



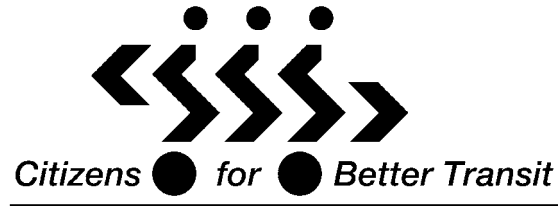
Citizens ● for ● Better Transit



**Future Directions:  
Considerations for Retaining  
Electric Trolley Bus Service in  
Edmonton**

May 12, 2004

[www.bettertransit.ab.ca](http://www.bettertransit.ab.ca)



*About Citizens for Better Transit . . .*

- **Incorporated non-profit society comprised of volunteers**
- **Raise awareness of public transit issues**
- **Promote investment in quality public transit as means to maintain and improve quality of life and environment**

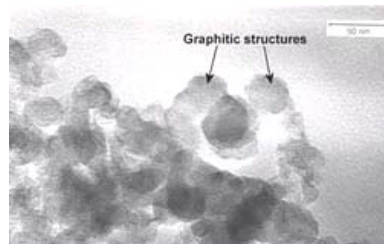
*Citizens for Better Transit believe trolley buses have significant benefits; they are an asset to the city and should continue to be part of our transit system.*

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## Issue - Emissions

- Trolleys produce **zero emissions** in the streets; health impact is minimal.
  - Emissions from power generation are outside the city from high stacks; clean electricity sources like “wind power” can be used.
- Diesel exhaust is implicated in cancer, heart disease, lung ailments, birth defects. There is “no safe level of exposure”.
  - Most carcinogenic substance known (3, nitrobenzathrone) found in diesel exhaust particles; diesel exhaust is more toxic than gasoline exhaust.
  - New diesel buses produce less emissions, but particles are finer and can more easily enter the bloodstream. [*Automotive Engineering*, Feb. 2001: Filter trap devices were mostly ineffective in reducing the proliferation of ultrafine, i.e. sub-40 nm, particles.]

Coarser particulate  
(older diesels produce  
many coarse particles) ▶



Finer particulate  
(particles from  
newer diesels tend  
to be finer)

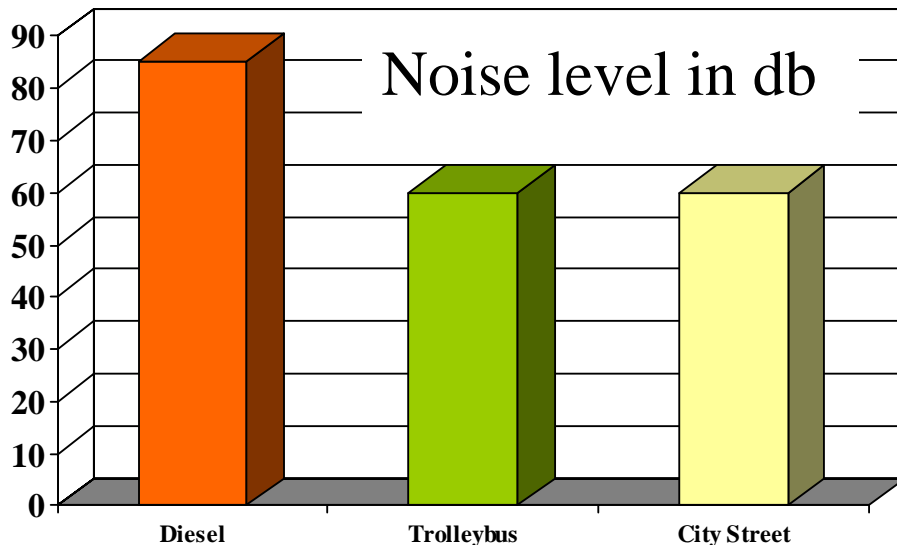


*Why add more diesel buses to the high density city core if we have an alternative?*

## *Issue - Noise*

Bus service starts in the wee hours of the morning and runs until after midnight. In some areas of downtown and the West End, a trolley bus passes 200-450 times in the course of one weekday. This service is delivered quietly.

Diesel buses produce sharp, intermittent noise peaks, particularly when accelerating. Phasing out trolleys permanently adds diesel bus noise to neighborhoods in the city core at most times of the day. This is undesirable in areas the city is seeking to revitalize with high density housing development.



**Passing trolleys are usually not heard above the ambient street noise.**

**Diesel buses are more than twice as loud.**

*Why add more noise?*

## *Other Issues . . .*



- Trolleys offer **route stability and permanence** – riders prefer routes that do not constantly change.
- Trolleys offer **route visibility** – “we know where the bus goes”.
- Trolleys offer **community character**; **symbol of environmental conscience**.
- Trolleys offer **local economic benefits** – power and maintenance services bought from locally owned power company which pays annual dividends to the city. No such benefit from buying more diesel fuel.

## *Issue – Reliability*



*“New or old, diesel or electric--any vehicle can break down.”*

- *Any* vehicle can break down inconveniencing passengers--including diesel buses.
- Similar to LRT service, trolley bus service can occasionally be disrupted by power outages. Several vehicles can be affected.
- Road construction is often cited as a deterrant to operating trolley buses in Edmonton.



# Many cities do operate trolley buses during road construction ...



Dayton



Seattle



Vancouver



San Francisco

## *Issue - Reliability*

And, new trolley buses have “auxiliary power” that enables them to travel under their own power. This allows them to continue in the event of a power interruption or even detour around road construction. This feature can make it easier to “manage” incidents.



