Transmission Asset Management Strategy

Sustain Program: Lines – Wood Pole



Rob Ochs, Program Manager

April 19, 2010

Situation Assessment

- Wood pole lines consist of approximately 5,000 miles on 336 separate transmission lines
- Equipment includes wood poles, guys, hardware, conductor and insulators
- 0ver 2,000 miles (40%) of the lines are over 50 years old; average expected life of a wood pole transmission line is approximately 60 years
- Over past decade, the program has focused on replacing poles >60 years of age – without addressing other line components such as guys, hardware and insulators
- Overall performance of these lines has been acceptable, but performance risks are increasing as they continue to age and deteriorate
  - Oldest lines typically have the original hardware, insulators, guying and counterpoise in place and condition of these assets in many cases is unknown
  - Over 500 miles of lines have obsolete copper conductor that is difficult to repair and replace once it fails
  - Over 20,000 wood poles are classified for priority replacement due to condition and/or age
- Limited planned outage time, unavailability of some needed resources, and environmental issues constrain the amount of maintenance and construction activity that can be performed each year
- Program needs to ramp up to conduct health inspections, manage replacement maintenance backlogs, and address a potential bow wave of line rebuild work

What equipment and facilities are covered?

What performance objectives, measures and targets should be set?

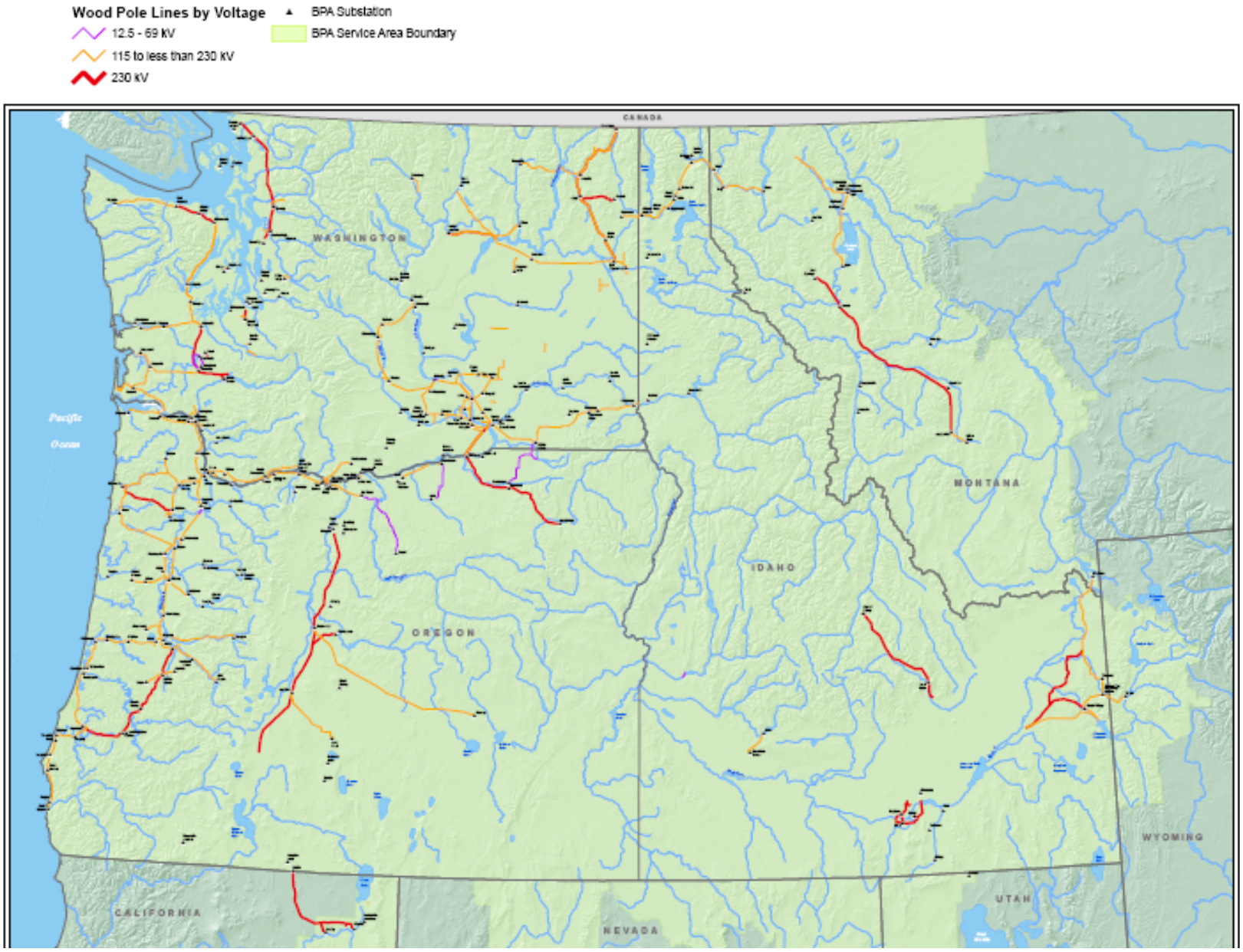
What is the health of the assets?

What risks must be managed?

What strategies should we undertake?

What will it cost?

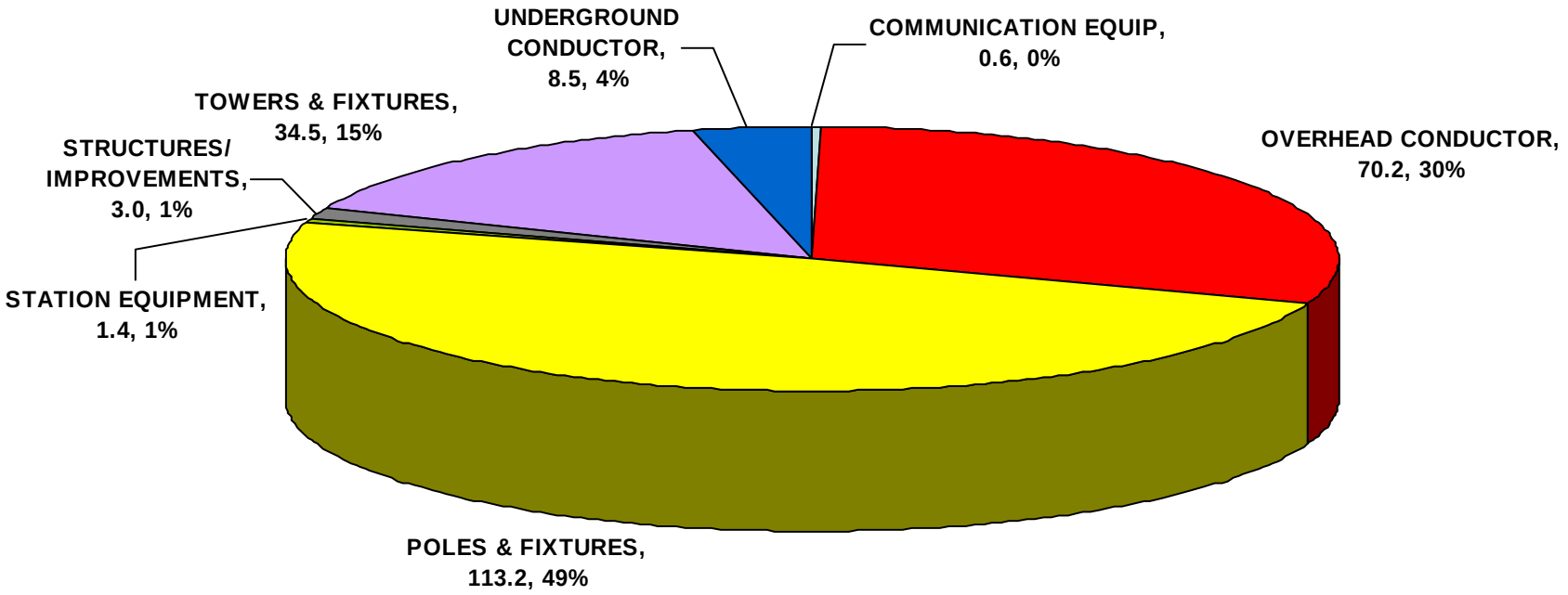
BPA Wood Pole Transmission Lines



Lines – Wood Pole: Net Book Value

(Cumulative historical investment net of depreciation) as of 9/30/2009
Millions $, % of Total

Wood Pole Transmission Lines:
$230 million total net book value
6% of total Transmission net book value



Source: BPA Asset Accounting

What equipment and facilities are covered?

