Pilot Green Transport Fund

Final Report
On
Trial of Electric Light Goods Vehicle for Renovation Services (Chan Foon Kee)

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(Chan Foon Kee)

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(Trial Period: 1 June 2019 – 31 May 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. Chan Foon Kee 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, Chan Foon Kee procured a JOYLONG EW4 electric light goods vehicle 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 vehicle. Chan Foon Kee assigned a diesel light goods vehicle providing the same type of services for comparing with the EV.

1.3 This Final Report summarizes the performance of the EV in the 24-month trial as compared with its conventional counterpart, i.e. the DV.

2. Trial and Conventional Vehicles

2.1 Chan Foon Kee procured a JOYLONG EW4 electric light goods vehicle (EV) with 3,700 kg and a driving range of 260 km (air conditioning off) for trial. Chan Foon Kee installed one dedicated 30 kW, 3-phase charger for the EV at its parking space in its Shaukeiwan office carpark. The EV was charged after work at night, but was not charged every day.

2.2 A SSANGYONG STAVIC diesel light goods vehicle (DV) of 2,750 kg GVW and 1,998 cc cylinder capacity was assigned for comparison with the EV.

2.3 All vehicles were equipped with air-conditioning units. Key features and photos of the EV, its charging facility and the DV are in Appendix 1 and Appendix 2 respectively.

3. Trial Information

3.1 The 24-month trial started on 1 June 2019. The EV and DV were stationed in the office carpark in Shaukeiwan. Both vehicles served all areas in Hong Kong. There was no fixed route. The usual operating hours were from 09:00 to 18:00 from Monday to Saturday, excluding Sunday and public holidays. The sole owner of Chan Foon Kee was also the designated driver of the EV.

3.2 Chan Foon Kee was required to collect and provide trial information including the EV's 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 and the charging facility. Similar data of the DV was also required. In addition to the cost information, reports on maintenance work, operational difficulties and opinions of the driver, i.e. the sole owner of Chan Foon Kee, were collected to reflect any problems of the EV.

4. Findings of Trial

4.1 Table 1 shows a summary of all the key statistics for each vehicle.

Table 1: Key operation statistics of each vehicle (June 2019 – May 2021)

		EV	**DV**
Total mileage (km)		19,563	38,240
Average daily mileage (km/working day)		34	66
Average fuel economy	(km/kWh)	3.98	-
	(km/litre)	-	8.91
	(km/MJ)	1.10	0.25 [1]
Average fuel cost (HK$/km) [2][3]		0.30	1.65
Average total operating cost (HK$/km) [4]		0.76	2.13
Downtime (working day) [4][5]		16	10

[1] Assuming lower heating value of 36.13 MJ/litre for diesel fuel.
[2] Electricity cost is based on HK$1.201/kWh for 2019 and HK$1.264/kWh for 2020 and 2021
[3] The market fuel price was used for calculation.
[4] Maintenance due to incidents unrelated to the performance of the vehicle was not included for comparison.
[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 24-month trial, the average fuel cost of EV was lower than that of DV by HK$1.35/km (82%).

4.3 Taking into account the maintenances, the average total operating cost of EV was HK$1.37/km (64%) lower than that of DV.

4.4 During the 24-month trial, there were 592 working days. The EV had two scheduled maintenances and five unscheduled maintenances of which four were unrelated to the vehicle performance and were thus not counted in the comparison. As such, the EV had 16 days of operation downtime. The charger was replaced once due to mal-functioning, but it had not affected the EV operation. Excluding the maintenances unrelated to the vehicle performance, the DV had two scheduled and one unscheduled maintenances causing 10 days of operation downtime in total. The utilization rates were 97% for EV and 98% for DV. The data showed that there was no sign of deterioration of the fuel economy and the performance of the EV battery.

4.5 The carbon dioxide equivalent (CO_2e) emission from EV was 3,668 kg while that from the DV based on the EV mileage was 6,090 kg. There was thus a total reduction of 2,422 kg CO_2e emission (40%) in the trial by using the EV compared with the DV.

4.6 The driver, the sole owner of Chan Foon Kee, had no difficulty in operating the EV and felt that the EV was quiet and environment-friendly compared with the DV, except that the EV might not have adequate driving range during exceptional busy days with long trip requirement. Chan Foon Kee was satisfied with the performance of the EV, especially on the cost saving. However, he would not consider replacing the entire vehicle fleet with the electric light goods vehicles because of the limited driving range.

5. Summary

5.1 In the 24-month trial, the average daily mileage of EV was 34 km while that of DV was 66 km. The average fuel cost of the EV was HK$1.35/km (82%) lower than that of the DV. Including the maintenance costs, the average total operating cost of the EV was HK$1.37/km (64%) lower than that of the DV. There was a total of 2,422 kg CO_2e emission reduction (40%) by using EV as compared with DV.

