

Pilot Green Transport Fund

Interim Report On Trial of Electric Light Goods Vehicle (Van Type) for Vehicle Repairing and Maintenance Products Delivery (Ever Success Enterprise Limited)

(22 February 2018)

PREPARED BY:

Dr. C.S. Cheung

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)

Professor

Department of Mechanical Engineering

The Hong Kong Polytechnic University

Dr. W.T. Hung (Deputy Team Leader)

PolyU Technology and Consultancy Company Limited

The Hong Kong Polytechnic University

Ir Dr. C. Ng

Senior Technical Officer

Department of Mechanical Engineering

The Hong Kong Polytechnic University

**Pilot Green Transport Fund
Trial of Electric Light Goods Vehicle (Van Type) for
Vehicle Repairing and Maintenance Products Delivery
(Ever Success Enterprise Limited)**

**Interim Report
(Trial Period: 1 January – 31 December, 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. Ever Success Enterprise Limited (Ever Success) was approved under the Fund for trial of one electric light goods vehicle (van type) for vehicle repairing and maintenance products delivery.

1.2 PolyU Technology and Consultancy Company Limited (PolyU) 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. PolyU regularly visited Ever Success to collect information for evaluating the performance of the EV as compared with the diesel light goods vehicle (non-van type) (DV) which provided the same type of service.

1.3 This 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 Vehicles

2.1 Through a tendering procedure stipulated in the Agreement, Ever Success procured one Nissan e-NV200 light goods vehicle (van type) (EV) for trial. According to the EV's manufacturer, the model's maximum payload is not less than 620 kg and it has a travel range of 165 km, with its battery fully charged and air-conditioning off. Ever Success assigned an Isuzu diesel light goods vehicle (non-van type) (DV) which had a 2,999 c.c. engine for comparison.

2.2 Ever Success used a standard 13-ampere charger for charging the EV. The amount of electricity charged was estimated based on state of charge of the battery appearing on the dashboard. The EV was normally charged overnight, with top-up charging in the afternoon or evening when it was not in use.

2.3 Key features of the EV, the charging facilities and the DV are in Appendix 1 and photos of the vehicles are in Appendix 2.

3. Trial Information

3.1 The trial started on 1 January 2017 and would last for 24 months. The EV was used mainly for delivery of urea solution for diesel vehicles while the DV was used mainly for delivery of tyres for trucks, from the Yuen Long office to different parts of Kowloon and the New Territories. The average daily mileages of the EV and the DV in this reporting period were about 80 km and 90 km respectively.

3.2 Ever Success 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 facilities. Similar data of the DV were also required. In addition to the cost information, reports on maintenance work, operational difficulties and opinions of the EV driver 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 the DV. The average fuel cost of the EV was \$1.46/km (86%) lower than that of the DV.

Table 1: Key operation statistics of each vehicle, January – December, 2017

		EV	DV
Total mileage (km)		29,499	33,126
Average fuel economy	(km/kWh)	5.27	-
	(km/litre)	-	7.08
	(km/MJ)	1.46	0.196 ^[1]
Average fuel cost (\$/km)		0.232	1.69
Average total operating cost (\$/km)		0.235	1.69
Downtime ^[2] (days)		0	0

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

^[2] Downtime refers to the period the vehicle was not in operation, which was counted from the first day it stopped operation till the day it was discharged from the vehicle supplier to the operator

4.2 Apart from the fuel cost, the average total operation cost in Table 1 included maintenance cost and other indirect costs, such as parking fee, towing fee and vehicle replacement fee. There were three scheduled maintenances for the EV and no maintenance for the DV in the first twelve months of the trial period. The scheduled maintenances of the EV were for general inspection, no downtime nor maintenance cost were incurred.

4.3 Utilization rates were 100% for both the EV and the DV.

5. Summary

5.1 The total mileage of the EV was 29,499 km (i.e. 80.8 km/day on average) while that of the DV was 33,126 km (i.e. 90.8 km/day on average). The average fuel cost of the EV was 86% (\$1.46/km) less than that of the DV. The average total operating cost of the EV was also 86% (\$1.46/km) less than that of the DV. Utilization rates were 100% for both the EV and the DV.

5.2 The driver had no problem in operating the EV and was satisfied with its performance.

5.3 Overall, Ever Success agreed that using electric vehicle is good because it can provide a greener and quiet environment as well as its much lower fuel cost. Ever Success would encourage other transport operators to try electric vehicles and replace all existing conventional vehicles with EVs.

5.4 Charging frequency and monthly average fuel economy did not indicate any deterioration in performance of the EV or its battery. However, the findings only reflect the performance of the EV in the first twelve months of the trial. Further monitoring is required.

Appendix 1: Key Features of the Vehicles and Charging Facilities

1. Trial Electric Light Goods Vehicle (Van Type) (EV)

Registration mark	UM1062
Make:	Nissan
Model:	e-NV200 Half Panel Van (LGV)
Class:	Light goods vehicle
Gross vehicle weight:	2,250 kg
Seating capacity:	driver + 4 passengers
Rated power:	80 kW
Travel range:	165 km (air conditioning off)
Maximum speed:	over 120 km/h
Battery material:	lithium-ion
Battery capacity:	24 kWh
Payload:	620 kg
Year of manufacture:	2015

2. Charging Facilities





Charging Standard:	IEC 61851
Charging Mode:	220V / 13A, AC (Mode 1)

3. Diesel Light Goods Vehicle Used for Comparison (DV)

Registration mark	ST5145
Make:	Isuzu
Model:	NKR77E-13M
Class:	Light Goods Vehicle
Seating capacity:	driver + 2 passengers
Gross vehicle weight:	5,300 kg
Cylinder capacity:	2,999 cc
Year of manufacture:	2004

Appendix 2: Photos of Vehicles

1. Trial Electric Light Goods Vehicle (EV)

	
EV – front view	EV – end view
	
EV – side view 1	EV – side view 2

2. Diesel Light Goods Vehicle (DV) for Comparison


DV – front view