What performance objectives, measures and targets should be set?

What is the health of the assets?

What risks must be managed?

What strategies should we undertake?

What will it cost?

Performance objectives, measures, and end-stage targets

- Reliability objective

Frequency of unplanned outages

- Performance objective: Minimize the ***number*** of unplanned transmission line outages on the most critical wood pole transmission lines (categories 1 through 4, 1 being most critical).
- Measure: System Average Interruption Frequency Index (SAIFI) – average number of automatic outages by BPA Line Category
- End-stage Target: Control Chart violation per year:
  - No more than 1 control chart violation per year for Wood Pole Transmission classified lines (typically line importance categories 3 and 4).

Duration of unplanned outages

- Performance objective: Minimize the ***duration*** of unplanned transmission line outages on the most critical wood pole transmission lines (categories 1 through 4, 1 being most critical).
- Measure: System Average Interruption Duration Index (SAIDI) – average number of automatic outage minutes by BPA Line Category
- End-stage Target: Control Chart violation per year:
  - No more than 1 control chart violation per year for wood pole transmission classified lines (typically line importance categories 3 and 4).

For both SAIFI and SAIDI, a control chart violation is defined as follows:

- Latest fiscal year above the Upper Control Limit (short-term degradation)
- 2 of last 3 fiscal years above the Upper Warning Limit (mid-term degradation)
- Continuous worsening trend in the last six fiscal years (long-term degradation)

Performance objectives, measures, and end-stage targets

- Availability objective
  - Performance Objective: Optimize availability of service from BPA's transmission lines.
  - Measure: Line availability percentage (includes planned and unplanned outages)
  - End-stage Target:
    - BPA's most important transmission lines (Category 1 and 2) are available for service at least 98.0 percent of the time.
    - BPA's next most important transmission lines (Category 3 and 4, and generally primarily wood pole structure type) are available for service at least (X) percent of the time.
- Adequacy objective
  - Performance Objective: Provide adequate transmission capacity to serve future customer load growth.
  - Measures: Forecasted peak load on transmission line segments.
  - End-Stage Targets: Mitigate risk of overload transmission lines (category 3 and 4) to a less than 1 in 20 chance.
  - Key driver: Agency 20 year load forecasts
- Compliance objective
  - Performance objective: Maintain and inspect wood pole transmission lines in accordance with NERC/WECC requirements.
  - Measures: Transmission Maintenance & Inspection Plan (TMIP) is reviewed and revised annually; Wood pole lines are maintained in accordance with the TMIP; Maintenance records are maintained as required by the TMIP
  - End-Stage Targets: BPA wood pole line maintenance & inspection practices comply with NERC/WECC standard PRC-STD-005-1
- Safety objective
  - No public safety event or injuries.
  - No BPA or contracted employee fatalities or injuries.

What equipment and facilities are covered?

What performance objectives, measures and targets should be set?

What is the health of the assets?

What risks must be managed?

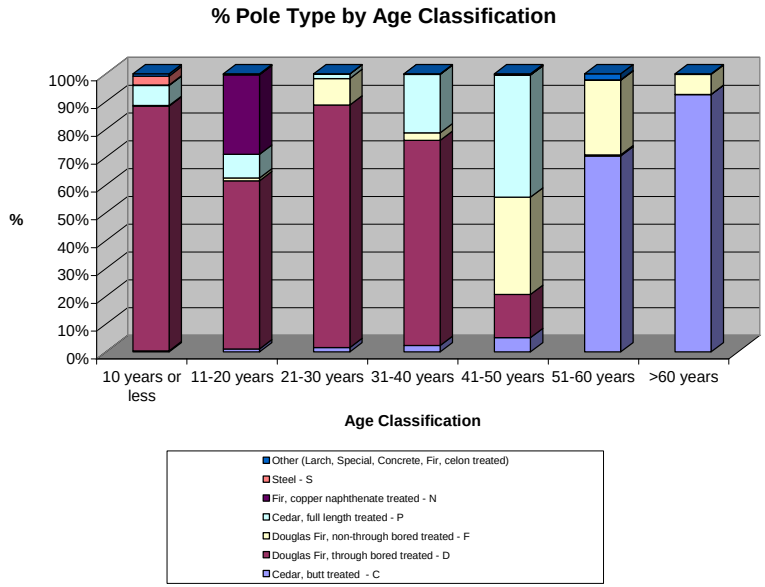
What strategies should we undertake?

What will it cost?

Wood pole condition assessment

Wood pole condition assessment

- Approximately 75,000 wood poles on 4,775 miles of wood pole transmission lines
- Expected service life of 60 years
- 8% of wood poles exceed 60 years of age (over 6,000 poles)
- Older poles tend to be butt treated cedar
- Pole strength and capability declines with age
- Loss of 1/3 of original strength = need to replace pole-no longer meets standards



Pole Age/Type	Cedar, butt treated - C	Douglas Fir, through bored treated - D	Douglas Fir, non-through bored treated - F	Cedar, full length treated - P	Fir, copper naphthenate treated - N	Steel - S	Other (Larch, Special, Concrete, Fir, celon treated)	Total	%
10 years or less	64	14,292	34	1,178	26	520	134	**16,248**	**22%**
11-20 years	51	2,921	48	410	1,383	3	14	**4,830**	**7%**
21-30 years	208	11,850	1,296	229	6	1	2	**13,592**	**18%**
31-40 years	203	6,586	241	1,878	2	-	16	**8,926**	**12%**
41-50 years	523	1,595	3,582	4,500	5	6	35	**10,246**	**14%**
51-60 years	9,684	52	3,689	24	-	-	300	**13,749**	**19%**
>60 years	5,763	4	445	14	-	-	1	**6,227**	**8%**
Total	**16,496**	**37,300**	**9,335**	**8,233**	**1,422**	**530**	**502**	**73,818**	**100%**
% of Total	**22%**	**51%**	**13%**	**11%**	**2%**	**1%**	**1%**		

