New Energy Transport Fund

Final Report
On
Trial of Electric Light Goods Vehicle for Container Operation
(Hongkong International Terminals Limited)

(20 December 2023)

PREPARED BY:
Dr. C. Ng

List of Monitoring and Evaluation Team Members

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

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

Mr. K.S. TSANG
Department of Mechanical Engineering
The Hong Kong Polytechnic University

Dr. Edward W.C. LO
Department of Electrical Engineering
The Hong Kong Polytechnic University

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

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Trial of Electric Light Goods Vehicle for Container Operation
(Hongkong International Terminals Limited)

Final Report
(Trial Period: 1 December 2021 – 30 November 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. Hongkong International Terminals Limited (HIT) 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, HIT procured one Nissan eNV200, electric light goods vehicle (EV) for trial.

1.2 PolyU Technology and Consultancy Company Limited has been engaged by the Environmental Protection Department (EPD) [1] as an independent third party assessor to monitor the trial and evaluate the performance of the trial vehicle. HIT assigned a diesel light goods vehicle (DV) providing same service as the conventional counterpart for comparison.

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

2. Trial and Conventional Vehicles

2.1 The trial EV, Nissan eNV200 electric light goods vehicle, has a gross vehicle weight 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. No designated driver used the EV. The DV, Nissan NV350 URVAN 2.5L diesel A/T half panel van (LGV) LUX 2,488 c.c. diesel light goods vehicle, was used as the conventional counterpart for comparison in this trial. The vehicles were used mainly for delivering company documents and maintenance parts among the Terminals 4, 6, 7 and 9 in the Kwai Tsing container port areas.

2.2 HIT has installed a 7.4 kW, single phase AC charger at its own cost for charging the EV. Key features of the EV and the DV as well as the EV charging facility (at the recipient's own cost) are presented in Appendix 1, the photos of vehicles and the EV charging facility are shown in Appendix 2.

[1] The Administration of the New Energy Transport Fund was migrated to the Environment Branch of the Environment and Ecology Bureau [EEB (Environment Branch)] since 1 January 2023 after internal re-organisation of EEB (Environment Branch) and EPD.

3. Trial Information

3.1 The trial commenced on 1 December 2021 and lasted for 12 months. HIT 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. 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.

Table 1: Key operation statistics of each vehicle (1 December 2021 – 30 November 2022)

		EV	**DV**
Total mileage (km)		9,377	6,462
Average daily mileage (km/working day)		26	18
Average fuel economy	(km/kWh)	3.59	-
	(km/litre)	-	5.45
	(km/MJ)	1.00	0.15 [1]
Average fuel cost (HK$/km) [2]		0.36	3.82
Average total operating cost (HK$/km)		0.41	4.75
Downtime (working day) [3]		6	13

[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 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 12 months of the trial, there were 365 working days. The total distance traveled and the average daily distance traveled of the EV were 9,377 km and 26 km/day, respectively while those of the DV were 6,462 km and 18 km/day, respectively. The average fuel cost of the EV was HK$3.46/km (i.e. about 90.6%) lower than that of the DV. Taking maintenance fee for both the EV and the DV into account, the average total operating cost of the EV was HK$4.34/km (i.e. about 91.4%) lower than that of the DV.

4.3 The utilization rates of the EV and the DV were 98.4% and 96.4%, respectively.

4.4 After the 12-month trial period, a full charging operation could be maintained at the level of 40 kWh. Thus, the deterioration in battery capacity within the 12-month trial period was insignificant.

4.5 Based on the total mileage of the EV and the fuel economy of the DV, the equivalent carbon dioxide (CO_2e) emission from the DV could be estimated for comparison purpose. The CO_2e emission from the EV and DV were 1,019 kg and 4,771 kg, respectively and hence the EV emitted 3,752 kg CO_2e (about 79%) less than the DV in this trial.

4.6 The operation of the EV was smooth. The EV drivers had no problem in operating the EV and considered it was clean and quiet. Both the drivers and HIT were satisfied with the EV performance.

5. Summary

5.1 In this trial, the average daily mileage of the EV was 26 km, while that of the DV was 18 km.

5.2 The average fuel cost of the EV was 90.6% lower than that of the DV. Taking maintenance fee for both the EV and the DV into account, the average total operating cost of the EV was 91.4% lower than that of the DV.

5.3 The utilization rates of the EV and the DV were 98.4% and 96.4%, respectively. In the trial period, there was no sign of deterioration in battery capacity of the EV.

5.4 Compared with the DV, there was about 79% CO_2e emission reduction by using the EV.

5.5 The drivers had no problem in operating the EV and considered it was clean and quiet. HIT was also satisfied with the EV performance in general.

5.6 The findings showed electric light goods vehicle is becoming more affordable and feasible to the transport trade for saving operating cost and reducing CO_2e emissions, provided that the vehicle can get easy access to charging facilities.

Appendix 1: Key Features of Vehicles and Charging Facility

1. Trial EV and Charging Facility

(a) EV

Registration mark:	**XR7222**
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:	317 km (air conditioning off)
Battery material:	Lithium-ion
Battery capacity:	40 kWh
Year of manufacture:	2020

(b) EV Charging Facility (At Recipient's own cost)

Make:	Wallbox
Model:	PLP1-0-1-2-3-001-A
Power:	7.4 kW, single phase AC
Charging standard:	IEC 61851-1
Weight:	5 kg
Year of manufacture:	2021

2. DV Used for Comparison

Registration mark	**VE3465**
Make:	Nissan
Model:	NV350 URVAN 2.5L diesel A/T half panel van (LGV) LUX
Class:	Light goods vehicle
Gross vehicle weight:	3,300 kg
Seating capacity:	Driver + 5 passengers
Cylinder capacity:	2,488 cc
Year of manufacture:	2017

Appendix 2: Photos of Vehicles and Charging Facility

1. Trial EV (XR7222) and Charging Facility

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<tr><td>Front view of EV</td><td>Rear view of EV</td></tr>
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<tr><td>Left side view of EV</td><td>Right side view of EV</td></tr>
<tr><td> 
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<tr><td>7.4 kW AC charging facility
(At Recipient’s own cost)</td><td></td></tr>
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2. DV (VE3465) for Comparison

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