Introductions

- Andy Swayne – Municipal Liaison Manager
- Bill Foster – Distribution System Planner
- Rick Buell – Distribution System Engineering Specialist
- Carol Jaeger – Transmission System Planner
- Sunitha Kothapalli – Transmission System Planner
- Chris McVicker – Supervisor Engineering Maintenance Programs
- Laura Feinstein – Smart Grid Planning Manager
- Dennis Martin – Electric System Senior Engineer
- Keri Pravitz – Community Projects Manager
- Katherine Taylor – Local Government Affairs Representative
Workshop Purpose

• Provide an overview of PSE electrical system performance in 2015 as reported to the City

• Overall performance
  • Reliability projects completed and proposed
  • Areas addressed at past workshops
  • Maintenance
  • Automation initiatives (smart grid)
  • Information technology initiatives
2015 Bellevue Reliability Overview

- Bellevue Performance & Comparison

**SYSTEM AVERAGE INTERRUPTION DURATION INDEX (SAIDI) &**

**SYSTEM AVERAGE INTERRUPTION FREQUENCY INDEX (SAIFI)**

**FIVE YEAR HISTORY**

SAIDI figures in minutes, all outages including storm
SAIFI figures in outage events, all non-storm outages

<table>
<thead>
<tr>
<th></th>
<th>SAIDI</th>
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<th>SAIFI</th>
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<tbody>
<tr>
<td></td>
<td>BELLEVUE</td>
<td>PSE</td>
<td>BELLEVUE</td>
<td>PSE</td>
</tr>
<tr>
<td>2011</td>
<td>86.1</td>
<td>281.0</td>
<td>0.60</td>
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<td>2012</td>
<td>52.4</td>
<td>245.0</td>
<td>0.40</td>
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<tr>
<td>2013</td>
<td>100.7</td>
<td>247.0</td>
<td>0.41</td>
<td>0.86</td>
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<tr>
<td>2014</td>
<td>160.2</td>
<td>312.0</td>
<td>0.60</td>
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<tr>
<td>2015</td>
<td>186.9</td>
<td>361.0</td>
<td>0.71</td>
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PSE SAIDI figures for 2011 - 2015 are five year rolling average figures.
The 2011 - 2012 Bellevue SAIDI figures were calculated as single year figures.
The 2013 Bellevue SAIDI figure was calculated as a four year rolling average for years 2010 - 2013.
The 2014 & 2015 Bellevue SAIDI figures were calculated as a five year rolling average figures.

System Average Interruption Duration Index [SAIDI] SQI 320
Total customer outage minutes / average total customer count

System Average Interruption Frequency Index [SAIFI] SQI 1.3
Total customers affected / average total customer count
2015 Bellevue Reliability Overview

- Distribution system serving Bellevue in 2015

95 distribution circuits serving Bellevue
72 circuits [76%] had performance better than our system wide average
27 circuits [28%] experienced no unplanned outages
23 circuits [24%] had SAIDI or SAIFI exceeding system wide average figures
  (5 circuits rolling average SAIDI resulted from prior years performance)
2015 Bellevue Reliability Overview

- Circuits Exceeding System SAIDI and/or SAIFI 2011 – 2015

<table>
<thead>
<tr>
<th>CIRCUIT</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
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<td>20</td>
<td>25</td>
<td>23</td>
<td>37</td>
<td>17</td>
<td>7</td>
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</table>

64 circuits exceeded system wide average performance …
- 37 (58%) once in five years
- 17 (27%) twice in five years
- 7 (11%) three times in five years
- 3 (5%) four times in five years
2015 Bellevue Reliability Overview

- 23 circuit had SAIDI or SAIFI exceeding system wide figures. 18 of these circuits have been addressed or require no corrective action. The remaining 5 circuits have improvement actions identified.
2015 Bellevue Reliability Overview

- 5 circuits rolling average SAIDI resulted from prior years performance

<table>
<thead>
<tr>
<th>Circuit</th>
<th>Rolling Average</th>
<th>2014 Single Year SAIDI</th>
<th>2015 Single Year SAIDI</th>
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</thead>
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<tr>
<td>MED-35</td>
<td>429.6</td>
<td>1334.0</td>
<td>602.6</td>
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<td>NRU-23</td>
<td>492.9</td>
<td>2024.0</td>
<td>99.9</td>
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<tr>
<td>NRU-27</td>
<td>401.9</td>
<td>1572.0</td>
<td>248.0</td>
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<tr>
<td>NRU-26</td>
<td>331.4</td>
<td>1320.0</td>
<td>202.6</td>
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<td>EGT-13(^1)</td>
<td>325.6</td>
<td>1123.0</td>
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</table>

1 EGT-13 single year SAIDI is from 2013

- 5 year rolling average SAIDI is calculated using single year figures for the performance year and the previous 4 years
2015 Bellevue Reliability Overview

Three Year Average SAIDI/SAIFI (IEEE) Scatterplot
(2013-2015 unplanned non-storm including substation and transmission line)

Distribution circuits serving Bellevue relative to all PSE circuits
Enlargement focusing on distribution of circuits serving Bellevue.
Bellevue CBD Performance continues to be very good

- 24 circuits from 4 substations serve customers downtown
- 7 reliability circuits provide redundancy for downtown customers
- There were no major unplanned outage events affected downtown customers in 2015. A major outage is a circuit level event that is greater than one minute.

