of PSE customers experiencing varying numbers of interruptions. For example, 41% of customers experienced no sustained interruptions while 28% of customers experienced one sustained interruption.

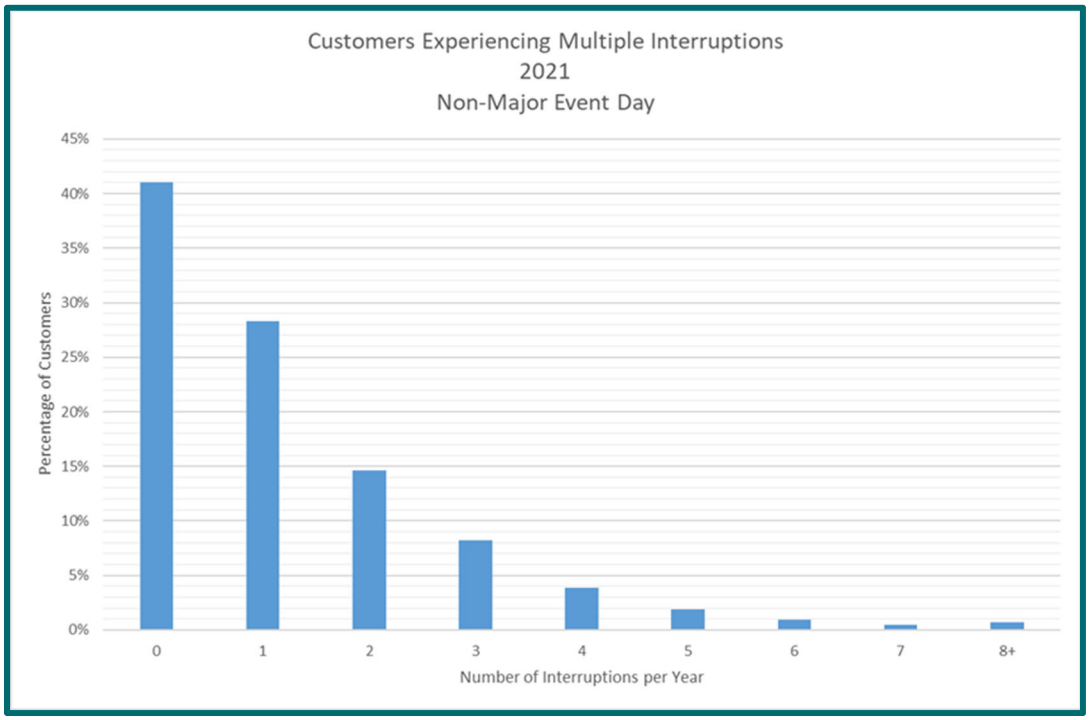

Figure 3n: Customers Experiencing Multiple Interruptions in 2021

About Electric Service Reliability Measurements and Baseline Statistics[41]

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 an 18-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, along with the associated interpretations, 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.

[41] This section meets a requirement of Attachment B of Docket UE-110060.

Table 3e details the dates, causes, affected areas and exclusion criteria for the SQI SAIDI, IEEE Standard 1366 exclusion, and 5% exclusion events in 2021. 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 2016, 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 2021, five of the IEEE T_{MED} and SQI SAIDI events did not meet the 5% Exclusion Major Event Day criteria.

Table 3e: 2021 SQI SAIDI, IEEE T_{MED} and SQI SAIFI Exclusion Events[42]

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	Affected Areas
1/12/2021	1/12/2021	54.36		33.1%	Wind, rain, snow, and atmospheric river	1/12/2021 11:00 PM - 1/17/2021 8:30 PM	Thurston, Skagit, Whatcom and Island Counties
1/13/2021	1/13/2021	277.27	Yes				
1/14/2021	1/14/2021	9.96					
2/13/2021	2/13/2021	10.26		n/a	Wind, Snow	n/a	King and Thurston Counties
6/27/2021	6/27/2021	6.53		n/a	Extreme and prolonged heat waves	n/a	System Wide
9/17/2021	9/17/2021	64.46		12.3%	Wind	9/17/2021 1:00 PM - 9/19/2021 11:00 PM	Whatcom, Skagit, Island, and King Counties
9/18/2021	9/18/2021	10.30					
10/24/2021	10/24/2021	54.09		12.0%	Wind	10/24/2021 7:30 AM - 10/27/2021 3:00 PM	King, Pierce, Thurston, and Kitsap Counties
10/25/2021	10/25/2021	12.90					
11/9/2021	11/9/2021	10.01		6.6%	Wind	11/8/2021 8 PM - 11/10/2021 8 PM	North King and Kitsap Counties
11/15/2021	11/15/2021	97.75	Yes	17.0%	Wind, Rain	11/14/2021 6:00 AM - 11/19/2021 12:00 AM	Western Washington Service Territory
12/8/2021	12/8/2021	9.95		n/a	Wind	n/a	Island County
12/11/2021	12/11/2021	17.07		n/a	Wind	n/a	Whatcom, Skagit, Island, Thurston, and Kitsap Counties. Vashon Island
12/26/2021	12/26/2021	7.10		n/a	Wind	n/a	Whatcom, Skagit, Island, and Kitsap Counties

[42] The 2021 T_{MEDADJ} is 5.80 minutes. The 2021 T_{MED} is 6.38 minutes. The 2021 T_{CAT} is 82.43 minutes.

Areas of Greatest Concern[43]

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.

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. **Appendix M**: *Areas of Greatest Concern with Action Plan* details the Year End 2021 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 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 even more efficient targeting of reliability improvement projects.

[43] This section meets a requirement of Attachment B of Docket UE-110060.

Customer Electric Reliability Complaints[44]

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.

Figure 3o illustrates the 2016 – 2021 number of recorded PSE complaints.[45] During the rolling two-year period of 2020–2021, PSE received complaints from 43 customers relating to reliability and power quality concerns as compared to 18 complaints recorded in the rolling two year period of 2019-2020. This number represents less than 0.004% of PSE's customers.

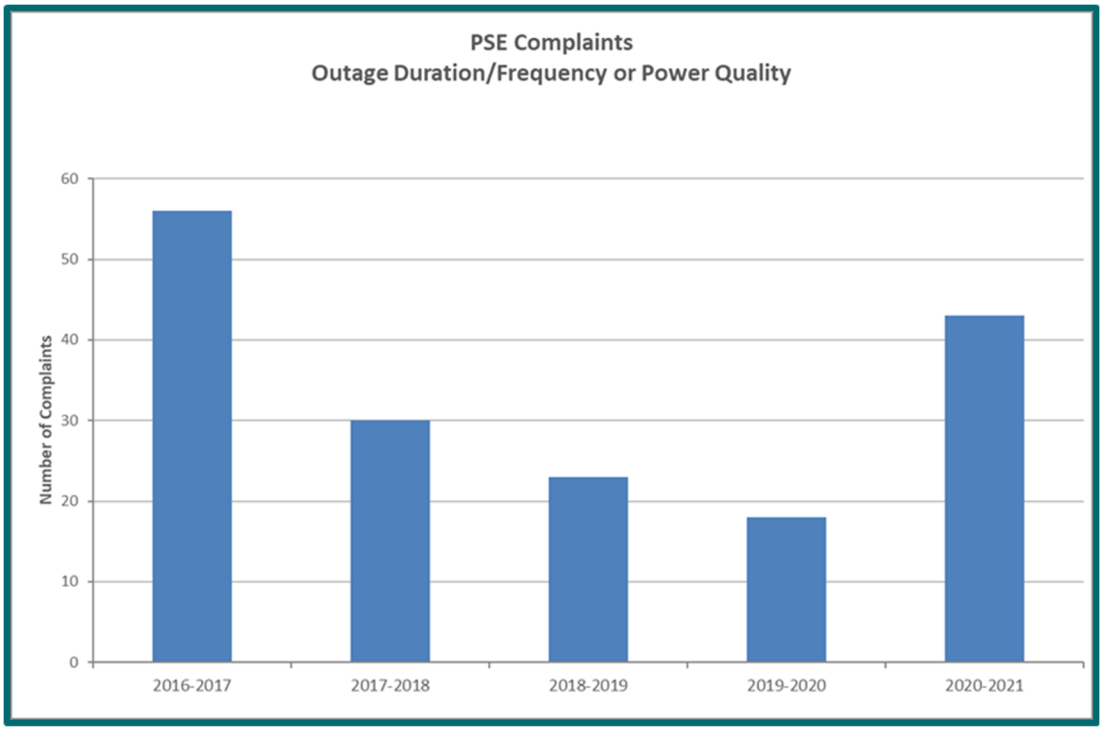

Figure 3o: Five Year History of PSE Complaints

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

[45] 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.

PSE's complaint process and the change in data collection are described in **Appendix I**: *Electric Reliability Data Collection Process and Calculations*. The 2019-2021 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*.

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. **Figure3p** illustrates 2017 – 2021 number of UTC electric service quality complaints in regards to interruption duration or frequency and/or power quality. In 2021, the UTC received 43 complaints relating to PSE's electric service quality as compared to 13 in 2020.[46] The 2021 complaints are shown in **Table N2** of **Appendix N**: *Current-Year Commission and Rolling-Two-Year PSE Customer Electric Service Reliability Complaints with Resolutions*.

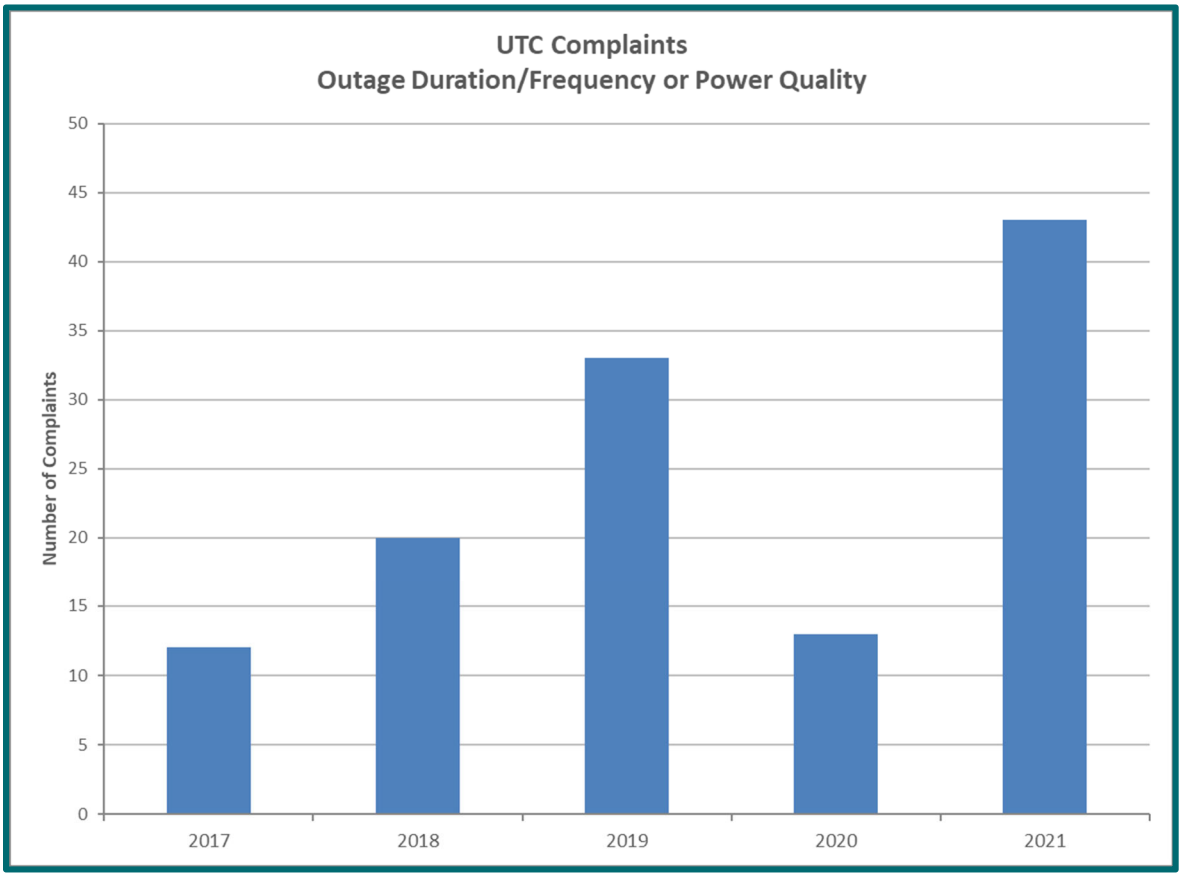

Figure 3p: Five Year History of UTC Complaints

[46] The main driver for the increase in UTC complaints in 2021 was a master complaint from one neighborhood in Pierce County.

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 2021.

Working to Uphold Reliability[47]

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, project 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, replacing old equipment or adding automation to the system. The descriptions of these reliability programs can be found in **Appendix P**: *Reliability Program Category Descriptions*. **Table 3f** shows the number of projects of each type that were completed in 2020 and 2021 as well as the projected 2021 SAIDI savings associated with projects completed in 2020.

Table 3f: Reliability program completed work and future plans

Program Category	Outage Cause Each Program Addresses						Estimated SAIDI Savings from 2020 projects	2020 Completed	2021 Completed	2022 Plan
	Trees	BA	EF	SO	UN	Other				
Vegetation Management										
Cyclical Tree Trimming	✓						n/a	2,560 miles	2,796 miles	2,625 miles
TreeWatch	✓						n/a	8,976 trees	1,857 trees	0 trees
Tree Replanting	✓						n/a	On-going	On-going	On-going
Substation Landscape Renovation	✓						n/a	Monitor	50 trees	100 trees
Targeted Reliability Improvements										
Worst Performing Circuits	✓	✓	✓			✓	1 minute	14 projects	12 projects	17 projects
Reclosers	✓	✓	✓	✓		✓	< 1 minute	1 projects	26 projects	29 projects
FuseSavers	✓	✓	✓			✓	< 1 minute	6 projects	42 projects	40 projects
Targeted Reliability	✓	✓	✓			✓	1 minute	9 projects	12 projects	12 projects
Distribution Automation	✓	✓	✓	✓	✓	✓	3 minutes	4 projects	3 projects	11 projects
Substation SCADA	✓	✓	✓		✓	✓	< 1 minute	11 projects	10 projects	10 projects

Table continues on next page

[47] This section meets a requirement of Attachment B of Docket UE-110060.

Program Category	Outage Cause Each Program Addresses						Estimated SAIDI Savings from 2020 projects	2020 Completed	2021 Completed	2022 Plan
	Trees	BA	EF	SO	UN	Other				
Transmission Automation	✓	✓	✓			✓	0 minutes	2 projects	2 projects	3 projects
Cable Remediation			✓			✓	1 minute	59 projects	67 projects	78 projects
Copper Conductor	✓		✓				n/a	n/a	n/a	1 mile
Wildfire	✓		✓			✓	TBD	1 circuit	1 circuit	11 circuits
Pole Inspection and Remediation			✓				TBD	45,475 poles	38,147 poles	35,296 poles
Substation Reliability			✓				< 1 minute	32 projects	17 projects	24 projects
Substation Maintenance			✓				n/a	2,952 projects	2,733 projects	3,215 projects

In addition to these improvement projects, PSE also works to maintain performance of the system by patrolling poor performing circuits, using health diagnostic programs to identify failing equipment and adhering to vegetation management best practices. Furthermore, PSE has actively worked in recent years to improve operation of the system by implementing initiatives to reduce the impact of planned outages and reduce the occurrence and extent of abnormal system configurations. Though the system is designed to be flexible, it operates at greatest efficiency when it is in its normal configuration. Reducing abnormal conditions results in fewer customers impacted and faster restoration times when interruptions occur. It can be difficult to see the impact of these programs in overall reliability metric results, but without them, customers would experience more frequent and longer duration interruptions.

