Pilot Green Transport Fund

Interim Report
On
Trial of Electric Light Goods Vehicles for Decoration and Construction Engineering Service (Bassey Holdings Limited)

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(Reporting Period: 1 June 2021 – 30 November 2021)

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. Bassey Holdings Limited (Bassey) was approved under the Fund for trial of two electric light goods vehicles for decoration and construction engineering. Bassey, through the tendering procedures stipulated in the Agreement entered into with the Government, procured two electric light goods vehicles (EVs), a Nissan e-NV200 electric light goods vehicle (EV-1) and a Joylong EW5 electric light goods vehicle (EV-2) for trial. According to the manufacturers, EV-1 and EV-2 have travel ranges of 317 km and 330 km, respectively, with battery fully charged and air-conditioning off. EV-2 is equipped with a chiller which is powered by the EV battery.

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. Bassey assigned two diesel light goods vehicles (DVs: DV-1 and DV-2) and provided similar service as the conventional counterparts for comparison. A Nissan diesel light goods vehicle (DV-1) was assigned as the conventional counterpart for comparing with EV-1. An Isuzu diesel light goods vehicle (DV-2) was assigned as the conventional counterpart for comparing with EV-2. DV-2 is equipped with a chiller for comparison with the EV-2.

1.3 This Interim Report summarizes the performance of the EVs in the first six months of the trial as compared with the DVs.

2. Trial and Conventional Vehicles

2.1 Key features of the EVs, the charging facilities and the DVs are in Appendix 1 and photos of the vehicles and the charging facilities are in Appendix 2. EV-1 was used for the delivery of tools and materials for construction and decoration from San Tin to different sites in Kowloon. EV-2 was used for the delivery of frozen food from San Tin to Tung Chung. EV-2 and DV-2 are refrigerated for carrying frozen food.

2.2 Bassey installed two set of charging facilities outside its office at Siu Hum Tsuen: a 7 kW AC charging facility for charging and recording the amount of electricity charged for EV-1 and a 30 kW DC charging facility for charging and recording the amount of electricity charged for EV-2. The 7 kW AC charger is owned by Bassey while the 30 kW DC is subsidized by the pilot green transport fund. The EVs were normally charged when their services were not required. The original battery charger for EV-1 was not working since 5/10/2021. Bassey has another 32-ampere battery charger and used it for charging EV-1 since 5/10/2021.

3. Trial Information

3.1 The trial commenced on 1 June 2021 and would last for 24 months. Bassey was required to collect and provide trial information including the EVs' mileage reading before charging, amount of electricity consumed and time used in each charging, and operation downtime due to charging, cost and downtime associated with scheduled and unscheduled maintenances of the EVs and the charging facilities. Similar data of the DVs were also required. 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 EVs.

4. Findings of Trial

4.1 The following table summarizes the statistical data of the EVs and the DVs. The fleet average fuel cost of the EVs was HK$3.56/km (92%) lower than that of the DVs. The fleet average total operating cost of the EVs was HK$3.74/km (91%) lower than that of the DVs. EV-2 had higher fuel costs than EV-1 because it was refrigerated, and energy is required for operating the refrigeration system.

Table 1: Key operation statistics of each vehicle (1 June 2021 –30 November 2021)

		EV-1	**EV-2**	**DV-1**	**DV-2**
Total mileage (km)		20,041	25,896	3,967	53,660
Average daily mileage (km/working day)		166	142	32	293
Average fuel economy	(km/kWh)	4.66	3.30	-	-
	(km/litre)	-	-	3.52	5.92
	(km/MJ)	1.29	0.92	0.097 [1]	0.164 [1]
Average fuel cost (HK$/km)		0.26 [2]	0.37 [2]	4.85 [3]	2.89 [3]
Fleet Average fuel cost (HK$/km)		0.315		3.87	
Average total operating cost (HK$/km) [4]		0.386	0.369	5.35	2.89
Fleet average total operating cost (HK$/km)		0.378		4.12	
Downtime (working day) [4][5]		5	0	1	0

[1] Assuming lower heating value of 36.13 MJ/litre for diesel fuel
[2] Electricity cost is based on HK$1.218/kWh
[3] The market fuel price was used for calculation
[4] Maintenance unrelated to the performance of the vehicle was not included for comparison.
[5] Downtime refers to the working days the vehicle is not in operation, which counted from the first day it stops operation till the day it is returned to the operator.

