New Energy Transport Fund

Final Report
On
Trial of Single-deck Electric Bus for Coach Hiring Service
(L & T Success Company Limited)

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(Reporting Period: 1 March 2024 – 28 February 2025)

Executive Summary

1. Introduction

1.1 The New Energy Transport Fund (the Fund) is set up to encourage transport operators to try out green innovative transport technologies, contributing to better air quality and public health for Hong Kong. L & T Success Company Limited (L & T) was approved under the Fund for trial of one single-deck electric bus for coach hiring service. L & T, through the tendering procedures stipulated in the Agreement entered into with the Government, procured a BAZN GTZ6128BEVCF single-deck electric bus (EV) for trial.

1.2 Hong Kong Productivity Council has been commissioned by the Environment and Ecology Bureau (Environment Branch) (EEB) as an independent third party assessor (the Assessor) to monitor the trial and evaluate the performance of the trial vehicle. L & T assigned a Volvo B7R MKIII EEV single-deck diesel bus (DV) providing same services as the conventional counterpart for comparison.

1.3 This Final Report summarises the performance of the EV in the 12 months of the trial as compared with its conventional counterpart, i.e. the DV.

2. Trial and Conventional Vehicles

2.1 The trial EV, BAZN GTZ6128BEVCF single-deck electric bus, has a gross vehicle weight (GVW) of 18,000 kg capable of carrying a driver with 65 passengers. It has a 373.4 kWh lithium iron phosphate battery pack and a driving range of 330 km according to its manufacturer. The DV, Volvo B7R MKIII EEV single-deck diesel bus with a GVW of 16,000 kg and a cylinder capacity of 7,146 c.c. was used as the conventional counterpart for comparison in this trial. The EV and the DV are mainly used for providing shuttle bus service. The route of the EV is between Tseung Kwan O and Tiu Keng Leng, while that of the DV is between Tsuen Wan and Shek Mun. There was a designated driver assigned to drive the EV and another designated driver assigned to drive the DV.

2.2 L & T shared a 60 kW DC charger at the car park at 30 Tin Tsz Road, Tin Shui Wai and a 200 kW mobile DC charger with 2 DC charging outputs at Tseung Kwan O with Wan Chong Company Limited, Chun Yan Management Limited, Allied Grand Development Limited and Super Land International Limited for charging the EV. A mobile energy storage system is connected to the mobile DC charger and is recharged from the power grid in the depot in Tuen Mun. Key features of the EV, the charging facilities and the DV are detailed in Appendix 1 and photos of the vehicles and the charging facility are shown in Appendix 2.

3. Trial Information

3.1 The trial commenced on 1 March 2024 and lasted for 12 months. L & T was required to collect and provide trial information including the EV's mileage reading before charging, amount of electricity consumed and time used in each charging, operation downtime due to charging, and cost and downtime associated with scheduled and unscheduled maintenances of the EV. Similar data of the DV were also required. In addition to the cost information, reports on maintenance work, operational difficulties and opinions of the driver, passengers and L & T were collected to reflect any problems of the EV.

4. Findings of Trial

4.1 The following table summarises the statistical data of the EV and the DV. The average fuel cost of the EV was HK$7.75/km (about 83%) lower than that of the DV. The average total operating cost of the EV was HK$8.17/km (about 79%) lower than that of the DV, taking the maintenance cost into account.

Table 1: Key operation statistics of each vehicle (1 March 2024 – 28 February 2025)

		EV	**DV**
Total distance travelled (km)		37,608	39,047
Average daily mileage (km/working day)		139	137
Average fuel economy	(km/kWh)	0.93	-
	(km/litre)	-	2.63
	(km/MJ)	0.26	0.07 [1]
Average fuel cost (HK$/km)		1.61 [2]	9.36 [3]
Average total operating cost (HK$/km) [4]		2.16	10.33
Downtime (working day) [4][5]		26	10

[1] Assuming lower heating value of 36.13 MJ/litre for diesel fuel.

[2] The electricity cost was calculated using average electricity tariff rates of HK$1.513/kWh (March 2024); HK$1.507/kWh (April 2024); HK$1.499/kWh (May 2024); HK$1.500/kWh (June 2024); HK$1.496/kWh (July 2024 – August 2024); HK$1.495/kWh (September 2024); HK$1.494/kWh (October 2024); HK$1.493/kWh (November 2024); HK$1.500/kWh (December 2024) and HK$1.537/kWh (January 2025 – February 2025) as reported by CLP.

[3] The market fuel price was used for calculation.

[4] Maintenance due to incident not related to the performance of the vehicle was not included for comparing the performance.

[5] Downtime refers to the equivalent number of working days in which the vehicle is not in operation due to charging or maintenance, counting from the first day it stops operation till the day it is returned to the operator.