Wood poles in the highest risk condition

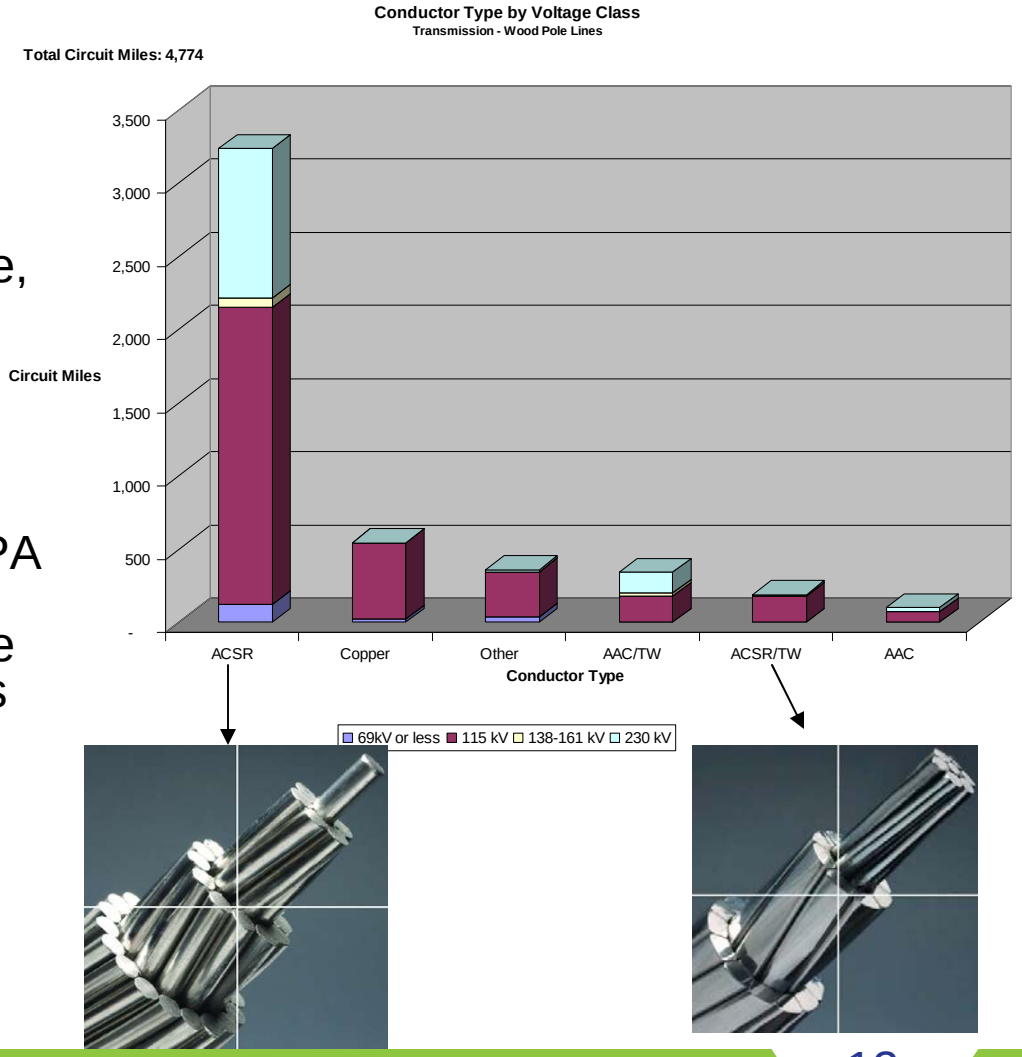
- Approximately 30% of the wood poles are classified for priority replacement.
- Danger poles, classified in priority 1, must be replaced with 12 months after being classified as a danger pole.
- The majority, 20,486, are classified as priority 3, which is based on age – Original Cedar 55 years or older and Original Fir, 45 years or older.
- Issue: Uncertainty on actual condition of priority 3 poles. If not replaced, some of these may become future danger poles and have to be replaced within 12 months.

Note: Aging Overhead Transmission Asset: Condition and Risk Assessment study completed in December 2007 provides a preliminary health assessment of wood pole structures on pages 129-141.

Replacement Priorities	**Pole Count**
Priority 1	
Danger Poles	155
Danger Pole Candidates	317
Evaluated Poles	251
OC-Rot	574
PR1-SCIBFO	281
Subtotal Category 1	**1,578**
Priority 2	
OC-Arm	208
OF-Arm	51
Subtotal Category 2	**259**
Priority 3	
OC-Sound	13,240
OF-45	7,246
Subtotal Category3	**20,486**
Total (all categories)	**22,323**

Conductor condition assessment

- For all transmission lines, we know the type and vintage of conductor, but lack adequate condition assessments.
- Information on other line equipment including hardware, insulators, guying and counterpoise is also lacking and antidotal at best.
- Various retired line components need to be collected and tested in the BPA lab to identify component issues and establish base-line and benchmarking data. This data will be made available through TAS for easy access for adjusting the future pace and priority of line rebuild activity.



Note: Aging Overhead Transmission Asset: Condition and Risk Assessment study completed in December 2007 provides a preliminary health assessment of conductor on pages 58-64.

Groupings for strategy development

- To facilitate development of strategies around inspection, test and treat, replacement and rebuild, these lines were grouped by line components, age and condition.

Grouping Name	Definition
Lines 20 to 40 years old	Transmission lines that are 20 to 40 years of age with majority of components in good to excellent condition. No known performance issue with the line.
Rebuilt Wood Pole lines <20 years old	Transmission lines that are no older than 20 years of age and are meeting performance objectives
Original cedar pole, butt treated	Transmission lines with a large percentage of wood poles that exceed 55 years of age and are original cedar, butt treated
Old Fir Wood Poles, Westside	Transmission lines located east of the Cascades with a large percentage of wood poles that exceed 45 years of age and are old fir, butt treated
Old Fir Wood Poles, Eastside	Transmission lines located west of the cascades with a large percentage of wood poles that exceed 45 years of age and are old fir, butt treated
Steel lines with wood poles	Transmission lines that predominately have steel structures supporting conductor, high voltage (230, 345 and 500kV), and have a few wood poles in certain locations along the line to support the conductor.
Wood pole lines with copper conductor	Transmission lines with any type of wood pole but have some portion or all of the line consist of copper conductor
Worst Performing Circuits	Transmission lines that have been assessed through actual performance and condition assessments by SME's to pose an unacceptable risk of component failures and sustained unplanned outages.
Other	Other includes lines with fewer than 50 wood poles, short segments, tie lines, service lines and taps. These lines could have any species of wood pole, including old fir and original cedar.

Line – Wood Pole groupings

- The following table provides line miles and number of wood poles for each of the groupings.

Transmission-Wood Pole Line Classifications	Line Miles	Number of Wood Poles
Wood Pole Lines 20 to 40 Years old	1,300	19,000
Rebuilt wood pole lines <20 Yrs	329	4,600
Original cedar pole, butt treated	1,191	18,400
Old fir wood poles, Westside	300	4,700
Old fir wood poles, Eastside	338	5,400
Steel lines with wood poles	NA	1,800
Wood pole lines with copper conductor	576	9,200
Worst performing circuits - wood pole lines	300	4,300
Other Wood Pole Lines - service lines, PSC, taps, etc.	441	6,418
Total	4,775	73,818

Historical Replacement Costs

- Wood pole replacement costs – FY 2007 through FY 2009

	Capital Cost FY 2007 - FY 2009	Number of Poles Replaced	Average cost per pole replaced
Wood Pole Lines 20 to 40 years old	1,424,853	353	4,036
Rebuilt wood pole lines <20 Yrs	44,922	60	749
Original cedar pole, butt treated	41,928,709	2,632	15,930
Old fir wood poles, Eastside	454,736	118	3,854
Old fir wood poles, Westside	1,003,076	203	4,941
Steel lines with wood poles	41,170	18	2,287
Wood pole lines with copper conductor	5,861,590	550	10,657
Worst performing circuits - wood pole lines	1,422,129	206	6,904
Other Wood Pole Lines	1,651,190	410	4,190
Total	$53,832,374	4,550	$11,831

