

Pilot Green Transport Fund

Interim Report On
Trial of Electric Light Goods Vehicle
for Logistics Service
(Airport Freight Forwarding Centre Co. Ltd)

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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.

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(Trial Period: 1 July 2017 – 30 June 2018)

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. Airport Freight Forwarding Centre Company Limited (AFFC) was approved under the Fund for trial of one electric light goods vehicle for logistics service. Through the tendering procedures stipulated in the Subsidy Agreement (the Agreement) signed with the Government, AFFC procured one Nissan e-NV200 light goods vehicle (EV) for trial.

1.2 PolyU Technology and Consultancy Company Limited (PolyU) 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. AFFC assigned an Isuzu diesel light goods vehicle (DV) which had a 2,499 c.c. engine and provided same type of service as the conventional counterpart for comparison.

1.3 This report summarizes the performance of the EV in the first 12 months of the trial as compared with its conventional counterpart.

2. Trial Vehicles

2.1 Key features of the EV, the charging facilities and the DV are in Appendix 1 and their photos are in Appendix 2. The EV was used for the delivery of mails from the AFFC Chek Lap Kok office to the AFFC Wan Chai office, for the delivery of materials to Tung Chung, and for patrol within the AFFC. Average daily traveled distance for providing such service is less than 50 km for both EV and DV. According to the EV's manufacturer, it has a travel range of 165 km, with its battery fully charged and air-conditioning off. AFFC also assigned a conventional counterpart, an Isuzu diesel light goods vehicle (DV) which had a 2,499 c.c. engine and provided same type of service as the EV, for comparison.

2.2 AFFC has installed a 32-ampere charger with a watt-hour meter to charge the batteries of the EV as well as to record the electricity consumed for EV charging. The EV was normally charged overnight or when required.

3. Trial Information

3.1 The trial commenced on 1 July 2017 and would last for 24 months. AFFC was required to collect and provide trial information including EV mileage reading before charging, amount of electricity consumed and time taken for charging, operation downtime due to charging, cost and 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 driver were collected and submitted to reflect any problems of the EV.

4. Findings of Trial

4.1 Table 1 summarizes the statistical data of the EV and the DV.

Table 1: Key operation statistics of each vehicle (1 July 2017 – 30 June 2018)

		EV	DV
Fuel cost (HK\$)		718	2,181
Total mileage (km)		2,474	1,370
Average fuel economy	(km/kWh)	3.81	-
	(km/litre)	-	8.01
	(km/MJ)	1.06	0.22 ^[1]
Average fuel cost (HK\$/km)		0.29	1.59
Maintenance cost and other cost (HK\$)		5,537	7,555
Total operating cost (HK\$)		6,255	9,736
Average total operating cost (HK\$/km)		2.53	7.11
Downtime ^[2] (working days)		2	3

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

^[2] Downtime refers to the equivalent number of working days in which the vehicle is not in operation due to charging, and the period 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 first 12 months of the trial, the average fuel cost of the EV was HK\$1.3/km (i.e., about 82%) lower than that of the DV. There was one scheduled maintenance for the EV and one scheduled maintenance for the DV resulting in downtime of 2 working days and 3 working days, respectively. The average total operating cost of the EV was HK\$4.58/km (i.e., about 64%) lower than that of the DV.

4.3 There were 2 working days and 3 working days downtime for the EV and the DV respectively due to the scheduled maintenance. The utilization rate of the EV and the DV were therefore 99.2% and 98.8% respectively in the first 12 months of trial.

5. Summary

5.1 During the first 12 months of the trial, the average fuel cost of the EV was about 82% (i.e., HK\$1.3/km) less than that of the DV and the average total operating cost of the EV was about 64% (i.e., HK\$4.58/km) less than that of the DV. Two-day maintenance-related downtime was incurred for the EV while 3-day maintenance-related downtime was incurred for the DV. The utilization rates were hence about 99.2% for the EV and 98.8% for the DV.

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

Overall, AFFC agreed that using EV is good because it can provide a greener and quiet environment as well as the comparatively lower fuel cost. AFFC will consider replacing all existing conventional light goods vehicles with electric ones.

5.3 The daily mileages of both the EV and the DV were very low. In the first 12 months of the trial, the total mileage of the EV was 2,474 km (i.e. 10.1 km per day on average) while that of the DV was 1,370 km (i.e. 5.6 km per day on average).

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 12 months of the trial. Further monitoring is thus required.

Appendix 1: Key Features of the Vehicles and Charging Facilities

1. Trial EV

Registration mark	UW3438
Make:	Nissan
Model:	e-NV200
Class:	Light goods vehicle
Gross vehicle weight:	2,250 kg
Seating capacity:	driver + 4 passengers
Rated power:	80 kW
Travel range after fully charged:	165 km (air conditioning off)
Maximum speed:	over 120 km/h
Battery material:	lithium-ion
Battery capacity:	24 kWh
Payload load:	620 kg
Year of manufacture:	2017

2. EV Charging Station





Maker:	Hong Kong EV Power Limited
Model:	EVC-32N
Charging Standard:	IEC62196
Charging Mode:	340V / 32A (max.), AC

3. DV Used for Comparison

Registration mark	MB6090
Make:	Isuzu
Model:	TFR54HDR
Class:	Light Goods Vehicle
Seating capacity:	driver + 4 passengers
Gross vehicle weight:	2,800 kg
Cylinder capacity:	2,499 cc
Year of manufacture:	2005

Appendix 2: Photos of Vehicles and Charging Facilities

1. Trial EV

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

2. EV Charging Station

	
EV – battery charger	EV - watt-hour meter

3. DV used for Comparison



DV – front view