

RE 61 e-FILING REPORT COVER SHEET

REPORT NAME: 2014 Annual Service Quality Measure Report

COMPANY NAME: Portland General Electric

DOES REPORT CONTAIN CONFIDENTIAL INFORMATION? No

If known, please select designation: RE (Electric)

Report is required by:

OPUC Order No. 11-160, (amended Order No. 97-196 (UM 814))

Is this report associated with a specific docket/case? No

Key words: 2014 Service Quality Measure Report (SQM)

If known, please select the PUC Section to which the report should be directed:

Electric Rates and Planning



Portland General Electric Company
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May 1, 2015

Public Utility Commission of Oregon
Attn: Filing Center
3930 Fairview Industrial Dr. SE
P.O. Box 1088
Salem, OR 97308-1088

RE: PGE 2014 Annual Service Quality Measure (SQM) Report

Pursuant to Order No. 11-160, which amended Order No. 97-196 (UM 814), PGE hereby submits via electronic only, the 2014 Annual Service Quality Measure Report.

Should you have any questions or comments regarding this filing, please contact Terri Bowman at (503) 464-8854.

Please direct all formal correspondence and requests to the following email address pge.opuc.filings@pgn.com

Sincerely,

A handwritten signature in blue ink, appearing to read "Karla Wenzel". The signature is fluid and cursive, written over a white background.

Karla Wenzel
Manager, Pricing and Tariffs

Enclosure
Cc: Lori Koho, OPUC



Portland General Electric

2014 Service Quality Measure Report

SERVICE QUALITY MEASURE ANNUAL REVIEW

Review of Safety and Operational Performance Areas

Portland General Electric submits this annual report pursuant to OPUC Order 97-196 as later amended to provide information on the service quality of the Company. The information addresses Service Quality Performance Measures on the following:

- C1 “At Fault” customer complaint frequency
- R1 Average customer interruption duration
- R2 Average customer interruption frequency
- R3 Average momentary interruption frequency
- R4 Annual service restoration
- X1 Vegetation Management program
- X2 Pole and overhead facilities inspection, testing and maintenance program
- X3 Other Programs (Marina inspection and maintenance)

In addition to the reporting on the above stated service quality performance measures, and to provide a fuller picture of PGE’s service quality, PGE has included in this report since 2008, additional information we call 21st Century Service Quality Indicators. These 21st Century Service Quality Indicators are included in an Appendix to this report and provide information on the following: customer satisfaction, system reliability and NESC safety violations.

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2014 Annual Review of Safety and Operational Performance Areas

A. Relentless Safety at PGE

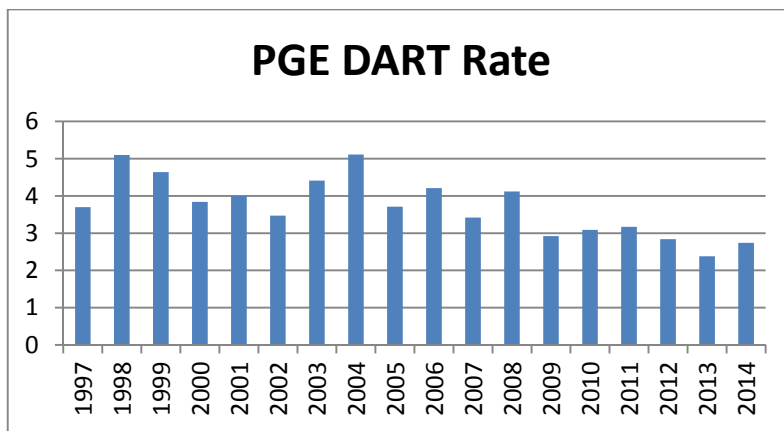
Safety is a core value at Portland General Electric and the continual focus on safety impacts all areas of the company. The changes are seen in generation, engineering, construction, maintenance, customer service, employee meetings, office environments, and many more. Employees recognize the corporate commitment to safety and the personal value in safety at work and at home. PGE leadership continues to guide our journey to an injury free work place and they set the example for relentless safety. A phrase that captures the value of safety is “There is no job so urgent that we cannot take the time necessary to perform the job safely.”

The Executive Safety Council (ESC) oversees multiple safety aspects within the company and with our customers. Their commitment to relentless safety provides direction to the various workgroups and is able to align resources needed to address safety issues. The Officers and senior management representatives on the ESC meet with employee groups to hear safety concerns and to share information on safety initiatives. The ESC helps reduce barriers that can impede our work on safety.

PGE is working on multiple fronts to improve safety. Generation capacity was added in 2014 that included 220 megawatts of gas fired generation and 267 megawatts of wind generation with 116 wind turbines. Relentless safety was included in all aspects of these projects to ensure the safety of employees, contractors and the public. PGE employees worked over 5.3 million person-hours in 2014 and the challenge to each of us is to complete the work safely.

SHARP and VPP safety programs at generation sites and Grassroots Safety programs at Transmission and Distribution sites are powered by strong employee engagement. These programs leverage the experience of the frontline workforce to identify hazards and work to correct them. Eliminating physical hazards, improving work procedures, and understanding regulatory compliance are key components of employee efforts in these programs. Their success builds each year and is part of the foundation of our safe work environment.