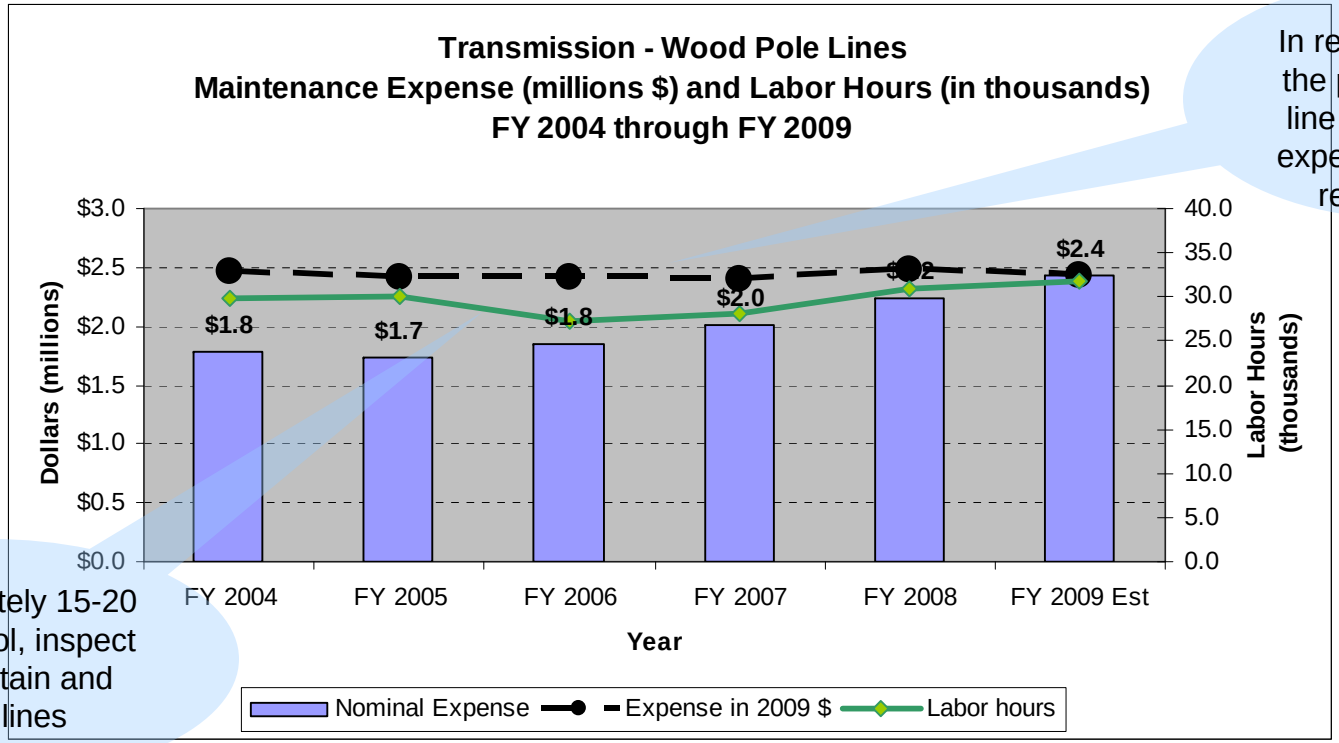
•Costs shown include access roads, land, and environment.

- Significant capital has been made over the past 10 years in replacing “Original Cedar, Butt Treated” poles while not considering the other components of the line and their impact on line performance.

- Strategy will focus on the transmission line as a whole, its criticality, component health, historic performance, likelihood of future failure, and costs (capital and expense) to maintain the line.

Historic Inspection and Maintenance Expense

- Annual maintenance costs for 4775 miles of transmission line – FY 2004 through FY 2009



In real terms, over the past six years line maintenance expense has been relatively flat

Approximately 15-20 BFTE patrol, inspect and maintain and these lines

- A major component of this cost is labor hours, to inspect and maintain these lines. Costs exclude right-of-way maintenance, access roads and vegetation management.
- The strategy for these lines will include collecting new information about the other line components other than the pole. This change in strategy will impact future expense and have budgetary implications not considered in previous plans.

Maintenance costs by line vary

- Not surprisingly, Wood pole lines in relatively poor condition cost more to maintain than wood pole lines that are new and in good condition. Maintenance cost per mile varies greatly - some selected examples are:

Adno	Line Name	Op Kv	C Miles	Pole Count	2004	2005	2006	2007	2008	2009	Total	Cost per Mile
7410	BANDON-ROGUE NO 1	115	46.00	597	14,069	13,789	17,253	18,230	22,422	20,348	106,111	***2,307***
9210	BENTON-FRANKLIN NO 1	115	21.03	305	2,215	1,989	3,142	2,638	3,975	2,110	16,069	***764***
9211	BENTON-FRANKLIN NO 2	115	21.03	298	2,638	1,869	10,502	50,147	7,717	2,408	75,281	***3,580***
7140	ALLSTON-ASTORIA NO 1	115	41.40	560	10,554	159	38,382	7,210	42,187	47,693	146,185	***3,531***
7305	ALBANY-EUGENE NO 1	115	39.80	688	68,923	38,904	34,854	22,695	26,974	13,964	206,314	***5,184***
6104	ALBENI FALLS-SAND CREEK NO 1	115	29.67	601	10,019	5,445	11,261	27,973	9,896	23,166	87,760	***2,958***
6136	COLVILLE-REPUBLIC NO 1	115	44.47	728	14,129	35,535	29,292	35,498	41,860	28,539	184,853	***4,157***
7236	KEELER-TILLAMOOK NO 1	115	57.81	988	36,067	24,677	35,723	30,435	64,303	57,888	249,093	***4,309***
9290	WALLA WALLA-TUCANNON RIVER NO 1	115	48.10	646	24,140	37,857	48,369	14,716	19,675	12,222	156,979	***3,264***

- Benton-Franklin #1 was rebuilt back prior to FY 2004. Average cost per mile to maintain over the past 6 years has been $764.
- Contrast with Albany-Eugene #1 built in 1940, which is one of the poorest condition lines on BPA system. It has cost BPA on average $5,184 per mile to maintain.
- Maintenance savings can be achieved by keeping wood pole transmission lines in good condition, but that alone doesn't justify a complete rebuild of a wood pole transmission line. Line performance also needs to be a consideration.

