



TO: Commissioners Brown, Carlson, Mital, Simpson and Helgeson
FROM: Rod Price, Chief Electric Engineering & Operations Officer, Tony McCallum, Line Crew Leader II, Tom Ossowski, Engineer, Tyler Nice, Systems Engineering Supervisor
DATE: February 23, 2018
SUBJECT: Electric System Outage Reduction Opportunities
OBJECTIVE: Status Update

Background

During the October 2017 Board meeting discussion of electric outage process updates, the Commissioners expressed an interest in projects that are aimed at helping reduce the impacts of future storm events. The EWEB Electric Division staff has been engaging in budget and project planning for 2018 and 2019. This backgrounder will review the resulting plans for projects in 2018 as well as upcoming work in 2019-2020.

Summary Update

In the third quarter of 2017, EWEB Electric Division staff created a cross departmental distribution planning group comprised of stakeholders from engineering, planning, troubleshooters, dispatch and overhead and underground crew leaders. Finance staff play a role to assist in budget reporting and planning for future FEMA work associated with the December 2016 Ice Storm as well as standardizing tracking and documentation of work to ensure re-imburement. The charter for this group is to plan future distribution work consistent with EWEB’s strategic objectives: increasing resiliency while maintaining reliability.

The group’s initial focus was to divide the 2018 Type 1 Renewal and Replacement budget into distinct categories in order to have defined spending targets so that progress and performance can be tracked throughout the year. Creating targets for the different types of projects has allowed for staff to prioritize spending in line with goals for the electric division, as well as aligning with outage data we collect. The work can be divided into two main categories, those aimed at preventing customer outages (resiliency, reliability), and work to repair customer outages due to unanticipated equipment failure (restoration). Preventative work planned for 2018 is expected to reduce risk of outages for approximately 8,600 customers.

A summary of these spending targets are included in Table 1.

Table 1
2018 Type 1 Renewable and Replacement Budget

Project Categories	Budget	Resiliency, Reliability	Restoration
Conductor/Cable Replacements	\$884,000	X	
Pole Replacements	\$390,000		X

PUC Corrections	\$390,000	X	
Live Front Switch Replacements	\$598,000	X	
Transformer Replacements	\$338,000		X
Total	\$2,600,000	\$1,872,000	\$728,000

2018 Project Details

Type 1 Renewable and Replacement budget has beneficial elements for both resiliency and reliability; with a heavier weighting on maintaining reliability. Some of these categories are emergent based equipment failure, and have been developed by analyzing historical outage budget performance. Examples of this would be allotting money for car-hit-pole events, underground cable failures, or transformer failures. Additionally, PUC compliance driven work is captured in this budget which has been reduced from previous years, because of EWEB’s completion of the neutral program.

Most notable in this budget are the strategic elements which involve decisions based on system and customer impact and are influenced by company objectives. The “Conductor Replacements” and “Live Front Switch Replacements” category budgets were increased from previous years to reflect a desire to increase resiliency and maintain reliability.

Of the \$884,000 “Conductor Replacement” category, \$618,000 of this is planned for cable replacements which will directly benefit customers by reducing probability of future outages through proactive replacement. In 2018, Spring Creek Substation get away cables, which are at the end of their projected life, will be replaced in coordination with a substation outage to replace breakers, switches and relays. Get away cables are underground conductors which exit feeder breakers at the substation and run to the first switch. These cables have a high impact to system reliability metrics because they feed 4,169 customers. This project accounts for \$432,000. Spring Creek cables were chosen due to opportunistic efficiencies gained by coordinating the work with an already planned outage; and Spring Creek cannot be back fed from another substation if there is a cable failure. Ensuring these cables are in good condition is important to maintaining reliability for these customers.

Pad mounted switches allow for reconfiguration of the distribution system due to planned or emergent outages. Live front switches are a type of pad mount switch that are some of EWEB’s oldest and least reliable switches and they are reaching the end of their projected life. Live fronts also expose EWEB personnel to high voltages once the enclosure door is opened. EWEB’s current standard is dead front switches, which provide EWEB personnel with the extra safety of a grounded metal panel in front of the live bus. As a result of the planning focus, all remaining live front switches (approximately 30) are planned to be replaced with new dead front switches in the next 3 to 4 years.