**Left:** New trolley bus in San Francisco skirts road construction on auxiliary power.  
**Right:** Trolley bus in Beijing China traverses five city blocks on auxiliary power at normal service speeds.

*Cities around the world find modern trolley buses to be an effective and reliable form of public transportation.*



*Issue – Other Technologies:* Hybrid buses now available, but not zero emission or low noise, still depend on diesel fuel. Fuel cell buses not feasible for many years yet. Cities that have trolley buses are choosing to continue with trolley buses, even those with relatively small trolley fleets.



Dayton



Boston



San Francisco



Seattle



## *Issue – Investment Losses*

### **Edmonton already has a sizeable investment in the trolley bus**

- About 46 neighborhoods served, many are in the city core in areas of growing high density residential development.
- 140 km of overhead wire
- 8 power substations
- 4,600 specialized support poles
- Specially designed streetscapes to accommodate trolleys in downtown areas
- About \$12 million invested in upgrades over the past decade
- System valued at \$73 million replacement value in 2002. 72% of system in good condition, 19% in fair condition. Average life expectancy 24 years.
- It will cost at least \$13.2 million to tear the trolley system down.

***Citizens for Better Transit feels the trolley system is more valuable to citizens if it continues to be used.***

*Issue – Costs* Administration’s proposal to end trolley service cites *cost reasons*. There are two categories of costs: Operating Costs (expenditure to run the vehicles) and Capital Costs (purchase of equipment, infrastructure upgrades or removal).

### Operating Cost Considerations:

EThe projected expenditure to operate trolleys is about \$1.9 million per year for the next ten years.

EThe transit budget is about \$132 million per year. Trolleys cost 1.4% of the annual operating budget.

EThe per km difference in operating costs between diesels and trolleys is less than the fare of ONE passenger. Trolleys serve many busy corridors (Jasper Ave, 107 Ave, 118 Ave, 124 St, 101 St.), carrying more passengers than many suburban routes. For the most part, trolleys appear to cover their addt’l costs.

ERising petroleum prices could close the cost gap between diesels and trolleys within a relatively short time frame.



## Capital Cost Considerations:

- Administration's focus on identifying "savings" by eliminating trolleys.
- ONE trolley retention scenario examined.
- Need to look at range of possible options and their different costs.

**To illustrate this range, some possibilities are represented below.**

(Note these are examples for illustrative purposes intended to show the existence of a range of options. They are not necessarily all-inclusive. All figures are ballpark estimates based on available info; expenditure is for 10 year time frame. Costs beyond this time frame, e.g. further overhead upgrades, overhaul of diesel buses, are not included here. Total costs are rounded to nearest million.)

## **DIESEL SCENARIOS:**

### **Scenario 1: Existing diesel technology, no benefit from 2007 emission standards**

Purchase 39 diesel buses plus 6 spares (15%) @ \$400,000 = \$18 million

Take down overhead system = \$13.2 million

(Vehicle life = 18 years)



**Total Cost = \$31 million**

### **Scenario 2: Buy post-2007 diesel buses with reduced emissions**

Purchase 39 diesel buses plus 6 spares (15%) @ \$500,000 = \$22.5 million

Take down overhead system = \$13.2 million

(Vehicle life – 18 years)



**Total Cost = \$36 million**

# TROLLEY SCENARIOS:

## Scenario A: Continue with existing trolleys with no modifications

Refurbish 39 existing trolleys plus 6 spares (15%) @ \$25,000 = \$1.13 million

Maintain overhead system = \$13.2 million

(Vehicle life: ~8-10 years)

**Total Cost = \$14 million**

## Scenario B: Modify existing trolleys with lifts to provide accessibility and auxiliary propulsion to permit off-wire travel. (Lifts are commonplace in many N.A. cities)

Upgrade 39 existing trolleys plus 6 spares (15%) @ \$110,000\* = \$4.95 million

Maintain overhead system = \$13.2 million

(Vehicle life: ~12-15 years)



**Total Cost = \$18 million**

## Scenario C: Buy new trolleys to fill base service, use existing trolleys to supplement service in peak hours

Purchase 22 new trolleys plus 4 spares (15%) @ \$900,000 = \$23.4 million

Refurbish 19 existing trolleys @ \$25,000 = \$475,000

Maintain overhead system = \$13.2 million

(Vehicle life: New trolleys 20-25 yrs; refurbished ~8-10 yrs)



**Total Cost= \$37 million**

## Scenario D: All new trolleys

Purchase 39 new trolleys plus 6 spares (15%) @ \$900,000 = \$40.5 million

Maintain overhead system = \$13.2 million

(Vehicle life: 20-25 yrs)



**Total Cost = \$54 million**

\*Per bus, est. \$40,000 for lift and modifications; \$30,000 for APU; \$40,000 other upgrades. Total = \$110,000 per bus.

To summarize . . .



- *Citizens for Better Transit* feel the future of trolleys is a matter requiring careful consideration. We already have a sizeable investment in trolleys. If the system is torn down, it is difficult to put it back.
- We believe the trolley bus system is a strong asset to Edmonton; its quality of life benefits are important in core areas of the city. It meets the principles of the *Transportation Master Plan* and *Plan Edmonton* which state the city will reduce or mitigate the negative impacts of transportation on communities, in particular in the high density city core.
- Electricity may prove an important alternative to diesel in future.
- Trolley costs are small in the context of the transit budget. Nevertheless, ALL of the various scenarios for retaining trolley buses need to be investigated to ensure the full range of options is put on the table for consideration. If costs are a concern, cost effective scenarios for trolley retention are possible.

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