

Trolley Bus Replacement Evaluation

**Transportation Committee
Seattle City Council**

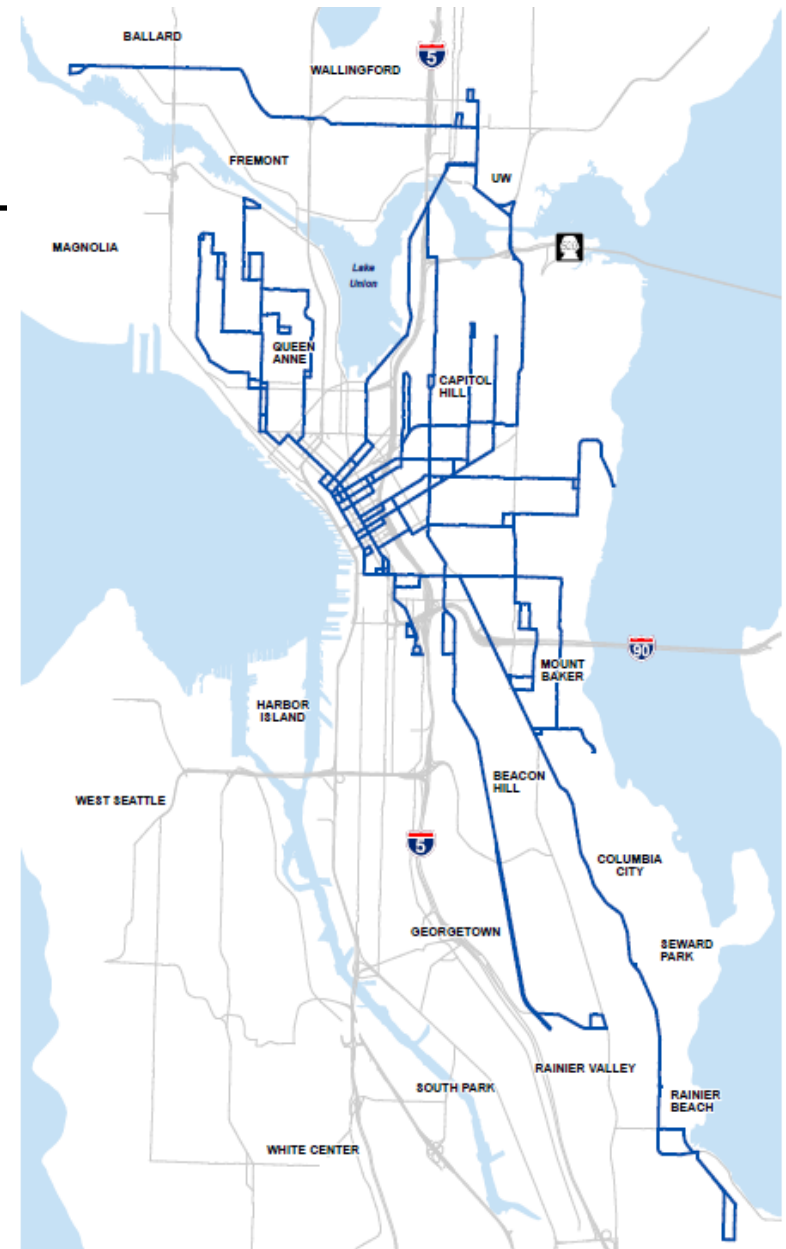
June 14, 2011

Agenda

- Background / Purpose of Evaluation
- Life Cycle Cost Analysis
- Environmental Analysis
- Summary

Trolley Bus Network

- 14 routes
- 159 trolley buses
- 70 miles of two-way overhead wire
- 20% of Metro's weekday riders
- One of five trolley systems in the United States
 1. Seattle, WA
 2. San Francisco, CA
 3. Dayton, OH
 4. Philadelphia, PA
 5. Boston, MA