Following implementation of solutions, PSE performs a reliability improvement verification analysis on a subset of projects 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 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. Note that this is not a measure of the value of a project or program, but whether or not it met a reliability benefit expectations. A high benefit project can achieve less than 100% of its reliability benefit expectation and still be the most valuable investment alternative for a given year. The analysis of projects implemented in 2017 resulted in projects achieving 90% of predicted reliability benefits.

PSE also performs a detailed root cause analysis on a sample of large interruptions each year to determine whether processes and system components are operating as intended. In 2021, PSE performed 47 RCAs, which accounted for nearly 8% 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. The analysis of benefits bubble in **Figure 3q** shows where this feedback fits into the process for identifying issues and developing solutions.

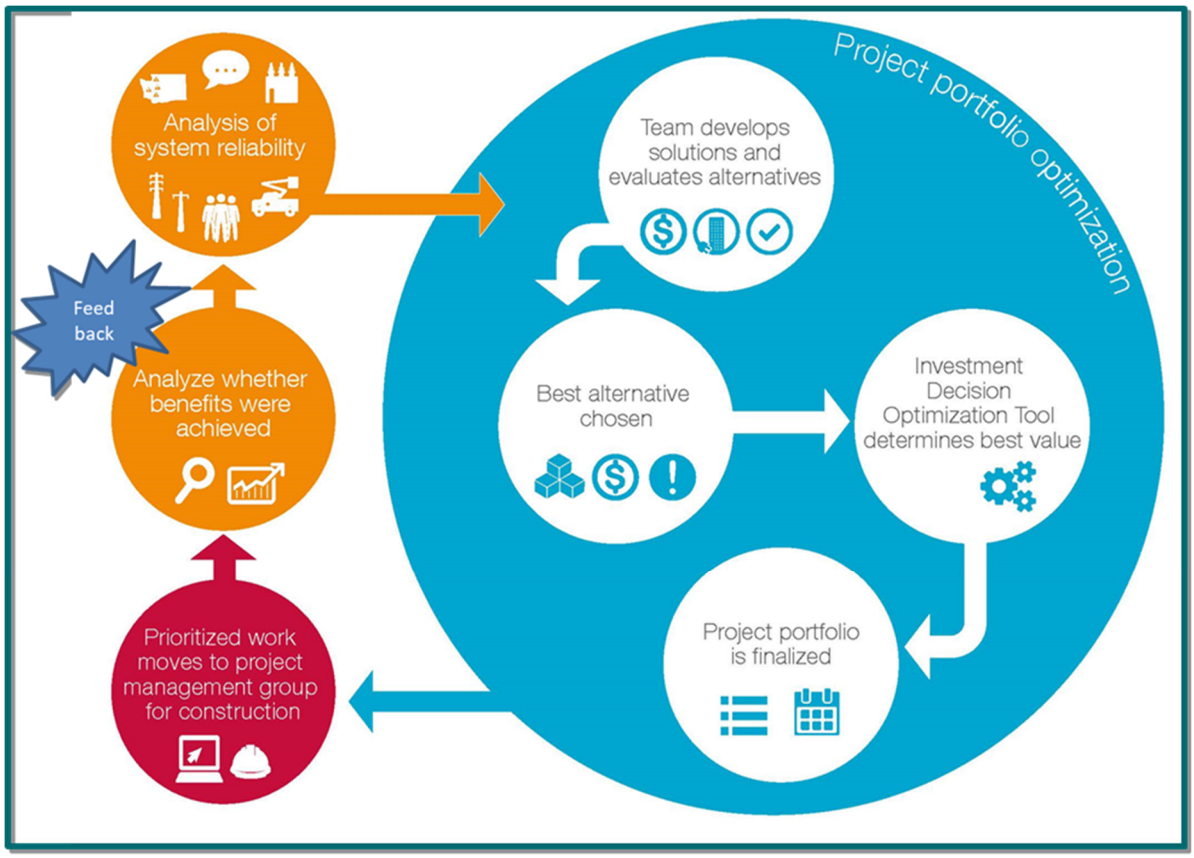

Figure 3q: Benefit analysis feedback in the system planning process

Going Forward[48]

Program benefit validation from the reliability improvement verification analysis indicates that continuing to implement electric system improvements will continue to benefit customers through improved reliability. An analysis using data from the IEEE reliability benchmarking study, the econometric benchmarking study initiated by the UTC staff in 2017 and results from the Interruption Cost Estimate (ICE) Calculator, developed by Lawrence Berkeley National Laboratory and Nexant Inc, suggests that achieving a SQI #3 SAIDI of 110 – 125 minutes and SQI #4 SAIFI 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 such as electric vehicles and distributed energy resources.

[48] This section meets a requirement of Attachment B of Docket UE-110060.

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. These reliability solutions are described in **Appendix P**: *Reliability Program Category Descriptions*. An example of a new technology being leveraged for reliability is the use of the AMI network for distribution automation telecommunications. Future technologies that may improve reliability will come from PSE's implementation of an Advanced Distribution Management System ("ADMS") 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. Finally, to achieve long term goals, reliability planning and performance considerations will be enhanced by integration of Customer Benefit Indicators, equity, and named communities into PSE's planning process in the coming year.

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 2022 can be found in **Table 3f**.

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 2021	Feb 2021	Mar 2021	Apr 2021	May 2021	Jun 2021	Jul 2021	Aug 2021	Sep 2021	Oct 2021	Nov 2021	Dec 2021
Customer Satisfaction	2	WUTC Complaint Ratio	0.40 complaints per 1000 customers, including all complaints filed with WUTC	0.006	0.009	0.011	0.008	0.010	0.011	0.011	0.004	0.007	0.008	0.007	0.011
	6	Telephone Center Transactions Customer Satisfaction	90% satisfied (rating of 5 or higher on a 7-point scale)	94%	95%	97%	96%	94%	95%	95%	97%	95%	93%	94%	96%
	8	Field Service Operations Transactions Customer Satisfaction	90% satisfied (rating of 5 or higher on a 7-point scale)	97%	97%	97%	98%	98%	98%	96%	96%	95%	93%	95%	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	56%	88%	88%	75%	88%	83%	90%	90%	88%	76%	76%	85%
Operations Services	4	SAIFI	1.30 interruptions per year per customer	0.10	0.11	0.06	0.08	0.09	0.16	0.08	0.09	0.11	0.14	0.19	0.13
	3	SAIDI	155 minutes per customer per year	14	16	9	9	11	20	12	15	16	22	39	25
	7	Gas Safety Response Time	Average of 55 minutes from customer call to arrival of field technician	33	33	32	31	32	31	32	32	33	32	32	34
	10	Kept Appointments[Note]	92% of appointments kept	99%	100%	99%	100%	100%	100%	99%	99%	99%	99%	99%	98%
	11	Electric Safety Response Time	Average of 55 minutes from customer call to arrival of field technician	52	53	49	51	52	55	63	63	67	77	97	98

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 2021	Feb 2021	Mar 2021	Apr 2021	May 2021	Jun 2021	Jul 2021	Aug 2021	Sep 2021	Oct 2021	Nov 2021	Dec 2021
Operations Services	Service Provider New Customer Construction Appointments Kept[Note1]	Quanta Electric	At least 92% of appointments kept Note 1	100%	100%	99%	100%	99%	99%	97%	99%	100%	99%	100%	100%
		Quanta Gas	At least 92% of appointments kept Note 1	100%	100%	99%	99%	100%	99%	98%	100%	100%	100%	100%	99%
	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	2.96	3.21	5.49	6.04	4.45	4.18	3.13	0.00	4.37	0.00	0.00
		Quanta Electric	Level 2 inspection items: ≤ 25 deviations/1000 items inspected Note 2	0.00	6.53	4.15	1.57	6.26	2.84	5.66	0.00	1.61	4.04	9.62	0.00
		Quanta Electric	Level 3 inspection items: ≤ 205deviations/1000 items inspected Note 2	12.80	15.37	4.47	4.76	14.58	7.46	9.68	5.53	7.87	9.52	6.90	12.80
		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	3.59	4.18	6.43	20.29	12.95	2.63	12.53	5.58	11.02	7.67	0.00	3.59
		Quanta Gas	Level 2 inspection items: ≤ 15 deviations/1000 items inspected Note 2	11.57	10.56	8.34	14.47	8.55	9.50	4.43	8.48	12.52	7.83	2.16	11.57

Category of Service	Index	Service Provider	Annual Benchmark Description	Jan 2021	Feb 2021	Mar 2021	Apr 2021	May 2021	Jun 2021	Jul 2021	Aug 2021	Sep 2021	Oct 2021	Nov 2021	Dec 2021
		Quanta Gas	Level 3 inspection items: ≤ 12 deviations/1000 items inspected [Note 2]	2.15	8.99	8.26	10.79	5.52	2.88	0.00	0.00	4.13	2.42	0.00	2.15
	Secondary Safety Response and Restoration Time-Core-Hour	Quanta Electric	Within 250 minutes from the dispatch time to the restoration of non-emergency outage during core hours	238.48	229.02	231.27	232.53	219.23	248.78	236.97	252	237	263	262	238.48
	Secondary Safety Response and Restoration Time-Non-Core-Hour	Quanta Electric	Within 316 minutes from the dispatch time to the restoration of non-emergency outage during non-core hours	241.03	257.30	239.40	246.20	249.08	256.73	254	271	254	295	332	241.03
	Secondary Safety Response Time	Quanta Gas	Within 60 minutes from first response assessment completion to second response arrival	55.9	45.8	48.1	55.6	51.4	49.5	66.0	48.5	50.1	67.6	68.6	55.9

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[49]
1/2/2021	Wind	Northern	1	6,180	209,363	3.0%	68	11 of 15	No	11 EFRs, 3 Reg Day Off, 10 Line Crews, 2 Tree Crews
1/2/2021	Wind	Western	1	11,989	131,789	9.1%	38	11 of 12	No	11 EFRs, 1 Reg Day Off, 7 Line Crews, 9 Tree Crews
01/04/2021	Wind	Western	1	837	131,789	0.6%	11	11 of 12	No	11 EFRs, 1 PTO, 5 Line Crews, 0 Tree Crews
01/05/2021	Wind	Northern	1	10,338	209,363	4.9%	31	15 of 15	No	15 EFRs, 8 Line Crews, 2 Tree Crews
01/08/2021	Wind	South King	1	2,135	249,372	0.9%	15	11 of 12	No	11 EFRs, 1 PTO, 8 Line Crews, 2 Tree Crews
1/12/2021	Wind	Northern	6	95,857	209,363	45.8%	537	15 of 15	Yes	15 Event Duty, 31 Line Crews, 10 Tree Crews
1/12/2021	Wind/Rain	North King	6	116,697	330,729	35.3%	489	24 of 24	Yes	24 Event Duty, 36 Line Crews, 14 Tree Crews
1/12/2021	Wind/Rain	South King	6	74,049	249,372	29.7%	277	12 of 12	Yes	12 Event Duty, 6 Line Crews, 5 Tree Crews
1/12/2021	Wind/Rain	Southern	6	114,230	263,788	43.3%	469	15 of 15	Yes	15 Event Duty, 42 Line Crews, 8 Tree Crews
1/12/2021	Wind/Rain	Western	6	46,311	131,789	35.1%	180	11 of 11	Yes	11 Event Duty, 3 Line Crew, 11 Tree Crew
2/11/2021	Wind/Snow	Northern	1	5,059	209,458	2.4%	51	13 of 15	No	13 EFRs, 2 Reg Day Off, 8 Line Crews, 5 Tree Crews

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[49] **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)

This Attachment A to Appendix A provides detail on 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[50]
2/13/2021	Heavy Snow	Northern	1	5,648	209,458	2.7%	32	10 of 15	No	10 EFRs, 2 PTO, 3 Reg day Off, 8 Line Crews, 2 Tree Crews
2/13/2021	Heavy Snow	North King	1	6,052	330,882	1.8%	39	18 of 24	No	18 EFRs, 6 Reg Day Off, 10 Line Crews, 3 Tree Crews
2/13/2021	Heavy Snow	South King	1	10,122	249,565	4.1%	63	12 of 13	No	12 EFRs, 1 Reg Day Off, 13 Line Crews, 4 Tree Crews
2/13/2021	Heavy Snow	Southern	1	7,890	264,006	3.0%	56	12 of 13	No	12 EFRs, 1 PTO, 3 Reg Day off, 6 Line Crews, 5 Tree Crews
2/13/2021	Heavy Snow	Western	1	1,660	131,808	1.3%	22	10 of 11	No	10 EFRs, 1 Reg Day Off, 3 Line Crews, 3 Tree Crews
2/14/2021	Heavy Snow	Northern	1	3,496	209,458	1.7%	22	12 of 15	No	12 EFRs, 3 Reg Day Off, 8 Line Crews, 2 Tree Crews
2/14/2021	Heavy Snow	South King	1	938	249,565	0.4%	12	12 of 13	No	12 EFRs, 1 Reg Day Off, 13 Line Crews, 2 Tree Crews
2/14/2021	Heavy Snow	Western	1	3,816	131,808	2.9%	17	9 of 11	No	9 EFRs, 2 Reg Day off, 5 Line Crews
2/15/2021	Wind/Snow	North King	1	3,932	330,882	1.2%	22	12 of 23	No	12 EFRs, 11 PTO, 9 Line Crews, 1 Tree Crew
2/15/2021	Wind/Snow	South King	1	2,695	249,565	1.1%	23	8 of 13	No	8 EFRs, 3 PTO, 2 Reg Day Off, 13 Line Crews, 1 Tree Crew
2/21/2021	Wind/Snow	Western	1	1,771	131,808	1.3%	16	10 of 15	No	10 EFRs, 5 PTO, 1 Reg Day Off, 5 Line Crews
2/26/2021	Wind/Snow	Southern	1	5,783	264,006	2.2%	16	12 of 15	No	12 EFRs, 1 PTO, 2 Reg Day off, 5 Line Crews

Table continues on next page.

[50] **EFR**—Electric First Responder, **PTO**—Paid Time 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[51]
3/28/2021	Wind/Snow	Northern	1	4,855	209,595	2.3%	52	12 of 15	No	12 EFRs, 1 PTO, 2 Reg Day off, 8 Line Crews, 4 Tree Crews
3/28/2021	Wind/Snow	South King	1	1,409	249,927	0.6%	14	6 of 13	No	6 EFRs, 7 Reg Day off, 8 Line Crews, 1 Tree Crew
3/28/2021	Wind/Snow	Southern	1	3,756	264,419	1.42%	16	9 of 16	No	9 EFRs, 1 PTO, 6 Reg Day off, 5 Line Crews, 2 Tree Crews
5/6/2021	Wind	Western	1	3,532	132,149	2.7%	21	10 of 11	No	10 EFRs, 1 PTO, 6 Line Crews
5/27/2021	Wind	Northern	1	5,218	210,277	2.5%	26	14 of 15	No	14 EFRs, 1 PTO, 8 Line Crews, 5 Tree Crews
5/27/2021	Wind	South King	1	6,644	250,788	2.6%	32	12 of 13	No	12 EFRs, 1 PTO, 9 Line Crews, 3 Tree Crews
5/27/2021	Wind	Southern	1	3,490	265,788	1.3%	23	10 of 15	No	10 EFRs, 4 PTO, 1 Reg Day Off, 4 Line Crews, 2 Tree Crews
6/5/2021	Wind	Western	1	4,990	132,302	3.8%	14	8 of 11	No	8 EFRs, 3 PTO, 5 Line Crews, 2 Tree Crews
6/26/2021	Extreme Heat	Northern	1	6,536	210,499	3.1%	32	9 of 15	No	9 EFRs, 2 PTO, 4 Reg Day Off, 8 Line Crews, 2 Tree Crews
6/26/2021	Extreme Heat	South King	1	477	251,091	0.2%	19	9 of 13	No	9 EFRs, 4 Reg Day Off, 10 Line Crews, 1 Tree Crew
6/26/2021	Extreme Heat	Southern	1	553	266,274	0.2%	22	7 of 16	No	7 EFRs, 1 PTO, 8 Reg Day Off, 3 Line Crews, 1 Tree Crew
6/26/2021	Extreme Heat	Western	1	13,977	132,302	10.6%	19	9 of 11	No	9 EFRs, 2 Reg Day Off, 5 Line Crews, 2 Tree Crews

Table continues on next page.

