

**SOUND TRANSIT
STAFF REPORT**

MOTION NO. M2002-16

Hybrid Bus Demonstration Project - Research and Technology

Meeting:	Date:	Type of Action:	Staff Contact:	Phone:
Finance Committee	2/21/02	Deferred	Paul Matsuoka, Policy and Planning Officer	(206) 398-5070
Finance Committee	3/21/02	Discussion/Possible Action	Nick Marquardt, Acting Project Manager, Policy and Planning	(206) 689-4903
			Fred Chun, Maintenance and Operations Project Coordinator, Regional Express	(206) 398-5044

OBJECTIVE OF ACTION

- To obtain information on the performance of new diesel-electric hybrid buses for use in the Sound Transit District and Puget Sound region. Particularly, testing and evaluation in the Downtown Seattle Transit Tunnel for future joint operations with Link Light Rail vehicles.

ACTION

- Authorizes the Executive Director to execute a contract with New Flyer of America to manufacture and deliver one (1) diesel-electric 40-foot hybrid transit bus in the amount of \$816,000 with an 8% contingency of \$65,280 for a total authorized amount not to exceed \$881,280.

KEY FEATURES

Highlights of Action:

- Procure one 40-foot diesel-electric hybrid bus equipped with Allison hybrid propulsion system and that adheres to standard ST Express bus specifications and passenger amenities. The schedule for delivery is the third quarter of 2003.
- Testing and evaluation of the 40-foot hybrid bus will be done on various Sound Transit revenue routes from the third quarter 2003 until 2004. A technical evaluation will be conducted after the completion of the hybrid bus demonstration in revenue service.
- Performance testing in areas such as fuel consumption, emissions, and the operation and reliability of the hybrid propulsion system in a transit application for comparing operational characteristics to the existing diesel and CNG (Compressed Natural Gas) buses.
- Development of an Interagency agreement with King County Metro for providing expertise with inspections during the manufacturing and delivery phases. King County Metro will be operating a 60-foot hybrid bus in revenue service on the Sound Transit Express Route 550. This will provide important decision support information for Regional Express's future fleet procurement.

- Provide information to the region's transit agencies for future fleet replacement.
- The demonstration project will be led by Sound Transit and completed in 2004 in participation with the following transit agencies and the Puget Sound Clear Air Agency – King County Metro Transit (KCM), Community Transit (CT), Everett Transit (ET), Pierce Transit (PT), and Kitsap Transit (KT).
- This action will allow Sound Transit to enter into contract negotiations in the first quarter of 2002 with New Flyer of America and begin the process of developing an interagency agreement with King County Metro. At the completion of the each hybrid bus testing phase, Sound Transit and the partner agencies will evaluate the demonstration project.

BUDGET

Funds for the Hybrid Bus Demonstration Project are included in the Research & Technology (R&T) budget. The 2002 Adopted Budget includes sufficient budget for this effort and committing these funds will not endanger any other project elements that are to be funded out of the respective elements of the budget. The following table represents the available budget as it relates to expenditures and the impact of this action.

Total R&T Budget⁽¹⁾	Budget for this task (A)	Expenditures to Date⁽²⁾ (B)	Total Amount Requested (C)	Budget Remaining (A-[B+C])
\$38,700,000	\$3,000,000	\$189,338	\$1,870,000	\$940,662

- (1) Lifetime budget amount for R&T project. Reference page 249 of the 2002 Budget document, project number 410.
- (2) Life-to-date expenditures and outstanding commitments for this task, through December 31, 2001, excluding this proposed action. This includes funding for the Smart Bus demonstration project with King County Metro in 2001 and costs associated with developing the Request for Proposals.

FINANCIAL IMPACTS

Impact on Current Year Budget: Action is fully consistent with the 2002 Adopted Budget.

Impact on Sound Move Budget: No impact.

Impact on Cost-to-Complete: No impact.

Impact on Subarea(s) Budget(s): R&T project is funded by the agency Regional Fund and is supported by contributing from all subareas' budgets.

HISTORY OF PROJECT

In April 2001, a letter of intent (attached) for the project was distributed to the Finance Committee expressing Sound Transit's plans to move forward with a Request for Proposals (RFP) for two diesel-electric hybrid buses and one compressed natural gas (CNG) - electric hybrid bus. The total estimated amount was \$2.5 million. Only one proposal was submitted from New Flyer, and it did not include a CNG-electric hybrid option. Upon further discussions, it was determined that there is still a large amount of research and development associated with a CNG-electric propulsion. As a result, the Hybrid Bus Demonstration Project is proposing to continue with the procurement of the two diesel-electric hybrid buses, thus resulting in a lower overall cost to the demonstration. The present cost is estimated from preliminary negotiation

with New Flyer of America. An approval to award a contract is necessary in order to finalize contract negotiations with New Flyer.

