Pilot Green Transport Fund

Interim Report
On
Trial of Electric Light Goods Vehicles for Logistics Service
(Ferrari Logistics (Asia) Limited)

(27 April 2021)

PREPARED BY:
Dr. C.S. Cheung

List of Monitoring and Evaluation Team Members

Dr. C.S. Cheung (Team Leader)
Department of Mechanical Engineering
The Hong Kong Polytechnic University

Dr. W.C. Lo (Deputy Team Leader)
Department of Electrical Engineering
The Hong Kong Polytechnic University

Ir Dr. C. NG
Department of Mechanical Engineering
The Hong Kong Polytechnic University

Dr. W.T. Hung
PolyU Technology and Consultancy Company Limited
The Hong Kong Polytechnic University

Dr. David Yuen
PolyU Technology and Consultancy Company Limited
The Hong Kong Polytechnic University

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Interim Report
(Reporting Period: 1 May 2019 – 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 innovative transport technologies, contributing to better air quality and public health for Hong Kong. Ferrari Logistics (Asia) Limited (Ferrari Logistics) was approved under the Fund for trial of two electric light goods vehicles for logistics service. Ferrari Logistics, through the tendering procedures stipulated in the Agreement entered into with the Government, procured two Nissan e-NV200 electric light goods vehicles (EVs: EV-1 and EV-2) for trial. According to the manufacturer, the EV has a travel range of 317 km with its battery fully charged and air-conditioning off.

1.2 PolyU Technology and Consultancy Company Limited 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 vehicles. Ferrari Logistics assigned two Hyundai diesel light goods vehicles (DVs: DV-1 and DV-2) each with a GVW of 3,230 kg and a cylinder capacity of 2,497 c.c. and provided similar service as the conventional counterparts for comparison.

1.3 This Interim Report summarizes the performance of the EVs in the first twelve months of the trial as compared with the DVs.

2. Trial and Conventional Vehicles

2.1 Key features of the EVs, the charging facilities and the DVs are in Appendix 1 and photos of the vehicles and the charging facilities are in Appendix 2. The EVs were used for the delivery of goods from Kwai Chung to different parts of Hong Kong Island, Kowloon and the New Territories.

2.2 Ferrari Logistics installed two 32-ampere AC chargers for charging and recording the amount of electricity charged, one for each EV. The EVs were normally charged overnight. However, the EVs sometimes had to be maintained in operational state for a whole day, so the electricity of the batteries was more consumed on such operation than actual travel. Hence, the EVs were required to have opportunity charging using public chargers occasionally.

3. Trial Information

3.1 The trial commenced on 1 May 2019 and would last for 24 months. Ferrari Logistics was required to collect and provide trial information including the EVs' mileage reading before charging, amount of electricity consumed and time used in each charging, and operation downtime due to charging, cost and downtime associated with scheduled and unscheduled maintenances of the EVs and the charging facilities. Similar data of the DVs were also required. In addition to the cost information, reports on maintenance work, operational difficulties and opinions of the drivers and Ferrari Logistics were collected to reflect any problems of the EVs.

4. Findings of Trial

4.1 The following table summarizes the statistical data of the EVs and the DVs. The fleet average fuel cost of the EVs was HK$1.45/km (85%) lower than that of the DVs. The fleet average total operating cost of the EVs was HK$2.01/km (80%) lower than that of the DVs.

Table 1: Key operation statistics of each vehicle (May 2019 –April 2020)

		EV-1	**EV-2**	**DV-1**	**DV-2**
Total mileage (km)		22,545	17,675	22,947	31,746
Average fuel economy	(km/kWh)	4.66	4.43	-	-
	(km/litre)	-	-	7.61	9.54
	(km/MJ)	1.29	1.23	0.21[1]	0.26[1]
Average fuel cost (HK$/km)		0.256[2]	0.268[2]	1.90[3]	1.51[3]
Fleet Average fuel cost (HK$/km)		0.26		1.71	
Average total operating cost (HK$/km) [4]		0.45	0.53	3.02	1.97
Fleet average total operating cost (HK$/km)		0.49		2.50	
Downtime (working day) [4][5]		50	2	4.5	1.5

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

[2] Electricity cost is based on HK$1.177/kWh for 2019 and HK$1.218/kWh for 2020

[3] The market fuel price was used for calculation

[4] Maintenance unrelated to the performance of the vehicle was not included for comparison. Parking fees paid for opportunity charging occasionally at public carparks were included.

