Strategic Plan: Asset Management
Electric Utility Infrastructure Planning

July 21, 2010 Presentation to City Light Review Panel
Proposed Long-Term Strategic Priorities

1. Infrastructure Maintenance and Renewal
   • Maintain Reliability
   • Provide Services Desired by Customers

2. Environmentally Responsible Operations
   • Green Portfolio Management
   • Environmental Stewardship

3. High Performance Organization & Workforce
# Utility Infrastructure and Assets

## Generation
- 7 dams
- 7 Generation Stations
- 26 powerhouse transformers

## Transmission/Substations
- 660 Circuit Miles of Transmission
  - 22 miles UG
- 1200 Steel Lattice Transmission Towers
- 700 Transmission Poles
- 15 major substations

## Distribution System
- 53,720 Transformers
  - 1231 Network transformers
  - 52,500 Distribution Transformers
- 167 Electric Feeders
- 108,000 Poles
- 84,000 Street Lights
- 2400 miles of Distribution Line
  - 500 mi UG
  - 160 mi UG Network

## Customer End Systems
- ~ 400,000 customer meters
- 71,500 in Suburban Cities (Shoreline, Lake Forest Park, Tukwila, Burien) and unincorporated King County

## Costs
- Priceless
- $630 M
- $1.7 B
- $60 M
Seattle – 1900’s
Seattle 1962 from Space Needle
Seattle Today
SCL Service Territory Population and Electric Peak

Population, 1000's

MW Peak


1924 Gorge Dam
1929 Diablo Dam
1940 Ross Dam
1967 Boundary Dam
Asset Failure for an Asset Class

- Decreasing Failure Rate
- Stable Failure Rate
- Increasing Failure Rate

- Early “Infant Mortality” Failures
- Observed Failure Rate
- Constant (Random) Failures
- Wear out Failures

Failure Rate vs. Time
Asset Replacement Alternatives

Option #1: Run to Failure

*Status Quo – highest risk; highest cost*

- Current methodology for most distribution assets
- Can lead to significant failure events and claims, including environmental spills

Option #2: Age-Based Replacement

*Replace on Proactive Schedule – lower risk – higher cost*

- Typically replaced shortly after economic life or using other rule of thumb

Option #3: Asset Management

*Optimizes cost and risk –*

- Use asset condition to inform asset decisions
- Likely will use all three options for specific equipment types
“Run to Failure” is Costly

• At least 3 times more costly than Asset Management Practices

Cost of pole replacement after failure:
• 12+ hours outage – lost revenue opportunity
• Service disruption – customer dissatisfaction
• Overtime restoration
• Potential public safety issues before on-site
• Potential for environmental impact
• Crews not available for planned work

Cost of planned pole replacement
• 4 hours straight time for crew
• Pre-arranged and scheduled
• Less costly
Strategy – Infrastructure Improvement Options

Impact of Delay

Today
- Result: Increased Rates
- Decreased Reliability

Tomorrow

Proposed

Today
- Result: More Predictable Rates
- Increased Reliability

Tomorrow
## Strategic Plan: Infrastructure Maintenance and Replacement Programs

<table>
<thead>
<tr>
<th>T&amp;D Assets</th>
<th>Program Description</th>
<th>A (current funding)</th>
<th>B (Proposed)</th>
<th>C (Slower pace)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distribution – Wood Poles</td>
<td>Pole Replacement (88,000 wood distribution poles)</td>
<td>600 poles</td>
<td>2000 poles</td>
<td>1500 poles</td>
</tr>
<tr>
<td>Distribution – UG Cable</td>
<td>Cable Injection &amp; Replacement (500 Mi UG)</td>
<td>30 Mi Inject 5 mi Replacement</td>
<td>30 Mi Inject 8.5 mi Replacement</td>
<td>Degradation of reliability for customers</td>
</tr>
<tr>
<td>Distribution – Network</td>
<td>Network Vault Rebuild (2400 Street Enclosures)</td>
<td>7 rebuilt annually</td>
<td>20 /yr</td>
<td>15 /yr</td>
</tr>
<tr>
<td>Transmission Steel Towers</td>
<td>Inspect and evaluate necessary corrective action (1200 steel lattice towers)</td>
<td>One yr Pilot 60 Towers</td>
<td>1140 towers over 2 years</td>
<td>1140 towers over 5 years</td>
</tr>
<tr>
<td>Transmission – Line</td>
<td>Transmission Assessment &amp; Maintenance (650 Miles)</td>
<td>Vegetation patrol</td>
<td>Full Inspection over 2 years</td>
<td>Full Inspection over 5 years</td>
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Strategic Plan: Infrastructure Maintenance and Replacement Programs

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<tr>
<td>T&amp;D Substation</td>
<td>Substation Transformer Replacement (67 Transformers)</td>
<td>1 per yr</td>
<td>2 per yr (2013-14)</td>
<td>N/A</td>
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<td>Generation</td>
<td>Major and Minor Maintenance</td>
<td>Rescheduled maintenance plans</td>
<td>Restore previous funding</td>
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<td>Unit Automation</td>
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