4.2 Apart from the fuel cost, maintenance cost and other indirect costs which may include parking fee, towing fee, vehicle replacement fee and cost of operation downtime due to charging and maintenance of the EV are also included in Table 1. In the 12 months of the trial period, the EV had one scheduled maintenance and two unscheduled maintenances, while the DV had two scheduled maintenances and seven unscheduled maintenances. The scheduled maintenance of the EV included government annual vehicle inspection, while that of the DV included government annual vehicle inspection and oil change. The unscheduled maintenances for the EV included replacement of motors and tyres, while that of the DV mainly included replacement of belts, lighting, hydraulic support of the luggage cabinet door and spring suspension.

4.3 In the 12 months of the trial period, the EV had no downtime due to the charging and 26 days of downtime due to maintenance, while the DV had 10 days of downtime due to maintenance. Thus, the EV had 26 days of downtime in total while the DV had 10 days of downtime. Hence, the utilisation rates of the EV and the DV were 91.2% and 96.6%, respectively. Based on the above, the average daily driving distances of the EV and the DV were 139 km and 137 km, respectively.

4.4 The driver of the EV liked driving the EV and had no operation difficulties in driving the EV. He agreed that the EV is quieter than the DV. Overall, he was satisfied with the performance of the EV and would promote the EV to other drivers. L & T was satisfied with the EV since the EV could meet the operational requirements and save the operation cost. Given the opportunity, L & T would consider replacing all existing conventional vehicles with EVs and encourage other transport operators to try the EVs. In general, passengers were satisfied with the performance of the EV.

4.5 It is observed that the amount of electricity stored in the battery after a full charging operation could be maintained at the level of 373.4 kWh after the 12-month trial period. The deterioration in battery capacity within the 12-month trial period, if any, would be insignificant and did not affect the operation of the EV.

4.6 Based on the total mileage of the EV and the fuel economy of the DV, the equivalent carbon dioxide (CO_2e) emission from the DV could be estimated for comparison purpose. In the 12-month trial period, the CO_2e emission from the EV and the DV were 15,037 kg and 38,107 kg respectively. Hence, there was a 23,070 kg (about 61%) reduction of CO_2e, with the replacement of the DV by the EV in the trial.

5. Summary

5.1 The average fuel cost of the EV was HK$7.75/km (about 83%) lower than that of the DV. Taking the maintenance fee and other costs into account, the average total operating cost of the EV was HK$8.17/km (about 79%) lower than that of the DV. The utilisation rates of the EV and the DV were 91.2% and 96.6%, respectively. There was a 23,070 kg (about 61%) reduction of CO_2e, with the replacement of the DV by the EV in the trial.

5.2 It is observed that the amount of electricity stored in the battery after a full charging operation could be maintained at the level of 373.4 kWh after the 12-month trial period. The deterioration in battery capacity within the 12-month trial period, if any, would be insignificant and did not affect the operation of the EV.

5.3 The driver of the EV liked driving the EV and had no operation difficulties in driving the EV. Overall, he was satisfied with the performance of the EV. L & T was satisfied with the EV since the EV could meet the operational requirements and save the operation cost. Given the opportunity, L & T would consider replacing all existing conventional vehicles with EVs and encourage other transport operators to try the EVs. In general, passengers were satisfied with the performance of the EV.

5.4 The findings showed single-deck electric bus are becoming more affordable and feasible to the transport trade for saving operating cost and reducing CO_2e emissions, provided that the vehicles can get easy access to charging facilities.

Appendix 1: Key Features of Vehicles and Charging Facilities

1. Trial EV and Charging Facility

(a) EV

Registration mark:	**ZB2786**
Make:	BAZN
Model:	GTZ6128BEVCF
Class:	Public Bus
Gross vehicle weight:	18,000 kg
Seating capacity:	Driver + 65 passengers
Rated power:	195 kW
Travel range:	330 km (light and air-conditioning off conditions)
Battery material:	Lithium iron phosphate
Battery capacity:	373.4 kWh
Year of manufacture:	2021

(b) EV Charging Facility (at Recipient's own cost)

Make:	珠海米雲新能源科技有限公司
Model:	MCEV-60KW750V
Output:	60 kW Mode 4 DC, max. 150 ADC
Charging Standard:	GB mode

Make:	珠海米雲新能源科技有限公司
Model:	TEEV-A84kW/D200kW
Output:	2 × 100 kW Mode 4 DC, max. 266 ADC
Charging Standard:	GB mode

2. DV Used for Comparison

Registration mark:	**AU635**
Make:	Volvo
Model:	B7R MKIII EEV
Class:	Public Bus
Gross vehicle weight:	16,000 kg
Seating capacity:	Driver + 65 passengers
Cylinder capacity:	7,146 cc
Year of manufacture:	2015

Appendix 2: Photos of Vehicles and Charging Facilities

1. Trial EV and Charging Facilities

(a) Trial EV (ZB2786)

	
Front view of EV	Rear view of EV
	
Left side view of EV	Right side view of EV

(b) Charging Facilities

	
60 kW DC charger at Tin Shui Wai (at Recipient's own cost)	200 kW mobile DC charger with mobile energy storage system in Tseung Kwan O (at Recipient's own cost)

2. DV (AU635) Used for Comparison

	
Front view of DV	Rear view of DV
	
Left side view of DV	Right side view of DV