[51] **EFR**—Electric First Responder, **PTO**—Paid Time 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[52]
6/27/2021	Extreme Heat	Northern	1	1,996	210,499	0.9%	31	8 of 15	No	8 EFRs, 2 PTO, 5 Reg Day Off, 8 Line Crews, 2 Tree Crews
6/27/2021	Extreme Heat	North King	1	19,445	333,289	5.8%	73	15 of 25	No	15 EFRs, 10 Reg Day Off, 12 Line Crews, 1 Tree Crew
6/27/2021	Extreme Heat	South King	1	1,939	251,091	0.8%	44	8 of 13	No	8 EFRs, 1 PTO, 4 Reg Day Off, 11 Line Crews, 1 Tree Crew
6/27/2021	Extreme Heat	Southern	1	1,228	266,274	0.5%	34	7 of 16	No	7 EFRs, 9 Reg Day off, 3 Line Crews, 1 Tree Crew
6/28/2021	Extreme Heat	Northern	1	1,674	210,499	0.8%	30	11 of 15	No	11 EFRs, 3 PTO, 1 Reg Day Off, 8 Line Crews, 3 Tree Crews
6/28/2021	Extreme Heat	North King	1	4,786	333,289	1.4%	86	20 of 26	No	20 EFRs, 2 PTO, 4 Reg Day Off, 12 Line Crews, 7 Tree Crews
6/28/2021	Extreme Heat	South King	1	15,462	251,091	6.2%	55	11 of 13	No	11 EFRs, 2 PTO, 11 Line Crews, 1 Tree Crew
6/28/2021	Extreme Heat	Southern	1	6,928	266,274	2.6%	38	13 of 16	No	13 EFRs, 1 PTO, 2 Reg Day Off, 4 Line Crews, 3 Tree Crews
6/29/2021	Extreme Heat	North King	1	2,829	333,289	0.8%	30	24 of 26	No	24 EFRs, 1 PTO, 1 Reg Day Off, 10 Line Crews, 4 Tree Crews
6/29/2021	Extreme Heat	South King	1	233	251,091	0.1%	18	13 of 13	No	13 EFRs, 10 Line Crews, 1 Tree Crew
8/6/2021	Wind	South King	1	3,642	251,305	1.4%	15	10 of 12	No	10 EFRs, 2 PTO, 8 Line Crews, 1 Tree Crew
8/7/2021	Wind	South King	1	1,639	251,305	0.7%	14	7 of 12	No	7 EFRs, 2 PTO, 3 Reg Day Off, 8 Line Crews, 1 Tree Crew

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[52] **EFR**—Electric First Responder, **PTO**—Paid Time 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[53]
9/17/2021	Wind/ Rain	Northern	3	59,424	211,011	28.2%	271	15 of 15	Yes	15 Event Duty, 20 Line Crews, 7 Tree Crews
9/17/2021	Wind/ Rain	North King	3	16,723	351,123	4.8%	72	24 of 24	Yes	24 Event Duty, 4 Line Crews, 3 Tree Crews
9/17/2021	Wind/ Rain	South King	3	43,307	253,733	17.1%	129	12 of 12	Yes	12 Event Duty, 13 Line Crews, 2 Tree Crews
9/17/2021	Wind/ Rain	Southern	3	39,284	265,371	14.8%	132	15 of 15	Yes	15 Event Duty, 12 Line Crews, 2 Tree Crews
9/17/2021	Wind/ Rain	Western	3	8,035	132,671	6.1%	48	11 of 11	Yes	11 Event Duty, 6 Line Crews, 4 Tree Crews
9/26/2021	Wind	Western	1	1,542	132,671	1.2%	12	5 of 11	No	5 EFRs, 6 Reg Day off, 8 Line Crews, 1 Tree Crew
9/27/2021	Wind	Western	1	1,380	132,671	1.0%	18	11 of 11	No	11 EFRs, 8 Line Crews, 1 Tree Crew
10/21/2021	Wind/ Rain	South King	1	15,318	256,251	6.0%	27	10 of 12	No	10 EFRs, 1 PTO, 1 Reg Day off, 11 Line Crews, 3 Tree Crews
10/24/2021	Wind/ Rain	Northern	4	19,309	211,248	9.1%	95	15 of 15	Yes	15 Event Duty, 7 Line Crews, 3 Tree Crews
10/24/2021	Wind/ Rain	North King	4	107,862	332,919	32.4%	273	24 of 24	Yes	24 Event Duty, 19 Line Crews, 11 Tree Crews
10/24/2021	Wind/ Rain	South King	4	41,153	256,251	16.1%	194	12 of 12	Yes	12 Event Duty, 15 Line Crews, 5 Tree Crews
10/24/2021	Wind/ Rain	Southern	4	31,463	263,957	11.9%	167	15 of 15	Yes	15 Event Duty, 20 Line Crews, 4 Tree Crews

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[53] **EFR**—Electric First Responder, **PTO**—Paid Time 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[54]
10/24/2021	Wind/ Rain	Western	4	45,751	132,782	34.5%	165	11 of 11	Yes	11 Event Duty, 13 Line Crews, 7 Tree Crews
11/4/2021	Wind/ Rain	Western	1	1,270	132,903	1.0%	15	12 of 13	No	12 EFRs, 1 STD, 10 Line Crews, 1 Tree Crew
11/9/2021	Wind/ Rain	Northern	1	6,205	211,472	2.9%	37	12 of 15	No	12 EFRs, 3 PTO, 8 Line Crews, 4 Tree Crews
11/9/2021	Wind/ Rain	South King	1	3,891	256,420	1.5%	19	12 of 13	No	12 EFRs, 1 PTO, 10 Line Crews, 3 Tree Crews
11/9/2021	Wind/ Rain	Western	1	13,621	132,903	10.2%	58	12 of 13	No	12 EFRs, 1 STD, 14 Line Crews, 7 Tree Crews
11/11/2021	Wind/ Rain	Western	1	1,428	132,903	1.1%	17	10 of 12	No	10 EFRs, 1 PTO, 1 STD, 1 Covering Safety meeting, 10 Line Crews, 1 Tree Crew
11/12/2021	Wind/ Rain	Western	1	774	132,903	0.6%	12	9 of 12	No	9 EFRs, 2 PTO, 1 STD, 1 Reg Day Off, 10 Line Crews, 6 Tree Crews
11/14/2021	Wind/ Rain	Northern	5	70,394	211,472	33.3%	18	15 of 15	Yes	15 Event Duty, 26 Line Crews, 4 Tree Crews
11/14/2021	Wind/ Rain	North King	5	46,050	333,277	13.8%	31	22 of 22	Yes	22 Event Duty, 6 Line Crews, 4 Tree Crews
11/14/2021	Wind/ Rain	South King	5	55,809	256,420	21.8%	17	13 of 13	Yes	13 Event Duty, 6 Line Crews, 4 Tree Crews
11/14/2021	Wind/ Rain	Southern	5	65,938	264,322	24.9%	10	16 of 16	Yes	16 Event Duty, 33 Line Crews, 7 Tree Crews
11/14/2021	Wind/ Rain	Western	5	28,366	132,903	21.3%	50	14 of 14	Yes	14 Event Duty, 4 Line Crews, 7 Tree Crews

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[54] **EFR**—Electric First Responder, **PTO**—Paid Time 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[55]
11/25/2021	Wind/ Rain	Northern	1	4,626	211,472	2.2%	20	8 of 15	No	8 EFRs, 7 PTO, 8 Line Crews, 1 Tree Crew
11/27/2021	Wind/ Rain	Northern	1	2,676	211,472	1.3%	16	8 of 15	No	8 EFRs, 2 PTO, 5 Reg Day Off, 8 Line Crews, 2 Tree Crews
12/10/2021	Wind	Western	1	338	133,076	0.3%	12	9 of 12	No	9 EFRs, 2 PTO, 1 STD, 2 Reg Day off, 9 Line Crews, 2 Tree Crews
12/11/2021	Wind	Northern	1	10,729	211,725	5.1%	53	11 of 14	No	11 EFRs 1 PTO, 2 Reg Day Off, 8 Line Crews, 5 Tree Crews
12/11/2021	Wind	Southern	1	13,614	264,769	5.1%	70	11 of 16	No	11 EFRs, 5 Reg Day Off, 8 Line Crews, 6 Tree Crews
12/11/2021	Wind	Western	1	19,435	133,076	14.6%	42	6 of 11	No	6 EFRs, 1 PTO, 4 Reg Day off, 7 Line Crews, 2 Tree Crews
12/18/2021	Wind	South King	1	5,216	256,548	2.0%	14	8 of 13	No	8 EFRs, 1 PTO, 4 Reg Day Off, 10 Line Crews, 2 Tree Crews
12/18/2021	Wind	Southern	1	3,105	264,769	1.2%	34	10 of 16	No	10 EFRs, 6 Reg Day Off, 9 Line Crews, 1 Tree Crew
12/18/2021	Wind	Western	1	1,831	133,076	1.4%	11	10 of 13	No	10 EFRs, 1 STD, 2 Reg Day Off, 9 Line Crews, 1 Tree Crew
12/25/2021	Snow/ Ice	Northern	1	12,700	211,725	6.0%	70	10 of 15	No	10 EFRs, 1 PTO, 4 Reg Day off, 11 Line Crews, 7 Tree Crews
12/26/2021	Snow/ Ice	Northern	1	17,210	211,725	8.1%	91	12 of 15	No	12 EFRs, 2 PTO, 1 Reg Day Off, 22 Line Crews, 7 Tree Crews
12/26/2021	Snow/ Ice	Southern	1	1,307	264,769	0.5%	17	10 of 15	No	10 EFRs, 5 PTO, 11 Reg Day Off, 9 Line Crews, 1 Tree Crew

Table continues on next page.

[55] **EFR**—Electric First Responder, **PTO**—Paid Time 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[56]
12/26/2021	Snow/ Ice	Western	1	1,658	133,076	1.2%	15	9 of 14	No	9 EFRs, 1 STD, 4 Reg Day off, 9 Line Crews
12/27/2021	Snow/ Ice	Northern	1	1,358	211,725	0.6%	48	11 of 15	No	11 EFRs, 4 PTO, 26 Line Crews, 7 Tree Crews
12/27/2021	Snow/ Ice	Western	1	3,167	133,076	2.4%	13	11 of 14	No	11 EFRs, 2 PTO, 1 STD, 12 Line Crews, 2 Tree Crews
12/28/2021	Snow/ Ice	Northern	1	1,649	211,725	0.8%	26	11 of 15	No	11 EFRs, 4 PTO, 26 Line Crews, 7 Tree Crews
12/30/2021	Snow/ Ice	Northern	1	12,080	211,725	5.7%	32	12 of 15	No	12 EFRs, 3 PTO, 12 Line Crews, 4 Tree Crews

[56] **EFR**—Electric First Responder, **PTO**—Paid Time Off, **STD**—Short-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
1/2/2021	Wind	North King	1	1,030	330,729	0.31%	12		No	
1/2/2021	Wind	South King	1	3,886	249,372	1.56%	10		No	
1/2/2021	Wind	Southern	1	639	263,788	0.24%	5		No	
1/4/2021	Wind	Northern	1	1,805	209,363	0.86%	16		No	
1/4/2021	Wind	North King	1	292	330,729	0.09%	9		No	
1/4/2021	Wind	South King	1	168	249,372	0.07%	13		No	
1/4/2021	Wind	Southern	1	1,300	263,788	0.49%	13		No	
1/5/2021	Wind	North King	1	272	330,729	0.08%	5		No	
1/5/2021	Wind	South King	1	294	249,372	0.12%	7		No	
1/5/2021	Wind	Southern	1	939	263,788	0.36%	10		No	
1/5/2021	Wind	Western	1	92	131,789	0.07%	6		No	
1/8/2021	Wind	Northern	1	4,575	209,363	2.19%	5		No	

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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
1/8/2021	Wind	Northern	1	4,575	209,363	2.19%	5		No	
1/8/2021	Wind	North King	1	572	330,729	0.17%	18		No	
1/8/2021	Wind	Southern	1	11	263,788	0.00%	5		No	
1/8/2021	Wind	Western	1	10	131,789	0.01%	3		No	
2/11/2021	Wind/Snow	North King	1	17	330,882	0.01%	9		No	
2/11/2021	Wind/Snow	South King	1	2	249,565	0.00%	2		No	
2/11/2021	Wind/Snow	Southern	1	604	264,006	0.23%	11		No	
2/11/2021	Wind/Snow	Western	1	9	131,808	0.01%	3		No	
2/14/2021	Heavy Snow	North King	1	155	330,882	0.05%	11		No	
2/14/2021	Heavy Snow	Southern	1	3,020	264,006	1.14%	7		No	
2/15/2021	Wind/Snow	Northern	1	1,055	209,458	0.50%	10		No	
2/15/2021	Wind/Snow	Southern	1	258	264,006	0.10%	9		No	
2/15/2021	Wind/Snow	Western	1	5	131,808	0.00%	3		No	
2/21/2021	Wind/Snow	Northern	1	680	209,458	0.32%	13		No	

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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
2/21/2021	Wind/Snow	North King	1	7,874	330,882	2.38%	13		No	
2/21/2021	Wind/Snow	South King	1	2	249,565	0.00%	2		No	
2/21/2021	Wind/Snow	Southern	1	18	264,006	0.01%	3		No	
2/26/2021	Wind/Snow	Northern	1	475	209,458	0.23%	12		No	
2/26/2021	Wind/Snow	North King	1	45	330,882	0.01%	11		No	
2/26/2021	Wind/Snow	South King	1	4	249,565	0.00%	2		No	
2/26/2021	Wind/Snow	Western	1	15	131,808	0.01%	4		No	
3/28/2021	Wind/Snow	North King	1	990	331,323	0.30%	12		No	
3/28/2021	Wind/Snow	Western	1	333	131,857	0.25%	10		No	
5/6/2021	Wind	Northern	1	2,469	210,277	1.17%	13		No	
5/6/2021	Wind	North King	1	1,082	332,936	0.32%	8		No	
5/6/2021	Wind	South King	1	686	250,788	0.27%	6		No	
5/6/2021	Wind	Southern	1	358	265,788	0.13%	15		No	
5/27/2021	Wind	North King	1	4,629	332,936	1.39%	21		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
5/27/2021	Wind	Western	1	2,985	132,149	2.26%	20		No	
6/5/2021	Wind	Northern	1	146	210,499	0.07%	7		No	
6/5/2021	Wind	North King	1	2,631	333,289	0.79%	15		No	
6/5/2021	Wind	South King	1	1,158	251,091	0.46%	9		No	
6/5/2021	Wind	Southern	1	81	266,274	0.03%	9		No	
6/26/2021	Extreme Heat	North King	1	2,054	333,289	0.6%	41		No	
6/26/2021	Extreme Heat	Western	1	7,880	132,302	6.0%	11		No	
6/26/2021	Extreme Heat	Western	1	60	132,302	0.0%	9		No	
6/29/2021	Extreme Heat	Northern	1	54	210,499	0.0%	11		No	
6/29/2021	Extreme Heat	Southern	1	178	266,274	0.1%	11		No	
6/29/2021	Extreme Heat	Western	1	963	132,302	0.7%	13		No	
8/6/2021	Wind	Northern	1	73	210,833	0.03%	9		No	
8/6/2021	Wind	North King	1	423	333,546	0.13%	14		No	
8/6/2021	Wind	Southern	1	1,128	266,854	0.42%	10		No	