Unplanned Outage History

Wood Pole Transmission Line System Performance

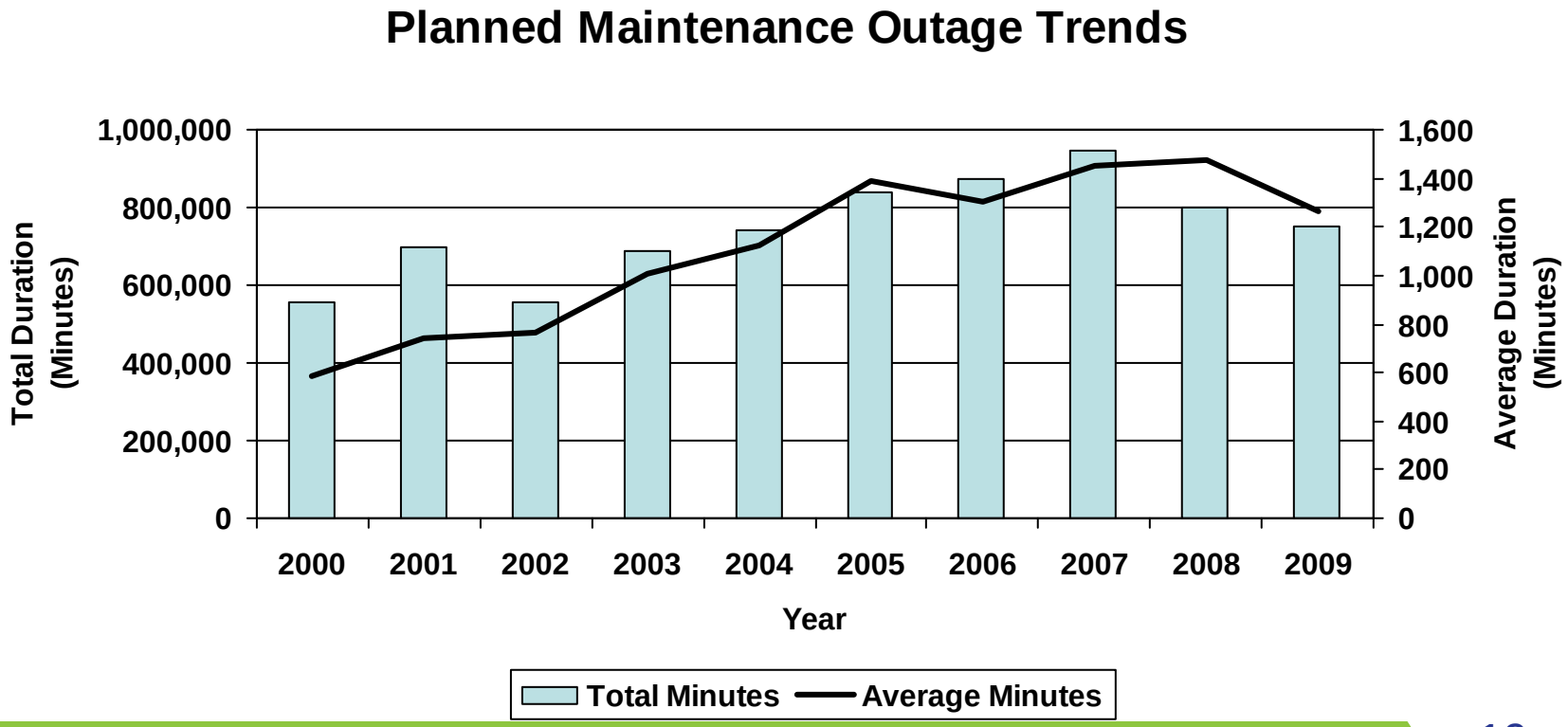
- 5 year period, 2005 through 2008
- Line outages cause due to conductor, insulator, pole, other structure failure

Over 70% of the unplanned outage minutes are due to component failures on west-side lines with old fir poles, lines with original cedar poles, and lines with copper conductor

Wood Pole Line Group	**Number of Outages**	**Total Minutes**	**SAIDI**
Maintain and operate	22	14,056	639
Rebuilt wood pole lines <20 Yrs	8	10,258	1,282
Old fir wood poles, Eastside	7	769	110
Old fir wood poles, Westside	15	7,925	528
Original cedar pole, butt treated	64	21,109	330
Wood pole lines with copper conductor	37	113,853	3,077
Worst performing circuits - wood pole lines	6	5,361	894
Non-tap with 50 or less wood poles	3	1,051	350
Total	**162**	**174,382**	**1,076**

Planned Outage History - Trends

- Aging wood pole lines have required increasing total planned outage minutes and an increase in the average duration of planned outages to complete necessary repair and replacement work.
- In 2008 and 2009, vegetation management issues diverted resources that would normally been doing capital replacement and maintenance work.



What equipment and facilities are covered?

What performance objectives, measures and targets should be set?

What is the health of the assets?

What risks must be managed?

What strategies should we undertake?

What will it cost?

Risk Assessment and Analysis

Risks addressed by this strategy:

1. Reliability Risk:
   - Risk that a component (conductor, wood structure, insulator, or hardware) would fail to perform its intended purpose resulting in an unplanned transmission line outage interrupting service to customers.
   - Likelihood: Components fail due to a variety of causes on these transmission lines every year
   - Consequence: Usually it is inconsequential but in the case of a radial feed line it could result in customers going dark for a short period of time until crews can be dispatched to restore service.
2. Safety Risk:
   - Risk that a line structure would fail while an employee is working on the structure which could result in serious injury or even fatality.
   - Likelihood: Rare – wood poles and hardware usually are replaced before they would get in a condition that would pose a safety hazard to employees that might have to work on these structures and lines.
   - Consequence: Significant consequence – loss of human life.
3. Availability Risk:
   - Risk that a backlog of transmission line maintenance and capital replacement work could accumulate such that planned outages would be difficult and if not possible to schedule to complete the work in a timely manner.
   - Likelihood: Likely to happen every year and limit the amount of work that could be completed.
   - Consequences: As a result of not getting a planned outage to complete work may result in a future unplanned outage where work would be completed in an emergency situation.
4. Adequacy Risk:
   - Risk that a transmission line may not have adequate capacity to meet required future demand.
   - Likelihood: Rare – load growth in region relatively flat and not expected to be significant driver for sustain program.
   - Consequence: Significant – may result in customers not being serviced, outage.

Risk Assessment and Analysis

- Likelihood of failure depends on asset condition and historical performance (ratings are a scale of 1 to 10, with 1 being in excellent condition to 10 being in poor condition)

Likelihood Scales

Level	Rare (<2)	Unlikely (Score 2 to 4)	Possible (Score 4 to 6)	Likely (Score 6 to 8)	Almost Certain (Score 8 to 10)	
	Very rare to have a line outage as a result of component failures in the next 10 years (1 in 100 chance).	Unlikely to have a line outage as a result of component failures in the next 10 years (1 in 20 chance).	Possible to have a line outage as a result of component failures in the next 10 years (1 in 10 chance).	Likely to have a line outage as a result of component failures in the next 5 years (1 in 5 chance).	Almost certain to have a line outage as a result of component failures in the next 2 years (1 in 2 chance).	
Likelihood	**Excellent**	**Good**	**Fair**	**Marginal**	**Poor**	
Rating Scale	**<2**	**2-3**	**4-6**	**7-8**	**9-10**	**Weight**
Wood Pole Structures incl hardware	No condition 1, 2 or 3 poles on line	Less than 10% condition 1, 2, or 3	10% to 20% of poles are rated 1,2 or 3	More than 20% of poles rated 1, 2, or 3	More than 50% are rated 1,2 or 3	**50%**
Conductor	ACSR/TW and no known issues	ACSR	Non-standard conductor	Conductor is obsolete and original to a line over 50 years	Copper conductor and other conductor with known performance issues	**20%**
Insulator & Assemblies	Line <20 years, w/Ceramic insulators	Non-ceramic insulators <10 years old	Ceramic between 20 and 40 years Non-ceramic between 10 and 20 years	Ceramic between 40 and 50 years	Non-ceramic > 20 years Ceramic > 50 years	**10%**
Performance (SAIDI average over past 10 years and number of outages)	No line outages in the last 10 years related to line components SAIDI 0	one or fewer line outages related to components SAIDI <100	More than one line outage related to components SAIDI 100 to 300	2-5 line component outages in last 10 years SAIDI 300 to 500	More than five in last 10 years SAIDI greater than 500	**20%**
						100%

****** Note: This scale only applies to Wood Pole Transmission Lines***

Risk Assessment and Analysis

- Consequence of failure is based on line rating, Priority Pathways ranking and number of taps on the line (Scale 1 to 10, with 1 being insignificant to 10 being extreme)

