New Energy Transport Fund

Final Report
On
Trial of Electric Light Goods Vehicle for Sustainability Education
(World Wide Fund for Nature Hong Kong)

(15 February 2024)

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Final Report
(Reporting Period: 1 February 2022 – 31 January 2023)

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. World Wide Fund for Nature Hong Kong (WWF) was approved under the Fund for trial of one electric light goods vehicle for sustainability education. WWF, through the tendering procedures stipulated in the Agreement entered into with the Government, procured a Nissan e-NV200 Half Panel Van (LGV) electric light goods vehicle (EV) for trial.

1.2 Hong Kong Productivity Council has been commissioned by the Environmental Protection Department (EPD)[1] as an independent third party assessor (the Assessor) to monitor the trial and evaluate the performance of the trial vehicle. WWF assigned a Mercedes Benz Sprinter 315 CDI Van diesel light goods vehicle (DV) providing same services as the conventional counterpart for comparison.

1.3 Since the start of the operation of the EV, the duty of the DV was replaced by the EV. Hence, the 12-month historical data of the DV (1 May 2020 – 30 April 2021) will be used for comparison in this Final Report.

1.4 This Final Report summarises the performance of the EV in the 12 months of the trial as compared with its conventional counterpart, i.e. the DV.

2. Trial and Conventional Vehicles

2.1 The trial EV, Nissan e-NV200 Half Panel Van (LGV) 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 a driving range of 317 km with its battery fully charged and air-conditioning off. The DV, Mercedes Benz Sprinter 315 CDI Van diesel light goods vehicle with a gross vehicle weight of 3,550 kg and a diesel engine with a cylinder capacity of 2,148 c.c., was used as the conventional counterpart for comparison in this trial. Both the EV and the DV were used for delivering organisation documents between WWF's offices in Hong Kong.

[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.

2.2 WWF installed a designated 7.4 kW single-phase AC charging facility at the office in Tai Po at its own cost for charging and recording the amount of electricity charged. Key features of the EV, the charging facility and the DV are detailed in Appendix 1 and photos of the vehicles and the charging facility are shown in Appendix 2.

3. Trial Information

3.1 The trial commenced on 1 February 2022 and lasted for 12 months. WWF was required to collect and provide trial information including the EV's mileage reading before charging, amount of electricity consumed and time used in each charging, operation downtime due to charging, and cost and downtime associated with scheduled and unscheduled maintenance 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 driver and WWF were collected to reflect any problems of the EV.

4. Findings of Trial

4.1 The following table summarises the statistical data of the EV and the DV. The average fuel cost of the EV was HK$1.68/km (about 88%) lower than that of the DV. The average total operating cost of the EV was HK$2.18/km (about 84%) lower than that of the DV taking the maintenance cost into account.

Table 1: Key operation statistics of each vehicle (1 February 2022 – 31 January 2023)

		EV	**DV (historical data)** [1]
Total distance travelled (km)		15,443	17,629
Average daily mileage (km/working day)		53	61
Average fuel economy	(km/kWh)	5.64	-
	(km/litre)	-	10.90
	(km/MJ)	1.57	0.30 [2]
Average fuel cost (HK$/km)		0.24 [3]	1.92 [4]
Average total operating cost (HK$/km) [5]		0.40	2.58
Downtime (working day) [5][6]		2	6

[1] Based on the historical data from 1 May 2020 to 30 April 2021.
[2] Assuming lower heating value of 36.13 MJ/litre for diesel fuel.
[3] The electricity cost was calculated using average electricity tariff rates of HK$1.289/kWh (Feb 2022 – Oct 2022); HK$1.451/kWh (Nov 2022 – Dec 2022) and; HK$1.544/kWh (Jan 2023) as claimed by CLP.
[4] The market fuel prices from Feb 2022 to Jan 2023 were used for calculation.
[5] Maintenance due to incident not related to the performance of the vehicle was not included for comparing the performance.
[6] Downtime refers to the working days the vehicle is not in operation, which is counted from the first day it stops operation till the day it is returned to the operator.