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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
8/6/2021	Wind	Western	1	178	132,532	0.13%	9		No	
8/7/2021	Wind	Northern	1	650	210,833	0.31%	13		No	
8/7/2021	Wind	North King	1	1,199	333,546	0.36%	14		No	
8/7/2021	Wind	Southern	1	377	266,854	0.14%	12		No	
8/7/2021	Wind	Western	1	4,537	132,532	3.42%	9		No	
9/26/2021	Wind	Northern	1	3,436	211,011	1.63%	10		No	
9/26/2021	Wind	North King	1	233	351,123	0.07%	9		No	
9/26/2021	Wind	Southern	1	281	265,371	0.11%	4		No	
9/26/2021	Wind	South King	1	1,199	253,733	0.47%	7		No	
9/27/2021	Wind	Northern	1	282	211,011	0.13%	17		No	
9/27/2021	Wind	North King	1	12,912	351,123	3.68%	16		No	
9/27/2021	Wind	Southern	1	30,375	265,371	11.45%	28		No	
9/27/2021	Wind	South King	1	1,120	253,733	0.44%	9		No	
10/21/2021	Wind/Rain	Northern	1	1,506	211,248	0.71%	14		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
10/21/2021	Wind/Rain	North King	1	3,187	332,919	0.96%	33		No	
10/21/2021	Wind/Rain	Southern	1	492	263,957	0.19%	10		No	
10/21/2021	Wind/Rain	Western	1	364	132,782	0.27%	9		No	
11/4/2021	Wind/Rain	Northern	1	1,416	211,472	0.67%	20		No	
11/4/2021	Wind/Rain	North King	1	1,278	333,277	0.38%	20		No	
11/4/2021	Wind/Rain	South King	1	3,119	256,420	1.22%	10		No	
11/4/2021	Wind/Rain	Southern	1	9,790	264,322	3.70%	17		No	
11/9/2021	Wind/Rain	North King	1	27,498	333,277	8.25%	62		No	
11/9/2021	Wind/Rain	Southern	1	2,799	264,322	1.06%	28		No	
11/11/2021	Wind/Rain	Northern	1	105	211,472	0.05%	7		No	
11/11/2021	Wind/Rain	North King	1	3,230	333,277	0.97%	15		No	
11/11/2021	Wind/Rain	South King	1	1,664	256,420	0.65%	11		No	
11/11/2021	Wind/Rain	Southern	1	1,501	264,322	0.57%	14		No	
11/12/2021	Wind/Rain	Northern	1	95	211,472	0.04%	9		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
11/12/2021	Wind/Rain	North King	1	266	333,277	0.08%	11		No	
11/12/2021	Wind/Rain	South King	1	376	256,420	0.15%	16		No	
11/12/2021	Wind/Rain	Southern	1	793	264,322	0.30%	10		No	
11/25/2021	Wind/Rain	North King	1	487	333,277	0.15%	6		No	
11/25/2021	Wind/Rain	South King	1	367	256,420	0.14%	5		No	
11/25/2021	Wind/Rain	Southern	1	2,168	264,322	0.82%	4		No	
11/25/2021	Wind/Rain	Western	1	1,281	132,903	0.96%	7		No	
11/27/2021	Wind/Rain	North King	1	138	333,277	0.04%	9		No	
11/27/2021	Wind/Rain	South King	1	436	256,420	0.17%	3		No	
11/27/2021	Wind/Rain	Southern	1	1,138	264,322	0.43%	5		No	
11/27/2021	Wind/Rain	Western	1	4,812	132,903	3.62%	7		No	
12/10/2021	Wind	Northern	1	2,594	211,725	1.23%	14		No	
12/10/2021	Wind	North King	1	594	333,577	0.18%	14		No	
12/10/2021	Wind	South King	1	4	256,548	0.00%	1		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
12/10/2021	Wind	Southern	1	1,789	264,769	0.68%	5		No	
12/11/2021	Wind	North King	1	9,113	333,577	2.73%	35		No	
12/11/2021	Wind	South King	1	871	256,548	0.34%	11		No	
12/18/2021	Wind	Northern	1	1,698	211,725	0.80%	12		No	
12/18/2021	Wind	North King	1	1,723	333,577	0.52%	9		No	
12/25/2021	Snow/Ice	North King	1	117	333,577	0.04%	6		No	
12/25/2021	Snow/Ice	South King	1	889	256,548	0.35%	2		No	
12/25/2021	Snow/Ice	Southern	1	180	264,769	0.07%	7		No	
12/25/2021	Snow/Ice	Western	1	485	133,076	0.36%	3		No	
12/26/2021	Snow/Ice	North King	1	2,927	333,577	0.88%	16		No	
12/26/2021	Snow/Ice	South King	1	1,118	256,548	0.44%	7		No	
12/27/2021	Snow/Ice	North King	1	822	333,577	0.25%	18		No	
12/27/2021	Snow/Ice	South King	1	218	256,548	0.08%	7		No	
12/27/2021	Snow/Ice	Southern	1	576	264,769	0.22%	12		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
12/28/2021	Snow/Ice	North King	1	1,339	333,577	0.40%	9		No	
12/28/2021	Snow/Ice	South King	1	297	256,548	0.12%	11		No	
12/28/2021	Snow/Ice	Southern	1	1,898	264,769	0.72%	12		No	
12/28/2021	Snow/Ice	Western	1	19	133,076	0.01%	5		No	
12/30/2021	Snow/Ice	North King	1	468	333,577	0.14%	15		No	
12/30/2021	Snow/Ice	South King	1	2,247	256,548	0.88%	16		No	
12/30/2021	Snow/Ice	Southern	1	7,878	264,769	2.98%	16		No	
12/30/2021	Snow/Ice	Western	1	135	133,076	0.10%	6		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.[57]

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
1/3/2021	Snoqualmie	38776 SE Newton St	15:49	16:19	18:53	2:34
1/6/2021	Seattle	1821 NE 52nd St	11:43	12:05	12:17	0:12
1/7/2021	Mountlake Terrace	4604 238th Pl SW	15:29	15:49	16:07	0:18
1/8/2021	Tacoma	E 54 St & A St	10:07	10:31	12:05	1:34
1/13/2021	Seattle	2255 Harbor Ave SW	7:28	7:41	8:19	0:38
1/13/2021	Kenmore	16450 Juanita Dr NE	11:10	11:35	12:39	1:04
1/19/2021	Seattle	4824 S Austin St	11:23	11:40	11:54	0:14
1/20/2021	Tacoma	20 Tacoma Ave S	23:09	23:39	3:22	3:43
1/22/2021	Tacoma	4721 N Orchard St	11:55	12:05	14:21	2:16
2/8/2021	Seattle	1305 NE 43RD ST	20:13	20:51	20:51	0:00
2/12/2021	Seattle	7300 Airport Way S	14:02	14:09	15:31	1:22
2/18/2021	Marysville	10118 Stave Ave	13:42	14:20	18:04	3:44
2/24/2021	Seattle	2765 E Cherry St.	11:12	11:19	13:55	2:36

Table continues on next page.

[57] 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
3/16/2021	Tukwila	3725 S 144th St	13:41	14:07	14:22	0:15
3/18/2021	Bothell	15322 107th Pl NE	11:12	11:20	11:27	0:07
3/22/2021	Redmond	16225 NE 87th ST	13:25	13:42	14:05	0:23
3/22/2021	Seattle	8402 6th Ave SW	17:33	17:50	17:58	0:08
3/31/2021	Olympia	4700 Lakemont Dr SE	13:35	14:09	14:20	0:11
3/31/2021	Kent	7600 S 212th St	17:58	18:28	19:40	1:12
4/13/2021	Seattle	8019 18th Ave NW	14:24	14:41	14:47	0:06
4/14/2021	Renton	6304 SE 2nd Pl	9:16	9:45	10:29	0:44
4/21/2021	Auburn	1628 Knickerbocker Drive	6:03	6:57	7:15	0:18
4/27/2021	Olympia	6021 GLENWOOD DR SW	18:37	18:51	19:02	0:11
4/29/2021	Bellevue	3110 127TH AVE NE	10:48	11:34	18:58	7:24
4/30/2021	Tacoma	2315 S Fawcett Ave	12:11	12:11	12:27	0:16
5/1/2021	Seattle	960 Republican St	9:36	10:08	11:35	1:27
5/5/2021	Seattle	1151 Fairview Ave N	14:59	15:13	15:45	0:32
5/11/2021	North Bend	42212 SE 166th Pl	20:08	20:37	20:44	0:07
5/16/2021	Everett	4408 121st Pl SE	13:23	14:04	14:27	0:23
5/23/2021	Seattle	1203 NW Norcross Way	16:05	16:27	16:27	0:00
5/25/2021	Seattle	9738 14th Ave NW	13:12	13:24	13:32	0:08

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
6/3/2021	Lakewood	13204 Country Club Dr SW	15:30	16:09	23:24	7:15
6/8/2021	Lynnwood	6024 200th ST SW	9:06	9:15	10:13	0:58
6/10/2021	Monroe	15729 170th Dr SE	12:33	13:10	13:18	0:08
6/11/2021	Seattle	7715 Aurora Ave N	14:10	14:34	14:47	0:13
6/16/2021	Milton	1617 Emerald St	9:27	10:05	10:13	0:08
6/21/2021	Fall City	4330 Preston Fall City Rd SE	21:34	22:00	22:00	0:00
6/22/2021	Seattle	7716 Delridge Way SW	14:01	14:23	14:30	0:07
6/25/2021	Tacoma	5225 s Thompson Ave	9:33	9:47	9:58	0:11
6/28/2021	North Bend	228 W North Bend Way	9:36	9:49	10:12	0:23
7/7/2021	Tacoma	5401 Pacific Ave	19:20	19:26	19:32	0:06
7/12/2021	Seattle	2715 California Ave SW	10:26	10:55	15:16	4:21
7/21/2021	Bellevue	450 110th Ave NE	13:40	14:04	14:47	0:43
7/22/2021	Marysville	6016 97th ST NE	13:05	13:31	13:57	0:26
7/27/2021	Kenmore	6145 NE 194th PL	12:24	13:02	13:13	0:11
7/28/2021	Kent	19006 72nd Ave S	13:21	13:37	13:50	0:13
7/29/2021	Edmonds	9120 Main St	10:39	10:58	11:05	0:07
8/3/2021	Puyallup	2606 Pioneer Way E	13:02	13:21	18:15	4:54

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
8/10/2021	Bellevue	1248 112th Ave NE	16:03	16:24	16:41	0:17
8/11/2021	Sammamish	22313 NE 30th ST	10:58	11:19	11:25	0:06
8/20/2021	Redmond	11716 238th Pl NE	12:57	13:56	15:40	1:44
8/22/2021	Monroe	20025 Heathers Pl SE	16:14	16:44	18:11	1:27
8/22/2021	Seattle	4218 7th Ave NE	18:57	19:06	20:06	1:00
8/23/2021	Woodinville	22509 102nd Ave SE	13:31	14:02	18:41	4:39
8/24/2021	Bellevue	14249 SE 40th St.	8:51	9:03	9:18	0:15
8/27/2021	Puyallup	2208 31ST AVE SE	12:14	12:43	14:58	2:15
8/28/2021	Snohomish	18107 132nd PL SE	0:29	1:10	1:25	0:15
9/1/2021	Renton	1621 GLENNWOOD AVE SE	13:29	13:44	14:47	1:03
9/3/2021	Bellevue	1840 184th Ave NE	7:17	7:41	14:35	6:54
9/10/2021	Seattle	608 N 47th ST	11:30	11:47	11:58	0:11
9/15/2021	Everett	Everett Delta Station. RS 2665	23:11	23:43	0:05	0:22
9/15/2021	Seattle	2608 NW 57th St.	9:19	9:43	9:53	0:10
9/23/2021	Seattle	10407 22nd AVE SW	17:56	18:22	18:31	0:09
9/24/2021	Seattle	5609 4th Ave S	5:51	6:35	6:58	0:23
9/29/2021	Seattle	3826 37TH AVE S	13:26	13:40	15:25	1:45

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
10/2/2021	Everett	9611 18th Ave W	22:42	23:19	23:41	0:22
10/5/2021	Redmond	17322 NE 42nd St.	11:22	11:28	12:03	0:35
10/11/2021	Lake Stevens	303 91st AVE NE	11:56	12:05	12:59	0:54
10/20/2021	Lacey	7610 Alice Ct SE	11:19	11:34	11:43	0:09
10/22/2021	Des Moines	24101 14th Pl. S	1:47	2:07	3:56	1:49
11/2/2021	Renton	419 S 2nd St.	8:20	8:36	8:41	0:05
11/9/2021	Bothell	16914 1st Ave SE	9:29	9:53	10:00	0:07
11/13/2021	Mukilteo	4717 75th St SW	16:16	16:51	19:13	2:22
11/22/2021	Seattle	3300 S. Mount Baker Blvd.	10:41	11:05	11:26	0:21
12/1/2021	Spanaway	23110 47th Ave E.	11:01	11:26	11:57	0:31
12/2/2021	Redmond	17550 NE 67th CT	13:01	13:13	14:00	0:47
12/3/2021	Arlington	4010 172nd St. NE	19:52	20:37	21:08	0:31
Average Natural Gas Reportable Incidents Control Time for 2021						**1:05**

B

Certification of Survey Results

TO: Eric Haechrel, Puget Sound Energy
FR: Andrew Thibault, EMC Research, Inc.
DT: January 28, 2022
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 2021 reporting year, PSE met 6 of 9 benchmarks for the Service Quality Program but missed the benchmark for the average frequency and length of non-major-storm power outages, per year, per customer (SQI #3 SAIDI and SQI #4 SAIFI, respectively) and the Electric Safety Response Time (SQI #11). There is no SQI penalty associated with SQI #3. The SQI #3 penalty mechanics have been were replaced since July 30, 2016, by PSE's 24-Hour Restoration Service Guarantee available under PSE's Schedule 131, Restoration Service Guarantees, where a $50 credit is applied to the customer's account if they experienced certain prolonged outages as prescribed in Schedule 131. The penalty for SQI #4 is $129,808. The potential penalty for SQI #11 is $613,636, which that may be reduced if the UTC grants PSE's penalty mitigation petition, which is filed concurrently with this report. The current total potential penalty is $743,444 or $0.67 per electric customers.

Per the SQ Program mechanics approved by the UTC, when the annual penalty dollars are less than the equivalent of $12 per customer, the annual penalty will be allocated to PSE's low income bill assistance program, the Home Energy Lifeline Program ("HELP"). If the annual penalty amount exceeds $12 per customer, the Company will place an SQI credit on each customer's bill, rather than allocating the penalty dollars to HELP.

The following tables show the calculation of the SQI #4 and SQI #11 penalties and the allocation of penalty between electric and natural gas HELP funding. There is no allotment to natural gas HELP as both SQI #4 and #7 pertaining to electric service only.

