Pilot Green Transport Fund

Interim Report
On
Trial of Electric Light Goods Vehicles for Building Renovation Services (Frans Trading Enterprises Company Limited)

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(Trial Period: 1 September 2021 – 31 August 2022)

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. Frans Trading Enterprises company Limited (Frans Trading) was approved under the Fund for trial of three electric light goods vehicles (EVs). Through the tendering procedures stipulated in the Agreement, Frans Trading procured three DFSK EC35 EVs for trial.

1.2 PolyU Technology and Consultancy Company Limited has been engaged by the Environmental Protection Department as an independent third party assessor to monitor the trial and evaluate the performance of the trial vehicles. Frans Trading assigned three diesel light goods vehicles (DVs), providing the same services in the territory were assigned as the conventional counterparts for comparing with the EVs.

1.3 This Interim Report summarizes the performance of the EVs in the first twelve months of trial as compared with the conventional counterparts, i.e. DVs.

2. Trial and Conventional Vehicles

2.1 The three trial EVs are DFSK EC35 electric light goods vehicles (EV-1, EV-2 and EV-3). Each EV 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 180 km with air-conditioning off. Any driver of the drivers' team could drive the EVs. Three 2,982 cc Toyota diesel light goods vehicles (DV-1, DV-2 and DV-3), were used for comparison in this trial. EVs and DVs were used for providing building renovation services in the Tai Po, Sheung Shui and Yuen Long areas.

2.2 Frans Trading installed, at its own cost at its Hung Shui Kiu depot, one 32A single-phase AC charger. All three EVs shared the same charger. Key features of the EVs, DVs, and charging facility are presented in Appendix 1. Photos of the vehicles and charging facility are shown in Appendix 2.

3. Trial Information

3.1 The trial started on 1 September 2021 and would last for 24 months. Frans Trading 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 maintenance of the EVs. A similar set of data of the DVs was also required. In addition to the cost information, reports on maintenance work, operational difficulties and opinions of the driver and Frans Trading were collected and provided to reflect any problems of the EVs.

4. Findings of Trial

4.1 Table 1 summarizes the statistical data of the EVs and DVs.

Table 1: Key operation statistics of each vehicle (1 September 2021 – 31 August 2022)

		EVs			**DVs**		
		EV-1	**EV-2**	**EV-3**	**DV-1**	**DV-2**	**DV-3**
Total mileage/km		12,678	10,898	24,190	34,006	17,380	34,092
Average daily mileage (km/working day)		43	40	82	116	59	116
Average fuel economy/	(km/kWh)	4.49	4.16	4.17	-	-	-
	(km/litre)	-	-	-	7.06	9.35	9.76
	(km/MJ)	1.25	1.16	1.16	0.20 [1]	0.26 [1]	0.27 [1]
Fleet average fuel economy (km/MJ)		1.19			0.24		
Average fuel cost (HK$/km)		0.28 [2]	0.31 [2]	0.30 [2]	2.76 [3]	2.04 [3]	1.99 [3]
Fleet average fuel cost (HK$/km)		0.30			2.26		
Average total operating cost (HK$/km)		0.65	0.73	0.50	2.95	2.22	2.17
Fleet average total operating cost (HK$/km)		0.63			2.45		
Downtime (working day) [4]		1.0	2.0	1.0	4.0	3.5	3.0

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

[2] Electricity bills not provided, electricity cost is based on market electricity price

[3] The market fuel price was used for calculation

[4] Downtime refers to the working days that the vehicle is not in operation due to charging, and the period 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 twelve months of trial, there were 296 working days. the total mileage and the average distance traveled of the EVs were lower than the DVs. Owing to the COVID-19 impacts, EV-2 did not operate in October 2021 and the mileage was the lowest among all three EVs. The average fuel cost of the three EVs varied from HK$0.23/km to HK$0.35/km while that of the three DVs varied from HK$1.59/km to HK$3.25/km. The fleet average fuel costs of the EVs was lower than that of the DVs by HK$1.97/km (87%). The fleet average total operating cost of the EVs was HK$1.82/km (74%) lower than that of the DVs.

4.3 All the six vehicles had one scheduled maintenance for renewal of licenses. For unscheduled maintenance, all three EVs, DV-1 and DV-3 had none but DV-2 had one. Subsequently, EV-2, EV-2 and EV-3 had 1, 2 and 1 working days downtimes; DV-1 and DV-3 had 4 and 3 working days downtime while DV-2 had 3.5 working days downtime. The utilization rates of EV-1, EV-2 and EV-3 were 99.7% 99.3% and 99.7% respectively; while DV-1, DV-2 and DV-3 were 98.6%, 98.8% and 99.0% respectively.