For 2018, funding has been included to replace \$598,000 worth of live front switches at 7 locations, along with \$186,000 of associated aging feeder cable. This is an increase compared to the 2 switches replaced in 2017. Planning has started to replace another 8-10 switches in 2019. Locations for these replacements have been prioritized based on budget availability and also system and customer impact.

Table 2 includes a summary of the system locations which will benefit from these upgrades along with the associated customer type and number.

Table 2
2018 Live Front Switch Replacements

Location	Customer Count	Customer Classification
Brewer & Tarpon Vault 2054	785	Industrial/commercial/retail/residential/medical
W. 18 th & Bertelsen (x2) Vaults 2444 & 5051	2,260	Commercial/residential
Hawkins & Highland Oaks Vault 3079	654	Residential
Hilyard & E. 32 nd Ave Vault 5883	400	Commercial/residential
Oakway Substation Vault 1496	378	Commercial/residential/ residential/medical
EWEB Office Headquarters Vault 6952	34	Commercial
Total	4,511	

Looking Forward

In addition to the planned strategic projects using EWEB Type 1 Renewal and Replacement funds, EWEB is in the final approval stages for FEMA money to harden the EWEB distribution system to reduce the future outages during storms similar to the December 2016 Ice Storm. This request for funding was submitted by EWEB to FEMA following the 2016 storm. EWEB is expecting a FEMA award of \$1.9 million for distribution system improvements. The submission process required EWEB to detail the cost/benefit associated with proposed projects. Proposed projects were based on outage data with high customer count and higher outage times from major events in 2012, 2014, 2016 and 2017. These projects include overhead to underground conversions, overhead arrangement re-configurations, re-routing lines, and conductor upgrades that affect approximately 2500 customers. Execution of these projects is planned for 2019 and 2020. Appendix A shows examples of these upgrades along with associated customer impact.

EWEB staff is continuing to plan Distribution upgrade work and actively track progress and performance of these projects. Due to the anticipated increase in resource needs during 2019 and 2020 to accommodate the FEMA reimbursable work, staff is currently creating tools which will enable more streamlined design and construction for projects, as well as the measurement of reliability and resiliency effected by these upgrades. In addition, staff has obtained board approved long term contract relationships with three Electrical Line Worker contractors and is in the process of obtaining contract design services. Having improved tools and flexible resources will allow EWEB to continue to serve customer work and complete projects that will increase resiliency and reliability.

If you have any questions please contact Rod Price at rod.price@eweb.org or 541-685-7122.

Appendix A: FEMA Project List

PROJECT #	PROJECT DESCRIPTION	REASON FOR PROJECT	FEEDER	# Meters on Tap
1	Reconductor 2 phase #6CU backyard tap to 1 phase from pole 25252 to 14802 & 14812 at Palamino & Harlow	Reframe overhead primary from 2 phase to 1 phase to eliminate crossarms and substantially reduce damage and outages from tree limb falls.	Currin 4524	30
	Reconductor 2 phase #6CU backyard tap to 1 phase from pole 14774 to 17007 at Palamino & Dapple Way	Reframe overhead primary from 2 phase to 1 phase to eliminate crossarms and substantially reduce damage and outages from tree limb falls.		147
2	Reconductor 2 phase #6CU street tap to 1 phase from pole 20144 to 20155 at Green Hill & W11th	Reframe overhead primary from 2 phase to 1 phase to eliminate crossarms and substantially reduce damage and outages from tree limb falls.	Danebo 4923	9
3	Reconductor 2 phase #6CU backyard tap to 1 phase from pole 14382 to 14386 at Debrick & Rio Glen	Reframe overhead primary from 2 phase to 1 phase to eliminate crossarms and substantially reduce damage and outages from tree limb falls.	Delta 5324	18
	Reconductor 2 phase #6CU street tap to 1 phase from pole 14357 to 14359 at Willagillespie & Russet	Reframe overhead primary from 2 phase to 1 phase to eliminate crossarms and substantially reduce damage and outages from tree limb falls.		44
4	Convert 3 phase backyard tap from OH to UG from pole 23554 to 34615 at Fox Hollow west of Saratoga to Donald.	Convert overhead primary to underground to virtually eliminate outages and damage from tree limb falls.	Dillard 4734	172

