

Pilot Green Transport Fund

Final Report On
Trial of Electric Light Goods Vehicle
for Courier Service II
(DHL Express (Hong Kong) 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.

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(DHL Express (Hong Kong) Limited)**

**Final Report
(Trial Period: 1 February 2018 – 30 April 2020)**

Executive Summary

1 Introduction

1.1 The Pilot Green Transport Fund (the Fund) is set up to encourage transport operators to try out green and innovative transport technologies, contributing to better air quality and public health for Hong Kong. DHL Express (Hong Kong) Limited (DHL) was approved under the Fund for trial of one electric light goods vehicle (EV) for logistic services.

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. DHL assigned one diesel light goods vehicle (DV) providing similar services as the conventional vehicle for comparing with the EV.

1.3 This report summarizes the performance of the EV in 24-month trial in the period of 1 February 2018 to 30 April 2020. Of which, 3 monthly data (from February 2020 to April 2020) are compensated for the period of October 2018 to December 2018 during which the EV was crashed in a traffic accident. This report also compares the performance of the EV with its conventional counterpart.

2 Trial Vehicles

2.1 Through the tendering procedures stipulated in the Subsidy Agreement that DHL entered into with the Government, DHL procured one Nissan e-NV200 light goods vehicle (EV) for trial.

2.2 Key features of the EV, DV and charging facility are in Appendix 1 and photos of the vehicles and charging facility are shown in Appendix 2. Details of each vehicle and their services are summarized in Table 1. According to the manufacturer, EV has a travel range of 165 km.

2.3 DHL has set up one dedicated 55A chargers for EV at its car park in Cheung Sha Wan office. The EV was charged regularly after work and during lunch time.

3 Trial Information

3.1 The trial commenced on 1 February 2018 and lasted for 24 months. DHL 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, operation downtime due to charging, and cost and operation downtime associated with scheduled and unscheduled maintenance of the EV and the charging facility. Similar monthly data from the DV were also required. In addition to the cost information, reports on maintenance work, operational difficulties and opinions of the driver and DHL were collected to reflect any problems of the EV.

4 Findings of Trial

4.1 Table 1 summarizes the total operating costs of the EV and the DV. The average total operating cost of the EV was HK\$0.66/km (44%) lower than the DV. The average fuel cost saving of EV was HK\$1.18/km (82%) lower than the DV.

Table 1: Key operation statistics of each vehicle (February 2018 to April 2020)

		EV	DV
Total mileage (km)		15,477	88,148
Average fuel economy	(km/kWh)	4.47	-
	(km/litre)	-	9.78
	(km/MJ)	1.24	0.27 ^[1]
Average fuel cost (HK\$/km) ^[2]		0.26	1.44
Average total operating cost (HK\$/km)		0.84	1.50
Downtime (working day) ^{[3], [4]}		17	5

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

[2] The market fuel price was used for calculation.

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

4.2 There were scheduled maintenance and unscheduled maintenances for both EV and DV in this reporting period and lead to 17 days and 5 days of operational downtime respectively. There were 587 working days in the trial period, the utilization rates of EV and DV were 97% and 99% respectively.

4.3 The driver of EV expressed satisfaction with the operation and performance of the vehicle. The driver found no problem in operating the EV and felt the EV was quiet and environmentally friendly.

4.4 DHL agreed that, in general, using electric vehicle was good because it provided a greener and quieter environment compared with the diesel vehicle. There was no major concern for the operating range of EV since the service area of EV was not far away from the charging station. Also, DHL expresses satisfaction with the cargo capacity of the EV.

4.5 To eliminate the effect of seasonal fluctuations, 12-month moving averages were used to evaluate the trend of the EV's fuel economy. The fuel economy varied from 4.29 to 4.59 km/kWh (i.e. about 7%) for the EV. During the 24-month trial period, there was a minor variation in fuel economy of the EV.

4.6 The carbon dioxide equivalent (CO₂e) emission from the EV was 1,750 kg while that from the DV was 4,387 kg. Hence, there is a reduction of 2,637 kg (about 60%) CO₂e emission.

5 Summary

5.1 The driver found no problems in operating the EV and was satisfied with the performance of it for the assigned daily driving duties. It was convenient for the driver to charge the vehicle at lunchtime or at the end of each day using in house charging facility.

5.2 The utilization rates of EV and the DV were 97% and 99% respectively. The EV was used for providing courier services between Kowloon and New Territories.

5.3 The trial showed that the EV had lower fuel cost as compared with its conventional diesel counterpart, with a saving of HK\$1.18/km (82%). Also, the average total operating cost of the EV was HK\$0.66/km (44%) lower than that of the DV. The EV had 60% lower CO₂e emission than the DV.

5.4 At present, the price of EV is higher than that of conventional vehicle, the accumulated fuel saving may not be able to offset the higher vehicle cost within a few years of operation. However, electric vehicle market is expanding and electric vehicle technology is improving, the price difference between electric vehicle and conventional vehicle is narrowing down and more affordable to the transport trade.

Appendix 1: Key Features of Vehicles and Charging Facility

1. Trial EV

Registration Mark	VE1251
Make:	Nissan
Model:	e-NV200
Class:	Light Goods Vehicle
Seating capacity:	Driver + 1 passenger
Gross vehicle weight:	2,250 kg
Rated Power:	80 kW
Travel range:	165 km
Maximum speed:	over 120 km/h
Battery Type:	Lithium ion
Year of manufacture:	2017

2. Charging Facility

Charging Standard:	CCS DC Combo 2 Standard
Charging Mode:	350-460V / 55A, DC

3. DV for comparison

Registration Mark	VC7776
Make:	Mercedes Benz
Model:	114BT L
Class:	Light Goods Vehicle
Seating capacity:	Driver + 2 passengers
Gross vehicle weight:	3,000 kg
Engine capacity:	2,143 c.c.
Year of manufacture:	2017

Appendix 2: Photos of Vehicles and Charging Facility

1. EV and charging facility



Front view of EV



Rear view of EV



Right side view of EV



Left side view of EV



EV Charging Station



Electricity Meter

2. DV for comparison



Front view of DV



Rear view of DV



Right side view of DV



Left side view of DV