

New Energy Transport Fund

Final Report
On
Trial of Electric Light Goods Vehicle for
Fish Delivery
(Fish Marketing Organization)

(15 February 2024)

PREPARED BY:
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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.

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Trial of Electric Light Goods Vehicle for Fish Delivery
(Fish Marketing Organization)**

**Final Report
(Reporting Period: 1 May 2022 – 30 April 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. Fish Marketing Organization (FMO) was approved under the Fund for trial of one electric light goods vehicle for fish delivery. FMO, through the tendering procedures stipulated in the Agreement entered into with the Government, procured a Joylong EW5 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. FMO assigned a Toyota Hiace Diesel LWB 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, Joylong EW5 electric light goods vehicle, has a gross vehicle weight of 4,300 kg capable of carrying a driver with one passenger and goods. It has a 73.4 kWh lithium-ion battery pack and a driving range of 330 km with its battery fully charged and air-conditioning off. The DV, Toyota Hiace Diesel LWB diesel light goods vehicle with a gross vehicle weight of 2,800 kg and a diesel engine with a cylinder capacity of 2,982 c.c., was used as the conventional counterpart for comparison in this trial. Both the EV and the DV were used for delivering fish in Hong Kong.

2.2 FMO installed a designated 30 kW DC charging facility at the office in Aberdeen 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.

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 May 2022 and lasted for 12 months. FMO 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 FMO 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\$1.56/km (about 73%) lower than that of the DV. The average total operating cost of the EV was HK\$0.60/km (about 21%) lower than that of the DV taking the maintenance cost into account.

Table 1: Key operation statistics of each vehicle (1 May 2022 – 30 April 2023)

	EV	DV
Total distance travelled (km)	3,672	12,105
Average daily mileage (km/working day)	11	33
Average fuel economy	(km/kWh)	2.68
	(km/litre)	-
	(km/MJ)	0.27 ^[1]
Average fuel cost (HK\$/km)	0.59 ^[2]	2.15 ^[3]
Average total operating cost (HK\$/km) ^[4]	2.22	2.82
Downtime (working day) ^{[4][5]}	23	2

^[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\$1.353/kWh (May 2022 – Oct 2022); HK\$1.868/kWh (Nov 2022 – Dec 2022); HK\$1.970/kWh (Jan 2023 – Feb 2023); HK\$2.009/kWh (Mar 2023) and; HK\$2.051/kWh (Apr 2023) and as claimed by HEC.

^[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 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. There were one scheduled maintenance and four unscheduled maintenance for the EV in the 12 months of the trial. The scheduled maintenance of the EV included battery service, preparation for Government inspection, replacement of main fuse and ignition relay cut-out switch. The unscheduled maintenance of the EV included refrigerant refill, power steering pump repair, replacement of fuse of the freezer, gear selector repair, cleaning and repair of electrical connection of drive motor. There was one scheduled maintenance for the DV in the 12 months of the trial. The scheduled maintenance of the DV included services of government annual vehicle inspection and regular maintenance service.

4.3 The EV and the DV had 23 and 2 days of maintenance downtime related to vehicle performance, respectively. The utilisation rates of the EV and the DV were 93.7% and 99.5%. Based on the above, the average daily driving distances of the EV and the DV were 11 km/day and 33 km/day, respectively.

4.4 The drivers of the EV had no problem in operating the EV. They agreed that the EV was quieter than the DV. Overall, they were satisfied with the performance of the EV and would like to promote the EV to other drivers. FMO was satisfied with the EV since the EV could save the operation cost. Thus, given the opportunity, FMO 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 73.4 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 931 kg and 1,029 kg respectively. Hence, there was a 98 kg (about 10%) 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\$1.56/km (about 73%) lower than that of the DV. The average total operating cost of the EV was HK\$0.60/km (about 21%) lower than that of the DV. The utilisation rates of the EV and the DV were 93.7% and 99.5%, respectively. There was a 98 kg (about 10%) 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 73.4 kWh. Thus, the deterioration in battery capacity within the 12-month trial period was insignificant.

5.3 The drivers of the EV had no problem in operating the EV and were satisfied with the performance of the EV. FMO was satisfied with the EV since the EV could save the operation cost. Thus, given the opportunity, FMO would consider replacing all existing conventional vehicles with EVs and 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

EV

Registration mark:	XW2964
Make:	Joylong
Model:	EW5
Class:	Light goods vehicle
Gross vehicle weight:	4,300 kg
Payload:	1,300 kg
Seating capacity:	Driver + 1 passenger
Rated power:	50 kW
Driving range:	330 km (air conditioning off)
Battery material:	Lithium-ion
Battery capacity:	73.4 kWh
Year of manufacture:	2021

EV Charging Facility






Make:	Only Power Supply
Model:	ANDC5-500V/60A-1
Power:	30 kW, 500V DC / max 60A
Charging standard:	GB Mode

2. DV Used for Comparison

Registration mark:	RS5017
Make:	Toyota
Model:	Hiace Diesel LWB
Class:	Light goods vehicle
Gross vehicle weight:	2,800 kg
Payload:	850 kg
Seating capacity:	Driver + 5 passengers
Cylinder capacity:	2,982 c.c.
Year of manufacture:	2012

Appendix 2: Photos of Vehicles and Charging Facility

1. Trial EV (XW2964) 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>30 kW DC charging facility</p>	

2. DV (RS5017) Used for Comparison



Front view of DV



Rear view of DV



Left side view of DV



Right side view of DV