We’ve had employee injuries at PGE in 2014. It impacts each of us, our families, and our communities. We are working together to drive safety into everything we do, evaluate safety before every task, and lookout for the safety of our coworkers and our customers. Regardless of the role of PGE employees – laborer, craftsman, engineering, management, officer and all groups in between – the commitment to safety is the same. We are all committed to relentless safety.



B. Performance Measures C1 Customer “At Fault” Complaint Frequency Customer Complaint and Customer Service Measures

In 2014, PGE’s OPUC Liaisons fielded 236 customer complaints, a decrease from 282 complaints in 2013. Of these, the OPUC determined 5 “at-fault” designations resulting in PGE’s 2014 total at-fault complaint rate at 0.0059 per 1,000 customers. It is standard practice to meticulously review all at-fault complaints for root cause and lessons learned.

Year	Logged Complaints	Total Customers	At Faults	At Fault Frequency
2011	254	820,676	14	0.0171
2012	208	822,466	12	0.0146
2013	282	828,354	16	0.0193
2014	236	842,273	5	0.0059

C. Reliability Performance Measures: R1-SAIDI, R2-SAIFI, R3-MAIFI, R4-CAIDI

Executive Summary

This executive summary provides an overview of the 2014 Reliability Report and highlights key information with comparisons to past years’ data. If there are any questions about this information, please call Rob Weik at (503) 464-8131.

a. 2014 Reliability

The three year weighted average for SAIDI, SAIFI, and MAIFI indices for 2014 were 79.5 minutes, 0.59 occurrences, and 1.16 occurrences respectively. The SAIDI three-year weighted averages are below the OPUC thresholds, and reflect an increase from the three year weighted average reported in 2013. The increase was due to multiple storms that increased our SAIDI this year.

The five-year average service availability for Portland General Electric customers is 99.986%. Service availability in 2014 was 99.974%. Continued efforts in 2015 will improve system reliability by focusing on the poorest performing feeders and tap lines, putting processes in place to reduce the length of major outages and investigating outage causes that are trending up.

b. Summary of Reliability Indices

Table 1, on the following page, provides a 10 year summary of the PGE’s reliability indices (excluding Major Event Days) and shows that PGE’s three year system average stayed under the OPUC SAIDI, SAIFI, and MAIFI Level 1 and 2 threshold limits in 2014.

NOTE: A day is designated as a Major Event Day when the daily system SAIDI exceeds a threshold value, T_{MED} . PGE utilizes the IEEE Standard 1366 methodology to calculate the T_{MED} value. In 2014, January 11th, March 6th, September 24th, October 13th, October 25th – 26th, November 11th – 13th, and December 11th, 2014 were designated as Major Event Days.

TABLE 1
10 YEAR SUMMARY OF RELIABILITY INDICES
(EXCLUDING MAJOR EVENT DAYS)

Year	SAIDI (minutes)	SAIFI (occurrences)	MAIFI (occurrences)	CAIDI (minutes)	Number of outages
2014	93	0.69	1.33	135	5,834
2013	62	0.45	0.91	138	4,495
2012	72	0.55	1.11	131	5,093
2011	66	0.51	0.89	129.0	4,535
2010	77	0.65	1.1	118.3	5,454
2009	115	0.81	1.4	141.6	6,354
2008	75	0.73	1.3	102.7	5,817
2007	77	0.71	1.3	108.5	5,994
2006	117	1.06	1.6	110.4	6,930
2005	86	0.83	1.6	103.6	5,560
2004	85	0.8	1.8	106.3	5,582
2003	82	0.8	2.1	102.5	5,366
3 Year Weighted Average for 2014	79.5	0.59	1.2	134.9	N/A
Level 1 Penalty	105	1.2	5	N/A	N/A
Level 2 Penalty	115	1.2	5	N/A	N/A

The following methods/assumptions were used to derive PGE's 2014 system reliability indices:

1. Correction factors for SAIDI and SAIFI were applied to tap line outages to more accurately reflect actual events. A factor of 0.8 for duration and 0.9 for number of customers has been used since 2004.
Note: Correction factors were not applied to feeder outages or outages affecting fewer than 30 customers as the information regarding number of customers affected and outage duration are more accurate for these types of outages.
2. The following were excluded from calculations:
 - All outages of five minutes or less were excluded from SAIDI and SAIFI calculations
 - Outage causes indicated as Non Outage, Telco Wire, Cable TV Wire, Verizon Equipment, Qwest Equipment, or Comcast Equipment
3. The three-year weighted averaging formula for 2014 was calculated with 2014 weighted at 50%, 2013 weighted at 30%, and 2012 weighted at 20%.

c. Underperforming Feeder Summary

PGE feeders are classified as Urban, Rural, or Remote and have established performance thresholds (see Appendix for details). Feeders with indices greater than or equal to the defined feeder classification thresholds are designated as underperforming.

A 10 year summary of PGE's underperforming feeders is shown below in Table 2. The number of underperforming feeders is displayed by year and filtered by reliability index and total. Of PGE's 596 feeders, 11 (1.8%) have been underperforming for the last three consecutive years and 26 (4.4%) have been underperforming for two out of the last three years.