Consequence Scales

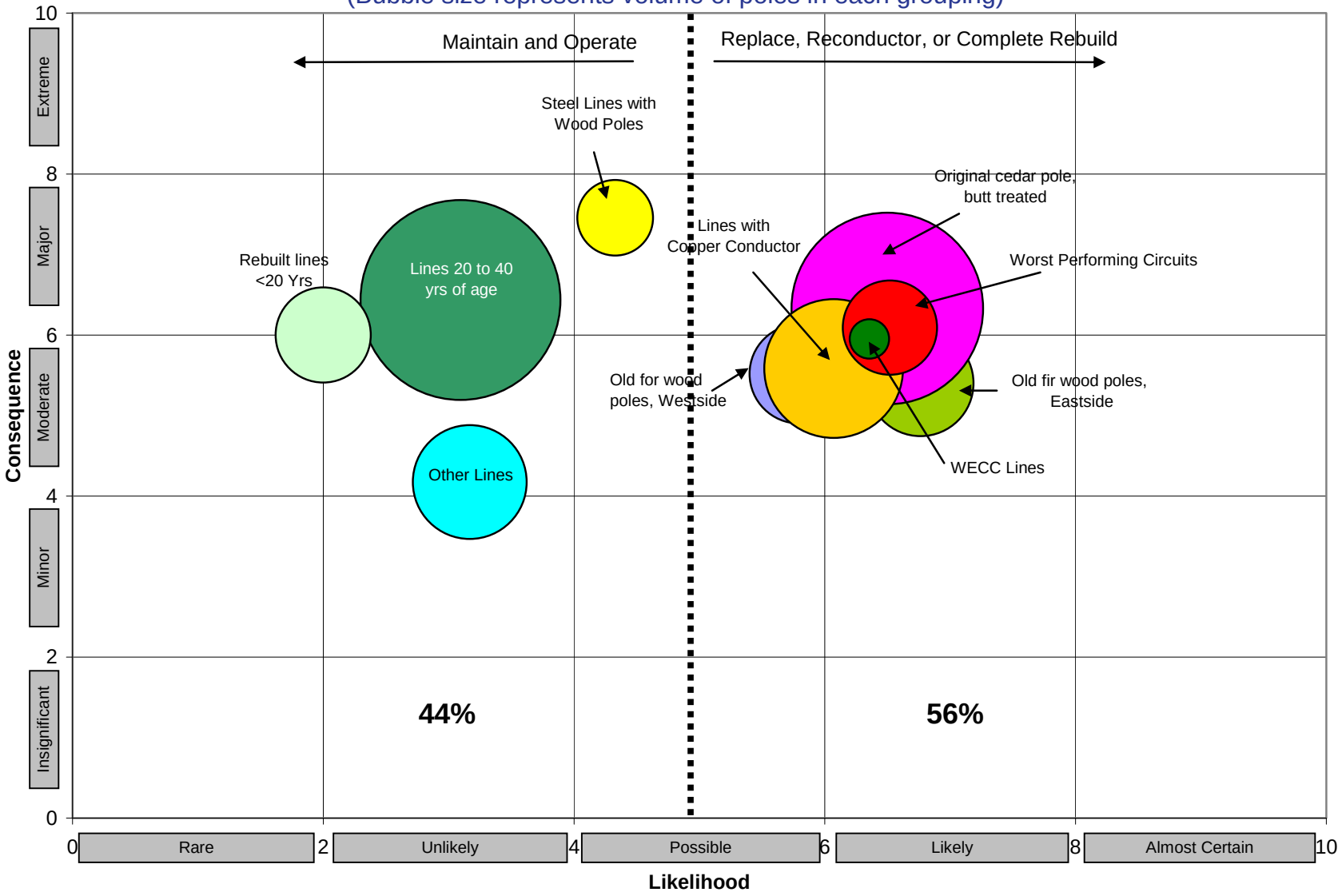
Level	Insiginificant (Score <2)	Minor (Score 2 to 4)	Moderate (Score 4 to 6)	Major (Score 6 to 8)	Extreme (Score 8 to 10)	
Reliability of Transmission Line in service	A failure to the transmission line occurs, but no customers lose power.	If a failure to the transmission line occurs, then there is a momentary outage, customers lose power but are not adversely impacted by the outage.	If a failure to the transmission line occurs, then there is an outage of short duration (less than 120 minutes), customers lose power and are inconvienanced by the outage.	If a failure to the transmission line occurs, then there is an outage of long duration (2 to 12 hours), customers lose power and are impacted by the outage.	If a failure to the transmission line occurs, then there is an outage of extended duration (over 24 hours), more than one BPA customer community is blacked out and results in significant financial losses for businesses and customers served by BPA.	
Consequence	**Insignificant (1-2)**	**Minor (2 to 4)**	**Moderate (4 to 6)**	**Major (6 to 8)**	**Extreme (8-10)**	**Weight**
Line Category (1-4)	4	4	3	3	2	**30%**
Priority Pathways ranking	Last Quartile	Last Quartile	3rd Quartile	2nd Quartile	1st Quartile	**60%**
Number of taps on line	No taps and line is not radial feed	one tap and line is not radial feed	Multiple taps and line is not radial feed	Line is a radial feed	Line is a radial feed with one or more taps	**10%**
						100%
This scale only applys to Wood Pole Transmission Lines						
Safety - Employee and Public	No or minor injury, first aid	Injury requiring treatment by medical professional	Injury resulting in hospitalization	Injury resulting in permanent disability	fatality	**0%**

****** Note: This scale only applies to Wood Pole Transmission Lines***

- Priority Pathways line ranking and number of taps was used as a proxy for assessing the consequences of a failure.

Risk Map – Current State (FY 2010)

(Bubble size represents volume of poles in each grouping)



What equipment and facilities are covered?

What performance objectives, measures and targets should be set?

What is the health of the assets?

What risks must be managed?

What strategies should we undertake?

What will it cost?

Alternative Strategies

- Consider alternative strategies to close the gap between end-stage target performance and current asset performance levels.
- What could we do differently over the next 10 years to maintain/improve current line performance?
- Alternative Strategies for wood pole lines:
  - Momentum strategy – continue replacing approximately 1200 poles per year across the system with primary focus on pole age and condition. Use TLM crews to replace a majority of these wood poles. Rebuild wood pole transmission lines when additional capacity is needed or work load is more than TLM crews can handle in their area.
  - Asset Renewal Strategy - pro-active replacement and refurbishment program that would include rebuilding all lines where majority of wood poles, conductor, hardware and insulators are 55 years or older (today), ~200 to 250 miles per year. Can be achieved with contracted resources.
  - Asset Life Cycle strategy – rebuild lines where current and anticipated future performance is unacceptable within next 10 years. Focus on the most critical lines that are worst performing circuits, poorest asset health, ~100 to 150 miles per year. Can be achieved with contracted resources.

Evaluation of Alternatives

- Momentum strategy (Current Practice)
  - Not sustainable
  - Does not address growing backlog of lines well beyond expected service life
  - Increasing risk of unplanned outages due to component failures (other than poles)
  - Does not give highest priority to worst performing circuits and criticality of the line
- Asset Renewal Strategy (Next Best)
  - Outages necessary to complete the work would be difficult
  - Improves reliability but adversely impact availability
  - Possible that some lines would be replaced before end of service life
- Asset Life Cycle strategy (Preferred)
  - Prioritizes replacement based on condition, performance and criticality of line
  - Balances need to replace worst performing lines with resources available, line outage availability and standardization of line components
  - Systematic and comprehensive approach to managing aging wood lines

Asset Life Cycle strategy (Preferred)

- **Systematic replacement of aging line assets.** Asset replacement program evolves from a wood pole condition-centric program to a comprehensive approach that considers health of all line components, line performance (actual and anticipated) and criticality.
  - **Worst Performing Circuits.** When overall condition and performance of lines deteriorate to the point that it poses an unacceptable risk to meeting asset objectives, then these lines are targeted for future replacement. Transmission lines will be prioritized for replacement based on condition, performance and line importance and criticality.
  - **Obsolete components will be replaced.** Opportunities to replace obsolete components with standard components in conjunction with other scheduled work and replacement opportunities will be considered. For example, copper conductor no longer manufactured and difficult to repair and find spare parts.
- **Pole Replacement.** When poles fail to meet the required strength and their conditioned has deteriorated to the point that it poses a risk to individual component failure, i.e. classified as a danger pole, then these poles will be scheduled for replacement within 12 months.
- **Timely and comprehensive line inspections.** Line working patrols are conducted annually on all transmission lines. Working patrols are conducted per the BPA Transmission Line Maintenance standards and guidelines.
- **Managing backlog of line conditions.** Proactively manage backlog of conditions (problems) found through working patrols and logged for later repair or replacement.