4.2 Apart from the fuel cost, maintenance cost and other indirect costs which may include parking fee, towing fee, vehicle replacement fee and cost of operation downtime due to charging and maintenance of the EV are also included in Table 1. There was one scheduled maintenance for both the EV and the DV in the 12 months of the trial. Both scheduled maintenance of the EV and the DV was the vehicle preparation for Government inspection.

4.3 The EV and the DV had 2 and 6 days of maintenance downtime related to vehicle performance, respectively. The utilisation rates of the EV and the DV were 99.3% and 98.0%. Based on the above, the average daily driving distances of the EV and the DV were 53 km/day and 61 km/day, respectively.

4.4 The driver of the EV liked driving the EV and had no problem in operating the EV. He agreed that the power of the EV is good even on uphill and the air is cleaner inside the cabin. Overall, he was satisfied with the performance of the EV and would like to promote the EV to other drivers. WWF was satisfied with the EV since the EV could meet the operational requirements and save the operation cost. WWF agreed that it was easier and cheaper to maintain the EV. Thus, given the opportunity, WWF would consider replacing all existing conventional vehicles with EVs and encourage other transport operators to try the EVs.

4.5 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.

4.6 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. In the 12-month trial period, the CO_2e emission from the EV and the DV were 1,069 kg and 3,929 kg respectively. Hence, there was a 2,860 kg (about 73%) reduction of CO_2e, with the replacement of the DV by the EV in the trial.

5. Summary

5.1 The average fuel cost of the EV was HK$1.68/km (about 88%) lower than that of the DV. The average total operating cost of the EV was HK$2.18/km (about 84%) lower than that of the DV. The utilisation rates of the EV and the DV were 99.3% and 98.0%, respectively. There was a 2,860 kg (about 73%) reduction of CO_2e, with the replacement of the DV by the EV in the trial.

5.2 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.

5.3 The driver of the EV liked driving the EV and was satisfied with the performance of the EV. WWF was satisfied with the EV since the EV could meet the operational requirements and save the operation cost. Thus, given the opportunity, WWF would consider replacing all existing conventional vehicles with EVs.

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

Appendix 1: Key Features of Vehicles and Charging Facility

1. Trial EV and Charging Facility

EV

Registration mark:	**XT6441**
Make:	Nissan
Model:	e-NV200 Half Panel Van (LGV)
Class:	Light goods vehicle
Gross vehicle weight:	2,250 kg
Payload:	658 kg
Seating capacity:	Driver + 4 passengers
Rated power:	80 kW
Driving range:	317 km (air conditioning off)
Battery material:	Lithium-ion
Battery capacity:	40 kWh
Year of manufacture:	2020

EV Charging Facility (At Recipient's own cost)

Make:	EV Power
Model:	EVC-32NK
Power:	7.4 kW, 220V AC / max 32A single-phase
Charging standard:	IEC 62196-2 Type 2

2. DV Used for Comparison

Registration mark:	**NP8332**
Make:	Mercedes Benz
Model:	Sprinter 315 CDI Van
Class:	Light goods vehicle
Gross vehicle weight:	3,550 kg
Payload:	1,535 kg
Seating capacity:	Driver + 5 passengers
Cylinder capacity:	2,148 c.c.
Year of manufacture:	2008

Appendix 2: Photos of Vehicles and Charging Facility

1. Trial EV (XT6441) and Charging Facility

	
Front view of EV	Rear view of EV
	
Left side view of EV	Right side view of EV
	
7.4 kW AC charging facility (At Recipient's own cost)	

2. DV (NP8332) Used for Comparison

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<tr><td>Front view of DV</td><td>Rear view of DV</td></tr>
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<tr><td>Left side view of DV</td><td>Right side view of DV</td></tr>
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