**TABLE 2
10 YEAR SUMMARY OF UNDERPERFORMING FEEDERS**

Year	Number of Underperforming Feeders (by index)				Total Underperforming Feeders ²
	SAIDI	SAIFI	MAIFI	MAIFI ONLY ¹	
2014	109	44	16	13	127
2013	53	19	10	7	63
2012	58	24	11	11	76
2011	56	29	11	12	61
2010	78	37	11	7	91
2009	124	44	25	12	136
2008	59	34	16	12	80
2007	71	35	25	17	96
2006	114	86	24	15	143
2005	76	49	33	27	111
2004	67	45	40	26	104
2003	77	45	51	36	116

¹ Designates feeders that are only underperforming for the MAIFI threshold and no other index thresholds (i.e. SAIDI and SAIFI). This column was added to show the benefit of tracking MAIFI on more feeders every year.

² A feeder can be underperforming for more than one index. Feeders that fall in multiple underperforming indices are only captured once in the Total Underperforming Feeders value.

d. Worst SAIDI Days

Table 3 displays the top 10 days with most significant impact to SAIDI in 2014 (NOTE: Major Event Days are excluded). The ranking is based on the total number customer outage minutes for the day and associated contribution to SAIDI. These 10 days made up 31% of the total customer minutes in 2014 and contributed 19.5 minutes to the 2014 system SAIDI value.

**TABLE 3
10 WORST DAYS FOR SAIDI IN 2014
(EXCLUDING MAJOR EVENT DAYS)**

Rank	Date	Customer-Outage Minutes	Minutes Contributed to SAIDI Total	Outage Cause
1	2/8/14	2,639,931	3.08	Weather-Heavy Snow
2	7/7/14	2,430,776	2.80	Loss of Supply - Substation
3	10/2/14	2,219,833	2.56	Loss of Supply - Substation
4	2/9/14	2,204,587	2.54	Weather-Ice-Freezing Rain
5	2/17/14	2,199,363	2.54	Weather-High Winds
6	6/12/14	2,174,014	2.51	Loss of Supply - Substation
7	2/15/14	2,109,588	2.43	Weather-High Winds
8	2/16/14	2,090,208	2.41	Weather-High Winds
9	12/12/14	1,936,459	2.24	Weather-High Winds
10	12/5/14	1,443,044	1.67	Vegetation

D. Performance Measure X1 – Vegetation Management

Description:

The Vegetation Management Program is a Basic Maintenance Program that is set apart from the other inspection and maintenance programs due to the crucial effect trees can have on system safety and reliability. Trees and other vegetation are trimmed or removed to provide line clearance and prevent system damage. The Vegetation Management personnel count is a valuable early warning indicator to alert Staff of the Company's ability to adequately maintain its system.

Understanding:

The Company acknowledges that "tickling," "brushing" contacts, brown leaves, desiccation, or any other descriptions, or results of, direct or arcing contact with primary conductors is interpreted by Staff as interference.

PGE Quality Control:

The Company shall inspect not less than 10% of recently completed tree trimming on a continuous basis to ensure compliance with the Program Plan and achievement of adequate clearance.

PGE Foresters monitor all trimming projects on a continual basis using QA performance logs for each project.

Program Expenditures:

The Annual Report will contain information showing the Company's actual annual expenditures compared with its previously planned expenditures. Information will include total budget with actual versus budgeted for each of the following elements: Maintenance Cycle Trimming, Customer Assistance Trimming, Line Construction Trimming, and PGE supervision and Administration.

Budget Plan and Actual Expenditures:

	<u>Actual</u>	<u>Budget</u>
2013 Actual versus budgeted:	\$13,199,330	\$13,320,884
2014 Actual versus budgeted:	\$13,450,480	\$13,746,624
• PGE Supervision and Administration:	\$669,713	
• Maintenance Cycle Trimming:	\$12,643,451	94%
• Customer Assistance Trimming :	\$672,524	5%
• Line Construction Trimming:	\$134,505	1%

Vegetation Management Personnel Information:

The Company's Annual Report shall include the number of full time employees assigned to the following positions for each of the last three years:

	2014	2013	2012
a) Company foresters:	8	8	8
b) Company tree trimmers and arborists; and	0	0	0
c) Contractor tree trimmers and arborists.	95	95	95

E. Performance Measure X2 Pole & Overhead Facilities Inspection, Testing, and Maintenance Program

Summary of Program

The year 2014 was our eighth year of the Facility Inspections and Treatment to the National Electrical Safety Code (FITNES) III 10-year cycle. 2014 FITNES overhead inspection and treatment was performed on 30,525 distribution and transmission poles and associated overhead distribution facilities (11.3% of 270,000 wood poles included in the FITNES Overhead Program).

a. Corrections of Violations Discovered During Inspections

- FITNES Program timelines are established and maintained to perform corrections, repairs, or replacement work within two (2) years of violation discovery. 12,000 violations were corrected in 2014.
- Violations deemed an immediate hazard receive expedited attention to ensure treatment/correction within 30 days.

b. PGE Quality Control

- Accuracy of the inspection is ensured by performing QC on a random sampling pulled on average weekly.
- QC was also performed on 809 corrected violations (6.7% of total 12,000 corrections).

c. Program Expenditures

- 2014 Pole and Overhead Facilities Inspection, Testing and Pole Treatment: \$1,032,000 (Budget) \$1,033,000 (Actual).

d. Repair and Replacement of Facilities

	2014	
	Budget	Actuals
Pole and OH Facilities Inspection, Testing, & Pole Treatment	\$1,032,000	\$1,033,000
Pole and OH Facilities Repair	\$1,382,000	\$1,055,000
Replacement of Facilities (Capital)		
Distribution	\$1,324,000	\$1,231,000
Full Pole Inspection – Transmission (FPI) Project	\$615,000	\$587,000

e. 2015 FITNES Plans

- PGE plans to stay on the Cycle 3 FITNES plan for Pole and OH Inspections and inspect approximately 28,000 poles and related OH facilities in 2015

F. Performance Measure X3 - Other Programs

Marina Inspections

Forty seven Marinas were inspected this quarter. One Marina was found to have violations. All inspection reports were entered into Maximo and forwarded to the appropriate region for resolution.