Asset Life Cycle strategy (Preferred)

- **Transmission line rebuild execution strategy:**
  - **Standardization of replacement components.** Standardization of structures, conductor and insulators when rebuilding. Components stock items and quicker to restore service in the event of an unplanned outage.
  - **Utilize Owner/Engineers.** Design work, for existing line rebuilds will be contracted to Owners/ Engineers when the workload for design exceeds what can be done with BPA design resources.
  - **Contract rebuilds.** With the exception of small rebuild jobs, most of this work will be performed by contractors.
- **Identify additional asset health data needs and develop a process to collect, store and analyze the data.**
  - Develop short-term plan that fills the asset health data gaps on specific line components where data is lacking. Assess retired component health.
  - Develop a long-term plan for collecting asset condition assessment data for all line components
  - TAS is an important part of these plans
- **Fiber optic cable replacement and maintenance.** In conjunction with partial and major line rebuild projects, fiber optic cable, if present, will be evaluated and assessed for replacement.

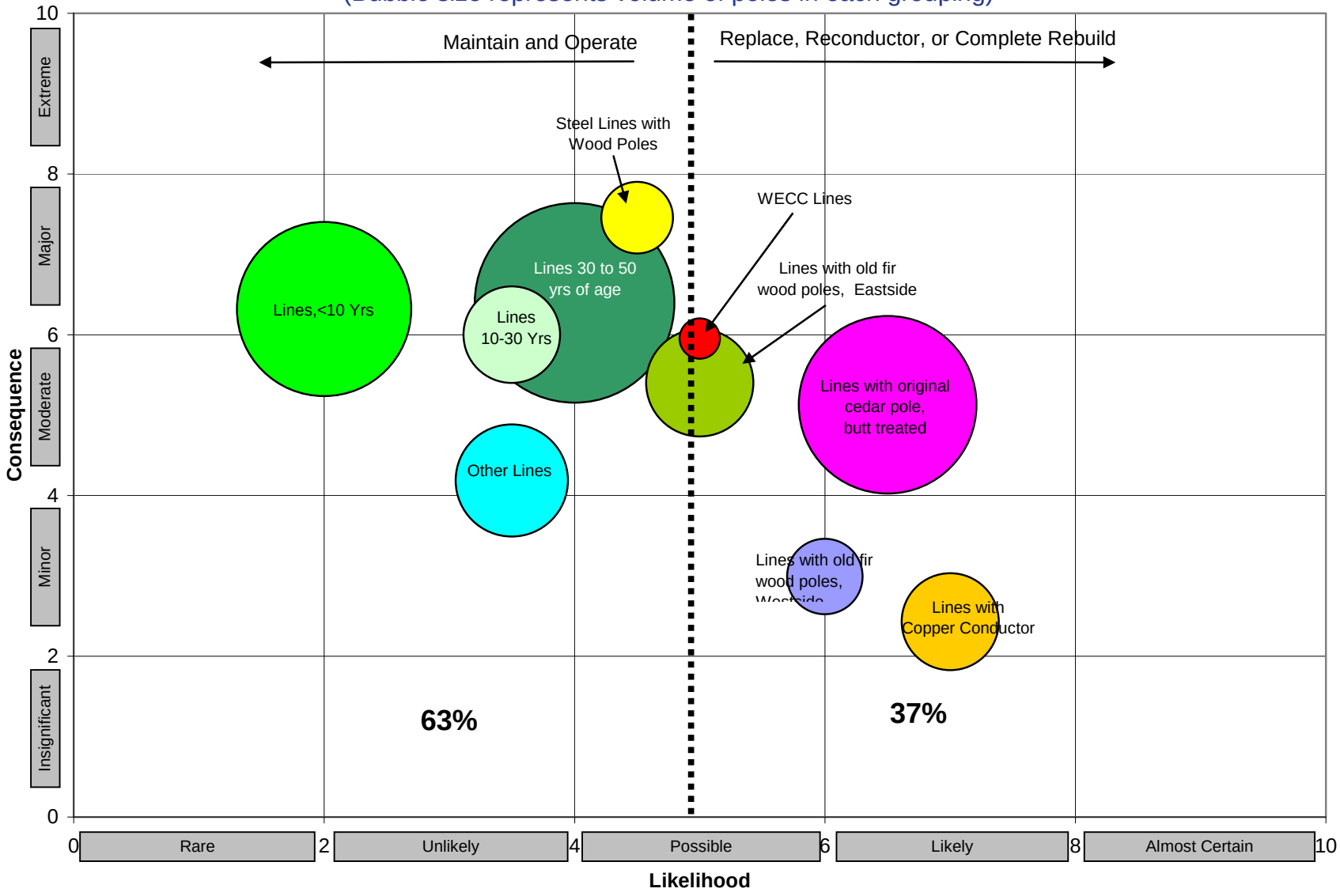
Asset Life Cycle strategy (Preferred)

- List of potential lines that would be targeted for partial or complete rebuild over next 10 years (not in priority of replacement)

Adno	Line Name	Group	Op Kv	Total Poles	Pole with Condition 1 Only	Pole with Condition 1,2 or 3	Percent Condition
	COMPLETE LINE REBUILD	(INCLUDING NEW CONDUCTOR)					
7305	ALBANY-EUGENE NO 1	Worst performing circuits - wood pole lines	115	688	150	316	45.93%
7410	BANDON-ROGUE NO 1	Worst performing circuits - wood pole lines	115	597	17	194	32.50%
9214	BENTON-OTHELLO NO 1	Wood pole lines with copper conductor	115	212	1	88	41.51%
9213	BENTON-SCOOTENEY NO 1	Original cedar pole, butt treated	115	331	23	261	78.85%
6136	COLVILLE-REPUBLIC NO 1	Worst performing circuits - wood pole lines	115	728	52	356	48.90%
6148	CRESTON-BELL NO 1	Wood pole lines with copper conductor	115	688	2	209	30.38%
6240	CRESTON-BELL NO 1	Wood pole lines with copper conductor	115	295	8	158	53.56%
6245	GRAND COULEE-CRESTON NO 1	Wood pole lines with copper conductor	115	520	10	192	36.92%
7361	LANE-WENDSON NO 1	Original cedar pole, butt treated	115	528	37	266	50.38%
9275	MIDWAY-BENTON NO 1	Wood pole lines with copper conductor	115	420	1	170	40.48%
6452	MIDWAY-MOXEE NO 1	Wood pole lines with copper conductor	115	459	6	204	44.44%
7264	SALEM-ALBANY NO 1	Wood pole lines with copper conductor	115	508	36	99	19.49%
7266	SALEM-ALBANY NO 2	Wood pole lines with copper conductor	115	629	37	176	27.98%
9290	WALLA WALLA-TUCANNON RIVER NO 1	Worst performing circuits - wood pole lines	115	646	11	318	49.23%
		Subtotal		***7,249***	***391***	***3,007***	***41.48%***
	WOOD STRUCTURE REBUILD	(RE-USE EXISTING CONDUCTOR)					
7321	ALVEY-FAIRVIEW NO 1, A-R 1 SECT	Old fir wood poles, Westside	230	1,115	27	299	26.82%
7405	ALVEY-FAIRVIEW NO 1, R-F 1 SECT	Old fir wood poles, Westside	230	453	7	72	15.89%
7121	CARDWELL-COWLITZ NO 1	Original cedar pole, butt treated	115	168	25	142	84.52%
6322	GARRISON-ANACONDA NO 1	Original cedar pole, butt treated	230	506		436	86.17%
7355	HILLS CREEK-LOOKOUT POINT NO 1	Old fir wood poles, Westside	115	476	15	217	45.59%
8434	MURRAY-CUSTER NO 1	Original cedar pole, butt treated	230	442	3	262	59.28%
6326	RATTLE SNAKE-GARRISON NO 1	Original cedar pole, butt treated	230	415	4	333	80.24%
		Subtotal		***3,575***	***81***	***1761***	***49.26%***
	LINE RECONDUCTORING	(REBUILD DEAD END'S)					
7140	ALLSTON-ASTORIA NO 1	Wood pole lines with copper conductor	115	560		46	8.21%
7236	KEELER-TILLAMOOK NO 1	Worst performing circuits - wood pole lines	115	988	46	193	19.53%
8350	SHELTON-FAIRMOUNT NO 1	Original cedar pole, butt treated	115	916	17	507	55.35%
		Subtotal		***2,464***	***63***	***746***	***30.28%***
		Total		***13,288***	***535***	***5,514***	***41.50%***