It is important to note this procurement only covers a portion of the total costs for this demonstration. There will be additional costs for an interagency agreement with King County Metro and a comprehensive evaluation. King County Metro will provide their expertise for inspections during the manufacturing and delivery phases. The evaluation will be completed by consultant services through a competitive process. This motion does not include requests for authorization for these two actions, as they are within the Executive Director's approval authority.

This project is supporting testing and evaluation of the hybrid electric technology for operations in the Downtown Seattle Tunnel. Hybrid electric technology is becoming increasingly popular in the transit industry as agencies seek to implement more environmentally friendly and cost-effective propulsion systems. The reported benefits of this advanced transit vehicle powertrain are improvements of 25+% fuel economy, a reduction in emissions by 60% to 90%, a reduction of a 1/3 of the brake wear, and better acceleration resulting in a smoother ride. In the Puget Sound region, there has been strong interest in this technology expressed by all of the region's transit agencies. Further, in 1998 the Board approved Motion No. M98-74 establishing policy guidance specifically identified hybrid electric buses as a prime example of the types of demonstration projects that would be an appropriate application of the R&T fund. It is important that Sound Transit and the regional transit agencies have an opportunity to test and validate the reported benefits of this technology within the Puget Sound's unique operating environment. Each agency participating with Sound Transit will operate one of these buses in their local service conditions and on ST Express routes.

Prior Board or Committee Actions and Relevant Board Policies

Motion Number	Summary of Action	Date of Action
M98-74	A motion of the Board adopting the basic program elements of the Research and Technology Program	10-22-98

CONSEQUENCES OF DELAY

Postponing action will delay obtaining information to aid in determining what features to acquire when procuring new buses for expanding the Sound Transit Express bus fleet, as well as to replace aging buses currently being operated in the Downtown Seattle Tunnel.

REGIONAL PARTNERSHIP AND COOPERATION

Sound Transit, in cooperation with four of the region's transit agencies and the Puget Sound Clear Air Agency, worked together to release the Request for Proposals. A special Task Force of the region's transit agency vehicle maintenance managers (CT, ET, KCM, KT, and ST), plus a staff representative of the Puget Sound Clean Air Agency, will be on-going partners in the demonstration phase of the project.

King County Metro will be providing expertise with the production and delivery of these two hybrid buses.

PUBLIC INVOLVEMENT

During the evaluation phase of the demonstration project, passengers will be surveyed to gauge rider comfort and satisfaction.

LEGAL REVIEW

JW 2/7/02

SOUND TRANSIT

MOTION NO. M2002-16

A motion of the Finance Committee of the Central Puget Sound Regional Transit Authority authorizing the Executive Director to execute a contract with New Flyer of America to manufacture and deliver one (1) diesel-electric 40-foot hybrid transit bus in the amount of \$816,000, with an 8% contingency of \$65,280 for a total authorized amount not to exceed \$881,280, for testing and evaluating the hybrid electric technology for operations in the downtown Seattle transit tunnel. The Regional Express department will reimburse the Research and Technology Fund at the vehicle's net book value if the vehicle is put into regular revenue service following the evaluation.

Background:

In April 2001, a letter of intent for the project was distributed to the Finance Committee expressing Sound Transit's plans to move forward with a Request for Proposals (RFP) for two diesel-electric hybrid buses and one compressed natural gas (CNG)-electric hybrid bus. The total estimated amount was \$2.5 million. Only one proposal was submitted from New Flyer and it did not include a CNG-electric hybrid option. Upon further discussions, it was determined that there is still a large amount of research and development associated with a CNG-electric propulsion. As a result, the Hybrid Bus Demonstration Project is proposing to procure one diesel-electric hybrid bus, thus resulting in a lower overall cost to the demonstration. The present cost is estimated from preliminary negotiation with New Flyer of America. An approval to award a contract is necessary in order to finalize contract negotiations with New Flyer.

It is important to note this procurement only covers a portion of the total costs for this demonstration. There will be additional costs for an interagency agreement with King County Metro and a comprehensive evaluation. King County Metro will provide their expertise for inspections during the manufacturing and delivery phases. The evaluation will be completed by consultant services through a competitive process. This motion does not include requests for authorization for these two actions as they are within the Executive Director's approval authority.

This project is supporting testing and evaluation of the hybrid electric technology for operations in the Downtown Seattle Tunnel. Hybrid electric technology is becoming increasingly popular in the transit industry as agencies seek to implement more environmentally friendly and cost-effective propulsion systems. The reported benefits of this advanced transit vehicle powertrain are improvements of 25+% fuel economy, a reduction in emissions by 60% to 90%, a reduction of a 1/3 of the brake wear, and better acceleration resulting in a smoother ride. In the Puget Sound region, there has been strong interest in this technology expressed by all of the region's transit agencies. Further, in 1998 the Board approved Motion No. M98-74 establishing policy guidance specifically identified hybrid electric buses as a prime example of the types of demonstration projects that would be an appropriate application of the Research and Technology fund. It is important that Sound Transit and the regional transit agencies have an opportunity to test and validate the reported benefits of this technology within the Puget Sound's unique operating environment. Each agency participating with Sound Transit will operate the bus in their local service conditions and on ST Express routes.

