

New Energy Transport Fund

Final Report
On
Trial of Electric Light Goods Vehicle for Tyre Service
(Fu Ming Tyres Services Limited)

(24 December 2024)

PREPARED BY:
Dr. Rick MO

The Monitoring and Evaluation Team's views expressed in this report do not necessarily reflect the views of the Environment and Ecology Bureau (Environment Branch), HKSAR.

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 Tyre Service
(Fu Ming Tyres Services Limited)**

**Final Report
(Reporting Period: 1 January 2023 – 31 December 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. Fu Ming Tyres Services Limited (Fu Ming) was approved under the Fund for trial of one electric light goods vehicle for tyre service. Fu Ming, through the tendering procedures stipulated in the Agreement entered into with the Government, procured a Maxus eDeliver 3 electric light goods vehicle (EV) for trial.

1.2 Hong Kong Productivity Council has been commissioned by the Environment and Ecology Bureau (Environment Branch) (EEB) as an independent third party assessor (the Assessor) to monitor the trial and evaluate the performance of the trial vehicle. Fu Ming assigned a Nissan NV350 Urvan 2.5L Diesel M/T Half Panel Van (LGV) STD diesel light goods vehicle (DV) providing same services as the conventional counterpart for comparison.

1.3 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, Maxus eDeliver 3 electric light goods vehicle, has a gross vehicle weight of 2,530 kg capable of carrying a driver with a passenger and goods. It has a 50.23 kWh lithium iron phosphate battery pack and a driving range of 371 km with its battery fully charged under WLTP urban conditions. The DV, Nissan NV350 Urvan 2.5L Diesel M/T Half Panel Van (LGV) STD diesel light goods vehicle with a gross vehicle weight of 3,300 kg and a diesel engine with a cylinder capacity of 2,488 c.c., was used as the conventional counterpart for comparison in this trial. The EV and the DV were used for tyre services for public light buses in Tseung Kwan O.

2.2 Fu Ming installed a designated 7.4 kW single-phase AC charging facility at the workshop in Fanling 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 January 2023 and lasted for 12 months. Fu Ming 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 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 driver and Fu Ming 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\$1.92/km (about 87%) lower than that of the DV. Taking the maintenance fee and other costs into account, the average total operating cost of the EV was HK\$2.06/km (about 86%) lower than that of the DV in the 12 months of the trial.

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

	EV	DV
Total distance travelled (km)	32,978	38,460
Average daily mileage (km/working day)	108	124
Average fuel economy	(km/kWh)	5.41
	(km/litre)	-
	(km/MJ)	0.27 ^[1]
Average fuel cost (HK\$/km)	0.28 ^[2]	2.20 ^[3]
Average total operating cost (HK\$/km) ^[4]	0.34	2.40
Downtime (working day) ^{[4][5]}	7	2.5

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

^[2] The electricity cost was calculated using average electricity tariff rates of HK\$1.544/kWh (Jan 2023 – Feb 2023); HK\$1.552/kWh (Mar 2023 – Apr 2023); HK\$1.565/kWh (May 2023); HK\$1.559/kWh (Jun 2023); HK\$1.535/kWh (Jul 2023); HK\$1.508/kWh (Aug 2023); HK\$1.482/kWh (Sep 2023); HK\$1.459/kWh (Oct 2023); HK\$1.442/kWh (Nov 2023) and; HK\$1.431/kWh (Dec 2023) as reported by CLP.

^[3] The market fuel price was used for calculation.

^[4] Maintenance due to incident not related to the performance of the vehicle was not included for comparing the performance.

^[5] Downtime refers to the working days that the vehicle is not in operation due to charging or maintenance, 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. The EV had 1 scheduled maintenance while the DV had 7 scheduled maintenances in the 12 months of the trial period. The scheduled maintenance of the EV and the DV included regular services and annual government vehicle inspection.

4.3 In the 12 months of the trial period, both the EV and the DV had 3 days of maintenance-related downtime. In addition, the EV had another 4 days of downtime due to charging. Hence, the utilisation rates of the EV and the DV were 97.8% and 99.2%, respectively. Based on the above, the average daily driving distances of the EV and the DV were 108 km and 124 km,

respectively.

4.4 The drivers of the EV liked driving the EV and had no operation difficulties in driving the EV. Overall, they were satisfied with the performance of the EV and would promote the EV to other drivers. Fu Ming was satisfied with the EV since the EV could meet the operational requirements and save the operation cost. Given the opportunity, Fu Ming would encourage other transport operators to try the EVs.

4.5 It is observed that the amount of electricity stored in the battery after a full charging operation could be maintained at the level of 50.23 kWh after the 12-month trial period. Thus, the deterioration in battery capacity within the 12-month trial period was insignificant, if any.

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 2,375 kg and 9,259 kg respectively. Hence, there was a 6,884 kg (about 74%) 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\$1.92/km (about 87%) lower than that of the DV. Taking the maintenance fee and other costs into account, the average total operating cost of the EV was HK\$2.06/km (about 86%) lower than that of the DV. The utilisation rates of the EV and the DV were 97.8% and 99.2%. There was a 6,884 kg (about 74%) reduction of CO_{2e}, with the replacement of the DV by the EV in the trial.

5.2 It is observed that the amount of electricity stored in the battery after a full charging operation could be maintained at the level of 50.23 kWh after the 12-month trial period. Thus, the deterioration in battery capacity within the 12-month trial period was insignificant, if any.

5.3 The drivers of the EV liked driving the EV and had no operation difficulties in driving the EV. Overall, they were satisfied with the performance of the EV. Fu Ming was satisfied with the EV since the EV could meet the operational requirements and save the operation cost. Given the opportunity, Fu Ming would encourage other transport operators to try the 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

(a) EV

Registration mark:	WC1329
Make:	Maxus
Model:	eDeliver 3
Class:	Light goods vehicle
Gross vehicle weight:	2,530 kg
Payload:	905 kg
Seating capacity:	Driver + 1 passenger
Rated power:	40 kW
Driving range:	371 km (WLTP urban condition)
Battery material:	Lithium iron phosphate
Battery capacity:	50.23 kWh
Year of manufacture:	2022

(b) EV Charging Facility







Make:	Schneider Electric
Model:	EVLink EVH2S7P02K
Power:	7.4 kW, 220V AC / max. 32A
Charging standard:	IEC 61296-2 Type 2

2. DV Used for Comparison

Registration mark:	HC1329
Make:	Nissan
Model:	NV350 Urvan 2.5L Diesel M/T Half Panel Van (LGV) STD
Class:	Light goods vehicle
Gross vehicle weight:	3,300 kg
Payload:	1,340 kg
Seating capacity:	Driver + 5 passengers
Cylinder capacity:	2,488 c.c.
Year of manufacture:	2014

Appendix 2: Photos of Vehicles and Charging Facility

1. Trial EV (WC1329) and Charging Facility

	
<p>Front view of EV</p>	<p>Rear view of EV</p>
	
<p>Left side view of EV</p>	<p>Right side view of EV</p>
	
<p>7.4 kW single-phase AC charging facility</p>	<p>Charging facility – watt-hour meter</p>

2. DV (HC1329) used for Comparison



Front view of DV



Rear view of DV



Left side view of DV



Right side view of DV