[5] Downtime refers to the working days the vehicle is not in operation, which counted from the first day it stops operation till the day it is returned to the operator.

4.2 In this reporting period, there were one scheduled and one unscheduled maintenance for EV-1; one scheduled maintenance for EV-2; three scheduled and three unscheduled maintenances for DV-1; and five scheduled and one unscheduled maintenances for DV-2. Scheduled maintenance of the EVs involved annual inspection. Unscheduled maintenance of EV-1 involved repair of the braking system. Scheduled maintenance of the two DVs involved replacement of lubricating oil and annual inspection. Unscheduled maintenance of DV-1 involved replacement of cooling fan for radiator, radiator and battery. Unscheduled maintenance of DV-2 involved replacement of cooling fan for air conditioning system.

4.3 EV-1 had 50 days of downtime mainly due to the longer waiting time for repair parts of the braking system, while EV-2 had 2 days of downtime. DV-1 had 4.5 days of downtime while DV-2 had 1.5 days of downtime. The utilization rates were 79.8% for EV-1, 99.2% for EV-2, 98.2% for DV-1 and 99.4% for DV-2. Based on the above, the average daily mileages of EV-1 and EV-2 were 114 km/day and 72 km/day respectively. While for the DVs, the average daily mileages were 94 km/day for DV-1 and 129 km/day for DV-2 respectively.

5. Summary

5.1 The fleet average fuel cost of the EVs was HK$1.45/km (85%) less than that of the DVs. The fleet average total operating cost of the EVs was HK$2.01/km (80%) lower than that of the DVs. The utilization rates were 79.8% for EV-1, 99.3% for EV-2, 98.2% for DV-1 and 99.4% for DV-2. EV-1 had lower utilization rate mainly due to the longer waiting time for repair parts of the braking system, which is not related to the EV technology.

5.2 The drivers of the EVs had no problem in operating the EVs and were satisfied with the performance of the EVs. However, the operation of Ferrari Logistics needs to maintain the EVs in operational state for a whole day, so the electricity of the batteries was more consumed on such operation than actual travel. Hence, the EVs were required to have opportunity charging using public chargers occasionally. The drivers commented that there were insufficient public chargers.

5.3 Overall, Ferrari Logistics agreed that using the EVs is good because they could provide a greener and quieter environment with lower fuel cost. Ferrari Logistics will consider using more electric light goods vehicles if more public charging stations are available in Hong Kong and the charging time can be shortened.

5.4 The findings only reflect the performance of the two EVs in the first twelve months of the trial. The performance and reliability of the EVs will be continuously monitored in this 24-month trial.

Appendix 1: Key Features of the Vehicles and Charging Facilities

1. Trial EVs

Registration mark	**VY2760 (EV-1), VY2984 (EV-2)**
Make:	Nissan
Model:	e-NV200
Class:	Light goods vehicle
Gross vehicle weight:	2,240 kg
Seating capacity:	Driver + 1 passenger
Rated power:	80 kW
Travel range:	317 km (air conditioning off)
Battery material:	lithium-ion
Battery capacity:	40 kWh
Year of manufacture:	2018

Charging Facilities

Maker:	EV Power
Model:	EVC-32NK
Output:	220V AC / max 32A
Charging Standard:	IEC62196-2 Type 2

2. DVs for Comparison

Registration mark	**SC6679 (DV-1), SC7180 (DV-2)**
Make:	Hyundai
Model:	H1 Van Standard Euro 5
Class:	Light Goods Vehicle
Seating capacity:	Driver + 5 passengers
Gross vehicle weight:	3,230 kg
Cylinder capacity:	2,497 cc
Year of manutfacture:	2013