The following are violations reported, but not corrected since 2013.

M1452510	Low Drop	Reported Oct 2014
M1406718	Low Drop & Tight TX	Reported April 2013
M1412317	Numerous Minor Repairs	Reported April 2013
M1429546	B/O Primary Conduit	Reported April 2014
M1457278	Raise TX	Reported November 2014
M1457281	Raise TX	Reported November 2014

PGE New Construction Quality Assurance Program

PGE QA's

1. 92 poles inspected involving new pole installations inspected in Q1 of 2015
2. 0 violations were found
3. Violations per pole was 0.0%

PGE Safety Survey for inspection of imminent danger of Overhead System

Safety Surveys

1. 38 Townships are in the 2015 cycle
2. 30% were inspected in Q1 of 2015
3. One Work Order created and forwarded to Region to fix B/O conduit.
4. 20 double poles reported on Safety Survey forwarded to UAM to review.

Maximo

In 2014 CS&I went to bid on 250 jobs with a total bid amount of \$5.9 million.

This averages 62 jobs per quarter and \$1.5 million per quarter.

Q1 of 2015 we have bid 13 jobs with a total bid amount of \$206,000.

Appendix

21st Century Service Quality Indicators

1. Customer Survey Data

PGE collects survey data from Residential, Business and Large Industrial (Key) customers to measure and evaluate how customers perceive its performance across several areas including:

- Reliability and Power Quality
- Customer Service
- Management
- Communications
- Pricing
- Corporate Citizenship
- Billing and Payment

The surveys reveal relative strengths and weaknesses in the Company's performance as well as opportunities for improvement.

PGE contracts with Market Strategies International (MSI), an independent, full-service customer market research company headquartered in Michigan, to conduct customer satisfaction surveys among PGE's residential and general business customers.

Each quarter, MSI surveys 400 to 600 residential customers and every other quarter, (Q2 and Q4) they survey 300-400 general business customers. They analyze and benchmark the collected data and provide PGE with quarter-to-quarter and year-to-year comparisons based on the "percent total positive" (%6-10) scores on an 11-point scale (where 0 means the customer has a "Very Unfavorable" impression, 10 means the customer has a "Very Favorable" impression). According to the fourth-quarter 2014 MSI survey, PGE received a positive rating on overall satisfaction for both residential and business customers, placing it in the top quartile for residential and top ten percent (decile) for business customers of its peer utilities.

In addition, PGE also acquires the results of the annual J.D. Power and Associates Electric Utility Customer Satisfaction StudySM (J.D. Power Study) for both residential and general business customers. PGE uses the J.D. Power Study primarily as a benchmark to other electric utilities. PGE was again ranked as the top investor-owned utility in the nation for residential customer satisfaction. PGE ranked as the top 2 utility in the West for business customer satisfaction by J.D. Power & Associates in 2014.

For its large industrial customers (key customers), PGE contracts with TQS Research, Inc. (TQS), an independent market research firm, to conduct annual customer satisfaction surveys. TQS, headquartered in Georgia, specializes in business-to-business research among the largest energy users in the United States and Canada. For 2014, TQS completed 84 PGE key customer interviews and the data against the results of 49 other U.S. utility holding companies. TQS uses a 10-point scale (with 1 being *Very Dissatisfied* and 10 being *Very Satisfied*) and reports the percent of customers that give a rating of 8, 9, or 10 (%8-10).

In the 2014 TQS research, PGE ranked third nationally in overall customer satisfaction and number nine in reliability with large key customers, placing it in the top quartile among electric utility holding companies.

2. Ranking Methodology:

National and/or peer comparison groups are not identical for MSI, J.D. Power and TQS research results, but there is some overlap in the utilities surveyed. In 2014, MSI included approximately 100 utilities serving residential customers and approximately 90 utilities serving business customers in their national databases. J.D. Power surveyed 138 utilities for its residential study and 93 utilities for its general business study. For both MSI and J.D. Power, PGE compares itself to all surveyed utilities and to a sub-set defined as a “peer group.” The TQS national comparison database contains 49 utilities and compares performance with respect to key customers only.

Utilities in the peer comparison groups for PGE are shown in the tables below for MSI, J.D. Power and TQS.