Risk Map – Future State (FY 2020)

(Bubble size represents volume of poles in each grouping)



What equipment and facilities are covered?

What performance objectives, measures and targets should be set?

What is the health of the assets?

What risks must be managed?

What strategies should we undertake?

What will it cost?

Forecasted Capital Spending Levels

(Un-inflated)

Group	Line Miles	# Priority Poles Replaced	2nd Qtr Forecast FY 2010	*Forecast FY2011*	*Forecast FY2012*	*Forecast FY2013*	*Forecast FY2014*	*Forecast FY2015*	*Forecast FY2016*	*Forecast FY2017*	*Forecast FY2018*
COMPLETE LINE REBUILD (INCLUDING NEW CONDUCTOR)											
Worst performing circuits - wood pole lines	178	1,184	$0.0	$32.1	$10.7	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Wood pole lines with copper conductor	209	1,297	$0.0	$0.0	$0.0	$22.5	$17.0	$10.8	$0.0	$0.0	$0.0
Original cedar pole, butt treated	195	527	$0.0	$0.0	$0.0	$0.0	$0.0	$2.0	$4.9	$20.0	$20.0
Total	583	3,008	$0.0	$32.1	$10.7	$22.5	$17.0	$12.8	$4.9	$20.0	$20.0
WOOD STRUCUTURE REBUILD (RE-USE EXISTING CONDUCTOR)											
Old fir wood poles, Westside	122	588	$0.0	$0.0	$19.7	$0.0	$0.0	$5.0	$0.0	$0.0	$0.0
Original cedar pole, butt treated	261	1,173	$0.0	$0.0	$1.5	$0.0	$7.0	$14.0	$13.8	$12.3	$12.8
Total	384	1,761	$0.0	$0.0	$21.2	$0.0	$7.0	$19.0	$13.8	$12.3	$12.8
LINE RECONDUCTORING (REBUILD DEAD END'S)											
Worst performing circuits - wood pole lines	58	193	$0.0	$0.0	$0.0	$10.8	$0.0	$0.0	$0.0	$0.0	$0.0
Wood pole lines with copper conductor	41	46	$0.0	$0.0	$0.0	$0.0	$7.7	$0.0	$0.0	$0.0	$0.0
Original cedar pole, butt treated	60	507	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$11.2	$0.0	$0.0
Total	159	746	$0.0	$0.0	$0.0	$10.8	$7.7	$0.0	$11.2	$0.0	$0.0
PROJECTS CURRENTLY "INFLIGHT" for FY 2010											
Worst performing circuits - wood pole lines	35	293	$5.7	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Wood pole lines with copper conductor	20	178	$4.8	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Original cedar pole, butt treated	45	463	$0.4	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Total	100	934	$10.9	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Wood Pole & Structure Replacements											
Pole Replacements			$4.1	$6.5	$6.5	$6.5	$5.9	$5.3	$4.8	$4.2	$3.7
TOTAL											
Worst performing circuits - wood pole lines	271	1,670	$5.7	$32.1	$10.7	$10.8	$0.0	$0.0	$0.0	$0.0	$0.0
Wood pole lines with copper conductor	271	1,521	$4.8	$0.0	$0.0	$22.5	$24.7	$10.8	$0.0	$0.0	$0.0
Original cedar pole, butt treated	562	2,670	$0.4	$0.0	$1.5	$0.0	$7.0	$16.0	$29.9	$32.3	$32.9
Old fir wood poles, Westside	122	588	$0.0	$0.0	$19.7	$0.0	$0.0	$5.0	$0.0	$0.0	$0.0
Wood Pole & Structure Replacements			$4.1	$6.5	$6.5	$6.5	$5.9	$5.3	$4.8	$4.2	$3.7
FY2010 represents 2nd Qtr Forecast of total spending, Includes $7.5M of pre-approved funding Total	1,227	6,449	$15.0	$38.6	$38.4	$39.7	$37.5	$37.1	$34.7	$36.5	$36.5

Forecasted Expense, Labor and Units

Wood Pole Transmission Line Planning Estimates

FY 2009

	Actual	Current Year Est.	Forecast								
	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	Total
EXPENSE (thousand $)											
Working Patrols	1900	2000	2000	2000	2000	2000	2000	2000	2000	2000	16000
Line Maintenance Expense 2/	300	400	400	400	400	400	400	400	400	400	3200
Retired Asset Health Assess/Lab testing	0	0	50	50	50	50	50	50	50	50	400
Total Expense	2200	2400	2450	2450	2450	2450	2450	2450	2450	2450	19600

2/ Expense includes misc repair work, working line patrol and pole inspections. Does not include access road maintenance and vvegetation management work.

	Actual	Current Year Est.	Forecast								
	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	Total
TLM Resource Requirements (Hours)											
TLM Labor Hours (Est.)											
Capital projects -e.g. pole replacements	25000	16000	24000	24000	24000	22000	20000	18000	15000	13000	160000
Maintenance work 3/	5000	5000	5000	5000	5000	5000	4500	4500	4500	4000	37500
Total labor hours	30000	21000	29000	29000	29000	27000	24500	22500	19500	17000	197500

3/ Hours exclude access road maintenance and vegetation management work

	Actual	Current Year Est.	Forecast								
	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	Total
Units of Work											
Miles of Line Rebuilt	62.2	55.1	133.9	149.6	93.6	102.1	141.5	80.3	132.9	132.9	966.8
Miles of Copper line Reconductored	0	0	0	0	57.8	46	0	60.2	0	0	164
Number of Poles Replaced	1200	1450	3100	3400	3000	2900	3100	2500	2800	2750	23550

Priority poles replacements (FY2010 through FY2018): **11,500**

BPA's Financial Disclosure Information

- All FY 2010 – FY 2018 information has been made publicly available by BPA on May 14th, 2010 and does not contain Agency-approved Financial Information.

- This information is being released externally by BPA on May 14th, 2010 as an ad hoc report or analysis generated for a specific purpose. The information provided is based upon data found in Agency Financial Information but may not be found verbatim in an External Standard Financial Report or other Agency Financial Information release.