

Pilot Green Transport Fund

Interim Report

On

Trial of Electric Light Goods Vehicle for

Renovation Services

(Koon Hing Engineering Co.)

(25 August 2021)

PREPARED BY:
Dr. W.T. Hung

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

List of Monitoring and Evaluation Team Members

Dr. C.S. CHEUNG (Team Leader)

Department of Mechanical Engineering
The Hong Kong Polytechnic University

Dr. C. NG

Department of Mechanical Engineering
The Hong Kong Polytechnic University

Mr. KS Tsang

Department of Mechanical Engineering
The Hong Kong Polytechnic University

Dr. Edward WC Lo

Department of Electrical Engineering
The Hong Kong Polytechnic University

Dr. W.T. HUNG

PolyU Technology and Consultancy Company Limited
The Hong Kong Polytechnic University

**Pilot Green Transport Fund
Trial of Electric Light Goods Vehicle for Renovation Services
(Koon Hing Engineering Co.)**

**Interim Report
(Trial Period: 1 August 2020 – 31 July 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. Koon Hing Engineering Co. (Koon Hing) was approved under the Fund for trial of one electric light goods vehicle for renovation services. Through the tendering procedure stipulated in the Subsidy Agreement signed with the Government, Koon Hing procured a JOYLONG EW4-A electric light goods vehicle (EV) for trial.

1.2 PolyU Technology and Consultancy Company Limited has been engaged by the Environmental Protection Department (EPD) as an independent third party assessor to monitor the trial and evaluate the performance of the trial vehicle. Koon Hing assigned a TOYOTA HIACE diesel light goods vehicle (DV) providing the same type of services for comparing with the EV.

1.3 This Interim Report summarizes the performance of the EV in the first twelve months of the trial as compared with its conventional counterpart, i.e. the DV.

2. Trial and Conventional Vehicles

2.1 Key features of the EV, DV and charging facility are in Appendix 1 and their photos are in Appendix 2. Both vehicles were used for providing renovation services in all areas of Hong Kong and stationed at the Koon Hing's office carpark in Shatin. According to the EV's manufacturer, the EV has a gross vehicle weight of 3,700 kg and a driving range of 260 km (air conditioning off).

2.2 Koon Hing installed a dedicated 30kW DC charging facility for the EV at its office parking space in Shatin. The EV was charged regularly after work at night.

3. Trial Information

3.1 The trial started on 1 August 2020 and would last for 24 months. Koon Hing 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. A similar set of data from the DV was also required. In addition to the cost information, reports on maintenance work, operational difficulties and opinions of the driver and Koon Hing were collected and provided to reflect any problems of the EV.

3.2 Table 1 summarizes the statistical data of the EV and DV. The average fuel cost of the EV was HK\$1.54/km (about 81%) lower than that of the DV. Both the EV and DV had one scheduled but no unscheduled maintenance. Thus, the saving in average total operating cost of the EV over DV was HK\$1.53/km (about 60%).

Table 1: Key operation statistics of each vehicle (1 August 2020 – 31 July 2021)

		EV	DV
Total distance travelled (km)		6,868	15,985
Average daily mileage (km/working day)		23	55
Average fuel economy	(km/kWh)	3.38	-
	(km/litre)	-	8.16
	(km/MJ)	0.94	0.23 ^[1]
Average fuel cost (HK\$/km) ^[2]		0.36	1.90
Average total operating cost (HK\$/km) ^[3]		1.00	2.53
Downtime (working day) ^{[3][4]}		3	3

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

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

^[3] Maintenance due to incident not related to the performance of the vehicle was not included for comparing the performance.

^[4] 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.

3.3 During the first twelve months of the trial, both the EV and DV had one scheduled but no unscheduled maintenances resulting in loss of three working days for both vehicles. The utilization rates of the EV and the DV were both 99% in this reporting period.

3.4 In this reporting period, the average fuel economy as well as the charging frequencies of the EV did not indicate any deterioration in the performance of the EV and its batteries.

3.5 Koon Hing had a designated driver for the EV. The driver found no problem in operating the EV. The driver liked to drive the EV. He felt the EV was cleaner and quieter than the DV. The EV had adequate driving range to meet the daily operation need. Koon Hing was also satisfied with the EV performance.

4. Summary

4.1 In the first twelve months of the trial, the average daily mileage of the EV was 23 km, while that of the DV was 55 km. The EV and DV had one scheduled maintenance each, but no scheduled maintenance. The utilization rates of the EV and the DV were 99%. The average fuel cost and the average total operating cost of the EV were HK\$1.54/km (about 81%) and HK\$1.53/km (about 60%) respectively lower than those of the DV.

4.2 The EV driver had no problem in operating the EV, and felt that the EV was quieter and more environmentally friendly compared to the DV. Koon Hing was also satisfied with the performance of the EV.

4.3 In this reporting period, there was no indication on deterioration of the EV's performance. 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 Charging Facility

1. Trial EV

Registration Mark:	SC6632
Make:	JOYLONG
Model:	EW4-A
Class:	Light goods vehicle
Gross vehicle weight:	3,700 kg
Seating Capacity:	driver + 5 passengers
Rated Power:	50 kW
Travel range:	260 km (air conditioning off)
Maximum speed:	100 km/hour
Battery Type:	Lithium-ion
Battery capacity:	64.8 kWh
Year of manufacture:	2019

2. Charging Facility





Make:	Hangzhou AoNeng Power Supply Equipment Co. Ltd
Model:	ANDC5-500V/60A-1
Power:	30 kW, DC (max. 500V / 60A)
Charging Standard:	GB

3. DV for comparison

Registration Mark:	KR1268
Make:	TOYOTA
Model:	HIACE DIESEL LWB
Class:	Light goods vehicle
Gross vehicle weight:	2800 kg
Seating Capacity:	driver + 5 passengers
Cylinder capacity:	2,982 cc
Year of manufacture:	2014

Appendix 2: Photos of Vehicles and Charging Facility

Trial EV – SC6632

	
<p>Front view of EV</p>	<p>Left side view of EV</p>
	
<p>Right side view of EV</p>	<p>Rear view of EV</p>

Charging Facility



30kW DC charging facility



Specification of the DC charger –
500V/ 60A

DV for comparison – KR1268



Front view of DV



Left side view of DV



Right side view of DV



Rear view of DV