PGE’s 2014 MSI Survey peer group

Residential	Business
NV Energy North	NV Energy North
NV Energy South	NV Energy South
Pacific Gas & Electric	Pacific Gas & Electric
Pacific Power	Pacific Power
Portland General Electric	Portland General Electric
Puget Sound Energy	Puget Sound Energy
Rocky Mountain Power	Rocky Mountain Power
San Diego Gas & Electric	San Diego Gas & Electric
Seattle City Light	Southern CA Edison
Southern CA Edison	

PGE's 2014 J.D. Power Study Peer Group

Residential	Business
SRP	SRP
Southern California Edison	Southern California Edison
Rocky Mountain Power	Rocky Mountain Power
APS	APS
Pacific Power	Pacific Power
NV Energy	NV Energy
Pacific Gas and Electric	Pacific Gas and Electric
San Diego Gas & Electric	San Diego Gas & Electric
Pudget Sound Energy	Pudget Sound Energy
Xcel Energy-West	Xcel Energy-West
LA Dept. of Water & Power	LA Dept. of Water & Power
SMUD	

**2014 TQS National Utility Benchmark Study
of Large Key Accounts**

Top 20 of 52 Holding Companies
Southern Co
Berkshire Hathaway
Portland General
NV Energy
We Energies
Duke Energy
PP&L
SCE&G
Xcel Energy
Duquesne
WPS
FP&L
NIPSCO
Tampa Electric
TVA
SCE&G
OG&E
Idaho Power
Entergy
Avista

3. Customer Satisfaction Results:

➤ Survey Question & Result

MSI:

Survey Question: “Based on your overall experience as a customer of PGE, how would you rate the company on a 0-10 scale, where a 0 means you are extremely dissatisfied and 10 mean you are extremely satisfied?”

TQS:

Survey Question: “Overall, how satisfied are you with the full package of electrical services provided by your local utility?” See PGE Customer Satisfaction results below.

PGE Customer Satisfaction Rolling Average Results

	MSI: Residential (%6-10)	MSI: General Business (%6-10)	TQS: Key Customers (%8-10)
2014	88%	94%	90.50%
2013	90%	94%	90.90%
2012	86%	94%	93.90%
2011	86%	92%	90.50%
2010	86%	94%	81%
2009	85%	92%	72%
2008	85%	94%	82%
2007	83%	92%	75%
2006	82%	92%	76%
2005	81%	93%	64%
2004	80%	87%	58%

Year End 2014 Rank on Customer Satisfaction

National	8th/105	2nd/94	3rd/49
Peers	2nd/10	1st/9	NA

4. System Reliability Results:

➤ Survey Question and Results

MSI:

Survey Question: “Thinking about the overall reliability of electric service to your [home/business], on a 0-10 scale, where 0 means you are extremely dissatisfied and 10 means you are extremely satisfied, how satisfied are you with the overall reliability of electric service?”

TQS:

Survey Question: “Concerning the reliability of electric power, please rate the reliability at this site on the following overall how satisfied are you with the reliability of electric power?”

PGE System Reliability Rolling Average Results

Year End 2014 Rank on System Reliability

	MSI: Residential (%6-10)	MSI: General Business (%6-10)	TQS: Key Customers (%8-10)
2014	96%	96%	91.70%
2013	97%	96%	96.60%
2012	96%	96%	97.60%
2011	95%	98%	88.40%
2010	95%	95%	95.70%
2009	94%	98%	86.60%
2008	95%	96%	86.20%
2007	94%	95%	85%
2006	95%	94%	88%
2005	94%	94%	83%
2004	93%	91%	71%

Year End 2014 Rank on System Reliability

National	4th/104	4th/93	9th /49
Peers	2nd /10	1st/9	NA

5. Safety Results – Note: Safety Not asked in 2014 for Residential Survey

MSI:

Survey Question: “Using this same 0-10 scale, how would you rate PGE in terms of helping customers use electricity safely in their [homes/businesses]?”

PGE Safety

	Residential (MSI) (%6-10)	General Business (MSI) (%6-10)
2014	Not asked	80%
2013	Not asked	85%
2012	80%	80%
2011	76%	83%
2010	75%	79%
2009	76%	70%
2008	76%	64%
2007	77%	70%
2006	79%	67%
2005	74%	62%
2004	74%	60%

8. PGE

Criteria:
more of
located
Growth

**Feeder
Classification**

Urban – 50% or
the feeder load is
inside the Urban
Boundary (UGB)

- Rural – One or more of the following apply:
 - a. Load is greater than 0.5 MVA per square mile
 - b. More than 100 customers per square mile
 - c. Serving load inside an incorporated city
 - d. Directly adjacent to the UGB with feeder ties into the UGB
- Remote – Not classified as Urban or Rural

9. PGE Feeder Classification Performance Thresholds:

Feeder Classification	SAIDI (minutes)	SAIFI (occurrences)	MAIFI (occurrences)
Urban	120	2.0	5
Rural	300	2.6	10
Remote	420	2.6	15