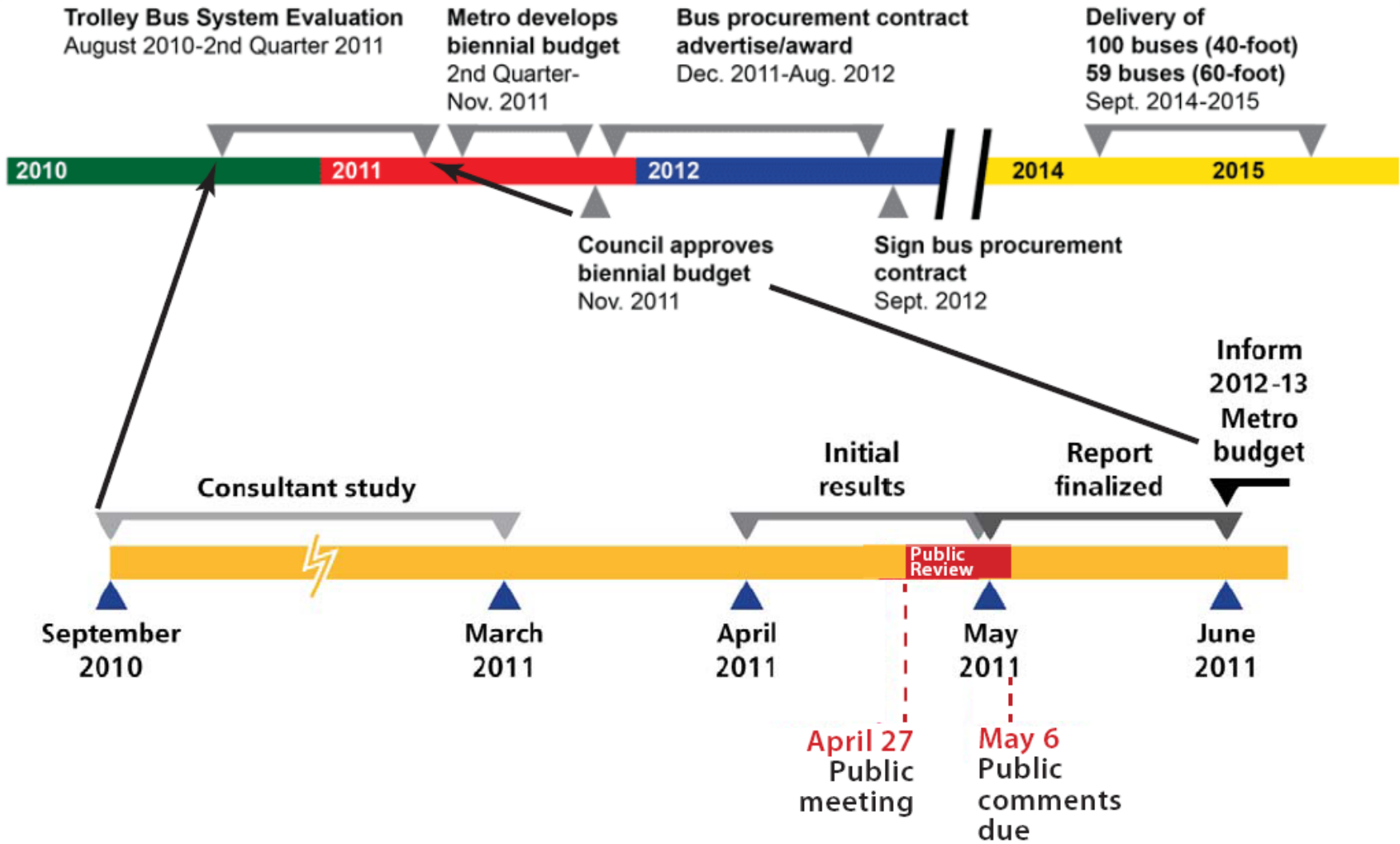


Purpose of the Evaluation

- Aging fleet
- 2009 transit performance audit
- Establish budget for fleet replacement (2012-2013 biennial budget)



