

New Energy Transport Fund

Final Report
On
Trial of Electric Light Goods Vehicle for
Kitchen Cabinet Delivery
(Hotex (H.K.) Company Limited)

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The Monitoring and Evaluation Team's views expressed in this report do not necessarily reflect the views of the Environment and Ecology Bureau, HKSAR.

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(Hotex (H.K.) Company Limited)**

**Final Report
(Reporting Period: 1 July 2022 – 30 June 2023)**

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. Hotex (H.K.) Company Limited (Hotex) was approved under the Fund for trial of one electric light goods vehicle for kitchen cabinet delivery. Hotex, through the tendering procedures stipulated in the Agreement entered into with the Government, procured a DFSK EC35 electric light goods vehicle (EV) for trial.

1.2 Hong Kong Productivity Council has been commissioned by the Environmental Protection Department¹ as an independent third party assessor (the Assessor) to monitor the trial and evaluate the performance of the trial vehicle. Hotex assigned a Toyota Hiace Diesel LWB diesel light goods vehicle (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, DFSK EC35 electric light goods vehicle, has a gross vehicle weight of 2,510 kg capable of carrying a driver with a passenger and goods. It has a 41.4 kWh lithium-ion battery pack and a driving range of 300 km with its battery fully charged and air-conditioning off. The DV, Toyota Hiace Diesel LWB diesel light goods vehicle with a gross vehicle weight of 2,800 kg and a diesel engine with a cylinder capacity of 2,982 c.c., was used as the conventional counterpart for comparison in this trial. The EV and the DV were used for the delivering kitchen cabinets and tools between clients and the office.

2.2 Hotex installed a designated 7.2 kW single-phase AC charging facility at its own cost in the office at Hung Kiu San Tsuen, Sheung Shui for charging and recording the amount of electricity charged. Key features of the EV, the charging facility and the DV are detailed in Appendix 1 and photos of the vehicles and the charging facility are shown in Appendix 2.

¹ The Administration of the New Energy Transport Fund was migrated to the Environment Branch of the Environment and Ecology Bureau [EEB (Environment Branch)] since 1 January 2023 after internal re-organisation of EEB (Environment Branch) and EPD.

3. Trial Information

3.1 The trial commenced on 1 July 2022 and lasted for 12 months. Hotex 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 and the charging facility. 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 and Hotex 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\$1.82/km (about 86%) lower than that of the DV. The average total operating cost of the EV was HK\$1.74/km (about 78%) lower than that of the DV, taking the maintenance cost into account.

Table 1: Key operation statistics of each vehicle (1 July 2022 – 30 June 2023)

	EV	DV
Total distance travelled (km)	25,850	19,950
Average daily mileage (km/working day)	88	68
Average fuel economy	(km/kWh)	4.74
	(km/litre)	-
	(km/MJ)	0.28 ^[1]
Average fuel cost (HK\$/km)	0.30 ^[2]	2.12 ^[3]
Average total operating cost (HK\$/km) ^[4]	0.49	2.23
Downtime (working day) ^{[4][5]}	3	2

^[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\$1.289/kWh (Jul 2022 – Oct 2022); HK\$1.451/kWh (Nov 2022 – Dec 2022); HK\$1.544/kWh (Jan 2023 – Feb 2023); HK\$1.552/kWh (Mar 2023 – Apr 2023); HK\$1.565/kWh (May 2023); and HK\$1.559/kWh (Jun 2023) as claimed 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 working days the vehicle is not in operation, which is counted 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. Both the EV and the DV had one scheduled maintenance in the 12 months of the trial period. The scheduled maintenance of the EV included government annual vehicle inspection, differential oil and electric motor oil change, replacement of front left tie rod ends and boots, front right wheel hub bolts and nuts, brake light bulb and calibration of rear brake. The scheduled maintenance of the DV included government annual vehicle inspection and replacement of engine oil and filter.

