

Highlights of Bus Technology Demonstration Project

1.0 Introduction

1.1 In January 2005, an agreement was signed between TransLink and Transport Canada related to the Urban Transportation Showcase Program. Vancouver was one of many cities across Canada selected to participate in this initiative. The program combines six separate elements in an integrated package of urban transportation measures that addresses some of the most challenging aspects of greenhouse gas reduction in urban regions across Canada. These elements are summarized as follows:

- Main Street Corridor Transit and Pedestrian Priority
- Central Valley Greenway
- Transit Villages
- Goods Movement
- TravelSmart
- Hybrid Bus Demonstration

1.2 The Hybrid Bus Demonstration involves the converting of two former fuel cell test buses with diesel/electric propulsion technology designed and developed by Allison Transmission. The use of hybrid propulsion technology in buses is becoming more and more popular with public transit systems in North America. The intent is to test this emerging technology in the streets of Vancouver to determine how suitable it is for the climate and terrain in the Lower Mainland region.

2.0 Bus Technology Demonstration Project

2.1 In addition to testing the hybrid buses in the Urban Transportation Showcase Program, TransLink has initiated an expanded demonstration project which includes other propulsion technologies and alternative fuels. This expanded program is called the Bus Technology Demonstration Project which will test a variety of buses over 2 distinct phases. The first phase is currently underway and includes the following bus types

- Two (2) diesel electric hybrid buses using parallel technology (participating in the Urban Transportation Showcase Program)
- Two (2) compressed natural gas (CNG) buses
- Two (2) biodiesel buses

- Two (2) diesel buses equipped with diesel particulate filters and powered using ultra-low sulfur diesel
- Two (2) diesel buses from the existing fleet being used as baseline buses for comparison purposes

Demonstration testing in this first phase began in September 2005 and will continue until March 2006

Demonstration testing in the second phase will commence in June 2006 and will include the following test buses:

- Two (2) compressed natural gas (CNG) buses modified to be powered using a blend of hydrogen and compressed natural gas, called HCNG
- Two (2) diesel electric hybrid buses using series technology

3.0 Highlights of the Bus Technology Demonstration Project

Recent highlights of the Bus Technology Demonstration Project are summarized as follows:

3.1 May 2005

- 3.1.1 TransLink representatives traveled to Houston, Texas to visit the subcontractor performing the vehicle integration work on the hybrid buses. Following the visit, the Conditional Acceptance Confirmation letter was issued to the main contractor for both of the hybrid buses.
- 3.1.2 M.J. Bradley & Associates of Manchester, New Hampshire was selected as the Test Program Consultant for the Bus Technology Demonstration Project. This consultant was retained to assist TransLink in the development and execution of the test program. As part of the M.J. Bradley team is a department from Environment Canada who will be involved in the emissions testing portion of the test program.

3.2 June 2005

- 3.2.1 Project kickoff meeting held with the Project team. Bus route selection criteria were discussed as well as key issues to be addressed in the test plan being developed by the test program consultant.

3.3 July 2005

- 3.3.1 Notice of Acceptance issued to the main contractor for the hybrid buses. Notice of Acceptance issued to the contractor performing the re-powering of the 2nd CNG bus. Bus wraps installed on most of the test buses including the hybrid buses. Photo of a hybrid bus with the unique bus wrap is shown below.



Photo of Diesel Electric Hybrid Bus

3.3.2 Fare boxes, bike racks, automatic passenger counting equipments etc. installed on the hybrid buses and CNG buses.

3.4 August 2005

3.4.1 Work Plan and Test Program for the demonstration project was finalized. This program also included the specific bus routes that would be used by the test buses and the bus schedule. In summary, the test program will commence initially with eight (8) test buses. (Two additional buses from Nova Bus will be added to the test program in November 2005). Eight different bus runs were selected and each bus would be placed in revenue service on one of the selected runs for a 1-week period. The test buses would alternate bus runs each week such that all buses would have been used on all eight selected bus runs over an eight-week period. The cycle would be repeated three times to allow data to be collected on these same runs throughout different times of the year.

3.5 September 2005

3.5.1 Demonstration testing officially commenced with all eight test buses in revenue service on September 6, 2005. A media event was held at the Burnaby Mountain Conservation Area on September 8, 2005 to inaugurate the launch of the testing.

3.5.2 In order to power the biodiesel test buses, a biodiesel storage and dispensing facility was designed and installed at the tank at Port Coquitlam Transit Centre. This storage facility was completed and ready for use on September 6, 2005.

3.5.3 TNS Canadian Facts was selected as the company to perform customer, operator and GVRD resident surveys during the demonstration project. The taking of onboard customer surveys commenced in September 2005. Surveys of the test bus operators also commenced this month.

3.6 October 2005

- 3.6.1 Offsite performance and emissions testing commenced at a test site located at the Boundary Bay Airport in Delta, BC. Test buses were brought to the test site two-at-a-time for testing. A variety of performance tests were performed including acceleration, braking, noise etc. Emissions tests measured a variety of tail pipe emissions including NO_x and particulate matter.
- 3.6.2 The test buses to be provided by Nova Bus in November will be equipped with diesel particulate filters to help reduce emissions. In addition, these buses will only operate using ultra-low sulfur diesel (ULSD), which is currently not readily available in British Columbia. In order to have the fuel necessary to power these Nova Bus test buses during our test program, special arrangements were made to convert an existing underground storage tank at Port Coquitlam Transit Centre to store and dispense the ULSD. The storage and dispensing facility was completed and in operation by the end of October 2005. The ULSD is imported into BC from Washington State. This is the sole storage and dispensing facility for ULSD in the Province of British Columbia.
- 3.6.3 With ULSD now readily available for the test buses, the hybrid buses were enhanced by the installation of diesel particulate filters. These hybrid buses now operate solely on ULSD.

3.7 November 2005

- 3.7.1 Performance and emissions tests were completed at the Boundary Bay Airport test site in early November 2005.
- 3.7.2 The two (2) diesel buses from Nova Bus were received from Nova Bus in early November 2005. Fare boxes, bike racks and other equipment were installed to make these buses ready for revenue service testing. As noted above, these buses are equipped with diesel particulate filters to help reduce emissions. The buses also operate solely using ULSD.
- 3.7.3 The bus wraps were also installed on these two Nova Bus buses. Please see photo below which depicts one of the completed test buses.



Photo of Nova Bus Diesel Bus

- 3.7.4 On November 23, 2005 both Nova Bus buses commenced revenue testing. The demonstration project now has ten (10) test buses on the road in daily revenue service. Revenue service testing will continue until the end of March 2006.