Evaluation Schedule



Bus Technologies Included in the Evaluation

Diesel Hybrid Bus



Reworked transmission to travel on steep grades

Electric Trolley Bus



Photo by John Perlic

Added auxiliary power unit (APU) for off-wire travel

Key Life-Cycle Cost Assumptions

- Vehicle useful life (FTA, 2008)
 - Electric Trolley Bus: 15 years
 - Diesel Hybrid: 12 years
- 60 foot vehicle costs
 - Electric Trolley Bus: \$1,285,000
 - Diesel Hybrid: \$785,000
- Real Discount Rate (King County): 7% future value of today's dollars
- Annualized cost is calculated over one life-cycle for each vehicle type.
- Continuation of federal fixed guideway grants is assumed in the analysis.
- Decommissioning trolley infrastructure: \$37 million
- Expanding fueling capacity at base for hybrids: \$5 million

Annualized Life-Cycle Cost



Diesel Hybrid

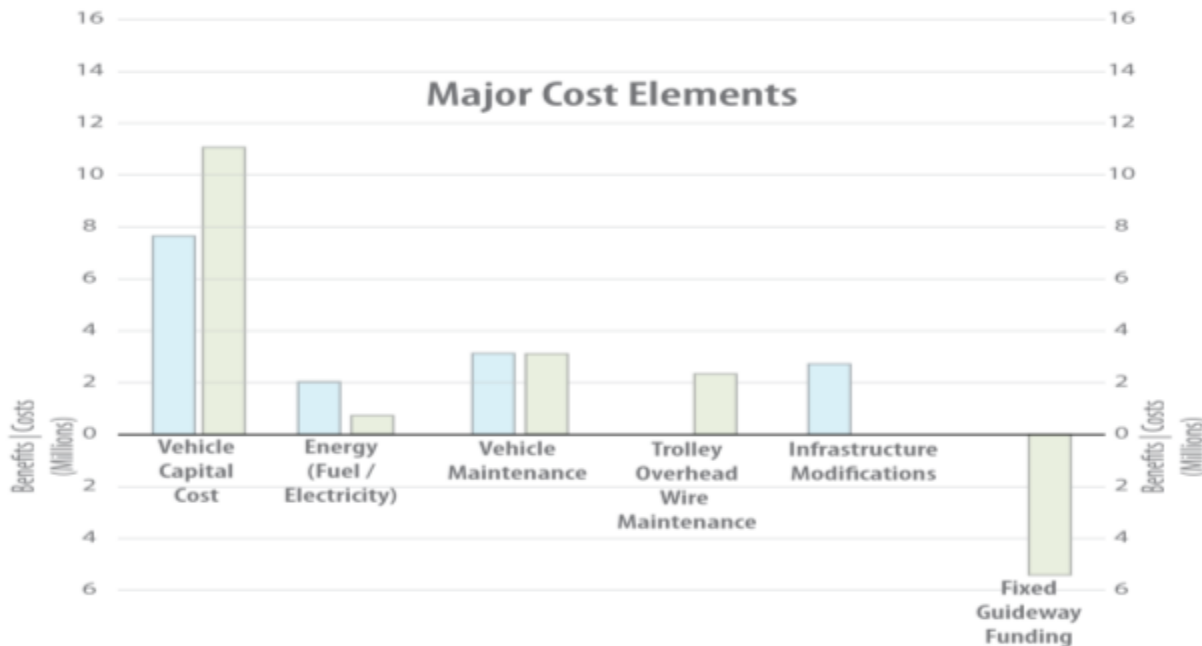
**Electric Trolley Bus
with Auxiliary Power Unit**



