Pilot Green Transport Fund

Interim Report On
Trial of Electric Van for Logistics Service (C&C)

(26 July 2017)

Prepared By:

Mr. Edward CHAN Fuk Cheung
Mr. Bruce ORGAN
Mr. Isaac TSE Yiu Lun

List of Monitoring and Evaluation Team Members

Mr. Edward F.C. Chan (Team Leader)
Project Manager
Jockey Club Heavy Vehicle Emissions Testing and Research Centre
Hong Kong Institute of Vocational Education (Tsing Yi)

Mr. Bruce Organ (Team Member)
Emission Manager
Jockey Club Heavy Vehicle Emissions Testing and Research Centre
Hong Kong Institute of Vocational Education (Tsing Yi)

Mr. Isaac Y. L. Tse (Team Member)
Officer
Jockey Club Heavy Vehicle Emissions Testing and Research Centre
Hong Kong Institute of Vocational Education (Tsing Yi)

Pilot Green Transport Fund
Trial of Electric Van for Logistics Service (C&C)

Interim Report
(Trial Period: 1 June 2014– 31 May 2015)

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. C&C Logistic Services Company Limited (C&C) was approved under the Fund for trial of one electric van-type light goods vehicle for logistics industry. Through the tendering procedures stipulated in the Subsidy Agreement C&C entered into with the Government, C&C procured one Renault Kangoo Van Z.E. light goods vehicle (EV) for trial.

1.2 Hong Kong Institute of Vocational Education (Tsing Yi) 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. C&C assigned one diesel vehicle (DV) providing similar services as the conventional vehicle 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 diesel counterpart.

2. Trial Vehicles

2.1 Key features of the EV and the DV are in Appendix 1 and photos of the vehicles are in Appendix 2. The vehicles were used for transporting documents and goods for clients mainly in Kowloon and New Territories. According to the EV manufacturer, the model's maximum payload is limited to 650 kg and it has a travel range of 170 km under no load condition, with a fully charged battery and air-conditioning off.

2.2 C&C had set up one dedicated 20A charger for the EV in its office carpark. It took about 8 hours to fully charge the battery and charging was normally carried out overnight. For a long journey, the EV driver would stop at a charging point to top up the battery during lunch time or at the time without any assigned duties even if the battery was far from being depleted.

3. Trial Information

3.1 The trial started on 1 June 2014 and would last for 24 months. C&C 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, downtime due to charging, cost and operation

downtime associated with scheduled and unscheduled maintenance of the EV and the charging facilities. Similar data from the DV were also required. In addition to the cost information, reports on maintenance work, operational difficulties and opinions of the drivers and C&C were collected to reflect any problems of the EV.

3.2 The following table summarizes the statistical data of the EV and the DV. The average fuel cost of the EV is $1.09/km (83.2%) lower than the DV.

Table 1: Key operation statistics of each vehicle (June 2014 to May 2015)

		EV	**DV**
Total mileage / km		11,834	23,537
Average fuel economy /	(km/kWh)	5.21	-
	(km/litre)	-	8.92
	(km/MJ) [1]	1.45	0.25
Average fuel cost /($/km) [2]		0.22	1.31
Average total operating cost / ($/km)		0.44	1.52
Downtime[3]/ day		5	3

[1] Assuming lower heating value of 36.13 MJ/liter for diesel fuel

[2] The market fuel price was used for calculation

[3] Downtime refers to the period the vehicle was not in operation, which counted from the first day it stopped operation till it was returned to the operator

3.3 Apart from the maintenance cost, other indirect costs might include towing fee, vehicle replacement fee and cost of operation downtime due to charging and maintenance of the EV. During the reporting period, no other indirect cost was found in the calculation of total operating cost for both vehicles.

3.4 Utilization rate of EV and DV were 98.3% and 99.0% respectively.

4. Summary

4.1 The average fuel cost of the EV was $1.09/km (83.2%) less than the DV. The average total operating cost of EV was HK$1.08/km (71.1%) less than the DV.

4.2 Comparing with the average fuel cost and average total operating cost of the EV, it was found that the maintenance cost would be a major factor affecting the operating cost benefit. It contributes to 50.9% of the total operating cost.

4.3 The fuel economy of EV in summer is lower than that of winter by around 22.5%, which might be due to the high energy consumption from the air-conditioning system in the hot season.

4.4 The EV driver found no problem in operating the EV and felt the EV was quiet and environmentally friendly. However, he consistently expressed disappointment with the limited travel range of the EV.

4.5 C&C agreed that, in general, using electric vehicle was good because it provided a greener and quieter environment compared with the diesel vehicles. However, due to the limitation on the battery range, C&C was required to plan for the journey in advance and restrict the service locations for the vehicle.

4.6 C&C had a concern that the burden on electricity consumption of the EV would be increased in case that the vehicle carried too many heavy objects, which might bring about the risk of insufficient battery range for completing the journey.

4.7 Charging frequency and monthly average fuel economy did not indicate any deterioration in performance of the EV or its battery.

Appendix 1: Key Features of Vehicles

1. Trial EV

Registration Mark	**SS6445**
Make:	Renault
Model:	Kangoo Van Z.E.
Class:	Light goods vehicle
Gross vehicle weight:	2.3 tonnes
Seating capacity:	driver + 4 passengers
Rated power:	44 kW
Travel range:	170 km (air-conditioning off)
Maximum speed:	130 km/h
Battery material:	Lithium ion
Batteries capacity:	22 kWh
Charging time:	8 hours (Max. current 16A)
Payload:	650kg
Year of manufacture:	2013

2. DV used for comparison

Registration Mark	**RR7794**
Make:	KIA
Model:	K2900 CRDI
Class:	Light goods vehicle
Seating capacity:	2 seats
Gross vehicle weight:	3.24 tonnes
Engine capacity:	2902 c.c.
Year of manufacture:	2011

Appendix 2: Photos of Vehicles and Charging Facility

1. Trial Electric Vehicle

<table>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>EV - Front View</td><td>EV - Rear View</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>EV – Left Side View</td><td>EV – Right Side View</td></tr>
</table>

2. Diesel Vehicle for Comparison

	
DV – Front View	DV – Rear View
	
DV – Left Side View	DV – Right Side View

3. Charging Facility for Trial Electric Vehicle

EV Charging Station