Appendix 2: Photos of Vehicles and Charging Facilities

1. Trial EVs and Charging Facilities

EV-1 (VY2760) & its charging facility

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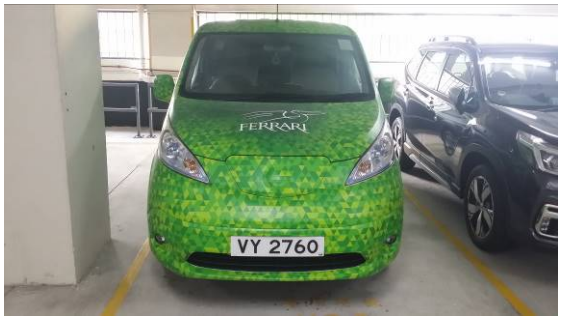
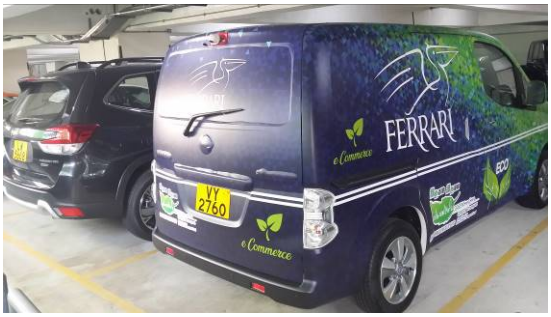
<tr><td> 
</td><td> 
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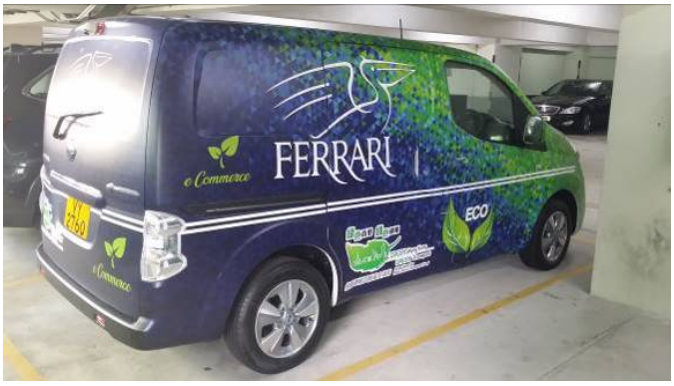
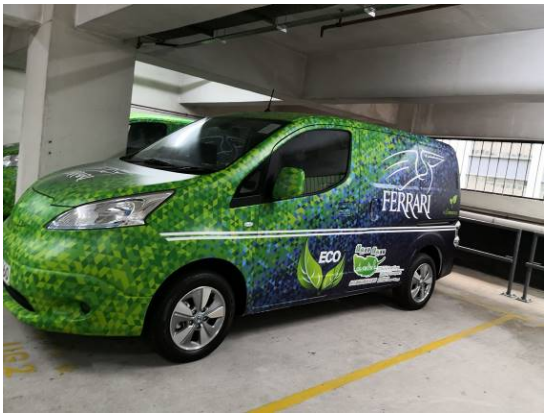
<tr><td>EV-1 – front view</td><td>EV-1 – rear view</td></tr>
<tr><td> 
</td><td> 
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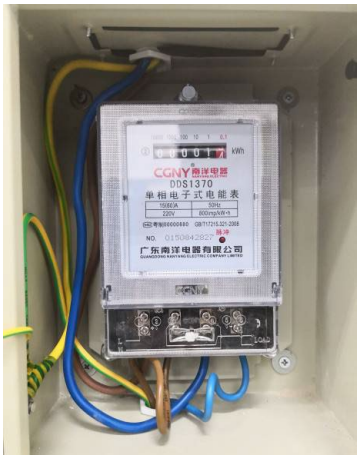
<tr><td>EV-1 – right side view</td><td>EV-1 – left side view</td></tr>
<tr><td> 
