Pilot Green Transport Fund

Interim Report
On
Trial of Electric Light Goods Vehicle for Gas Engineering Industry
(Kam Po Engineering Company Limited)

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(Kam Po Engineering Company Limited)

Interim Report
(Trial Period: 1 June 2019 – 31 May 2020)

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. Kam Po Engineering Company Limited (Kam Po) 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, Kam Po procured one Joylong EW4, electric light goods vehicle (EV) for trial.

1.2 The PolyU Technology and Consultancy Company Limited has been engaged by the Environmental Protection Department (EPD) as an independent third party assessor (the Assessor) to monitor the trial and evaluate the performance of the trial vehicle.

1.3 Kam Po assigned a Toyota HIACE diesel light goods vehicle (DV), which provided the same service, as the conventional counterpart for comparison purpose. The EV replaced the DV thereafter, and the DV was sold at the end of May 2019. Kam Po has provided 1-year DV fuel bills and maintenance receipts (Apr-2018 ~ Mar-2019) to compare the fuel economy and operation cost with the EV.

1.4 This Interim Report summarizes the performance of the EV in the first twelve months of the trial and compares it with the historical data of its conventional counterpart, i.e. DV.

2. Trial and Conventional Vehicles

2.1 The trial EV, Joylong EW4 electric light goods vehicle, has a gross vehicle weight of 3,700 kg capable of carrying a driver with five passengers and goods. It has a 73.4 kWh Li-ion battery pack and the driving range is 350 km with air-conditioning off. Kam Po assigned a designated driver for the EV. Kam Po provided 1-year historical data of the sold DV, Toyota HIACE series 2,982c.c. diesel light goods vehicle, as the conventional counterpart for comparison in this trial. The vehicles were used mainly for providing Towngas installation parts delivery service in Yuen Long. The delivery service is from Monday to Sunday (from 6:00 to 19:00, 6 working hours per day). In the 12-month trial period, the average daily distance traveled of the EV was around 77 km, while that of the DV was around 98 km.

2.2 Kam Po has installed a 30 kW, 3-phase DC charger to charge the batteries of the EV as well as to record the electricity consumed for EV charging. The EV was charged around 2 hours with the charger when it was not in use. Key features of the EV, the charger and the DV were presented in Appendix 1 and their photos were shown in Appendix 2.

3. Trial Information

3.1 The trial commenced on 1 June 2019 and would last for 24 months. Kam Po 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 charging facility. A similar set of historical data from the DV was also required. In addition to the cost information, reports on maintenance work and operational difficulties as well as opinions of the driver and Kam Po were collected to reflect any operational 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 June 2019 – 31 May 2020)

		EV	**DV**
Total distance travelled (km)		27,779	35,510
Average daily distance travelled (km/day)		77 [1]	98 [2]
Average fuel economy	(km/kWh)	3.20	-
	(km/litre)	-	9.67
	(km/MJ)	0.89	0.27 [3]
Average fuel cost (HK$/km) [4]		0.39	1.48
Average total operating cost per km (HK$/km)		0.48	1.60
Downtime (working day) [5]		3 [1]	2 [2]

[1] The EV had undergone 3-day scheduled maintenance in March 2020. There was an unscheduled maintenance due to a traffic accident on 10 May 2020. The EV was sent back to the vehicle agent for maintenance until 26 June 2020. The downtime of the EV was 22 working days, which is non-performance relative and will not be included in estimating number of working days. Therefore, the EV only worked 363 days in the period from 1 June 2019 to 31 May 2020.

[2] The downtime of the DV was 2 working days due to 2 scheduled maintenances, therefore the DV only worked 364 days in the first twelve months of the trial.

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

[4] The market fuel prices from 1 June 2019 to 31 May 2020, were used for calculation.

[5] Downtime refers to the equivalent number of working days in which 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 first 12 months of the trial, the total distance traveled and the average daily distance traveled of the EV were 27,779 km and 77 km/day, respectively while those of the DV were 35,510 km and 98 km/day, respectively. The average fuel cost of the EV was HK$1.09/km (i.e. about 74%) lower than that of the DV. The average total operating cost of the EV was HK$1.12/km (i.e. about 70%) lower than that of the DV.

4.3 In the first twelve months of the trial, there were 366 working days. Regarding the maintenance related to the performance of the vehicle, the EV had undergone a scheduled maintenance resulting in a downtime of 3 working days; while the DV had undergone two scheduled maintenances resulting in accumulating a downtime of 2 working days. The utilization rates of the EV and DV were 99.2% and 99.5%, respectively.

4.4 The fuel economies of the EV in winter time and summer time are more or less, so did the DV. Besides, there was no indication on the deterioration of the EV performance.

5. Summary

5.1 In the first twelve months of the trial, the average daily mileage of the EV was 77 km, while that of the DV was 98 km.

5.2 The data showed that the EV had lower fuel cost than the DV, with an average fuel cost saving of 74%. Accounting the maintenance costs incurred for both the EV and the DV, the average total operating cost saving of the EV was about 70% lower than that of the DV.

5.3 The utilization rates of the EV and the DV were 99.2% and 99.5%, respectively. There was no indication on the deterioration of the EV performance.

5.4 The driver had no problem in operating the EV and was satisfied with its performance. The subsidy recipient was also satisfied with the performance of the EV and agreed that using the EV is good because it can improve roadside air quality as well as its economic advantage.

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

Appendix 1: Key Features of Vehicles and the Charging Facility

1. Trial EV and the Charging Facility

(a) EV

Registration mark	**WC1083**
Make:	Joylong
Model:	HKL5040XXYBEV1 (EW4)
Class:	Light goods vehicle
Gross vehicle weight:	3,700 kg
Seating capacity:	driver + 5 passengers
Rated power:	50 kW
Travel range:	350 km (air conditioning off)
Maximum speed:	100 km/h
Battery material:	lithium-ion
Battery capacity:	73.4 kWh
Year of manufacture:	2018

(b) Charging Facility

Make:	ONLY POWER SUPPLY
Model:	ANDC5-500/60A-1
Power:	30 kW, 3-phase
Charging standard:	GB mode
Weight:	30 kg
Year of manufacture:	2018

2. DV Used for Comparison

Registration mark	**TP7223**
Make:	Toyota
Model:	HIACE DIESEL LWB
Class:	Light goods vehicle
Gross vehicle weight:	2,800 kg
Seating capacity:	driver + 5 passengers
Cylinder capacity:	2,982 cc
Year of manufacture:	2015

Appendix 2: Photos of Vehicles and Charging Facility

1. Trial EV (WC1083) and Charging Facility

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<tr><td>Front view of EV</td><td>Rear view of EV</td></tr>
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<tr><td>Left side view of EV</td><td>Right side view of EV</td></tr>
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<tr><td>30 kW, 3-phase DC charger</td><td></td></tr>
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2. DV (TP7223) for Comparison

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