IEEE 2.5 BETA METHOD

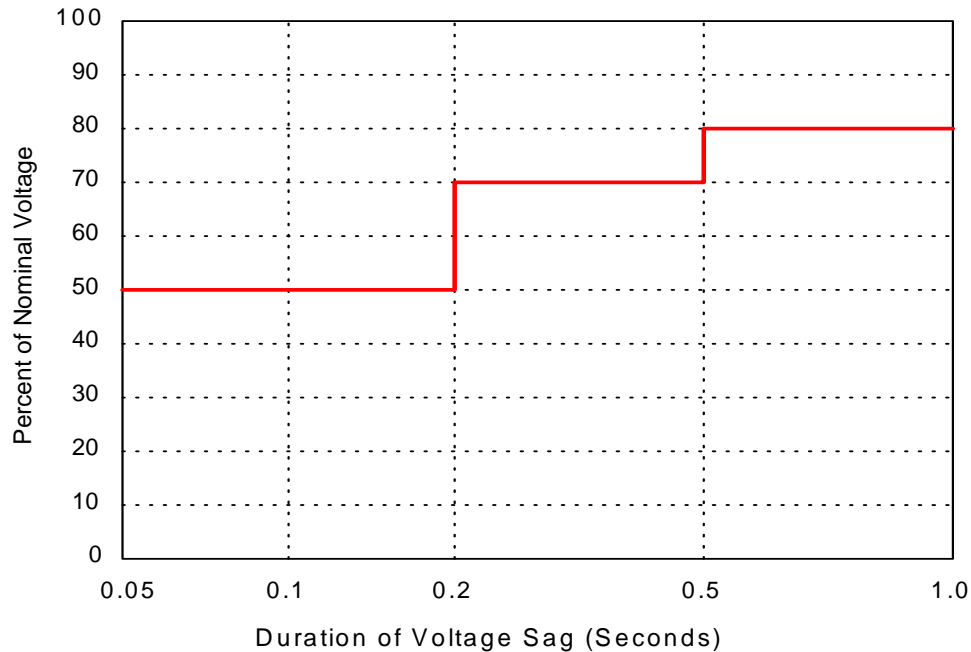
The 2.5 Beta Method looks at the Daily SAIDI values of a utility and compares them to a threshold value (T-MED) obtained by performing a logarithmic distribution analysis on the previous 5 years of outage data. Calculating a T-MED value allows the utility to identify and study days in which the distribution system experienced stresses beyond what is observed under daily operation. Per IEEE Standard 1366-2003 the steps to obtain major event day threshold (T-MED) are outlined below.

IEEE GUIDE FOR ELECTRIC POWER DISTRIBUTION RELIABILITY INDICES	IEEE Std 1366-2003
<p>a) Collect values of daily SAIDI for five sequential years ending on the last day of the last complete reporting period. If fewer than five years of historical data are available, use all available historical data until five years of historical data are available.</p> <p>b) Only those days that have a SAIDI/Day value will be used to calculate the T_{MED} (do not include days that did not have any interruptions).</p> <p>c) Take the natural logarithm (ln) of each daily SAIDI value in the data set.</p> <p>d) Find α (Alpha), the average of the logarithms (also known as the log-average) of the data set.</p> <p>e) Find β (Beta), the standard deviation of the logarithms (also known as the log-standard deviation) of the data set.</p> <p>f) Compute the major event day threshold, T_{MED}, using equation (25).</p> $T_{MED} = e^{(\alpha + 2.5 \beta)} \quad (25)$ <p>g) Any day with daily SAIDI greater than the threshold value T_{MED} that occurs during the subsequent reporting period is classified as a major event day.</p> <p>Activities that occur on days classified as major event days should be separately analyzed and reported.</p>	

Since OPUC, PGE, Pacific Corp., and Idaho Power have collaborated on incorporating the IEEE-2.5 Beta method for calculating Major Event Days into Oregon's Electric Service Reliability Rules. The new rules became affective January of 2012.

SARFI

System Average RMS Variation Frequency Index (SARFI) represents the average number of RMS sag events experienced by a customer over a time period, where the disturbances are those with a magnitude less than the semiconductor equipment voltage sag ride-through capability curve specified in SEMI F47-0200 (below).



The Semiconductor Equipment and Materials International (SEMI) developed the SEMI F47-0200 standard for semiconductor process equipment voltage sag immunity. The standard specifies minimum voltage sag ride-through requirements of semiconductor processing equipment. A voltage sag event is defined as a short term decrease in voltage (10 - 90% of nominal) ranging between 0.5 cycles and one minute. Voltage sags can be caused by bad weather, tree into line, car hit pole, failed equipment on PGE's system, or events originating outside PGE's system.

In 2014, PGE's Large Customer Quality and Reliability Program (QRP) tracked voltage sag events against the SEMI F47 curve for 25 customers who have unique power quality and reliability requirements.

The PGE Quality and Reliability Program (QRP) is a focused effort to provide a high level of service reliability to a group of customers determined to have unique reliability needs. The QRP program includes monitoring and reporting of power quality and reliability metrics for 26 customer sites and customers located within our three Reliability Areas. These Reliability Areas are Downtown Salem Core, Hillsboro-Sunset, and Downtown Portland Network.

Additional objectives of the QRP Program include:

- working with stakeholders to review the facilities serving QRP customers and identify potential system improvements
- developing detailed maintenance plans including enhanced system inspections and testing.
- managing implementation of identified capital improvements
- performing root cause investigations and identifying preventive actions for significant reliability events

Through this effort, PGE is providing a higher level of service excellence to meet the service quality and reliability needs of an increasingly sophisticated and demanding customer base.

Events below the curve are considered a SARFI event.

SARFI is calculated using the following formula:

$$SARFI = \frac{\sum \text{Total Number of Events}}{\text{Total Number of Customers}}$$

The 2014 SARFI results reflect 16 events.