5	Reconductor 2 phase #6CU backyard tap to 1 phase from pole 11624 to 11648 at E Amazon & 35th Pl	Reframe overhead primary from 2 phase to 1 phase to eliminate crossarms and substantially reduce damage and outages from tree limb falls.	Hilyard 4115	44
	Reconductor 2 phase #6CU street tap to 1 phase from pole 2419 to 22641 & 18408 at W35th & McMillan	Reframe overhead primary from 2 phase to 1 phase to eliminate crossarms and substantially reduce damage and outages from tree limb falls.		35
6	Reconductor 2 phase #6CU & #4CU street tap to 1 phase from pole 7331 to 7334 & 7336 & 9232 at E31st & Ferry	Reframe overhead primary from 2 phase to 1 phase to eliminate crossarms and substantially reduce damage and outages from tree limb falls.	Hilyard 4125	255
7	Reconductor 2 phase #6CU street tap to 1 phase from pole 5436 to 8302 & 20771 at E38th & Central	Reframe overhead primary from 2 phase to 1 phase to eliminate crossarms and substantially reduce damage and outages from tree limb falls.	Hilyard 4127	61
	Reconductor 2 phase #6CU street tap to 1 phase from pole 5422 to 5425 & 5420 at Agate & E27th	Reframe overhead primary from 2 phase to 1 phase to eliminate crossarms and substantially reduce damage and outages from tree limb falls.		28
8	Reconductor 2 phase #4CU street tap to 1 phase from pole 2142 to 12230 at MacClean & Fillmore	Reframe overhead primary from 2 phase to 1 phase to eliminate crossarms and substantially reduce damage and outages from tree limb falls.	Monroe 3714	27
	Reconductor 2 phase #6CU street tap to 1 phase from pole 11238 to 17022 at W28th & Adams	Reframe overhead primary from 2 phase to 1 phase to eliminate crossarms and substantially reduce damage and outages from tree limb falls.		41
9	Reconductor 2 phase #4CU backyard tap to 1 phase from pole 21636 to 5999 at Jefferson & 22nd	Reframe overhead primary from 2 phase to 1 phase to eliminate crossarms and substantially reduce damage and outages from tree limb falls.	Monroe 3716	39

10	Reconductor 2 phase #4CU backyard tap to 1 phase from pole 9666 to 9600 & 1555 at Willamette & W31st	Reframe overhead primary from 2 phase to 1 phase to eliminate crossarms and substantially reduce damage and outages from tree limb falls.	Monroe 3732	47
	Reconductor 2 phase #6CU street tap to 1 phase from pole 2286 to 2282 & 2289 at Washington & W29th	Reframe overhead primary from 2 phase to 1 phase to eliminate crossarms and substantially reduce damage and outages from tree limb falls.		88
11	Reconductor 2 phase #6CU street tap to 1 phase from pole 4993 to 4915 at W22nd & Olive Alley	Reframe overhead primary from 2 phase to 1 phase to eliminate crossarms and substantially reduce damage and outages from tree limb falls.	Monroe 3734	24
12	Convert 3 phase tap from OH to UG feeder from pole 34270 to 10735 on Blanton Rd	Convert overhead primary to underground to virtually eliminate outages and damage from tree limb falls.	Monroe 3737	80
13	Convert 3 phase backyard tap from OH to UG from pole 17923 to 113 off Oakway north of Fair Oaks.	Convert overhead primary to underground to virtually eliminate outages and damage from tree limb falls.	Oakway 5916	97
14	Reconductor 2 phase #6CU street tap to 1 phase from pole 673 to 141 at Willow & Park	Reframe overhead primary from 2 phase to 1 phase to eliminate crossarms and substantially reduce damage and outages from tree limb falls.	River Road 5512	24
15	Reconductor 2 phase #6CU street tap to 1 phase from pole 18246 to 18250 at Owosso & Carolyn	Reframe overhead primary from 2 phase to 1 phase to eliminate crossarms and substantially reduce damage and outages from tree limb falls.	Santa Clara 4624	106
16	Convert 3 phase backyard feeder to 1 phase tap from pole 21167 to 22470 from Willamette & Coachman to Kingswood & 50th & convert backyard feeder Dillard 4724 from OH to UG from pole 19423 to 11330 by Kingswood from Brookwood to Donald.	Convert overhead primary to underground to virtually eliminate outages and damage from tree limb falls. Reframe overhead primary from 2 phase to 1 phase to eliminate crossarms and substantially reduce damage and outages from tree limb falls.	Monroe 3722	1,076