Table C1--Calculated SQI #4 Penalty

SQI #		Benchmark		Overall Performance	Difference from Benchmark	Penalty		Calculation
4	SAIFI	1.30	interruptions per year per customer	1.35	0.05	$129,808	$129,808	= ((1.35-1.30) /1.3) * 10 * $337,500

Average Annual Customer	
Not applicable to natural gas customers	
Electric	1,103,403
Total	1,103,403

Allocation to HELP Funding

SQI #		Total	Electric		Gas	
4	SAIFI	$129,808	$129,808	= 129,808* (1,103,403 / 1,103,403)	$0	= 129,808* (0 / 1,103,403)
	Total	**$129,808**	**$129,808**		**$0**	

Table C2--Calculated SQI #7 Potential Penalty

SQI #		Benchmark		Overall Performance	Difference from Benchmar	Penalty	Calculation	
11	Electric Safety Response Time	55	Average minutes from customer call to arrival of field technician	65	10	$613,636	$613,636	= ((65-55) /55) * 10 * $337,500

Average Annual Customer	
Not applicable to natural gas customers	
Electric	1,103,403
Total	1,103,403

Allocation to HELP Funding

SQI #		Total	Electric		Gas	
11	Electric Safety Response Time	$613,636	$613,636	= 613,636* (1,103,403 / 1,103,403)	$0	= 613,636* (0 / 1,103,403)
	Total	**$613,636**	**$613,636**		**$0**	

D
Proposed Customer Notice (Report Card)

2021 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 2021 Service Quality Report Card

2021 Service Quality Report Card

Each year Puget Sound Energy measures service-quality benchmarks established in cooperation with the Washington Utilities and Transportation Commission (UTC), the Public Counsel Unit of the Attorney General's Office, and other parties. These benchmarks ensure we are satisfying customer's expectations, providing reliable service, and keeping customers safe. Failure to achieve these service-quality measurements would put us at risk of a penalty of up to $12 million.

Key Measurement	Benchmark	2020 Performance	Achieved
Customer Satisfaction			
Percent of customers satisfied with our Customer Care Center services, based on survey	At least 90 percent	95 percent	✓
Percent of customers satisfied with field services, based on survey	At least 90 percent	96 percent	✓
Number of complaints to the UTC per 1,000 customers, per year	Less than 0.40	0.10	✓
Customer Services			
Percent of calls answered live within 60 seconds by our Customer Care Center	At least 80 percent	82 percent	✓
Operations Services			
Frequency of non-major-storm power outages, per year, per customer	Less than 1.30 outages	1.35 outages	
Length of power outages per year, per customer*	Less than 2 hours, 35 minutes	3 hours, 27 minutes	
Time from customer call to arrival of field technicians in response to electric system emergencies	No more than 55 minutes	65 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	99 percent	✓

* There is no annual performance penalty associated with this measurement, but we give customers a $50 account credit when we don't restore the customer's power within 24 consecutive hours during a non-major-storm power outage. Please see the information about service guarantees below.

2021 Performance Highlights

To meet the challenges brought on by the on-going COVID-19 pandemic, we have continued to adapt to the CDC and state agencies' evolving guidelines to ensure our employee's and the public's safety and provide reliable energy service.

We met six of the nine service metrics (see chart above). We did not meet the benchmarks for the average frequency and length of non-major-storm power outages, per year, per customer and the time from customer call to arrival of field technicians in response to electric system emergencies. It is mainly due the abnormal weather events throughout the year that primarily impacted vegetation and equipment failure caused outages. There was also large increases in vandalism, vehicle accidents and animal caused outages. The surge of these unplanned outages throughout 2021also increased the workload levels placed on the electric first response workforce and exacerbated the average response time resulted from resource constraints.

The penalty for not meeting the system average interruption frequency is $129,808. However, there are no penalties associated with system average interruption duration The potential penalty for electric safety response time is $613,636 which may be reduced if the UTC grant PSE's penalty mitigation petition. PSE will contribute to its electric low income payment assistance program for the amount of all applicable SQI penalties

In addition to committing to the nine service-quality measures, we have three service guarantees to our customers.

- 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.

If we fail to meet any of these guarantees, we credit your bill $50, conditions apply, and customer action required. Learn more at **https://www.pse.com/pages/customer-service-guarantees** or 1-888-225-5773.

For 2021, PSE paid $15,200 for missing 304 of the total 34,356 service guaranteed appointments. We provided 279 customers with a $50 credit for not restoring electric service within 24 consecutive hours during certain non-major-storm power outages aand there were no customer claims issued on restoring electric service within 120 consecutive hours during any power outage.

Every day our employees aim to provide safe, dependable, and efficient service to meet your expectations.

Copies of information on rules, rates, power supply fuel mix, regulations, customer rights and responsibilities, as well as an annual report, are available by calling 1-888-225-5773 and at pse.com.

7695 04/22

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. For the year of 2021, there is no disconnection for non-payment of amounts due.

On February 29, 2020, Washington Governor Jay Inslee declared a state of emergency in response to the COVID-19 pandemic. On April 17, 2020, Governor Inslee issued Proclamation 20-23.2, which prohibits all energy, water, and telecommunications providers from disconnecting residential service due to nonpayment, (2) refusing to reconnect residential customers who were disconnected due to nonpayment, and (3) charging late fees or reconnection fees. Prior to the April 17 2020 Proclamation, PSE had suspended all service disconnections and late payment fees. On October 20, 2020, the Commission issued Order 01 in Docket U-200281 to extend the suspension of the disconnection of energy services for nonpayment initially until after April 30, 2021, but further extended to September 30, 2021. PSE is allowed to resume the non-payment disconnection 180 days after the moratorium was lifted.

Table E1: Annual Disconnection Results from 2017 to 2021 per 1,000 Customers

2017	2018	2019	2020	2021
53	48	42	8	0

Table E2: Monthly Disconnection Results per 1,000 Customers for 2021

Month	Disconnections per 1,000 Customers
January	0
February	0
March	0
April	0
May	0
June	0
July	0

Table continues on next page.

Table E2: Monthly Disconnection Results per 1,000 Customers for 2021 (Continued)

Month	Disconnections per 1,000 Customers
August	0
September	0
October	0
November	0
December	0

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 2021

	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) *
Electric											
Permanent Service	8,273	37	0	37	2,550	5,686	8,236	0	78	$1,850	100%
Reconnection	4,448	33	0	33	176	4,239	4,415	0	4	$1,650	99%
Subtotal	**12,721**	**70**	**0**	**70**	**2,726**	**9,925**	**12,651**	**0**	**82**	**$3,500**	**99%**
Natural Gas											
Diagnostic	9,232	122	0	122	214	8,896	9,110	0	0	$6,100	99%
Permanent Service	8,397	48	0	48	3,187	5,162	8,349	0	16	$2,400	99%
Reconnection	4,006	64	0	64	123	3,819	3,942	0	0	$3,200	98%
Subtotal	**21,635**	**234**	**0**	**234**	**3,524**	**17,877**	**21,401**	**0**	**16**	**$11,700**	**99%**
Grand Total	**34,356**	**304**	**0**	**304**	**6,250**	**27,802**	**34,052**	**0**	**98**	**$15,200**	**99%**

*SQI Results shown in the table and in this document are rounded to the nearest whole percentage per UTC order for performance calculation and comparison to the benchmark.

Table F2: SQI #10 and Customer Service Guarantee Payment Annual Details for 2021 (Continued)

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-21	Electric	Permanent Service	508	0	0	0	178	330	508	0	22	$0
Jan-21	Electric	Reconnection	315	1	0	1	7	307	314	0	4	$50
Jan-21	Gas	Diagnostic	397	5	0	5	4	388	392	0	0	$250
Jan-21	Gas	Permanent Service	609	1	0	1	197	411	608	0	0	$50
Jan-21	Gas	Reconnection	381	8	0	8	10	363	373	0	0	$400
Jan-21 Total			**2,210**	**15**	**0**	**15**	**396**	**1,799**	**2,195**	**0**	**26**	**$750**
Feb-21	Electric	Permanent Service	682	0	0	0	235	447	682	0	0	$0
Feb-21	Electric	Reconnection	312	2	0	2	4	30	310	0	0	$100
Feb-21	Gas	Diagnostic	308	1	0	1	4	303	307	0	0	$50
Feb-21	Gas	Permanent Service	682	5	0	5	214	463	677	0	15	$250
Feb-21	Gas	Reconnection	288	3	0	3	8	277	285	0	0	$150
Feb-21 Total			**2,272**	**11**	**0**	**11**	**465**	**1,796**	**2,261**	**0**	**15**	**$550**
Mar-21	Electric	Permanent Service	797	8	0	8	314	472	789	0	0	$400
Mar-21	Electric	Reconnection	359	0	0	0	10	344	359	0	0	$0
Mar-21	Gas	Diagnostic	281	3	0	3	5	277	278	0	0	$150
Mar-21	Gas	Permanent Service	853	31	0	1	371	512	852	0	0	$50
Mar-21	Gas	Reconnection	304	6	0	6	7	288	298	0	0	$300
Mar-21 Total			**2,594**	**9**	**0**	**9**	**707**	**1,893**	**2,576**	**0**	**0**	**$900**

Table continues on next page.

Table F2: SQI #10 and Customer Service Guarantee Payment Annual Details for 2021 (Continued)

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-21	Electric	Permanent Service	779	1	0	1	314	464	778	0	0	$50
Apr-21	Electric	Reconnection	345	0	0	0	10	335	345	0	0	$0
Apr-21	Gas	Diagnostic	312	1	0	1	5	306	311	0	0	$50
Apr-21	Gas	Permanent Service	844	3	0	3	371	470	841	0	0	$150
Apr-21	Gas	Reconnection	223	4	0	4	7	212	219	0	0	$200
Apr-21 Total			**2,503**	**9**	**0**	**9**	**707**	**1,787**	**2,494**	**0**	**0**	**$450**
May-21	Electric	Permanent Service	708	1	0	1	197	510	707	0	0	$50
May-21	Electric	Reconnection	364	3	0	3	8	353	361	0	0	$150
May-21	Gas	Diagnostic	508	1	0	1	9	498	507	0	0	$50
May-21	Gas	Permanent Service	755	1	0	1	285	469	754	0	0	$50
May-21	Gas	Reconnection	212	2	0	2	6	204	210	0	0	$100
May-21 Total			**2,547**	**8**	**0**	**8**	**505**	**2,034**	**2,539**	**0**	**0**	**$400**
Jun-21	Electric	Permanent Service	761	2	0	2	174	585	759	0	0	$100
Jun-21	Electric	Reconnection	323	0	0	0	8	315	323	0	0	$0
Jun-21	Gas	Diagnostic	474	4	0	4	20	450	470	0	0	$200
Jun-21	Gas	Permanent Service	828	1	0	1	390	437	827	0	0	$50
Jun-21	Gas	Reconnection	193	1	0	1	7	185	192	0	0	$50
Jun-21 Total			**2,579**	**8**	**0**	**8**	**599**	**1,972**	**2,571**	**0**	**0**	**$400**

Table continues on next page.

Table F2: SQI #10 and Customer Service Guarantee Payment Annual Details for 2021 (Continued)

	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-21	Electric	Permanent	700	5	0	5	150	545	695	0	7	$250
Jul-21	Electric	Reconnection	383	4	0	4	9	370	379	0	0	$200
Jul-21	Gas	Diagnostic	424	3	0	3	9	412	421	0	0	$150
Jul-21	Gas	Permanent	670	2	0	2	287	381	668	0	0	$100
Jul-21	Gas	Reconnection	238	3	0	3	8	227	235	0	0	$150
Jul-21 Total			**2,415**	**17**	**0**	**17**	**463**	**1,935**	**2,398**	**0**	**7**	**$850**
Aug-21	Electric	Permanent	740	7	0	7	199	534	733	0	0	$350
Aug-21	Electric	Reconnection	434	5	0	5	41	388	429	0	0	$250
Aug-21	Gas	Diagnostic	502	7	0	7	5	490	495	0	0	$350
Aug-21	Gas	Permanent	722	3	0	3	380	339	719	0	0	$150
Aug-21	Gas	Reconnection	241	3	0	3	2	236	238	0	0	$150
Aug-21 Total			**2,639**	**25**	**0**	**25**	**627**	**1,987**	**2,614**	**0**	**0**	**$1,250**
Sep-21	Electric	Permanent	725	5	0	5	219	501	720	0	1	$250
Sep-21	Electric	Reconnection	479	4	0	4	41	434	475	0	0	$200
Sep-21	Gas	Diagnostic	1,169	23	0	23	38	1,108	1,146	0	0	$1,150
Sep-21	Gas	Permanent	652	0	0	0	211	441	652	0	0	$0
Sep-21	Gas	Reconnection	386	9	0	9	10	367	377	0	0	$450
Sep-20 Total			**3,411**	**41**	**0**	**41**	**519**	**2,851**	**3,370**	**0**	**1**	**$2,050**

Table continues on next page.

Table F2: SQI #10 and Customer Service Guarantee Payment Annual Details for 2021 (Continued)

	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-21	Electric	Permanent	596	2	0	2	170	424	594	0	1	$100
Oct-21	Electric	Reconnection	448	4	0	4	13	431	444	0	0	$200
Oct-21	Gas	Diagnostic	1,772	28	0	28	47	1,697	1,744	0	0	$1,400
Oct-21	Gas	Permanent	703	0	0	0	206	497	703	0	0	$0
Oct-21	Gas	Reconnection	647	8	0	8	26	613	639	0	0	$400
Oct-21 Total			**4,166**	**42**	**0**	**42**	**462**	**3,662**	**4,124**	**0**	**1**	**$2,100**
Nov-21	Electric	Permanent	648	5	0	2	170	424	594	0	40	$250
Nov-21	Electric	Reconnection	300	4	0	4	13	431	444	0	0	$200
Nov-21	Gas	Diagnostic	1,487	15	0	28	47	1,697	1,744	0	0	$750
Nov-21	Gas	Permanent	577	3	0	0	206	497	703	0	0	$150
Nov-21	Gas	Reconnection	426	10	0	8	26	613	639	0	0	$500
Nov-21 Total			**3,438**	**37**	**0**	**42**	**462**	**3,662**	**4,124**	**0**	**40**	**$1,850**
Dec-21	Electric	Permanent	629	1	0	1	189	439	628	0	7	$50
Dec-21	Electric	Reconnection	386	6	0	6	12	368	380	0	0	$300
Dec-21	Gas	Diagnostic	1,598	31	0	31	25	1,542	1,567	0	0	$1,550
Dec-21	Gas	Permanent	502	28	0	28	105	369	474	0	1	$1,400
Dec-21	Gas	Reconnection	467	7	0	7	19	441	460	0	0	$350
Dec-21 Total			**3,582**	**73**	**0**	**73**	**350**	**3,159**	**3,509**	**0**	**8**	**$3,650**
Grand Total			**34,356**	**304**	**0**	**304**	**6,250**	**27.802**	**34,052**	**0**	**98**	**$15,200**

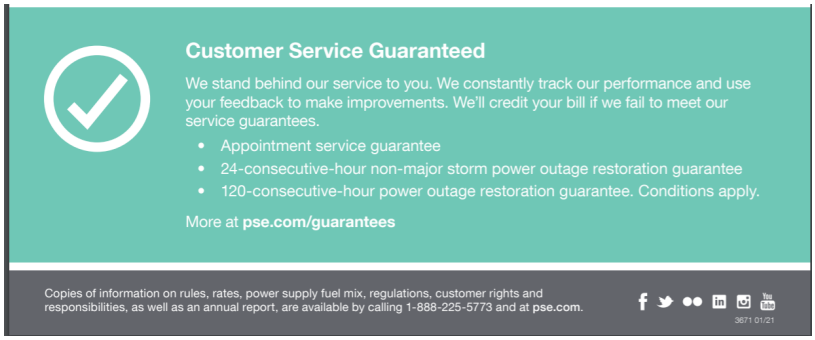
G
Customer Awareness of Service Guarantees

In 2021, Puget Sound Energy made customers aware of its three service guarantees through the following efforts:

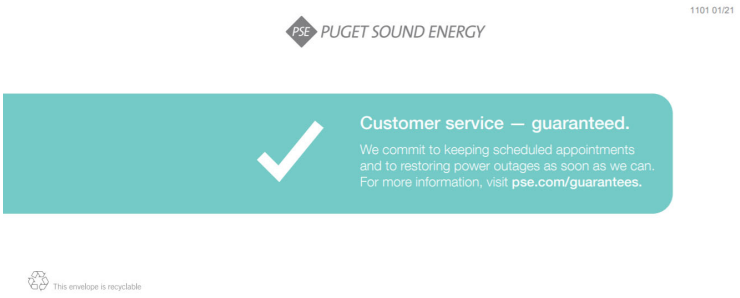
1. PSE Customer Care Center and customer service representatives received training about the Customer Service Guarantee and the following script:
   If we miss your customer service appointment under normal operating conditions, we will automatically credit your energy account with $50 guaranteed.
2. 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.

