

Pilot Green Transport Fund

Final Report

On

Trial of Electric Light Goods Vehicle for

Vehicle Maintenance Parts Transportation Service

(Kamwai Tyre Service 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 (Environment Branch), HKSAR.

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for Vehicle Maintenance Parts Transportation Service
(Kamwai Tyre Service Limited)**

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(Trial Period: 1 May 2021 – 30 April 2023)**

Executive Summary

1. Introduction

1.1 The Pilot Green 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. Kamwai Tyre Service Limited (Kamwai) was approved under the Fund for trial of one electric light goods vehicle. Through the tendering procedures stipulated in the Subsidy Agreement entered into with the Government, Kamwai procured a DFSK EC35, electric light goods vehicle (EV) for trial.

1.2 PolyU Technology and Consultancy Company Limited has been engaged by the Environmental Protection Department¹ as an independent third party assessor to monitor the trial and evaluate the performance of the trial vehicle. Kamwai assigned a Toyota diesel light goods vehicle (DV) providing the same service as the conventional counterpart for comparison in this report.

1.3 This Final Report summarizes the performance of the EV in the 24 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 2,330 kg capable of carrying a driver with four passengers and goods. It has a 41.4 kWh lithium-ion battery pack and the driving range is 300 km with air-conditioning off. Designated drivers were assigned to drive the EV. The DV, Toyota KDH201RSSPDY 2,982 c.c. diesel light goods vehicle, was used as the conventional counterpart for comparison in this trial. The vehicles were used mainly for providing vehicle maintenance parts transportation service in the New Territories, Kowloon and Hong Kong Island.

2.2 Kamwai has installed a designated 7.2 kW, single phase AC charging facility for charging the EV. Key features of the EV and the DV as well as the EV charging facility are presented in Appendix 1. Photos of vehicles and the EV 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 May 2021 and lasted for 24 months. Kamwai was required to collect and provide trial information including the EV mileage reading before charging, amount of electricity consumed in each charging, time taken for charging, operation downtime due to charging, cost and downtime associated with scheduled and unscheduled maintenances of the EV and the charging facility. Similar data of the DV were also collected. In addition to the cost information, reports on maintenance work, operational difficulties and opinions of the drivers were collected to reflect any problems of the EV.

4. Findings of Trial

4.1 Table 1 summarizes the statistical data of the EV and the DV.

Table 1: Key operation statistics of each vehicle (1 May 2021 – 30 April 2023)

	EV	DV	
Total distance travelled (km)	25,619	8,043	
Average daily distance travelled (km/working day)	45	14	
Average fuel economy	(km/kWh)	4.23	-
	(km/litre)	-	9.11
	(km/MJ)	1.18	0.25 ^[1]
Average fuel cost (HK\$/km) ^[2]	0.31	2.17	
Average total operating cost (HK\$/km)	0.37	2.34	
Downtime (working day) ^[3]	21	2	

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

^[2] The market fuel price was used for calculation.

^[3] Downtime refers to the working days that the vehicle is not in operation due to maintenance, counting from the first day it stops operation till the day it is returned to the operator.

4.2. During the 24 months of the trial, there were 591 working days. The total distance travelled and the average daily distance travelled of the EV were 25,619 km and 45 km/day, respectively while those of the DV were 8,043 km and 14 km/day, respectively. The average fuel cost of the EV was HK\$1.86/km (86%) lower than that of the DV. Taking maintenance fee into account, the average total operating cost of the EV was HK\$1.97/km (84%) lower than that of the DV.

4.3 Excluding non-performance related maintenance, the utilization rates of the EV and the DV were 96.4% and 99.7%, respectively.

4.4 To remove the effect of seasonal fluctuations, the 12-month moving average were used to evaluate the trend of the EV's fuel economy. There was no indication of deterioration in the EV performance.

4.5 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. The CO_{2e} emission from the EV and the DV were 2,361 kg and 7,795 kg, respectively and hence the EV emitted 5,434 kg CO_{2e} (about 70%) less than the DV in this trial.

4.6 The operation of the EV was smooth. The EV drivers had no problem in operating the EV and considered it was clean and quiet. However, the recipient was unsatisfied that the EV's driving range could not meet their operational requirements.

5. Summary

5.1 In this trial, the average daily distance travelled of the EV and DV were 45 km and 14 km, respectively.

5.2 The EV had a better fuel economy than the DV. The average fuel cost of the EV was HK\$1.86/km (86%) lower than that of the DV, while the average total operating cost of the EV was HK\$1.97/km (84%) lower than that of the DV.

5.3 The utilization rates of the EV and the DV were 96.4% and 99.7%, respectively. There was no indication of deterioration in the EV performance.

5.4 Compared with the DV, there was about 70% CO₂e emission reduction by using the EV.

5.5 The drivers had no problem in operating the EV and considered it was clean and quiet. However, the recipient was unsatisfied that the EV's driving range could not meet their operation requirements.

5.6 The findings showed electric light goods vehicle is becoming more affordable and feasible to the transport trade for saving operating cost and reducing CO₂e emissions, provided that the vehicle can get easy access to charging facilities.

Appendix 1: Key Features of Vehicles and EV Charging Facility

1. Trial EV and EV Charging Facility

(a) EV

Registration mark:	XD5368
Make:	DFSK
Model:	EC35
Class:	Light goods vehicle
Gross vehicle weight:	2,330 kg
Seating capacity:	Driver + 4 passengers
Rated power:	30 kW
Driving range:	300 km (air conditioning off)
Battery material:	Lithium-ion
Battery capacity:	41.4 kWh
Year of manufacture:	2020

(b) EV Charging Facility

Make:	SKYTEC
Model:	BS-B20-BA-7.2kW
Type:	Single Phase 220V / 32A
Power:	7.2kW, AC
Charging standard:	IEC62196 Type 2

2. DV Used for Comparison

Registration mark	NP3382
Make:	Toyota
Model:	KDH201RSSPDY
Class:	Light goods vehicle
Gross vehicle weight:	2,800 kg
Seating capacity:	Driver + 5 passengers
Cylinder capacity:	2,982 cc
Year of manufacture:	2008

Appendix 2: Photos of Vehicles and EV Charging Facility

1. Trial EV and EV 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 AC charging facility</p>	

2. DV for Comparison



Front view of DV



Rear view of DV



Left side view of DV



Right side view of DV