Year	SEMI F47 (occurrences)	SEMI F47 (occurrences originating inside PGE system)	SARFI (total)	SARFI (originating inside PGE system)
2014	30	30	1.15	1.15

Please see the table below for a summary of SARFI SEMI results for 2014.

* % Sag is the percentage of nominal voltage remaining during event

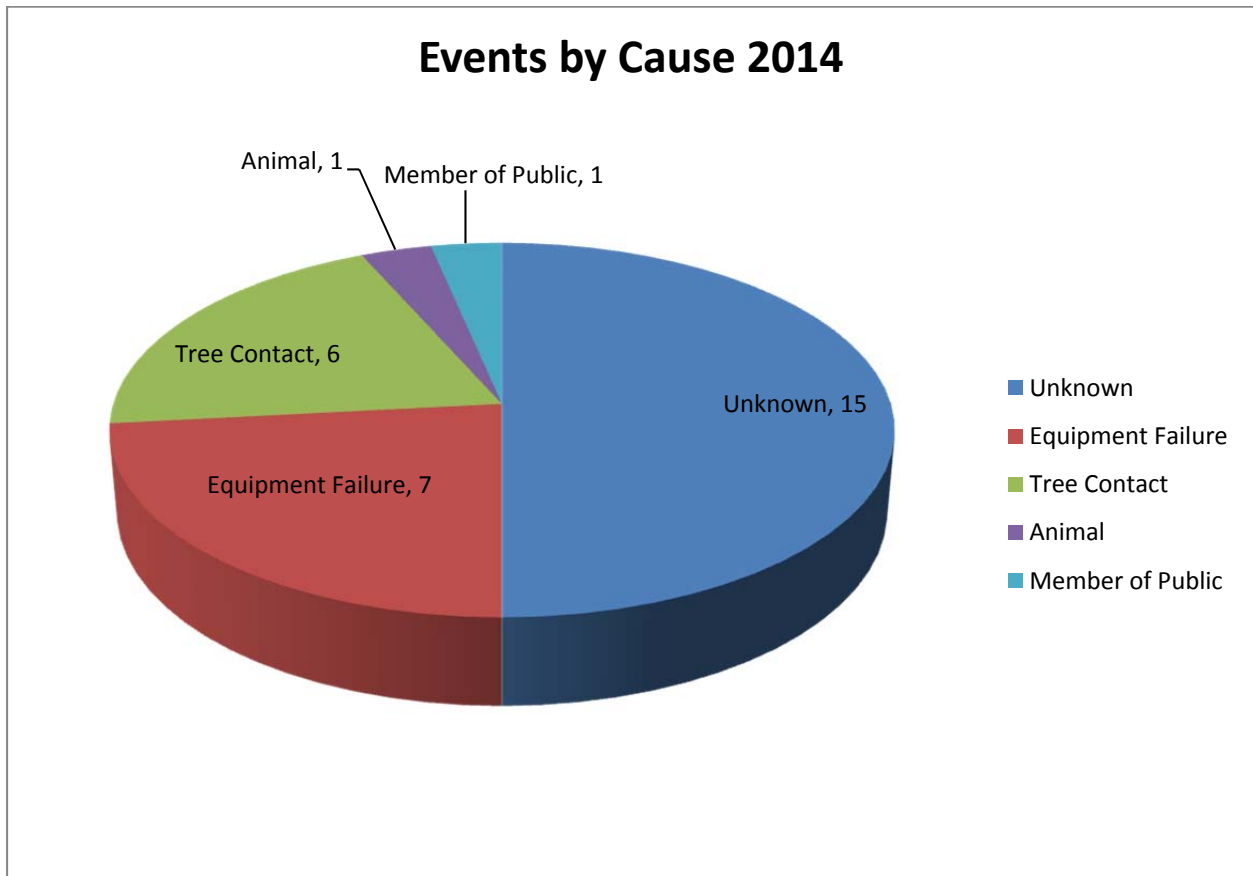
# of Customers	Event Date	Duration	Worst Case Voltage	Description of Event	Follow-Up
1	1/11/14	5.76 Cycles	42.25%	Canemah-Mcloughlin #1 tripped and reclosed. High winds in area.	None.
1	2/4/14	18.02 Cycles	14.51%	Failed tie switch.	Performance Improvement Analysis under way.
1	2/16/14	4.92 Cycles	47.14%	Meridian-Rosemont 115 kV tripped and reclosed. Causes unknown.	None.
1	2/17/14	1.91 Seconds	74.53%	Tree into line caused a wire down on Bell-King.	Faulted section isolated and repairs made.
1	3/3/14	26.74 Cycles	59.58%	Underground conductor damaged due to dig-in.	Faulted section isolated and repairs made.
1	3/6/14	6.72 Cycles	14.63%	Tree limb into line on Harmony 13 kV.	Tree limb removed and breaker closed.
1	4/1/14	16.33 Cycles	52.21%	Trip and reclose on Tektronix-Hocken. Broken guy wire.	Repairs made.
1	4/13/14	6.96 Cycles	15.00%	Squirrel into 13 kV capacitor bank.	Capacitor bank taken out of service. Investigating infrastructure upgrades at Reedville.