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

1. January 2021 bill-insert newsletter article to all customers, also posted on pse.com:



2. January 2021 bill envelope, also posted on pse.com:



3. January 2021 bill-print message for all customers with link to Service guarantees page on pse.com:

January 2021 bill print messages
Summary page

Customer service, guaranteed
We stand behind our service, from keeping scheduled appointments to restoring power outages as soon as we can. We'll credit your bill if we fail to meet our service guarantees.
pse.com/guarantees

4. April 2021 Voice bill insert newsletter article to all customers, also posted on pse.com:

Service guarantees

We stand behind our service to you. We constantly track our performance and use your feedback to make improvements. We'll credit your bill if we fail to meet our service guarantees.

- Appointment service guarantee
- 24-consecutive-hour non-major storm power outage restoration guarantee
- 120-consecutive-hour power outage restoration guarantee

Conditions apply. More at **pse.com/guarantees**.

5. July 2021 bill-print message on envelope for all customers with link to Service Guarantees page on pse.com:

1101 07/21

Customer service — guaranteed.
We commit to keeping scheduled appointments and to restoring power outages as soon as we can. For more information, visit **pse.com/guarantees.**

This envelope is recyclable

6. August 2021 bill insert newsletter article to all customers, also posted on pse.com:

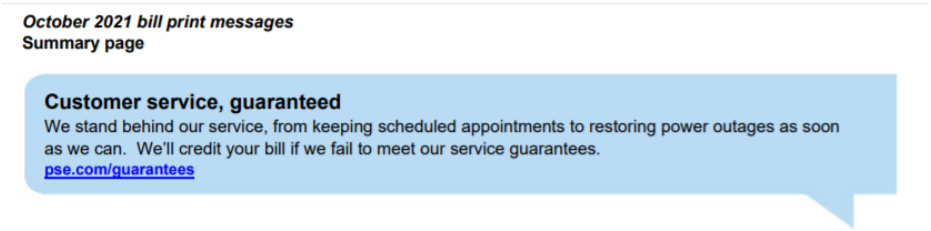
Customer service guaranteed

We stand behind our service to you. We constantly track our performance and use your feedback to make improvements. We'll credit your bill if we fail to meet our service guarantees.

- Appointment service guarantee
- 24-consecutive-hour non-major storm power outage restoration guarantee
- 120-consecutive-hour power outage restoration guarantee

Conditions apply. More at **pse.com/guarantees**.

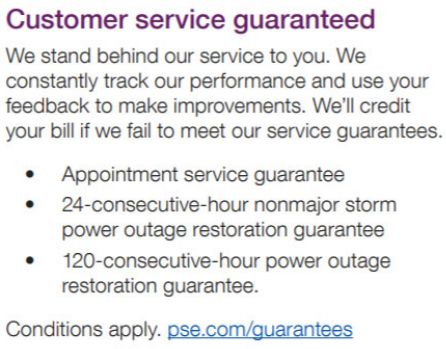
7. October 2021 bill-print message for all customers with link to Service Guarantees page on pse.com:



October 2021 bill print messages
Summary page

Customer service, guaranteed
We stand behind our service, from keeping scheduled appointments to restoring power outages as soon as we can. We'll credit your bill if we fail to meet our service guarantees.
pse.com/guarantees

8. December 2021 bill-print message for all customers with link to Service Guarantees page on pse.com:



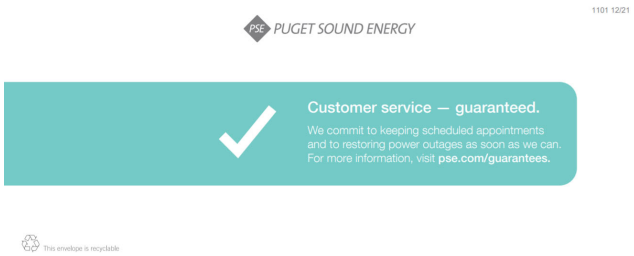
Customer service guaranteed

We stand behind our service to you. We constantly track our performance and use your feedback to make improvements. We'll credit your bill if we fail to meet our service guarantees.

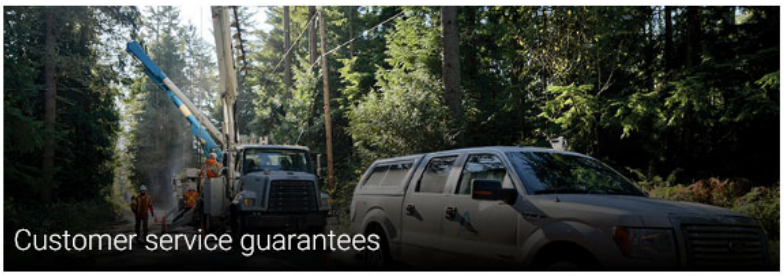
- Appointment service guarantee
- 24-consecutive-hour nonmajor storm power outage restoration guarantee
- 120-consecutive-hour power outage restoration guarantee.

Conditions apply. pse.com/guarantees

9. December 2021 bill envelope, also posted on pse.com:



10. 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 2021	Feb 2021	Mar 2021	Apr 2021	May 2021	Jun 2021	Jul 2021	Aug 2021	Sep 2021	Oct 2021	Nov 2021	Dec 2021
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	56	38	36	41	45	48	62	41	45	79	51	50
	No	149	117	125	111	92	98	202	108	96	105	98	103
	Don't Know	45	45	39	47	37	49	67	50	53	62	50	46
	Refused Response	0	0	0	1	0	0	0	1	6	4	1	1
	Total Customers Surveyed	**250**	**200**	**200**	**200**	**174**	**195**	**331**	**200**	**200**	**250**	**200**	**200**
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.	28	20	13	15	17	20	24	17	18	32	25	22
	Whenever PSE changes an appointment, you are given the $50.	23	16	17	14	18	19	26	16	28	33	26	21
	You have no understanding or expectations about this part of the service guarantee plan.	147	123	114	142	111	111	234	133	112	150	115	106
	Don't Know	50	40	54	28	26	44	45	33	31	32	30	50
	Refused Response	2	1	2	1	2	1	2	1	11	3	4	1
	Total Customers Surveyed	**250**	**200**	**200**	**200**	**174**	**195**	**331**	**200**	**200**	**250**	**200**	**200**

Table continues on next page.

Table G1: Customer Awareness of Customer Service Guarantee (continues)

		Jan 2021	Feb 2021	Mar 2021	Apr 2021	May 2021	Jun 2021	Jul 2021	Aug 2021	Sep 2021	Oct 2021	Nov 2021	Dec 2021
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.	235	195	188	187	166	177	317	185	183	221	186	189
	It was rescheduled.	7	2	4	4	2	8	9	6	7	13	8	4
	Technician arrived but was late.	2	0	1	1	1	1	1	2	2	3	1	1
	Don't Know	5	3	5	5	5	8	4	4	5	10	2	4
	Refused Response	1	-	2	3	-	1	-	3	3	3	3	2
	Total Customers Surveyed	**250**	**200**	**200**	**200**	**174**	**195**	**331**	**200**	**200**	**250**	**200**	**200**
Q26E. Who initiated rescheduling your appointment?	Myself (Customer Initiated)	4	1	2	2	0	4	4	3	4	6	3	2
	Puget Sound Energy Initiated	3	0	1	0	2	3	5	2	3	5	5	1
	Don't Know	0	1	1	2	0	1	0	1	0	2	0	1
	Refused Response	0	0	0	0	0	0	0	0	0	0	0	0
	Total Customers Surveyed	7	2	4	4	2	8	9	6	7	13	8	4

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:

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

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.

$SAIDI_{SQI-3}$: 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 sectionalizing device 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 sectionalizing device 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.[58]

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. The TO/TF designation is still used in some cases where a certified arborist field-verifies if the tree was on or off right-of-way, but its use is limited. All other tree-related outages are coded as TV. A more useful and stable process for categorizing vegetation caused interruptions is in development.

PSE complaints

The business process for recording customer inquiries changed with the new CIS implementation in March 2013. Starting in 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

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

of customer inquiries pertaining to reliability and power quality concern.

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.

Changes for 2021 and Subsequent Years Reporting

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 in September of 2021, PSE implemented new outage cause codes and revised the tree-related outage coding process. The additional tree-related outage codes are Tree Grow In (GI), Tree Limb (TL), Tree Trunk Failure (TT), Tree Uprooted (TU).

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 2021 Electric Service Reliability Report, PSE continues to designate the Areas of Greatest Concern as the Top 50 worst-performing circuits[59] over the previous five years that rank worst in terms of customer interruption minutes.

[59] 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.

- 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 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
- January 13, 2021
- November 15, 2021

J
1997-current year PSE SAIDI and SAIFI Performance by Different Measurements[60]

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

1997-2021 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
2020	220	171	414	414	454	165
2021	245	207	849	849	546	207

[1] Per UTC approval, excludes the January 2012 Storm Event

[2] Per UTC approval, excludes the August 2015 and November 2015 storm events

Figure J1: 1997–2021 SAIDI Performance by Different Measurement

[60] This section meets a requirement of Attachment B of Docket UE-110060.

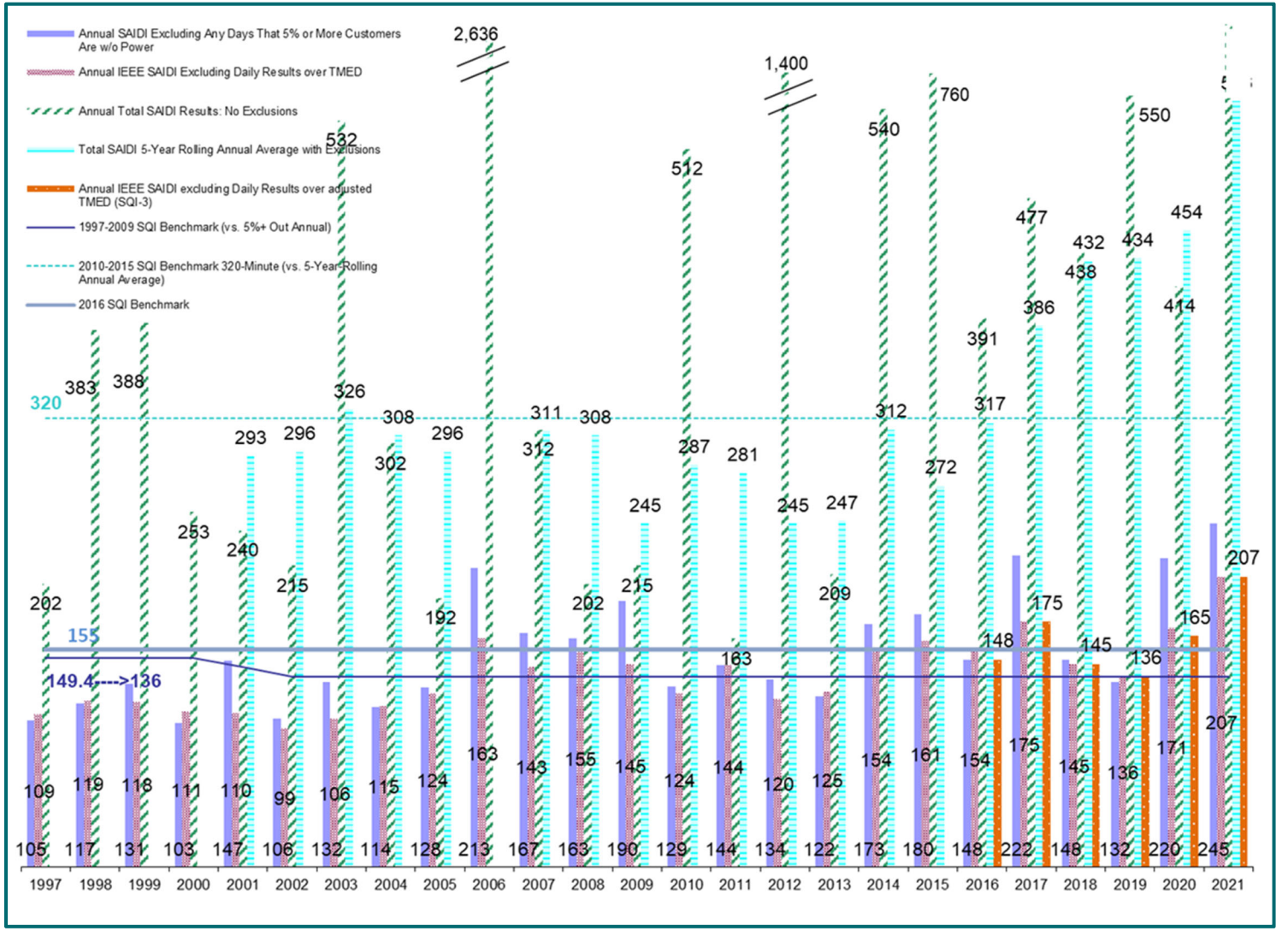


Figure J2: 1997–2021 SAIDI Performance by Different Measurements

1997-2021 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
2020	1.24	1.06	1.70	1.70	1.67
2021	1.35	1.26	2.27	2.27	1.78