4.3 In the 12 months of the trial period, the EV had 3 days of maintenance related downtime while the DV had 2 days of maintenance related downtime. Hence, the utilisation

rates of the EV and the DV were 99.0% and 99.3%, respectively. Based on the above, the average daily driving distances of the EV and the DV were 88 km and 68 km, respectively.

4.4 The drivers of the EV liked driving the EV and had no problem in operating the EV. They agreed that the EV is quieter and its performance has not deteriorated. Overall, they were satisfied with the performance of the EV and would promote the EV to other drivers. Hotex was satisfied with the EV since the EV could meet the operational requirements and save the operation cost. Given the opportunity, Hotex would consider replacing all existing conventional vehicles with EVs and encourage other transport operators to try the EVs.

4.5 The estimated driving range of the EV remained stable and predictable in the 12 months of the trial period, providing a minimum estimated driving range of at least 200 km. Furthermore, it is observed that the amount of electricity stored in the battery after a full charging operation could be maintained at the level of 41.4 kWh after the 12-month trial. Thus, the deterioration in battery capacity within the 12-month trial period was insignificant, if any.

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 2,127 kg and 7,168 kg respectively. Hence, there was a 5,041 kg (about 70%) 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\$1.82/km (about 86%) lower than that of the DV. Taking the maintenance fee for both the EV and the DV into account, the average total operating cost of the EV was HK\$1.74/km (about 78%) lower than that of the DV. The utilisation rates of the EV and the DV were 99.0% and 99.3%, respectively. There was a 5,041 kg (about 70%) reduction of CO_{2e}, with the replacement of the DV by the EV in the trial.

5.2 The results showed that the estimated driving range of a full charge remained stable and predictable over the 12-month trial period. The EV could provide a minimum estimated driving range of 200 km. Furthermore, it is observed that the amount of electricity stored in the battery after a full charging operation could be maintained at the level of 41.4 kWh after the 12-month trial. Thus, the deterioration in battery capacity within the 12-month trial period was insignificant, if any.

5.3 The drivers of the EV liked driving the EV and had no problem in operating the EV. Overall, they were satisfied with the performance of the EV. Hotex was satisfied with the EV since the EV could meet the operational requirements and save the operation cost. Given the opportunity, Hotex would consider replacing all existing conventional vehicles with EVs and encourage other transport operators to try the EVs.

5.4 The findings showed electric light goods vehicles 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 Facility

1. Trial EV and Charging Facility

EV

Registration mark:	XY1824
Make:	DFSK
Model:	EC35
Class:	Light goods vehicle
Gross vehicle weight:	2,510 kg
Payload:	1,090 kg
Seating capacity:	Driver + 1 passenger
Rated power:	30 kW
Driving range:	300 km (air conditioning off)
Battery material:	Lithium-ion
Battery capacity:	41.4 kWh
Year of manufacture:	2021

EV Charging Facility (at Recipient's own cost)

Make:	Skytec
Model:	BS-B20-BC-7.2W
Power:	7.2 kW, 220V AC / max 32 A single phase
Charging standard:	IEC 62196-2 Type 2

2. DV Used for Comparison

Registration mark:	VB9581
Make:	Toyota
Model:	Hiace Diesel LWB
Class:	Light goods vehicle
Gross vehicle weight:	2,800 kg
Payload:	850 kg
Seating capacity:	Driver + 2 passengers
Cylinder capacity:	2,982 c.c.
Year of manufacture:	2013

Appendix 2: Photos of Vehicles and Charging Facility

1. Trial EV (XY1824) and Charging Facility

	
<p>Front view of EV</p>	<p>Rear view of EV</p>
	
<p>Left side view of EV</p>	<p>Right side view of EV</p>
	
<p>7.2 kW single-phase AC charging facility (at Recipient's own cost)</p>	

2. DV (VB9581) used for Comparison



Front view of DV



Rear view of DV



Left side view of DV



Right side view of DV