The Committee of 100
on the Federal City

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COUNCIL OF THE DISTRICT OF COLUMBIA

Committee on Public Works and Transportation

District Department of Transportation

Performance Oversight Hearing

Statement of

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On behalf of
The Committee of 100 on the Federal City

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On December 21st the Council enacted the "Transportation Infrastructure Amendment Act of 2010" that requires evaluating the feasibility of non-aerial power as a means of streetcar propulsion prior to expansion of the streetcar system beyond the H Street-Benning Road segment. On December 22nd, the City was awarded a one million dollar grant from the Federal Transit Administration (FTA) to study alternatives for the K Street Corridor, other alternative streetcar route alignments, and streetcar propulsion alternatives. My testimony today provides recommendations for the portion of the study that will examine streetcar propulsion alternatives.

DC's challenge is to determine which technology is most appropriate for our city. The Committee of 100 has been advocating that DDOT evaluate alternatives to overhead lines because those lines and their supporting structures would be unwelcome visual elements that have been prohibited or substantially avoided in our city for 121 years. Some cities in Europe are now operating non-overhead wire streetcar systems and additional technologies are being rapidly developed.

Life-Cycle Cost Questions

A useful method for evaluating and comparing those systems is a life-cycle cost or whole-life cost study that quantifies the total cost of an asset, over its life. For the purpose of my testimony today, I will limit my discussion to the equipment acquisition and structural aspects of the financial costs, and not get into environmental and social costs that should be fully understood through a system-wide Environmental Impact Study.

A life-cycle cost study should answer the following questions as a starting point in comparing and evaluating the costs associated with different technologies:

- What is the cost of providing power by overhead wires or street-level conductors?
- What is the cost of providing power through electric storage devices such as super-capacitors or batteries?
- What is the cost of providing power through on-board generation?
- What are the operating costs of the propulsion alternatives?
- What are the maintenance costs of the propulsion alternatives?

Some costs will be the same regardless of propulsion system, for example planning and design, maintenance and storage facilities, and turn-around or turn-back facilities should be roughly comparable for the different propulsion alternatives. These need to be quantified for a total cost analysis but not for the comparative analysis I am outlining.

Categorizing Costs

The existing H-Street-Benning Road system should be the baseline, since those costs are known. Further, several alternative propulsion systems are already in revenue service and their costs should be obtainable: For example, Alstom has been in service in Bordeaux since 2003, CAF began service in Seville and Saragossa this year, and LTE is in service in Nordhausen.

A. <u>Cost of Providing Power by Overhead wires or Street-level Conductors.</u>

• The cost of an overhead wire system involves the overhead wires, the stanchions to support the overhead wires, the heavy power wire in the street (to minimize the size of the overhead wires), the fairly closely spaced substations to distribute the power (2 or 3 will be required for the H Street-Benning segment) and the cost of insulating and insuring electric continuity of the rails because the rails are used as the return electric current path.

• The Alstom system, used in Bordeaux, has a power rail between the tracks that is energized in sections, only when the streetcar is above the section of track, and supplied to the streetcar through contacts with the power rail. It relies on the rails as the return current path.

• The Bombardier system uses a power wire imbedded in the paving and power is supplied inductively (no physical contact) through a receiver on the streetcar. The rails provide the return current path.

All of the systems that use the rails as the return current path require relocating utilities away from stray current paths and insulating the rails.

B. Cost of providing power through electric storage devices (super-capacitors or batteries).

Batteries and super-capacitors add expense to the cost of the streetcar, but because they do not require special overhead wires or between-the-track power, there are cost savings in the method of delivering power to the streetcar.

Part of the recharging of these systems is done through regenerative braking, but all require some means of topping-off the charge, usually by having a pantograph that raises to contact an overhead power source, or some form of contact that can extend to the passenger platform. With super-capacitors, batteries or on-board electric generation, the rails are not a part of the electric circuit and do not require insulation or isolation from stray currents. Thus they do require the expense of special current-return tracks, overhead wire supports or between-the-track power sources. Instead there will be the requirement of recharging at some passenger stops, the distance between which will be determined by the capacity of the electric storage devices.

C. Cost of providing power through on-board power generation.

The city of Nordhausen, Germany is using the LTE diesel/electric generator hybrid. Unlike the all-electric systems, it produces exhaust emission from the streetcar (but of course there are emissions at the generating plants to produce the electricity for the all-electric streetcars). LTE claims the technology is environment-friendly, because their hybrid system uses vegetable oil instead of diesel fuel.

D. Operating costs.

For the all-electric systems, the efficiency of power usage will vary. For example, the inductive pick-up is less efficient than a direct contact overhead wire system, whereas a battery/super-capacitor system that captures braking energy would likely be more efficient. There are also associated indirect operating concerns, such as the cost of special fire department ladders to extend over the streetcar wires to access upper stories.

E. Maintenance costs.

Overhead wire systems are exposed to the elements and require regular inspection and service as well as tree pruning/removal and repair of downed lines in snow and ice storms. For the Alstom power rail-between-the-tracks, there will be a requirement for special snow removal equipment, because a snowplow would likely be harmful to the exposed power rail.

Quantifying Costs

To form an accurate picture of the total cost of each technology, operating and maintenance costs would be quantified on an annual basis, and capital costs would be spread over their estimated lifetime. The lifetimes of the different capital assets are likely quite long for things like the tracks and the streetcars, and need to be defined by an expert. To spread the capital costs over their estimated lifetimes, we need a discount rate. There is likely a standard rate, used by the Office of the Chief Financial Officer, but again, we need the recommendation of an expert as to whether that is appropriate.

Recommendation

The kind of life-cycle study the City needs will require the services of an independent engineering firm with internal or subcontracted public works economics expertise. The study needs to be done by an independent firm because of DDOT's demonstrated lack of understanding of alternative streetcar propulsion technologies. Attached to this testimony is Appendix B from the recently released Committee of 100's Report, *BUILDING A WORLD-CLASS STREETCAR SYSTEM FOR A WORLD-CLASS CITY,* that critiques DDOT's description of wireless streetcar options. The attached Appendix B identifies those deficiencies in DDOT's description and provides a more comprehensive and updated description of the technologies.

Conclusion

The City needs a meaningful, total-cost evaluation of the alternative propulsion technologies that starts with an analysis that quantifies capital, operating and maintenance costs over the life of the system. The study needs to be prepared by an independent engineering firm. The resulting quantifiable data will form the essential foundation for developing the world-class system this world-class city deserves.

Other cities in our region are considering streetcars and the life-cycle cost analysis described here can also be of interest to them as well as indispensable for DC's future investments.