Motion:

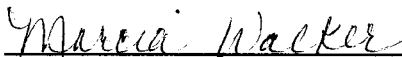
It is hereby moved by the Finance Committee of the Central Puget Sound Regional Transit Authority that the Executive Director execute a contract with New Flyer of America to manufacture and deliver one (1) diesel-electric 40-foot hybrid transit bus in the amount of \$816,000, with an 8% contingency of \$65,280 for a total authorized amount not to exceed \$881,280, for testing and evaluating the hybrid electric technology for operations in the downtown Seattle transit tunnel. The Regional Express department will reimburse the Research and Technology Fund at the vehicle's net book value if the vehicle is put into regular revenue service following the evaluation.

APPROVED by the Finance Committee of the Central Puget Sound Regional Transit Authority at a regular meeting thereof held on March 21, 2002.



Keyin Phelps
Finance Committee Chair

ATTEST:



Marcia Walker
Board Administrator



March 19, 2002

TO: Finance Committee

FROM: Nick Marquardt, Acting Project Manager, Office of Policy and Planning

SUBJECT: The Hybrid Bus Demonstration Project, Motion No. M2002- 16

At the Finance Committee Meeting on February 21, 2002, staff was asked to research and respond to a series of questions in regard to the Hybrid Bus Demonstration Project. Since this meeting, staff has worked with King County Metro to provide answers and present options to the original motion for the Finance Committee to consider. The following are the questions asked by the Finance Committee members and options to the motion for consideration:

Questions and Answers

- Q. *What are the options available for Sound Transit in the event the hybrid propulsion is unsatisfactory?*
- A. In the event that the hybrid propulsion demonstration fails, the contingency available in the motion would cover the cost of replacing the hybrid motor with a standard diesel engine. This could occur at a King County Metro maintenance facility and the coach could remain in revenue service.
- Q. *Include language in the motion stating that Regional Express will reimburse the Research and Technology Fund if the vehicle is put into regular service after the evaluation.*
- A. The Regional Fund was established by the Board to receive contributions from all the subareas for activities that benefit all subareas. Work activities are not intended to be subarea or line of business (LOB) specific; rather, the emphasis is on "Regional." Staff does not recommend a change in policy to reimburse allocation costs to LOB's and subareas.
- Q. *If King County Metro is conducting an evaluation of an identical vehicle, can Sound Transit partner with them on this study?*
- A. King County Metro is procuring a 60-foot diesel/electric hybrid bus for testing and evaluation this summer. Subsequent discussion with King County Metro has revealed that their 60-foot hybrid bus will have similar passenger amenities such as air conditioning. This particular amenity adds to the overall weight of the vehicle, which has some affect on vehicle testing. Because of this additional feature, King County Metro's 60-foot bus testing provides a similar testing environment to the proposed Sound Transit 60-foot hybrid bus. Consequently, staff recommends sharing the King County Metro 60-foot hybrid bus testing information and pursuing a Sound Transit demonstration and testing of a 40-foot hybrid bus. Regardless of the path chosen, King County Metro and Sound Transit have agreed to share testing information. In addition, through further discussion with King County Metro staff, they are willing to consider allowing Sound Transit to

use the Metro bus at the end of their five to six month testing. This proposal has led to an additional option to Motion No. M2002-16.

Discussion of Options for Consideration

Two options for consideration:

1. Keep the Motion No. M2002-16 intact for added performance testing and information of both a 60 and 40 foot hybrid bus
2. Prepare a new motion procuring one 40-foot hybrid bus for total amount not to exceed \$881,600.

Option 1: Procure both a 60-foot and 40-foot Hybrid Bus

- Allows for a more robust testing with more vehicles throughout the region. Accommodates testing under greater operational conditions as well as with different vehicle specifications.
- Having a 60-foot Sound Transit hybrid bus for procurement decision purposes will allow for the truest test with ST Express bus amenities operating in route 550.
- The benefit of additional information on three buses in testing for evaluation purposes includes break wear, fuel economy, and jerking distance for stop/ start.
- The ability to test both bus types through the tunnel. The 40-foot bus will be able to operate in the Downtown Tunnel and could be operated in revenue service as such.

Option 2: Procure only a 40 foot Hybrid Bus

- At least one bus with Sound Transit amenities for regional testing and evaluation.
- Combines 60-foot hybrid bus testing efforts between King County Metro and Sound Transit.
- A lower cost demonstration project.
- The ability to retain testing of a 40-foot bus in conditions that the 60-foot bus can not operate in. The 40-foot bus is more maneuverable, lighter weight, and will have a quiet mode. This allows for quiet zone testing in residential areas, dense city centers, and/or hospital areas.
- The 40-foot bus will be tested for long distance travel for future express routes. The 60-foot hybrid bus has a shorter range due to its weight.

Staff recommends revising the current motion to procure one (1) 40-foot hybrid bus for demonstration and testing in the Sound Transit service area and Puget Sound Region.