Figure J3: 1997–2021 SAIFI Performance by Different Measurements

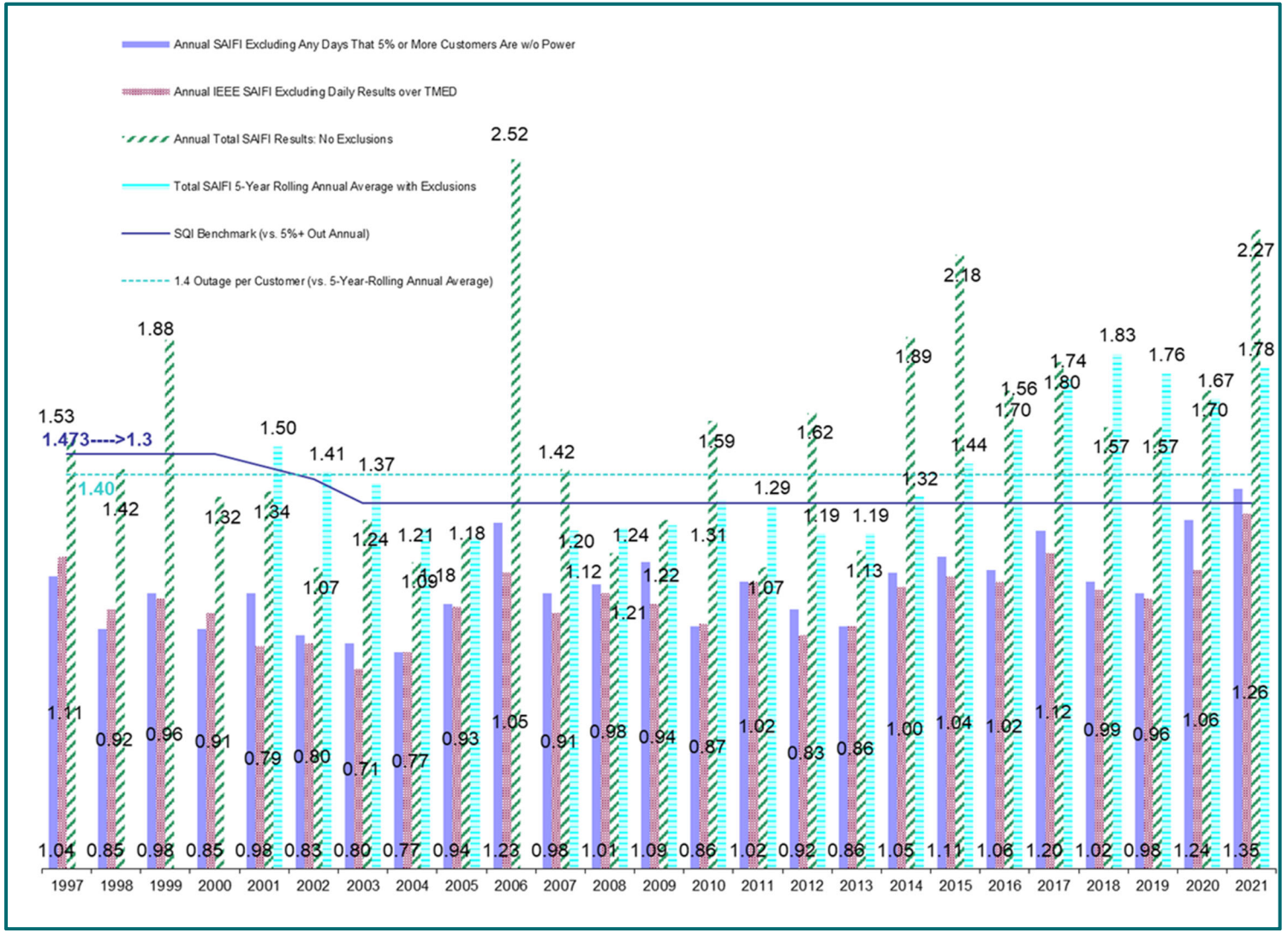


Figure J4: 1997–2021 SAIFI Performance by Different Measurements

K

Current Year Electric Service Outage by Cause by Area[61]

This appendix details the 2021 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	23	24	16	96	12	29	39	22	261
BA	185	107	75	820	35	126	196	321	1,865
CP	45	39	11	152	6	40	54	41	388
CR	3	0	0	4	0	0	0	0	7
DU	11	13	6	85	6	14	18	13	166
EF	796	539	367	2,708	183	514	814	540	6,460
EO	0	0	0	4	3	0	1	1	9
EQ	0	0	0	0	0	0	0	0	0
FI	2	4	3	32	0	6	2	2	51
LI	0	0	0	4	0	0	0	3	7
SO	174	157	69	755	43	149	204	279	1,830
TV[62]	648	827	697	2,712	83	612	942	1,080	7,601
UN	57	52	18	273	5	18	30	40	493
VA	3	1	0	25	0	3	5	8	45
Misc[63]	35	21	13	89	15	33	28	13	247
Total	1,982	1,784	1,275	7,758	391	1,544	2,333	2,363	19,430

[61] This section meets a requirement of Attachment B of Docket UE-110060.

[62] 1,128 of the outages were caused by Tree Grow In (GI), Tree Off Right of way (TF), Tree On Right of way (TO), Tree Trunk Failure (TT), Tree Uprooted (TU), or Tree Limb (TL).

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

Table K3: SQI #3 SAIDI Outages by Cause

	Northern			King/Kittitas		Southern/Western			
	Whatcom	Skagit	Island	King	Kittitas	Pierce	Thurston	Kitsap	Total
AO	21	24	16	92	12	27	37	22	251
BA	182	107	73	809	33	122	193	320	1,839
CP	44	35	10	148	6	38	52	39	372
CR	3	0	0	4	0	0	0	0	7
DU	11	13	6	83	6	13	18	13	163
EF	707	471	325	2,451	171	466	735	496	5,822
EO	0	0	0	1	3	0	1	0	5
EQ	0	0	0	0	0	0	0	0	0
FI	2	4	2	29	0	6	2	2	47
LI	0	0	0	2	0	0	0	0	2
SO	172	156	69	742	43	145	202	278	1,807
TV[64]	336	419	356	1,280	50	228	443	643	3,755
UN	42	42	12	203	2	13	24	33	371
VA	3	1	0	25	0	3	5	8	45
Misc[65]	24	15	11	75	14	23	24	11	197
Total	1,547	1,287	880	5,944	340	1,084	1,736	1,865	14,683

[64] 514 of the outages were caused by Tree Grow In (GI), Tree Off Right of way (TF), Tree On Right of way (TO), Tree Trunk Failure (TT), Tree Uprooted (TU), or Tree Limb (TL).

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

L
Historical SAIDI and SAIFI by Area[66]

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[67]

Region/County	Year	Total SAIFI	SAIFI 5%	Total SAIDI	SQI SAIDI
Northern					
Whatcom	**2021**	**2.05**	**1.50**	**652**	**224**
	2020	2.12	1.70	382	237
	2019	1.91	1.62	309	191
Skagit	**2021**	**3.25**	**2.18**	**1295**	**296**
	2020	1.68	1.43	403	234
	2019	1.02	0.92	203	157
Island	**2021**	**5.34**	**2.55**	**3448**	**384**
	2020	3.01	2.47	1108	195
	2019	1.20	1.06	196	164
King/Kittitas					
King	**2021**	**1.95**	**1.06**	**740**	**179**
	2020	1.37	0.96	311	140
	2019	1.51	0.84	593	117
Kittitas	**2021**	**2.58**	**2.08**	**456**	**312**
	2020	2.57	2.00	574	263
	2019	2.24	2.07	464	358

Table continues on next page

[66] This section meets a requirement of Attachment B of Docket UE-110060.

[67] Reported figures are based on most current SAP outage data, as of January 2022.

Region/County	Year	Total SAIFI	SAIFI 5%	Total SAIDI	SQI SAIDI
Southern/Western					
Pierce	**2021**	**2.13**	**1.03**	**1007**	**195**
	2020	1.69	0.98	800	125
	2019	1.12	0.61	623	88
Thurston	**2021**	**2.31**	**1.57**	**660**	**179**
	2020	1.41	1.12	236	145
	2019	1.89	0.91	784	159
Kitsap	**2021**	**2.63**	**1.76**	**610**	**253**
	2020	2.69	1.95	501	225
	2019	1.93	1.38	525	157

County Trends from 2020 to 2021:

- Whatcom County improved in three measures and declined in one measure.
  - Total SAIFI, SAIFI 5% and SQI SAIDI performance driven by fewer customers impacted by fewer tree related outages.
  - Total SAIDI declined due to longer duration of tree related outages. The longer duration was due to snow and icy conditions that delayed a safe response.

- Skagit and King Counties declined across all four measures. Both counties saw an increase in tree related outages that impacted more customers for a longer duration.

- Island County declined across all four measures.
  - Total SAIDI, Total SAIFI, and SQI SAIDI performance driven by an increase in tree related outages that impacted more customers, and a longer duration of those tree outages.
  - SAIFI 5% performance driven by an increase in in bird/animal outages that impacted more customers.

- Kittitas County saw an improvement in one measure and a decline in the other three measures.
  - Total SAIFI, SAIFI 5% and SQI SAIDI performance declined primarily due to an increase in bird/animal outages that impacted more customers.
  - The improvement in Total SAIDI performance was primarily driven by a decrease in the number of tree related outages that impacted fewer customers.

- Pierce County declined across all four measures.
    - Total SAIDI, Total SAIFI, and SQI SAIDI performance driven by an increase in tree related outages that impacted more customers, and a longer duration of those tree outages. An act of vandalism also contributed to the decline in performance across the three measures.
    - SAIFI 5% performance declined due to an act of vandalism that impacted 15% of Pierce County customers.

- Thurston County declined across all four measures.
    - Total SAIDI and Total SAIFI performance driven by an increase in tree related outages that impacted more customers, and a longer duration of those tree outages.
    - SQI SAIDI and SAIFI 5% performance declined due to an increase in bird/animal outages that impacted more customers.

- Kitsap County saw an improvement in two measures and a decline in two measures.
    - Total SAIFI and SAIFI 5% improved to due fewer customers affected by fewer tree related outages.
    - Total SAIDI declined due to longer duration of tree related outages
    - SQI SAIDI declined due to an increase in the number of equipment failure outages that affected more customers.

M

Areas of Greatest Concern with Action Plan[68]

This appendix details the areas of greatest concern with the 2021 and 2022 action plan.

Table M1 provides the 2021 list of the Top 50 Circuits with the highest minutes interrupted in the PSE territory.

CMI refers to Customer Minutes Interruptions.

[68] This section meets a requirement of Attachment B of Docket UE-110060.

Table M1: 2021 Areas of Greatest Concern

Circuit	County	2021 Year End 5 Year Avg Rank	2021 Year End 5 Year Average Total CMI	2020 Year End 5 Year Avg Rank	2020 Year End 5 Year Average Total CMI	Action by PSE	5 Yr CMI Trend
Baker River Switch-24	Skagit	1	5,287,730	1	4,187,458	One underground conversion project planned for 2022. One underground conversion project proposed for 2023.	▲
Chico-12	Kitsap	2	3,241,917	2	3,409,149	One recloser replacement project planned for 2022.	▼
Sherwood-18	King	3	3,346,246	6	2,363,202	One fusesaver project completed in 2021. One fusesaver and one treewire project proposed for 2022.	▲
Kendall-12	Whatcom	4	4,130,768	5	3,659,975	One underground conversion project proposed for 2023.	▲
Cottage Brook-13	King	5	2,937,005	3	2,786,844	One fusesaver project planned for 2022 One recloser project proposed for 2023.	▲
Vashon-12	King	6	3,242,864	9	2,640,350	One feeder tie and one treewire project planned for 2022.	▲
Nugents Corner-26	Whatcom	7	3,097,818	4	3,311,791	Two underground conversion projects proposed for 2023.	▼
Langley-16	Island	8	3,495,256	11	2,209,787	One treewire and one underground conversion project proposed for 2023.	▲
Big Rock-15	Skagit	9	2,689,096	7	2,658,742	One feeder tie project planned for 2022. Two underground conversion projects proposed for 2023.	▲

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Circuit	County	2021 Year End 5 Year Avg Rank	2021 Year End 5 Year Average Total CMI	2020 Year End 5 Year Avg Rank	2020 Year End 5 Year Average Total CMI	Action by PSE	5 Yr CMI Trend
Fernwood-16	Kitsap	10	3,078,399	10	2,115,499	One fusesaver project completed in 2021.	▲
Slater-16	Whatcom	11	2,132,929	22	1,328,729	One treewire project and one recloser replacement project planned for 2022.	▲
Glacier-12	Whatcom	12	3,670,516	17	2,082,603	Two underground cable replacement projects completed in 2021. Two underground cable replacement projects planned for 2022. One treewire project proposed for 2023.	▲
Freeland-12	Island	13	3,878,007	19	2,260,793	One fusesaver project planned for 2022. One distribution automation project proposed for 2023.	▲
Tolt-15	King	14	3,225,651	33	2,054,306	One underground cable replacement project completed in 2021. One underground conversion project planned for 2022. One overhead system improvement project and one treewire project proposed for 2023.	▲
Duvall-15	King	15	2,057,346	26	1,643,362	One treewire project completed in 2021. One treewire project and one recloser replacement project planned for 2022. One feeder tie project is proposed for 2023.	▲

Table continues on next page

Circuit	County	2021 Year End 5 Year Avg Rank	2021 Year End 5 Year Average Total CMI	2020 Year End 5 Year Avg Rank	2020 Year End 5 Year Average Total CMI	Action by PSE	5 Yr CMI Trend
Brooks Hill-15	Island	16	3,646,934	21	2,236,004	Planning is continuing to monitor for improvements.	▲
Fernwood-17	Kitsap	17	3,007,017	8	2,974,369	Two underground cable replacement projects and one fusesaver project completed in 2021.	▲
Four Corners-12	King	18	1,678,563	Not on 2020 list		One fusesaver project completed in 2021. One treewire project planned for 2022.	▲
Baker River Sw-13	Skagit	19	2,811,227	38	1,527,714	One recloser replacement project planned for 2022. One feeder tie project proposed for 2023.	▲
Cottage Brook-15	King	20	1,695,859	13	1,538,362	Two overhead system improvement projects planned for 2022.	▲
Vashon-23	King	21	1,574,018	15	1,390,824	Two recloser replacement projects and one feeder treewire project planned for 2022.	▲
Eastgate-12	King	22	1,727,498	18	1,554,529	Planning is continuing to monitor for improvements.	▲
Duvall-12	King	23	2,254,572	Not on 2020 list		Two recloser projects and one underground conversion project proposed for 2023.	▲
Clover Valley-16	Island	24	2,820,172	28	2,119,786	One treewire project proposed for 2023.	▲
Fragaria-12	Kitsap	25	1,605,334	24	1,442,355	Two fusesaver projects completed in 2021. One treewire project planned for 2022.	▲

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Circuit	County	2021 Year End 5 Year Avg Rank	2021 Year End 5 Year Average Total CMI	2020 Year End 5 Year Avg Rank	2020 Year End 5 Year Average Total CMI	Action by PSE	5 Yr CMI Trend
Pine Lake-26	King	26	1,996,106	45	1,571,727	One fusesaver project completed in 2021.	▲
Buckley-16	Pierce	27	1,737,780	Not on 2020 list		One treewire project completed in 2021.	▲
Griffin-13	Thurston	28	2,237,459	12	2,220,200	Planning is continuing to monitor for improvements.	▲
Winslow-12	Kitsap	29	1,979,427	20	1,859,225	One recloser replacement project completed in 2021.	▲
Vashon-13	King	30	2,173,816	27	1,976,873	One distibution automation and one underground cable replacement project planned for 2022.	▲
Hamilton-15	Skagit	31	3,811,579	41	2,187,690	One recloser replacement project completed in 2021. One treewire and one fusesaver project planned for 2022. One feeder tie project proposed for 2023.	▲
Miller Bay-23	Kitsap	32	1,766,571	30	1,494,736	One recloser replacement project completed in 2021. One recloser replacement project planned for 2022. One treewire and one underground conversion project scheduled for 2024.	▲
Greenwater-16	King	33	2,325,712	25	2,167,224	One recloser replacement project completed in 2021.	▲
Fragaria-16	Kitsap	34	1,994,002	16	1,968,273	One recloser replacement project completed in 2021.	▲

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Circuit	County	2021 Year End 5 Year Avg Rank	2021 Year End 5 Year Average Total CMI	2020 Year End 5 Year Avg Rank	2020 Year End 5 Year Average Total CMI	Action by PSE	5 Yr CMI Trend
Alger-15	Skagit	35	3,220,803	44	2,134,729	Planning is continuing to monitor for improvements.	▲
Fragaria-15	Kitsap	36	1,949,811	23	1,926,829	One fusesaver project completed in 2021.	▲
Skykomish-25	King	37	2,464,239	31	2,285,891	One underground system improvement project is planned for 2022. One treewire project is scheduled for 2024.	▲
Langley-12	Island	38	3,403,556	49	1,755,437	One treewire project completed in 2021. One underground conversion project planned for 2022.	▲
Plateau-21	King	39	1,581,423	48	1,225,173	One underground cable replacement project completed in 2021. One recloser and one distribution automation project proposed for 2023.	▲
Maxwelton-12	Island	40	2,878,981	Not on 2020 list		One overhead system improvement, one underground cable replacement and one fusesaver project planned for 2022.	▲
Chambers-13	Thurston	41	1,313,267	Not on 2020 list		Planning is continuing to monitor for improvements.	▲
Shaw-15	Pierce	42	1,841,952	Not on 2020 list		Planning is continuing to monitor for improvements.	▲
Longmire-25	Thurston	43	1,496,457	36	1,200,066	One treewire project completed in 2021.	▲

