New Energy Transport Fund

Interim Report
On
Trial of Electric Light Goods Vehicle for E&M Engineering Industry (Aplus Engineering Limited)

(20 September 2022)

PREPARED BY:
Dr. Rick MO

List of Monitoring and Evaluation Team Members

Dr. Rick MO (Team Leader)
Smart City Division
Hong Kong Productivity Council

Ms. Rachel CHAN
Smart City Division
Hong Kong Productivity Council

Mr. Michael WU
Smart City Division
Hong Kong Productivity Council

Mr. K.S. LI
Smart City Division
Hong Kong Productivity Council

New Energy Transport Fund
Trial of Electric Light Goods Vehicle for E&M Engineering Industry
(Aplus Engineering Limited)

Interim Report
(Trial Period: 1 March 2022 – 31 August 2022)

Executive Summary

1. Introduction

1.1 The New Energy 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. Aplus Engineering Limited (Aplus) was approved under the Fund for trial of one electric light goods vehicle. Through the tendering procedures stipulated in the Subsidy Agreement entered into with the Government, Aplus procured one Nissan e-NV200, electric light goods vehicle (EV) for trial.

1.2 Hong Kong Productivity Council 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. Aplus assigned a diesel light goods vehicle (DV) providing same services as the conventional counterpart for comparison.

1.3 This Interim Report summarizes the performance of the EV in the first six months of the trial as compared with its conventional counterpart.

2. Trial and Conventional Vehicles

2.1 The trial EV, Nissan e-NV200 electric light goods vehicle, has a gross vehicle weight (GVW) of 2,250 kg capable of carrying a driver with four passengers and goods. It has a 40 kWh Lithium-ion battery pack and the driving range is 317 km with air-conditioning off. There is a designated driver assigned to drive the EV. The DV, Toyota Hiace diesel light goods vehicle with a GVW of 2,800 kg and a cylinder capacity of 2,755 c.c., was used as the conventional counterpart for comparison in this trial. The vehicles are used mainly for delivering tools and parts to different construction sites in Hong Kong.

2.2 Aplus has installed a 7.4 kW AC single phase charger for charging the EV. Key features of the EV and the DV as well as the EV charging facility are presented in Appendix 1. The photos of vehicles and the EV charging facility are shown in Appendix 2.

3. Trial Information

3.1 The trial commenced on 1 March 2022 and would last for 12 months. Aplus 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 facility. Similar data of the DV were also required. In addition to the cost information, reports on maintenance work, operational difficulties and opinions of the drivers were collected and provided 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 in the first six months of the trial period.

Table 1: Key operation statistics of each vehicle (1 March 2022 – 31 August 2022)

		EV	**DV**
Total distance travelled (km)		7,490	5,201
Average daily distance travelled (km/working day)		50	35
Average fuel economy	(km/kWh)	4.00	-
	(km/litre)	-	9.19
	(km/MJ)	1.11	0.25 [1]
Average fuel cost (HK$/km)		0.32 [2]	2.32 [3]
Average total operating cost (HK$/km)		0.32	2.32
Downtime (working day) [4]		0	0

[1] Assuming lower heating value of 36.13 MJ/litre for diesel fuel.
[2] Electricity cost was based on HK$1.289/kWh for 2022.
[3] The market fuel price was used for calculation.
[4] Downtime refers to the working days that the vehicle is not in operation due to charging or maintenance, counting from the first day it stops operation till the day it is returned to the operator.

4.2. During the six months of the trial, there were 150 working days. The total distance travelled and the average daily distance travelled of the EV were 7,490 km and 50 km/day, respectively while those of the DV were 5,201 km and 35 km/day, respectively. The average fuel cost of the EV was HK$2.00/km (about 86%) lower than that of the DV. As there were no maintenance for the EV and the DV, the utilization rates of both vehicles were 100%. The average total operating cost of the EV and DV was the same as the average fuel cost.

4.3 The driver of the EV had no problem in operating the vehicle.

5. Summary

5.1 In the first six months of the trial, the average daily distance travelled of the EV was 50 km, while that of the DV was 35 km.

5.2 Both the average fuel cost and the average total operating cost of the EV was HK$2.00/km (about 86%) lower than that of the DV.

5.3 The utilization rates of both the EV and the DV were 100%.

5.4 The driver of the EV had no problem in operating the vehicle.

5.5 The findings only reflect the performance of the EV in the first 6 months of the trial. The performance and reliability of the EV will be continuously monitored in the 12 months of the trial.

Appendix 1: Key Features of Vehicles and Charging Facility

1. Trial EV and Charging Facility

EV

Registration mark:	**UT1603**
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:	317 km (air conditioning off)
Battery material:	Lithium-ion
Battery capacity:	40 kWh
Year of manufacture:	2020

EV Charging Facility

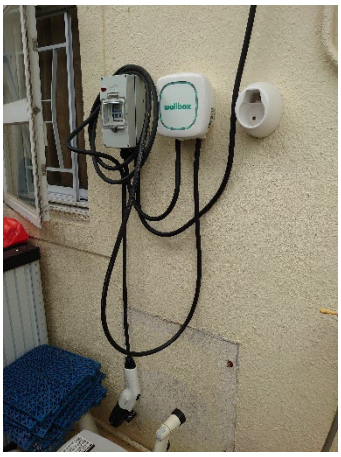
Make:	Wallbox
Model:	Pulsar
Power:	7.4 kW, 220V AC / max 32A single phase
Charging standard:	SAE J1772 Type 1

2. DV Used for Comparison

Registration mark	**PG1360**
Make:	Toyota
Model:	Hiace Diesel
Class:	Light goods vehicle
Gross vehicle weight:	2,800 kg
Seating capacity:	Driver + 5 passengers
Cylinder capacity:	2,755 c.c.
Year of manufacture:	2017

Appendix 2: Photos of Vehicles and Charging Facility

1. Trial EV and Charging Facility

<table>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>Front view of EV</td><td>Rear view of EV</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Left side view of EV</td><td>Right side view of EV</td></tr>
<tr><td>  </td><td></td></tr>
<tr><td>7.4 kW AC single phase charging facility</td><td></td></tr>
</table>

2. DV for Comparison

	
Front view of DV	Rear view of DV
	
Left side view of DV	Right side view of DV