Favors Diesel Hybrid

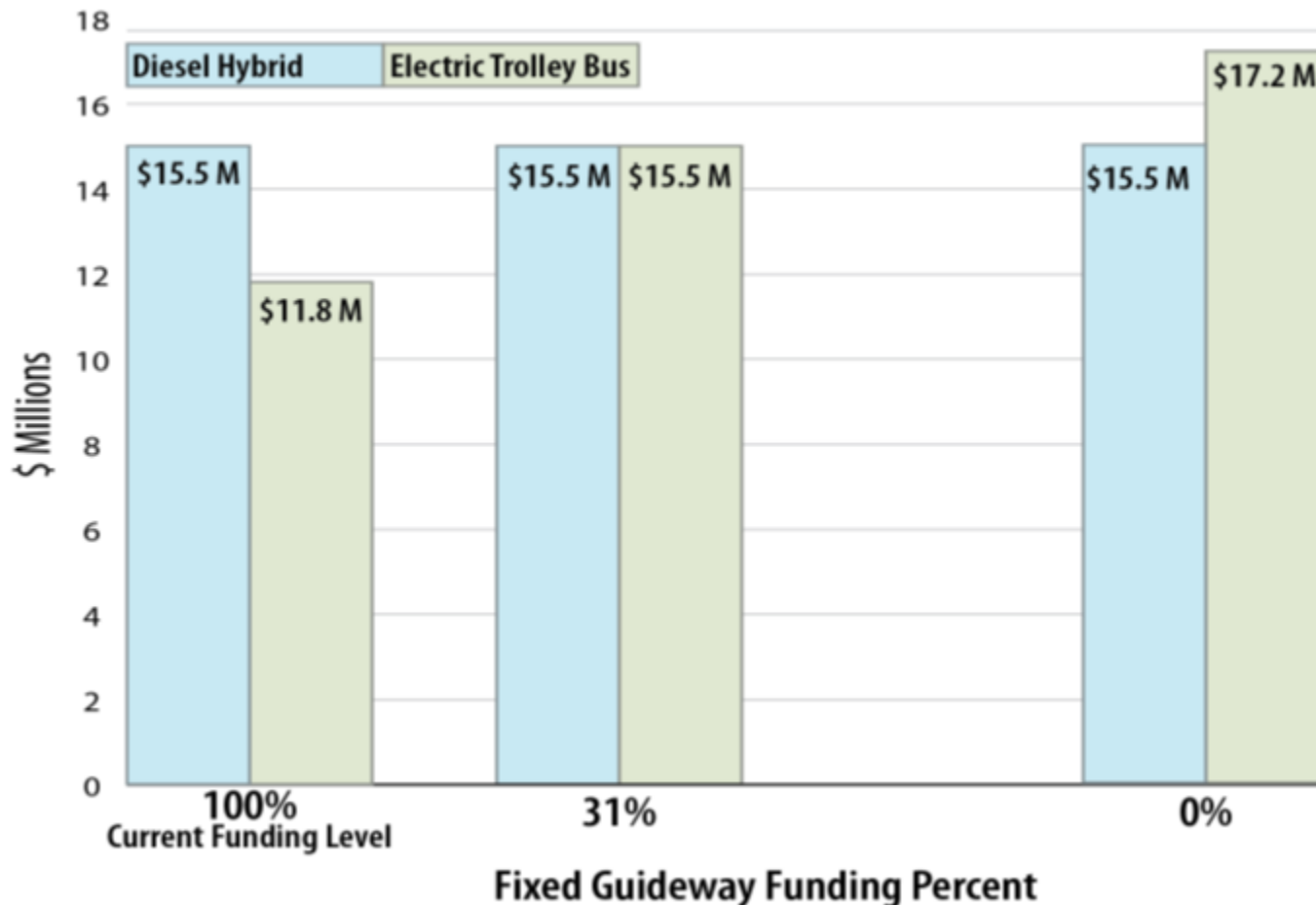
Favors Electric Trolley Bus

Electric Trolley Bus technology costs \$3.7 million less than Diesel Hybrid



Influence of Fixed Guideway Funding on Annualized Costs

If FTA fixed guideway funding falls below 31% of current funding, the Diesel Hybrid technology costs less



Sensitivity of Major Cost Variables

What would be required to make Diesel Hybrid more cost effective?