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<tr><td>EV-1 – watt-hour meter</td><td>EV-1 – EV charger</td></tr>
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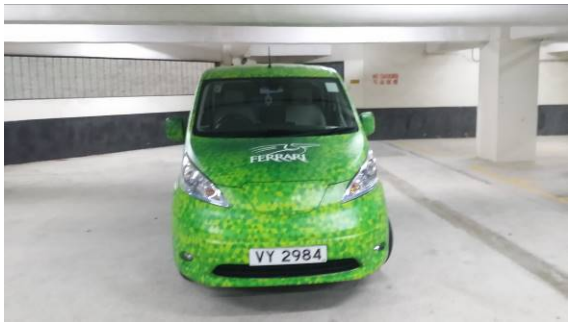
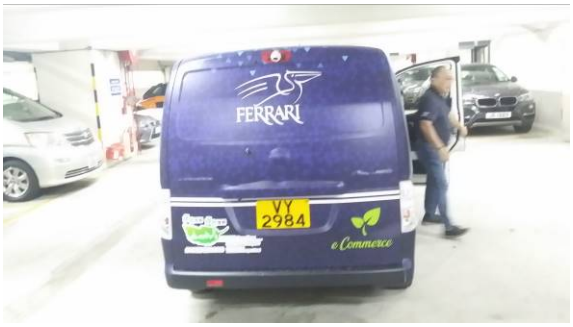
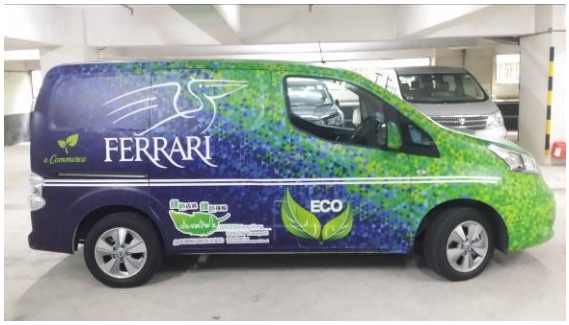
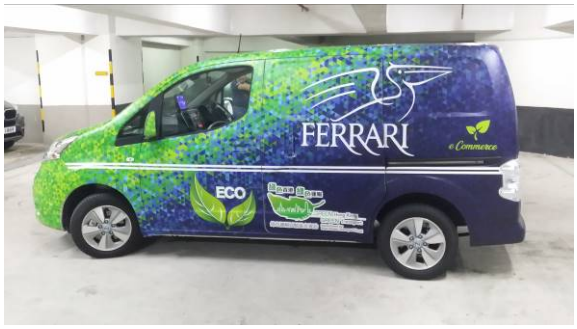
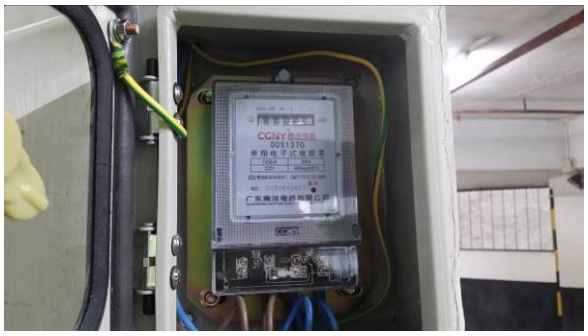
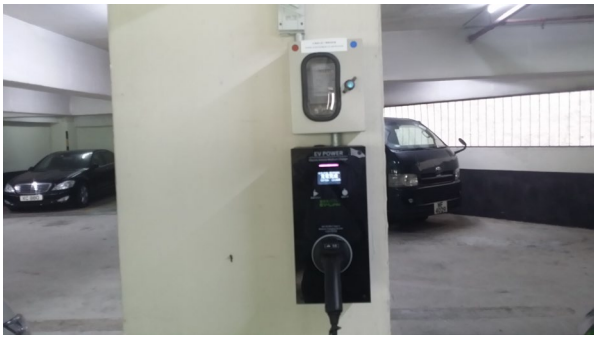
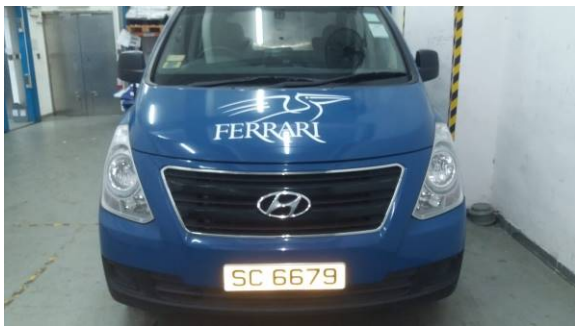
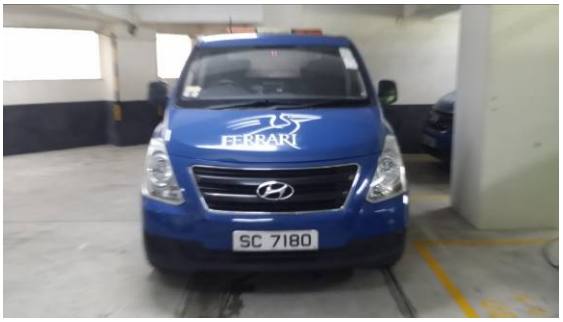
EV-2 (VY2984) & its charging facility

	
EV-2 – front view	EV-2 – rear view
	
EV-2 – right side view	EV-2 – left side view
	
EV-2 – watt-hour meter	EV-2 – EV charger

2. DVs for Comparison

	
DV-1 (SC6679)	DV-2 (SC7180)