5.2 In the 24-nonth trial, there were 592 working days for the vehicles of Chan Foon Kee. The EV and DV had 16 and 10 days of operation downtime respectively. The utilization rates were 97% for EV and 98% for DV. No deterioration in the fuel economy and the performance of the EV battery was observed in the trial period.

5.3 The driver had no problem in operating the EV and felt that the EV was quiet and environment-friendly compared with the DV. Chan Foon Kee was satisfied with the performance of the EV, especially on the cost saving, but would not consider replacing the entire vehicle fleet with the electric light goods vehicles in view of the driving range.

Appendix 1: Key Features of Vehicles and Charging Facility

1. Trial EV

Registration Mark:	**WB6179**
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:	260 km (air conditioning off)
Maximum speed:	100 km/hr
Battery type	Lithium-ion
Battery capacity:	64.8 kWh
Year of manufacture:	2018

2. Charging Facility

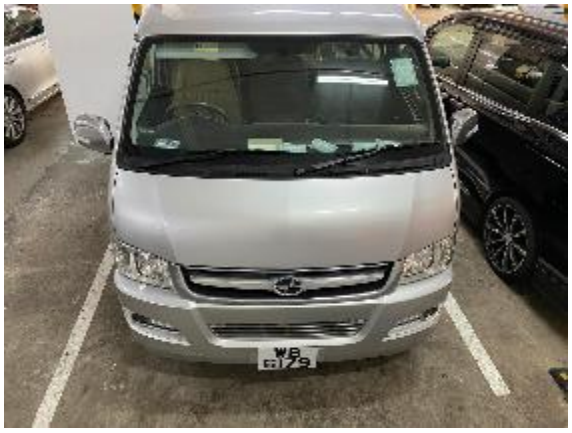
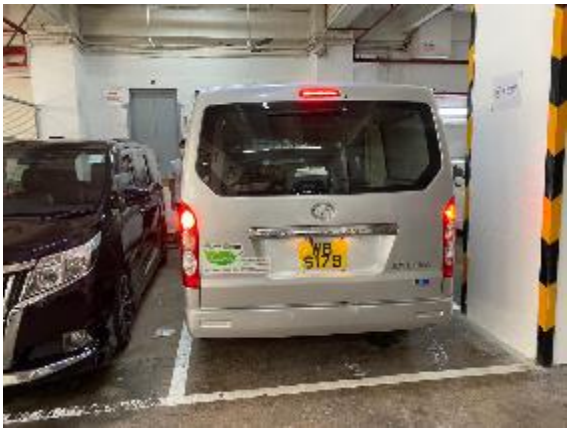
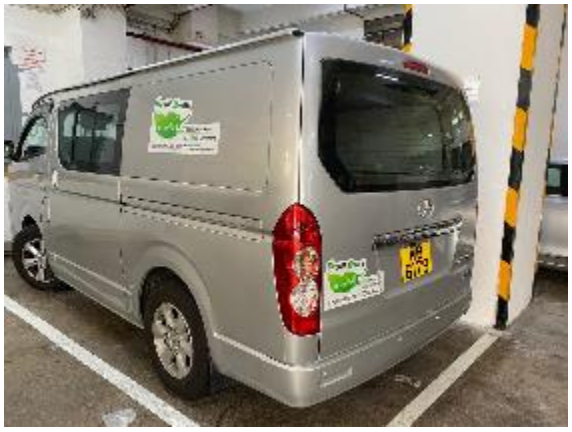
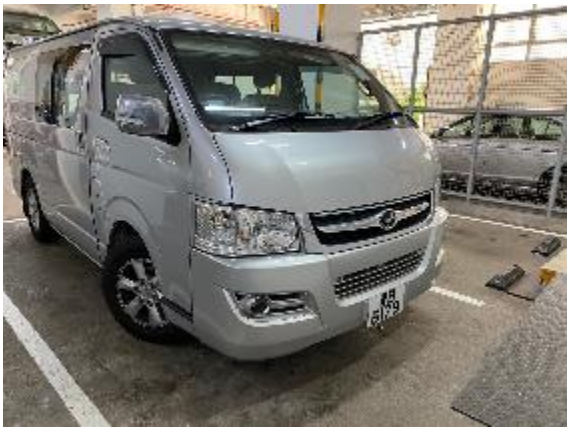
Make:	Inovance
Model:	IDCH-T030AM
Charging standard:	GB
Charging mode:	30 kW, 3-phase