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Circuit	County	2021 Year End 5 Year Avg Rank	2021 Year End 5 Year Average Total CMI	2020 Year End 5 Year Avg Rank	2020 Year End 5 Year Average Total CMI	Action by PSE	5 Yr CMI Trend
Osceola-22	King	44	1,657,144	Not on 2020 list		One fusesaver project planned for 2022.	▲
Cottage Brook-16	King	45	1,312,776	29	1,195,443	Planning is continuing to monitor for improvements.	▲
Black Diamond-13	King	46	1,360,364	Not on 2020 list		One fusesaver project completed in 2021. One underground conversion project proposed for 2023.	▲
Lake Youngs-15	King	47	2,119,860	40	1,909,685	One underground cable replacement project planned for 2022.	▲
Prine-23	Thurston	48	1,239,612	Not on 2020 list		One underground cable replacement project and one treewire project completed in 2021.	▲
Capitol-13	Thurston	49	2,821,110	Not on 2020 list		One tree wire project completed 2021. One underground conversion project proposed for 2022.	▲
Hobart-16	King	50	1,979,689	Not on 2020 list		One recloser replacement project planned for 2022.	▲

N
Current-Year Commission and Rolling-Two Year PSE Customer Electric Service Reliability Complaints with Resolutions[69]

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	1/4/2021	Vashon	01/28/2021	Company upheld
2	Reliability	1/12/2021	Bellevue	02/01/2021	Company upheld
3	Reliability	1/19/2021	Renton	02/08/2021	Company upheld
4	Reliability	1/28/2021	Yelm	02/12/2021	Company upheld
5	Reliability	2/2/2021	Olympia	02/12/2021	Company upheld
6	Reliability	3/16/2021	Coupeville	03/31/2021	Company upheld
7	Reliability	3/17/2021	Olympia	03/31/2021	Company upheld
8	Reliability	6/28/2021	Sammamish	07/09/2021	Company upheld
9	Reliability	6/29/2021	Graham	07/12/2021	Company upheld
10	Reliability	6/30/2021	Graham	08/06/2021	Company upheld
11	Reliability	7/1/2021	Kirkland	07/14/2021	Company upheld
12	Reliability	7/6/2021	Bellevue	07/19/2021	Company upheld
13	Reliability	7/7/2021	Bellevue	07/29/2021	Company upheld
14	Reliability	7/7/2021	Bellevue	07/29/2021	Company upheld
15	Reliability	7/19/2021	Bellevue	07/30/2021	Company upheld
16	Reliability	7/22/2021	Bellevue	07/29/2021	Company upheld
17	Reliability	8/3/2021	Bellevue	08/06/2021	Company upheld

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[69] This section meets a requirement of Attachment B of Docket UE-110060.

No.	Complaint Type	Date of Complaint	Location	Closing Date	Case Resolution
18	Reliability	8/3/2021	Bellevue	08/06/2021	Company upheld
19	Reliability	8/9/2021	Bellevue	08/19/2021	Company upheld
20	Reliability	9/22/2021	Everson	10/14/2021	Company upheld
21	Reliability	9/24/2021	Puyallup	09/30/2021	Company upheld
22	Reliability	9/30/2021	Sumas	10/13/2021	Company upheld
23	Reliability	10/1/2021	Puyallup	10/11/2021	Company upheld
24	Reliability	10/4/2021	Puyallup	10/15/2021	Consumer upheld
25	Reliability	10/12/2021	Lacey	10/15/2021	Company upheld
26	Reliability	10/27/2021	Sammamish	11/03/2021	Company upheld
27	Reliability	11/18/2021	Lacey	11/23/2021	Company upheld
28	Reliability	11/19/2021	Bellevue	12/07/2021	Company upheld
29	Reliability	11/19/2021	Freeland	12/16/2021	Company upheld
30	Reliability	12/6/2021	Puyallup	12/21/2021	Company upheld
31	Reliability	12/7/2021	Puyallup	12/21/2021	Company upheld
32	Reliability	12/7/2021	Puyallup	12/21/2021	Company upheld
33	Reliability	12/7/2021	Puyallup	12/21/2021	Company upheld
34	Reliability	12/7/2021	Puyallup	12/21/2021	Company upheld
35	Reliability	12/7/2021	Renton	12/27/2021	Company upheld
36	Reliability	12/9/2021	Puyallup	12/21/2021	Company upheld
37	Reliability	12/9/2021	Puyallup	12/21/2021	Company upheld
38	Reliability	12/9/2021	Puyallup	12/21/2021	Company upheld
39	Reliability	12/9/2021	Puyallup	12/21/2021	Company upheld
40	Reliability	12/9/2021	Puyallup	12/21/2021	Company upheld
41	Reliability	12/9/2021	Puyallup	12/21/2021	Company upheld
42	Reliability	12/9/2021	Puyallup	12/21/2021	Company upheld
43	Reliability	12/22/2021	Coupeville	1/19/2022	Company upheld

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	King	Sep-20 Jul-21	Auburn	Power Quality	Christopher-25	Contacted customer to address concerns
2	King	Jan-21 Jan-21 Oct-21	Auburn	Reliability	Sherwood-17	Contacted customer to address concerns
3	King	Oct-20 Sep-21	Auburn	Reliability	Sherwood-18	Contacted customer to address concerns
4	King	Jan-20 Jan-20	Baring	Reliability	Skykomish-25	Reported in 2020, no new inquiries in 2021
5	King	Jul-21 Oct-21	Bellevue	Reliability	Kenilworth-25	Contacted customer to address concerns
6	King	Nov-20 Nov-20 Jan-21	Bellevue	Reliability	North Bellevue-24	Contacted customer to address concerns
7	King	Jul-21 Aug-21	Bellevue	Power Quality	Somerset-13	Contacted customer to address concerns
8	King	Dec-20 Jan-21	Bellevue	Reliability	Somerset-16	Contacted customer to address concerns
9	King	Oct-21 Nov-21	Duvall	Reliability	Tolt-15	Contacted customer to address concerns

Table continues on next page

No.	County	Date of Complaint	Location	Complaint Type	Circuit	Response
10	King	Aug-21 Sep-21	Duvall	Reliability	Tolt-15	Contacted customer to address concerns
11	King	Jan-21 Jan-21	Fall City	Reliability	Fall City-13	Contacted customer to address concerns
12	King	Dec-20 Jan-21	Fall City	Power Quality	Klahanie-15	Contacted customer to address concerns
13	King	Aug-20 Nov-21	Federal Way	Reliability	Redondo-16	Contacted customer to address concerns
14	King	Oct-20 Jan-21	Kenmore	Power Quality	Inglewood-13	Contacted customer to address concerns
15	King	Aug-20 Aug-21	Kenmore	Reliability	Kenmore-23	Contacted customer to address concerns
16	King	Aug-21 Nov-21	Kirkland	Reliability	Crestwood-22	Contacted customer to address concerns
17	King	Apr-20 Jun-20	Kirkland	Power Quality	Inglewood-15	Reported in 2020, no new inquiries in 2021
18	King	Jan-20 May-20	Kirkland	Power Quality Reliability	Rose Hill-21	Reported in 2020, no new inquiries in 2021

Table continues on next page

No.	County	Date of Complaint	Location	Complaint Type	Circuit	Response
19	King	Feb-21 Jul-21	Redmond	Reliability	Hollywood-22	Contacted customer to address concerns
20	King	Feb-21 Jul-21	Redmond	Reliability	Hollywood-22	Contacted customer to address concerns
21	King	Apr-20 Oct-20	Redmond	Reliability	Redmond-22	Reported in 2020, no new inquiries in 2021
22	King	Apr-20 Jul-20	Renton	Reliability	Hazelwood-15	Reported in 2020, no new inquiries in 2021
23	King	Oct-21 Dec-21	Renton	Reliability	Hazelwood-15	Contacted customer to address concerns
24	King	Jun-20 Jul-20 Sep-20	Sammamish	Reliability	Klahanie-17	Reported in 2020, no new inquiries in 2021
25	King	Nov-20 Sep-21	Sammamish	Reliability	Pickering-21	Contacted customer to address concerns
26	King	Sep-21 Oct-21	Sammamish	Reliability	Pine Lake-23	Contacted customer to address concerns
27	King	Jan-21 Feb-21	Sammamish	Power Quality	Pine Lake-27	Contacted customer to address concerns

Table continues on next page

No.	County	Date of Complaint	Location	Complaint Type	Circuit	Response
28	King	Nov-20 Mar-21	Woodinville	Reliability	Cottage Brook-13	Contacted customer to address concerns
29	King	Mar-21 Apr-21	Woodinville	Power Quality	Cottage Brook-15	Power Quality
30	King	Aug-21 Dec-21	Woodinville	Power Quality	Lake Leota-13	Contacted customer to address concerns
31	Kitsap	Oct-21 Oct-21	Port Orchard	Reliability	Fernwood-17	Contacted customer to address concerns
32	Kittitas	Feb-21 Jun-21	Ellensburg	Reliability	Kittitas-25	Contacted customer to address concerns
33	Pierce	Jun-21 Sep-21	Graham	Reliability	Kapowsin-15	Contacted customer to address concerns
34	Pierce	Aug-21 Sep-21	Puyallup	Power Quality	Shaw-13	Contacted customer to address concerns
35	Pierce	Aug-20 Dec-21	Puyallup	Reliability	Shaw-15	Contacted customer to address concerns
36	Skagit	Jul-20 Jul-20	Sedro Woolley	Reliability	Alger-15	Reported in 2020, no new inquiries in 2021

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No.	County	Date of Complaint	Location	Complaint Type	Circuit	Response
37	Thurston	Sep-20 Nov-20	Lacey	Reliability	Patterson-13	Reported in 2020, no new inquiries in 2021
38	Thurston	Dec-21 Dec-21	Olympia	Power Quality	Friendly Grove-25	Contacted customer to address concerns
39	Thurston	Feb-20 Dec-20	Rainier	Reliability	Rainier-12	Reported in 2020, no new inquiries in 2021
40	Thurston	Sep-21 Oct-21	Yelm	Power Quality	Yelm-25	Contacted customer to address concerns
41	Whatcom	Oct-21 Oct-21	Bellingham	Reliability	Britton-15	Contacted customer to address concerns
42	Whatcom	Oct-21 Dec-21	Bellingham	Power Quality	Woburn-27	Contacted customer to address concerns
43	Whatcom	Dec-21 Dec-21	Deming	Reliability	Glacier-12	Contacted customer to address concerns

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[70]

This appendix illustrates current-year geographic location of the 2021 electric service reliability customer complaints on service territory map with the number of 2022 proposed projects and vegetation-management mileage.

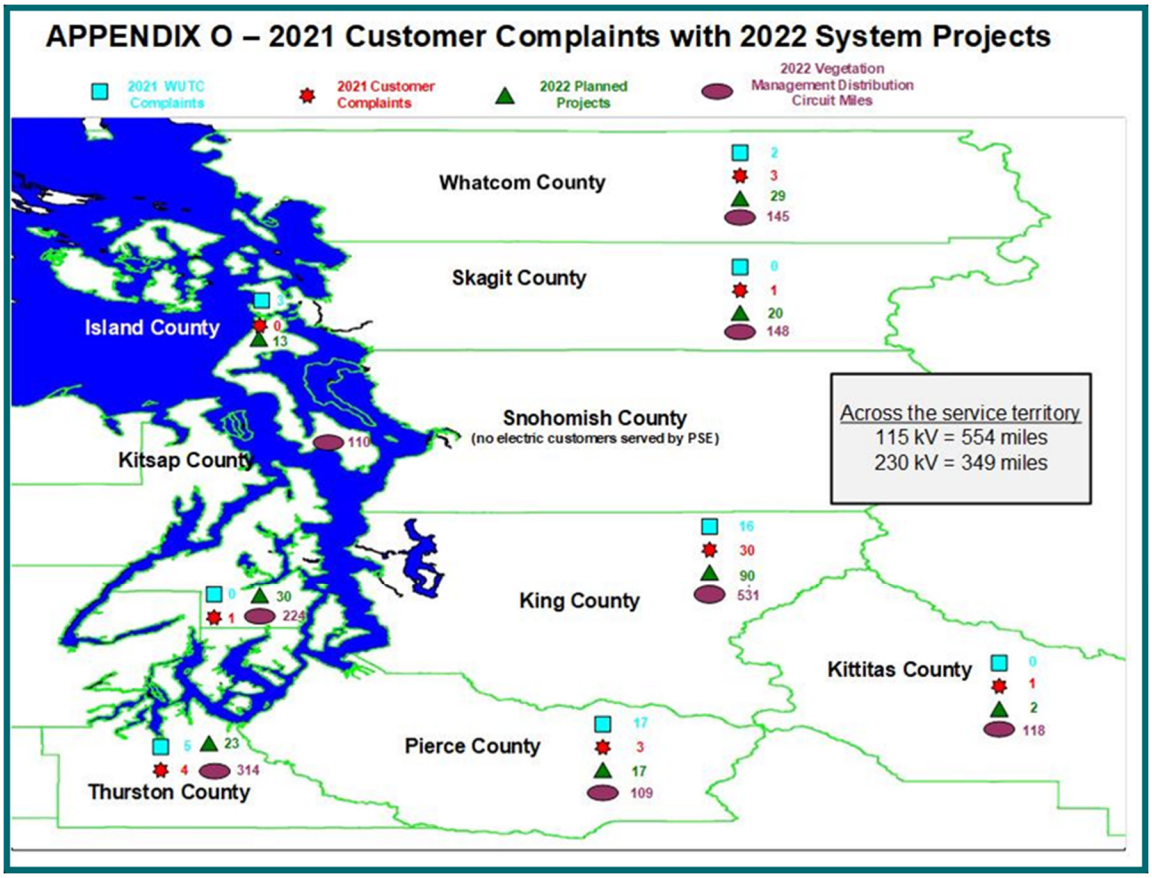

Figure O1: 2021 Customer Complaints with 2022 System Projects

[70] This section meets a requirement of Attachment B of Docket UE-110060.

P

Reliability Program Category Descriptions

This appendix provides reliability program work category descriptions for work outlined in **Table 3f**.

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 Tree Trimming

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

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

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 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.

Reclosers

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.

FuseSavers

PSE has been replacing 100T overhead fuses with single phase reclosing devices in some locations. These devices help reduce temporary outages related to tree limbs and animal contact, similar to a recloser, but at a reduced cost.

Targeted Reliability

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 under the same 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. The telecommunication for this automation relies on various technologies, the newest of which is the AMI network.

Substation 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.

Transmission Automation

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. The Transmission Line Automated Switching (TLAS) solution solves this issue and automatically restores power to the maximum number of customers in all scenarios.

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. The cable remediation program primarily remediates the underground residential distribution system that have a trended probability of failure, of which high-molecular weight (HMW) cable type is the worst offender. Cable replacement has an expected life that exceeds 30 years.

Copper Conductor Replacement

The Copper Replacement program is a safety, reliability and resiliency initiative to replace #6 overhead copper (CU) conductor in PSE's primary distribution system. This conductor is old, losing mechanical strength and at a risk of failure.

Wildfire Mitigation

The Wildfire mitigation plan is a reliability and safety initiative to prevent wildfire ignition and reduce ignition risks associated with electricity delivery by developing situational awareness, targeted operational response and system hardening. Specific improvements include insulator replacement, non-wood cross-arms and poles, pole wraps, current limiting expulsion-type fuses, FR3-filled service transformers, covered conductors, line detection and enhanced fault detection on circuits designated as having extreme or high burn potential.

Pole Inspection 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 Reliability

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