- There were …
  - 10 customer requested or scheduled outages
  - 4 smaller unplanned outages
Distribution Reliability Projects Completed in 2015

- Installation of Reclosers on Eastgate 27 and Factoria 13 & 15 feeder circuits
- Replacement of four oil-filled switches at Bellevue Square (CBD)
- Two tree wire retrofit project on Lake Hills 22 & one on Medina 36
- Extension of new feeder circuit Goodes Corner 21 west from Issaquah to east Bellevue south of I-90
- Distribution cable replacement projects in the Crossroads area (programmatic replacements planned to continue into 2017)
- 16 cable replacement projects (various circuits – 16,000 circuit feet) including proactive replacements
- Vegetation management trimming of 11 distribution circuits and 5 transmission lines
Proposed Distribution Reliability Projects

• Mark 1 switch replacement in the Cherry Crest Neighborhood
• Installation of Reclosers on Northrup 23 & South Bellevue 22 feeder circuits
• Tree wire retrofit projects on Eastgate 12, Kenilworth 23, Overlake 15 and South Bellevue 25
• Bridle Trails 22 feeder undergrounding west of 140th AVE NE
• CBD SCADA switch installation (continuing) 8 & 10 switches planned for 2016 & 2017 respectively
• Distribution cable replacements in Crossroads area (continuing)
• 40 cable replacement projects engineered for future construction (73,000 circuit feet)
• 26 cable replacement projects scoped for future engineering (42,000 circuit feet)
Distribution Areas Addressed At Prior Workshops

- Circuit Updates
  - **Lake Hills 25**: Some underground distribution cables in the Crossroads Mall vicinity have experienced high incidents of failure. *Cable replacement in this area begun in 2014 will likely extend into 2017 as final project scope is developed. All final project phases are in private property and require outage scheduling with property owners for construction.*
  - **Northup 25**: The Cherry Crest neighborhood north of NE 24th ST is served by direct-buried distribution cables and a mark-1 switch. *We continue to monitor the performance of this system. The were no additional cable issues in 2015, however the mark-1 switch has failed and is now slated for replacement by early 2017.*
Transmission System Improvements

• In Progress …
  • Lake Hills – Phantom Lake 115kV – New transmission line between existing substations to provide redundant (looped) transmission connection for three substations – this project was rejected by the East Bellevue Community Council and is currently under appeal.
  • Lakeside 115 kV Switching Station Rebuild – Multi-year phased replacement and upgrade of control and operating equipment in the substation for enhanced automation and reliability – planned completion in 2017.
  • Energize Eastside 230kV – Upgrading existing transmission lines and build a new transmission substation in Bellevue to provide increased system capacity and reliability for Bellevue and the greater Eastside – currently in permitting with planned construction in 2017-2018.

• On the Near Horizon …
  • Vernell Substation – New 115kV transmission switching station with local distribution substation for improved transmission system flexibility/reliability and new distribution system capacity to support Sound Transit and Spring District development in 2022, in coordination with the City and Spring District Developers.
Smart Grid Initiatives Including Automation

- FLISR (Fault Location, Isolation, Service Restoration) – Implementation started in 2015; initial project currently in commissioning phase; expansion to CBD planned in the future.
- Remote Data Acquisition Devices (RDADs) – 60 units in place in Bellevue providing remote alert to detected feeder system faults.
- Distribution SCADA Switchgear – The current plan calls for retrofitting 66 switches in the CBD area to add SCADA and integrating them into the EMS so that the system operators can see the distribution system configuration and events in real time. 24 switches have been retrofitted with SCADA and integrated. 9 switches are planned for retrofit in 2016 and 10 are proposed for 2017.
- Bellevue Urban Smart – PSE is supporting downtown businesses in managing building energy use including combinations of behavioral and technology solutions to achieve energy savings.
CIS, GIS & OMS

- PSE implemented three new integrated systems in April 2013
  - Customer Information System
  - Geospatial Information System
  - Outage Management System
- All successful with ongoing assessment of best practices and potential “next step” functionality enhancements
- On-line and mobile app outage map enhanced to show approximate geographic area affected by outages and ability to check service status for home and business accounts.
Wrapping Up

Questions & Discussion