



MEMORANDUM

EUGENE WATER & ELECTRIC BOARD

Rely on us.

TO: Commissioners Simpson, Brown, Helgeson, Manning and Mital
FROM: Mel Damewood, Engineering Manager
Alan Fraser, Engineering Supervisor
DATE: September 6, 2013
SUBJECT: Downtown Eugene Electric Distribution System: Network or Radial
OBJECTIVE: Information Only with desire for Board Input

Issue

The age and condition of the downtown electrical system (i.e. “Downtown Network”) are driving EWEB to a multi-million dollar renovation of this part of the system. The existing system is built as a “Network” and serves approximately 900 downtown customers. Most EWEB customers (and most utility customers across the nation) are served by a “Radial” distribution system. Should the downtown electric distribution system remain as a Network system or be converted to a Radial system?

Background

Triggered by condition assessments, along with a rare extended outage in 2010, a review of EWEB’s downtown electric distribution Network revealed the need to either replace the aging system with a similar Network design or a new Radial design. Both design approaches have advantages and disadvantages, as revealed using a comprehensive Triple Bottom Line (TBL) review. The TBL results indicate a clear advantage in some aspects such as: ease of implementation, and flexibility of scheduling and cash flow of a Network approach. Conversely, a Radial system offers advantages to customers in other aspects such as: lower future connection costs, ease/capacity of distributed generation, and flexibility of future system changes/growth. Overall, how much value EWEB places on the distinct categories of advantages/ disadvantages will drive the decision of which type of system to pursue. This paper summarizes the categories addressed in the TBL assessment.

Discussion

Management has identified different attributes for each distribution system. Staff will provide background, describe the different characteristics for each system, and solicit Board members opinions about these attributes in consideration for deciding the downtown’s distribution system.

Summary of Evaluated Characteristics

Characteristic	Network	Radial	Comments
Distributed Generation (DG)	More Restricted and potentially more costly.	Less Restricted	Network protection restricts reverse power flow
Reliability	Ultra	Very High	Both are UG systems
Distribution Energy Efficiency (EE)	No	Yes (BPA incentive \$500k to \$800k)	Voltage optimization Higher incentive if Spots are converted to Radial
Construction Complexity	Moderate	Difficult	Rebuild vs. Redesign
Customer-Side Electric Equipment Costs	Larger costs	Smaller costs	Affects new/remodel and larger customers.
Customer Voltage Options	Less options	More options	Affects new/remodel and larger customers
Contribution in Aid (customer cost to reimburse EWEB costs)	Larger costs	Smaller costs	Affects new/remodel and larger customers.
Road Construction Disruption	Less (49 days)	More (80 days)	During construction process
Outages during construction	Limited	Likely	During conversion, less system redundancy
Safety (EWEB & Public)	Higher fault current and larger chance of low voltage cable fires	Lower fault current	2010 fire was a low-voltage cable fire. Lower fault current is safer for EWEB personnel and public
Greenhouse Gas Emissions	Higher GHG releases	Lower GHG releases	GHG savings from EE, Renewable-DG & EWEB Elec. Equip. purchases
Equipment Life Cycle Costs	Larger by \$500k	Smaller	Network equipment is more expensive
Potential Contingency Impact to Project Cost	Less	More	Radial: More unknowns
EWEB Resources	Less	More	
Cash Flow Requirements	Less	More	Final design affects answer
Construction Costs	\$17M	\$21M	Preliminary design costs

Requested Board Action

Management is interested in the Board members opinions of the different characteristics for each distribution system, and potentially how to evaluate their importance.