4.2 There were one scheduled maintenance and one unscheduled maintenance for EV-1; one scheduled maintenance for DV-1; and no maintenances for EV-2 and DV-2, in the first six months of the trial. Scheduled maintenances for EV-1 and DV-1 were for annual examinations. The unscheduled maintenance of EV-1 involved the repairing of the odometer.

4.3 EV-1 had 5 days of downtime while DV-1 had one day of downtime for maintenance work. EV-2 and DV-2 did not have any downtime. The utilization rates were 96% for EV-1, 99.2% for DV-1 and 100% for both EV-2 and DV-2. Based on the above, the average daily mileages of EV-1 and EV-2 were 166 km/day and 142 km/day respectively. For the DVs, the average daily mileages were 32 km/day for DV-1 and 293 km/day for DV-2.

5. Summary

5.1 The fleet average fuel cost of the EVs was HK$3.56/km (92%) less than that of the DVs. The fleet average total operating cost of the EVs was HK$3.74/km (91%) lower than that of the DVs. The utilization rates were 96% for EV-1, 100% for EV-2, 99.2% for DV-1 and 100% DV-2.

5.2 EV-2 had much higher fuel costs than EV-1 because it was used for refrigeration, and energy is required for operating the refrigeration system.

5.3 The driver of EV-1 had no problem in operating the EV and was satisfied with its performance. The driver of EV-2 did not like driving the EV in comparison with a DV because of its lower power and lower daily range in comparison with a DV.

5.4 The findings only reflect the performance of the two EVs in the first six months of the trial. The performance and reliability of the EVs will be continuously monitored in this 24-month trial.

Appendix 1: Key Features of the Vehicles and Charging Facilities

1. Trial EVs

Registration mark	**WW9212 (EV-1)**	**XC7540 (EV-2)**
Make:	Nissan	Joylong
Model:	e-NV200 Half Panel Van	EW5
Class:	Light goods vehicle	Light goods vehicle, refrigerated
Gross vehicle weight:	2,250 kg	4,300 kg
Seating capacity:	Driver + 4 passengers	Driver + 1 passenger
Rated power:	80 kW	100 kW
Travel range:	317 km (air conditioning off)	330 km (air conditioning off)
Battery material:	lithium-ion	lithium-ion
Battery capacity:	40 kWh	73.4 kWh
Year of manufacture:	2019	2020

Charging Facilities

Maker:	Shun Hing Electric Services Supply Centre Limited [1]	Hangzhou AoNeng Power Equipment Co. Ltd.
Model:	DH-AC0070XG57-Y	ANDC5-500V/60A-1
Power:	7 kW, single phase, 220V, 32A	3-phase, 380V, movable type 30 kW, DC (max 500V/60A)
Charging Standard:	GB	GB

[1] Charger owned by Bassey, not working since 5/10/2021

Make:	EV Power [2]
Model:	EVC-32NK
Output:	220V AC / max 32A
Charging Standard:	IEC62196-2 Type 2

[2] Charger owned by Bassey, in use as a temporary charger since 5/10/2021

2. DVs for Comparison

Registration mark	**UZ5786 (DV-1)**	**VN2829 (DV-2)**
Make:	Nissan	Isuzu
Model:	NV350 Urvan 2.5L diesel	NMR85E-V
Class:	Light goods vehicle	Light goods vehicle, refrigerated
Seating capacity:	Driver + 5 passengers	Driver + 2 passengers
Gross vehicle weight:	3,300 kg	5,200 kg
Cylinder capacity:	2,488 cc	2,999 cc
Year of manufacture:	2017	2017

Appendix 2: Photos of Vehicles and Charging Facilities

1. Trial EVs and Charging Facilities

EV-1 (WW9212) & its charging facility

	
EV-1 – front view	EV-1 – rear view
	
EV-1 – right side view	EV-1 – left side view
	
EV-1 – watt-hour meter	EV-1 – EV charger (up to 5/10/2021)

	
EV-1 – EV charger (since 5/10/2021)	

EV-2 (XC7540) & its charging facility

	
EV-2 – front view	EV-2 – rear view
	
EV-2 – right side view	EV-2 – left side view
	
EV-2 – EV charger	

2. DVs for Comparison

DV-1 UZ5786

	
DV1 – Front view	DV1 – Rear view
	
DV1 – Right side view	DV1 – Left side view

DV-2 VN2829

	
DV2 – Front view	DV2 – Rear view
	
DV2 – Right side view	DV2 – Left side view