4.4 The drivers of the EVs had no problem in operating the EVs. They were satisfied with the EVs' performance and did not detect deterioration of the EVs' performance. Frans Trading was satisfied with the EVs in particular the significant fuel and operating costs savings.

5. Summary

5.1 In the first twelve months of trial, the average daily mileage of EV-1, EV-2 and EV-3 were 43 km, 40 km and 82 km respectively while that of DV-1, DV-2 and DV-3 were 116 km, 59 km and 116 km respectively.

5.2 The fleet average fuel cost of the EVs was HK$1.97/km (87%) lower than that of the DVs. The fleet average total operating cost of the EVs was HK$1.82/km (74%) lower than that of the DVs.

5.3 The utilization rates of the EV-1, EV-2 and EV-3 were 99.7%, 99.3% and 99.7%; while DV-1, DV-2 and DV-3 were 98.6%, 98.8% and 99.0% respectively.

5.4 The drivers of the EVs had no problem in operating the EVs and were satisfied with the performance of the EVs. Frans Trading was happy with the EVs for significant cost savings.

5.5 The findings only reflected the EVs' performance in the first twelve months of trial. The performance and reliability of the EVs will be continuously monitored in the 24 months of trial.

Appendix 1: Key Features of Vehicles and Charging Facility

1. Trial EVs and Charging Facility

(a) Trial EVs

Registration Mark:	**WX3166 (EV-1), WX4280 (EV-2) and WX3616 (EV-3)**
Make:	DFSK
Model:	EC35
Class:	Light goods vehicle (Van)
Gross vehicle weight:	2,330 kg
Seating Capacity:	driver + 4 passengers
Rated Power:	30 kW
Travel range:	180 km (air conditioning off)
Battery type	Lithium-ion
Battery capacity:	41.4 kWh
Year of manufacture:	2020

(b) Charging Facility (At Recipient's own cost)

No. of Charging Facility:	1
Make:	SKYTEC Wallbox Charging Station
Model:	Mode A Station
Charging Standard:	EN 61851-1:2011 and EN61851-22: 2002
Charging Mode:	BS-B10-BC7.2KW, 32A/60Hz, 1-phase

2. DVs for Comparison

Registration Mark:	**UE2891 (DV-1)**
Make:	TOYOTA
Model:	HIACE Diesel LWB
Class:	Light goods vehicle (Van)
Gross vehicle weight:	2,800 kg
Seating Capacity:	driver + 5 passengers
Cylinder capacity:	2,982 cc
Year of manufacture:	2016

Registration Mark:	**PY1269 (DV-2)**
Make:	TOYOTA
Model:	KDH201RSSPDY
Class:	Light goods vehicle (Van)
Gross vehicle weight:	2,800 kg
Seating Capacity:	driver + 5 passengers
Cylinder capacity:	2,982 cc
Year of manufacture:	2011

Registration Mark:	**UE9136 (DV-3)**
Make:	TOYOTA
Model:	HIACE Diesel LWB
Class:	Light goods vehicle (Van)
Gross vehicle weight:	2,800 kg
Seating Capacity:	driver + 5 passengers
Cylinder capacity:	2,982 cc
Year of manufacture:	2012

Appendix 2: Photos of Vehicles and Charging Facility

1. Trial EVs and Charging Facility

(a) Trial EVs

EV-1(WX3166)

	
Front view	Left side view
	
Right side view	Rear view

EV-2 (WX4280)

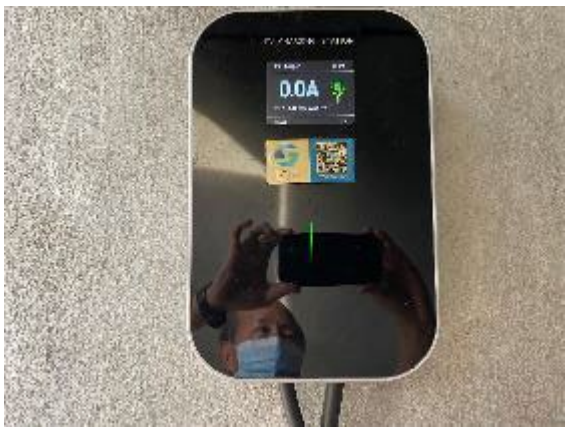
	
Front view	Left side view
	
Right side view	Rear view

EV-3(WX3616)

	
Front view	Left side view
	
Right side view	Rear view

(b) Charging Facility

Charging Facility of EV-1 EV-2 and EV-3

	
The SKYTEC Charging Facility	EV Power 32A Charger Monitor

2. DVs for comparison

DV-1 (UE2891)

	
Front view	Left side view
	
Right side view	Rear view

DV-2 (PY1269)

	
Front view	Left side view
	
Right side view	Rear view

DV-3 (UE9136)

	
Front view	Left side view
	
Right side view	Rear view