3. DV for comparison

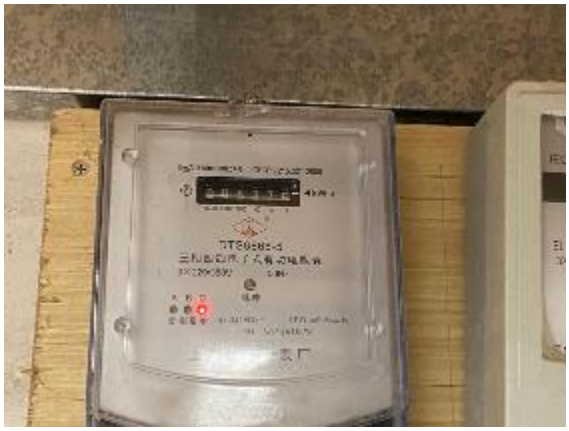
Registration Mark:	**SW9113**
Make:	SSANGYONG
Model:	STAVIC
Class:	Light goods vehicle
Gross vehicle weight:	2,750 kg
Seating capacity:	Driver +4 passengers
Cylinder capacity:	1,998 cc
Year of manufacture:	2014

Appendix 2: Photos of the Vehicles and Charging Facility

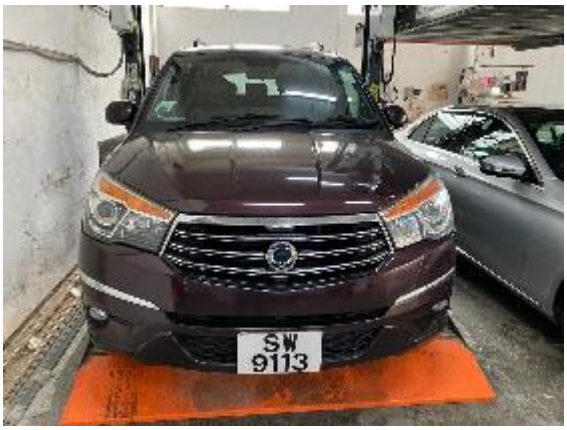
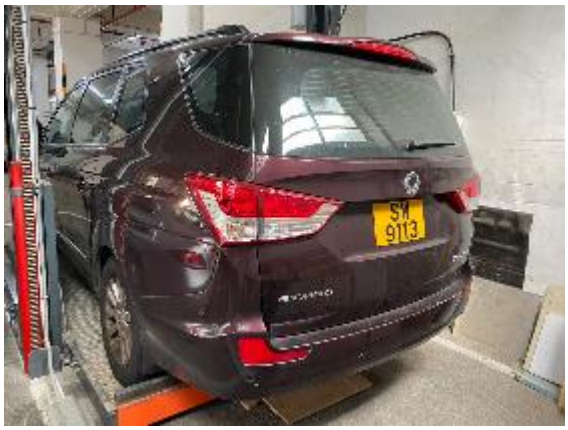
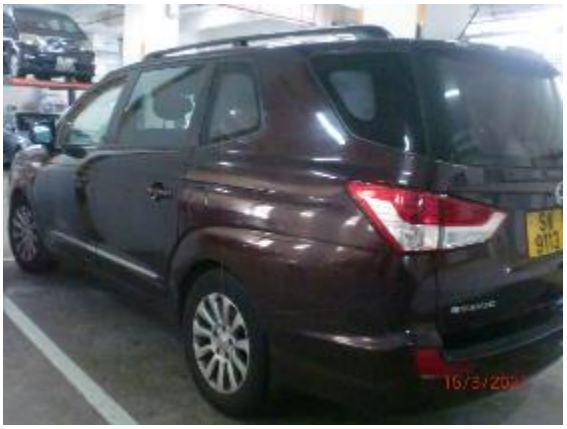
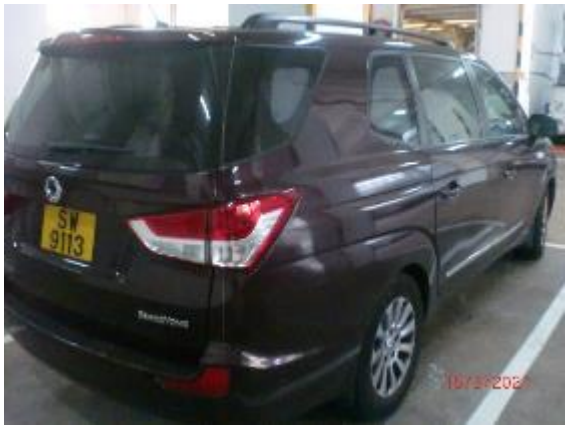
1. Trial EV

	
Front view	Rear view
	
Left side view	Right side view

2. Charging Facility

	
Charging Facility	Electricity Meter

3. DV for comparison

	
Front view	Rear view
	
Left side view	Right side view