

**Pilot Green Transport Fund**

**Final Report On**  
**Trial of an Electric Light Goods Vehicle**  
**for**  
**(French International School "Victor Segalen"**  
**Association 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.

# **List of Monitoring and Evaluation Team Members**

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**Pilot Green Transport Fund  
Trial of an Electric Light Goods Vehicle for School  
(French International School "Victor Segalen" Association Limited)**

**Final Report  
(Trial Period: 1 November 2015 – 31 October 2017)**

## **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. French International School "Victor Segalen" Association Limited (FIS) was approved under the Fund for trial of one electric light goods vehicle (EV) for school.

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 vehicle.

1.3 This report summarizes the performance of the EVs in the 24-month trial as compared with their conventional counterparts.

### **2 Trial Vehicles**

2.1 Through the tendering procedures stipulated in the Agreement, FIS procured one Renault Kangoo Van Z.E. EV for trial. One conventional petrol vehicle (PV) providing similar services was assigned as the conventional vehicle for comparing with the EV.

2.2 Key features of the EV and the PV are in Appendix 1 and photos of the vehicles and the charging facility are in Appendix 2. The vehicles were used for transporting documents among different campuses in Hong Kong Island and Kowloon as well as the Airport.

2.3 FIS has set up one dedicated 20A charger at the campus in Happy Valley. The EV was mainly charged using this charger. It took about 8 hours to fully charge the batteries. The EV was charged overnight after work.

### **3 Trial Information**

3.1 The trial started on 1 November 2015 and lasted for 24 months. FIS 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. Similar data from the PV is also required. In addition to the cost information, reports on maintenance work, operational difficulties and opinions of the drivers and FIS were collected to reflect any operational problems of the EV.

#### 4 Findings of Trial

4.1 Table 1 below summarizes the statistical data of the EV and the PV. Average total operating cost of the EV was about HK\$5.08/km (77%) lower than the PV. The average fuel cost of the EV is HK\$2.03/km (85%) lower than the PV.

Table 1: Key operation statistics of each vehicle (November 2015 to October 2017)

		EV	PV
Total mileage (km)		10,936	5,113
Average fuel economy <sup>[1]</sup>	(km/kWh)	3.80	-
	(km/litre)	-	6.19
	(km/MJ)	1.06	0.19
Average fuel cost (HK\$/km) <sup>[2]</sup>		0.35	2.38
Average total operating cost (HK\$/km)		1.56	6.64
Downtime (working day) <sup>[3][4]</sup>		15	5

[1] Assuming lower heating value of 32MJ/litre for petrol fuel.

[2] Market rate was used for calculation.

[3] Downtime refers to the equivalent number of working days in which the vehicle was not in operation due to charging, and the period the vehicle was not in operation due to maintenance, counting from the first day it stopped operation till the day it was returned to the operator.

[4] Maintenance due to incidents unrelated to the performance of the vehicle was not included for comparison.

4.2 During the trial period, the total downtime of the EV was 15 days while the total downtime of the PV was 5 days. The maintenance cost of EV is HK\$12,045 and that of PV is HK\$21,784. Utilization rate of EV was 98% and that of PV was 99 %.

4.3 FIS has designated one driver for the EV. The driver was satisfied with the performance of EV and felt that the EV was quiet and environmentally friendly. He would prefer to use the EV when both vehicles were available to choose from.

4.4 FIS supported the use of an electric vehicle since it could contribute to a greener and quieter environment when compared with the conventional vehicle as well as providing savings in the operating cost. The cargo capacity of the EV was sufficient to support the daily work.

4.5 To eliminate the effect of seasonal fluctuations, 12-month moving averages were used to evaluate the trend of the EVs' fuel economy. The fuel economy varied from 3.72 to 4.01 km/kWh (i.e. about 7% drop) for the EV. During the 24-month trial period, there was only minor variation in fuel economy of the EV.

4.6 The carbon dioxide equivalent (CO<sub>2</sub>e) emissions from the EV was 2,272 kg, while from PV was 4,786 kg. Hence there is a reduction of 2,514 kg (about 53%) CO<sub>2</sub>e emission for EV in the trial.

## **5 Summary of Findings**

5.1 The vehicles were used for transporting documents among different campuses in Hong Kong Island and Kowloon as well as the Airport. The average fuel cost of the EV is HK\$2.03/km (85%) lower than the PV. The EV had 4 scheduled maintenances and the PV had 4 scheduled maintenances as well. There were three and two unscheduled maintenance records for the EV and PV respectively in this reporting period. The total downtime for EV and PV were 15 days and 5 days. Utilization rate of EV was 98% and the PV was 99%. There is a reduction of 2,514 kg (about 53%) CO<sub>2</sub>e emission for EV in the trial.

5.2 The driver found no problem with the performance of EV and felt that the EV was quiet and environmentally friendly. He would prefer to use the EV when both vehicles were available to choose from. FIS supported the use of electric vehicle since it could contribute to a greener and quieter environment when compared with the conventional vehicle as well as providing savings in the operating cost. The cargo capacity of the EV could support the daily work.

## Appendix 1: Key Features of Vehicles

### 1. Trial EV

<b>Registration Mark</b>	<b>TR6967</b>
Make:	Renault
Model:	Kangoo Light Goods Vehicle Z.E.
Class:	Light Goods Vehicle
Gross vehicle weight:	2.26 tonnes
Seating capacity:	Driver + 4 passengers
Rated power:	44 kW
Travel range:	170 km (air-conditioning off)
Maximum speed:	130 km/h
Battery Type:	Lithium ion
Batteries capacity:	22 kWh
Charging time:	8 hours (Max. current 16A)
Year of manufacture:	2015

### 2. PV for comparison

<b>Registration Mark</b>	<b>JU9001</b>
Make:	Toyota
Model:	SR40RGRSRKSD
Class:	Private 7-Seater Car
Seating capacity:	Driver + 7 passengers
Cylinder capacity:	1,998 c.c.
Year of manufacture:	2000

## Appendix 2: Photos of Vehicles and Charging Facility

### 1. Trial EV and charging facility



Front View



Rear View



Left Side View

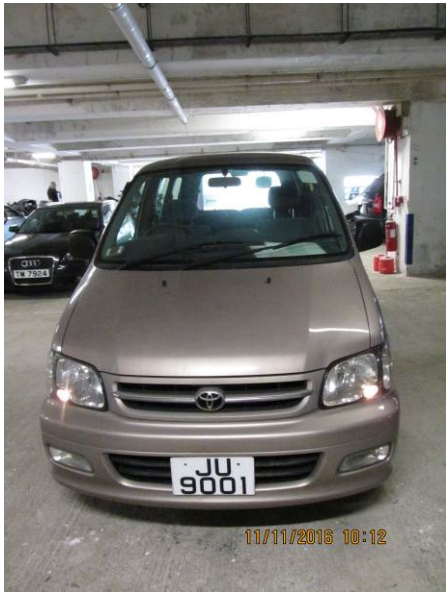


Right Side View



EV Charging Station

2. PV for comparison



Front View



Rear View



Left Side View



Right Side View