

Pilot Green Transport Fund

Interim Report

On

Trial of Electric Light Goods Vehicle

for Civil Engineering Industry

(Pan Kee Engineering Co. Limited)

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The Monitoring and Evaluation Team's views expressed in this report do not necessarily reflect the views of the Environmental Protection Department, HKSAR.

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Trial of Electric Light Goods Vehicle for Civil Engineering Industry
(Pan Kee Engineering Co. Limited)**

**Interim Report
(Trial Period: 1 August 2019 – 31 July 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. Pan Kee Engineering Co. Limited (Pan Kee) was approved under the Fund for trial of one electric light goods vehicle to provide general moving services of construction materials and equipment among its site office in Kwai Chung, its warehouse in Tsing Yi and a number of construction sites in various locations throughout Hong Kong. Through the tendering procedure stipulated in the Agreement entered into with the Government, Pan Kee procured one Joylong EW5 electric light goods vehicle (EV) for the trial.

1.2 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. Pan Kee assigned a diesel light goods vehicle (DV), URVAN of Nissan, providing similar services as the conventional counterpart for comparing with the EV.

1.3 This Interim Report summarizes the performance of the EV in the first 12 months of the trial as compared with the DV.

2. Trial and Conventional Vehicles

2.1 Key features and photos of the EV, the charging facility and the DV are provided in Appendix 1 and Appendix 2, respectively. As the nature of engineering moving services for construction sites, there were no fixed daily routes for these two vehicles. The daily distance travelled by each vehicle varies from day to day, with routes covering the whole area of Hong Kong. The EV was charged overnight at Pan Kee's office car park in Kwai Chung with a designated moveable-type 30kW DC charger. In the first 12 months of the trial, the average daily mileages of the EV and DV are 80 km and 174 km, respectively.

3. Trial Information

3.1 The trial commenced on 1 August 2019 and would last for 24 months. Pan Kee was required to collect and provide trial information including the EV 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 EV. Similar sets of data of the DV was also required. In addition to the cost information, reports on maintenance work, operational difficulties and opinions of the driver and Pan Kee were collected to reflect any problems of the EV.

4. Findings of Trial

4.1 The following table summarizes the statistical data of the EV and DV.

Table 1: Key operation statistics of the vehicles (1 August 2019 – 31 July 2020)

Items	EV	DV
Total mileage (km)	19,627	43,960
Average fuel cost (HK\$/km)	0.42 ^[1]	1.77 ^[2]
Average fuel economy	2.87 km/kWh	8.90 km/litre
	0.80 km/MJ	0.22 km/MJ ^[3]
Average total operating cost (HK\$/km) ^[4]	0.56	1.77
Downtime (working day) ^{[4][5]}	6	0

^[1] Electricity cost is based on HK\$1.177/kWh for 2019 and HK\$1.218/kWh for 2020.

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

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

^[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 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 In the first 12-month trial period, the average fuel cost of the EV was lower than that of the DV by HK\$1.35/km (76%). Including the maintenance cost, the average total operating cost of the EV was HK\$1.21/km (68%) lower than that of the DV. The EV and DV recorded higher fuel economy in winter time than summer time probably due to air-conditioning requirement. Besides, there was no indication on the deterioration of the EV performance.

4.3 There were 252 working days in the first 12 months of the trial. The EV had three scheduled maintenances and no unscheduled maintenance incurring 6 days of total downtime, while the DV had no scheduled and unscheduled maintenances. The utilization rates of the EV and the DV were 98% and 100%, respectively.

4.4 The EV and DV recorded higher fuel economy in winter time than summer time probably due to air-conditioning requirement. In the first 12 months of the trial, there was no indication on the deterioration of the EV performance.

5. Summary

5.1 During the first 12 months of the trial, the average fuel cost of the EV was lower than that of the DV by HK1.35/km (76%), while the average total operating cost of the EV were lower than that of DV by HK\$.21/km (68%).

5.2 There were 252 working days in the first 12 months of the trial. The utilization rate of the EV was 98%, while that of the DV was 100%. There was no indication on the deterioration of the EV performance.

5.3 The driver had no problem in operating the EV and he was quite satisfied with the performance of the EV. Pan Kee was also satisfied with the EV.

5.4 The findings only reflect the performance of the EV in the first 12 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 the Vehicles Involved in the Trial

1. Trial EV and Charging Facility

(a) EV

Registration mark	VY379
Make:	Joylong
Model:	EW5
Class:	Light Goods Vehicle
Gross vehicle weight:	4,300 kg
Seating capacity:	Driver + 5 passengers
Rated power:	100 kW
Travel range:	330 km
Maximum speed:	120 km per hour
Battery material:	Lithium nickel cobalt manganese oxide
Battery capacity:	73 kWh
Year of manufacture:	2018

Charging Facility

Make:	Only Power Supply
Model:	ANDC5-500V/60A-1
Type:	3-phase, 380V, movable type
Output Power:	30kW
Output voltage:	500V DC
Maximum output current:	60A DC
Format:	Non-online version, single charging gun

(b) DV Used for Comparison

Registration mark	SD379
Make:	Nissan
Model:	NV350 URVAN
Class:	Light Goods Vehicle
Gross vehicle weight:	3,300 kg
Seating capacity:	Driver + 5 passengers
Cylinder capacity:	2,488 cc
Year of manufacture:	2016

Appendix 2: Photos of Vehicles and Charging facility

EV for Trial

(a) EV



Front view



Rear view



Right side view



Left side view

(a) Charging Facility



30 kW, 3-phase DC charging facility



The specifications stated on the charger

2. DV for comparison

	
Front view	Rear view
	
Right side view	Left side view