# of Customers	Event Date	Duration	Worst Case Voltage	Description of Event	Follow-Up
2	7/9/14	26.28 Cycles	44.47%	Underground conductor failure on Sunset-Pauling feeder.	Repairs made.
2	8/16/14	28.34 Cycles	26.07%	Underground conductor failure on Sunset-Pauling feeder.	Repairs made. Infrared scan of feeder performed.
1	9/20/14	15.97 Cycles	5.10%	Bad order getaway cable.	Load picked up via switching. Getaway cable replaced.
1	10/15/14	22.79 Cycles	2.48%	Tree limb on line Harmony-Milwaukie 13 kV	Tree limb removed and breaker closed.
1	10/17/14	27.95 Cycles	27.53%	Trip and reclose on Wilsonville-West	None.
1	10/25/14	5.28 Cycles	48.05%	Trip and reclose at both ends of Meridian-Rosemont 115 kV. High winds.	None.
2	10/25/14	4.92 Cycles	46.93%	Trip and reclose on Sellwood-Raleigh Hills 115 kV. High winds.	None.
3	10/25/14	6.12 Cycles	43.39%	Trip and reclose McLoughlin-Sellwood 115 kV. High Winds.	None.
3	10/25/14	5.28 Cycles	39.03%	Sellwood-Raleigh Hills 115 kV tripped and locked out. High Winds.	None.

# of Customers	Event Date	Duration	Worst Case Voltage	Description of Event	Follow-Up
1	10/31/14	8.52 Cycles	14.14%	Restoration activities for failed primary cable on Urban-Medical 13 kV #1	Joint Root Cause Analysis being performed with OHSU.
1	10/31/14	28.09 Cycles	56.94%	Restoration activities for failed primary cable on Urban-Medical 13 kV #2	Joint Root Cause Analysis being performed with OHSU.
1	11/11/14	43.11 Cycles	45.98%	Tektronix-South tripped and reclosed. High Winds.	None.
1	11/11/14	29.77 Cycles	26.36%	Brookwood-Borwick trip and reclose. High Winds.	None.
7	11/11/14	4.2 Cycles	35.43%	Orenco-Reedville 115 kV trip and reclose. High winds.	Solarworld investigating methods to harden tools.
1	12/2/14	6 Cycles	31.22%	Tree broken limb into line at pole 4647.	Replaced insulator stack.
1	12/11/14	4.8 Cycles	15.63%	Bethel-Market 115 kV tripped and locked out. Tree limb on line.	PGE power quality assisting on PLC settings.
1	12/11/14	25.79 Cycles	23.56%	Trip and reclose on Brookwood-Sunrise. High winds.	None.

# of Customers	Event Date	Duration	Worst Case Voltage	Description of Event	Follow-Up
1	12/11/14	27.48 Cycles	23.98%	Trip and reclose on Brookwood-Sunrise. High winds.	None.
1	12/11/14	27.7 Cycles	30.83%	Trip and reclose on Brookwood-Sunrise. High winds.	None.
1	12/11/14	32.4 Cycles	32.00%	Trip and reclose on Brookwood-Sunrise. High winds.	None.
1	12/11/14	27.22 Cycles	34.24%	Brookwood-Sunrise tripped and reclosed. High winds.	None.
1	12/11/14	4.2 Cycles	32.88%	Cornelius-Orengo #2 tripped and locked out. Tree limb on line.	None.

The graph below shows the sources for the 30 SARFI events which occurred during 2014:



2014 NESC Violations

Starting in 1999 a random sample of newly constructed poles was inspected by trained personnel looking for any National Electrical Safety Code NESC violations. Quarterly, the results were reviewed with line crew management in each region. The same crew that built a given pole is sent back to correct any violations identified. Steady progress has been achieved over the past 10 years in construction to the NESC. Annual training of the line crew included a review of the most common violations found. In 2014, 320 newly constructed poles was randomly selected and individually inspected and individually inspected. On average .05 violations were found per pole.

REGION	POLES	ABANDONED ANCHOR	BUILDING CLEARANCE	B/O GROUND	CONDUIT DAM/BRKTS	CLEARANCE PEDESTRIAN	CLIMBING SPACE	GROUND ROD	WH/CLEAR	GUY BONDING	GUY SLACK	INSULATOR BROKEN	WIRE OFF INSULATOR	STRUCTURE CLEARANCE	LOOSE WIRE	RISER GROUNDING	SECONDARY CLEARANCE	DRIVEWAY CLEARANCE	AG CLEARANCE	POLE-COM CLEARANCE	ROAD CLEARANCE	RAILROAD CLEARANCE	SERVICE ATTACHMENT	MIDSPAN COM CLEARANCE	SERVICE CLEARANCE	VERTICAL CLEARANCE	TOTAL VIOLATIONS	VIOLATIONS PER POLE	
PSC	55									2					3													5	0.091
ORE CITY	0																											0	0.000
EASTERN	60																											0	0.000
SOUTHERN	116		5		1		1									1	1									2	11	0.095	
WESTERN	89																											0	0.000
TOTAL	320	0	5	0	1	0	1	0	0	2	0	0	0	0	3	1	1	0	0	0	0	0	0	0	0	0	2	16	0.050

PGE SERVICE TERRITORY

Including Regional Boundaries

REVISED: 2/24/2012

- Legend
- SERVICE TERRITORY BOUNDARY
 - EASTERN
 - SOUTHERN
 - WESTERN
- © PORTLAND GENERAL ELECTRIC