Input	Ability to Switch Results
Fixed guideway funding	Reduce to 31% of current level
Gas price	Not possible
Electricity price	Increase 20% per year
Diesel Hybrid life span	Increase from 12 to 17 years
Electric Trolley Bus purchase price	Increase by 34%
Diesel Hybrid purchase price	Decrease by 48%

Environmental Analysis

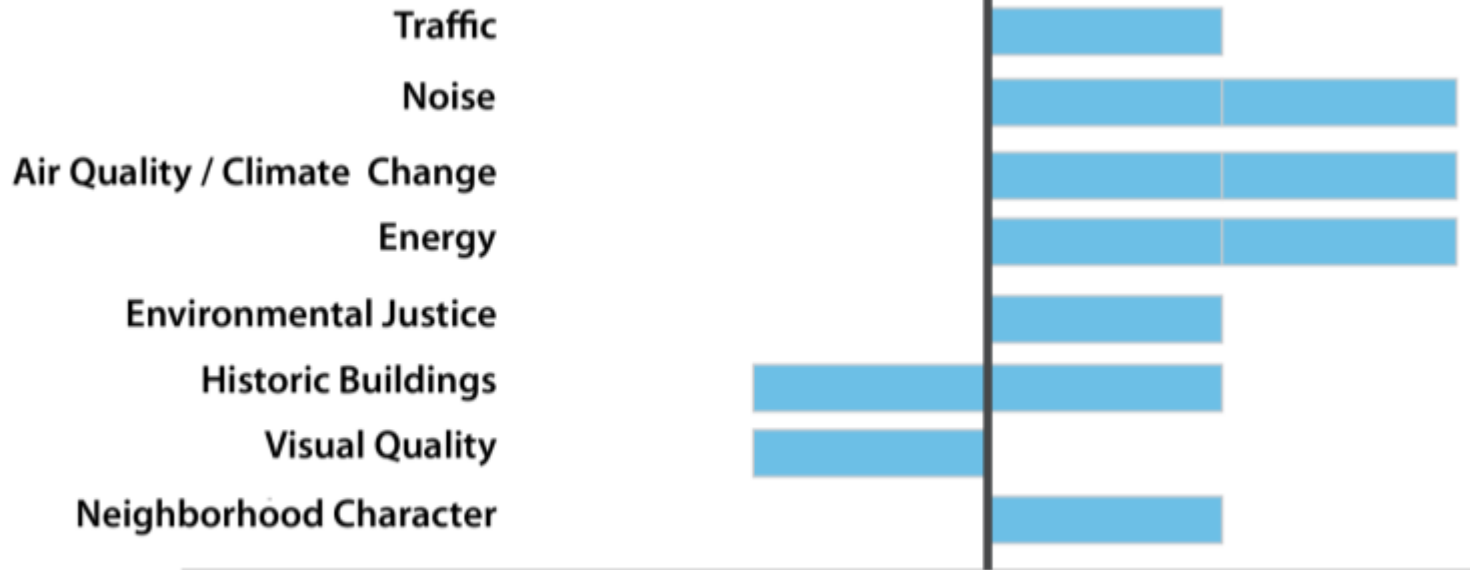


Diesel Hybrid



**Electric Trolley Bus
with Auxiliary Power Unit**

Favors Diesel Hybrid

Favors Electric Trolley Bus



KEY

-  Favors Bus Technology
-  Greatly Favors Bus Technology
- Similar Benefit or Impact for both Bus Technologies

Summary

- Cost elements favor Electric Trolley Bus
- Built environment elements favor Electric Trolley Bus
- Study findings will be incorporated into Metro's 2012- 2013 budget proposal