

New Energy Transport Fund

Final Report
On
Trial of Electric Light Goods Vehicle for
Renovation Works
(Sang Kee Building Maintenance Company Limited)

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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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**New Energy Transport Fund
Trial of Electric Light Goods Vehicle for Renovation Works
(Sang Kee Building Maintenance Company Limited)**

**Final Report
(Reporting Period: 1 October 2023 – 30 September 2024)**

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. Sang Kee Building Maintenance Company Limited (Sang Kee) was approved under the Fund for trial of one electric light goods vehicle for renovation works. Sang Kee, through the tendering procedures stipulated in the Subsidy Agreement entered 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 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. Sang Kee assigned one 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 (GVW) of 4,300 kg capable of carrying a driver with four passengers and goods. It has a 73.4 kWh lithium-ion battery pack and the driving range is 330 km with air-conditioning off. The DV, Toyota Hiace Diesel LWB diesel light goods vehicle with a GVW of 2,800 kg and a cylinder capacity of 2,982 c.c., was used as the conventional counterpart for comparison in this trial. There is a designated driver assigned to drive the EV, and another designated driver is assigned to drive the DV. The vehicles were used for delivering tools and materials to different construction and renovation sites in Hong Kong.

2.2 Sang Kee has installed a designated 22 kW three-phase AC charging facility for charging the EV. 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 October 2023 and lasted for 12 months. Sang Kee 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 drivers and Sang Kee 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\$2.09/km (about 84%) 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\$2.79/km (about 84%) lower than that of the DV in the 12 months of the trial.

Table 1: Key operation statistics of each vehicle (1 October 2023 – 30 September 2024)

		EV	DV
Total distance travelled (km)		38,227	17,949
Average daily mileage (km/working day)		129	61
Average fuel economy	(km/kWh)	3.65	-
	(km/litre)	-	9.43
	(km/MJ)	1.01	0.26 ^[1]
Average fuel cost (HK\$/km)		0.41 ^[2]	2.50 ^[3]
Average total operating cost (HK\$/km) ^[4]		0.52	3.31
Downtime (working day) ^{[4][5]}		0.5	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\$1.459/kWh (Oct 2023); HK\$1.442/kWh (Nov 2023); HK\$1.431/kWh (Dec 2023); HK\$1.523/kWh (Jan 2024 – Feb 2024); HK\$1.513/kWh (Mar 2024); HK\$1.507/kWh (Apr 2024); HK\$1.499/kWh (May 2024); HK\$1.500/kWh (Jun 2024); HK\$1.496/kWh (Jul 2024); HK\$1.496/kWh (Aug 2024); and HK\$1.495/kWh (Sep 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. In the 12 months of the trial period, both the EV and the DV had one scheduled maintenance, and the EV had one and the DV had three unscheduled maintenances. The unscheduled maintenance for the EV and one of three unscheduled maintenances of the DV were not related to the performance of the vehicle and, therefore, were not included for comparing the performance.

4.3 In the 12 months of the trial period, the EV had half day of downtime, while the DV had two days of downtime. Hence, the utilisation rates of the EV and the DV were 99.8% and 99.3%. Based on the above, the average daily driving distances of the EV and the DV were 129 km and 61 km, respectively.

4.4 The driver of the EV liked driving the EV and had no operation difficulties in driving the EV. However, he stated that the recharge of the EV affected his operation and the mileage for each recharge of the EV had deteriorated. Overall, he was satisfied with the performance of the EV. Sang Kee was satisfied with the EV since the EV could meet the operational

requirements and save the operation cost. Given the opportunity, Sang Kee 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 73.4 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 (CO₂e) emission from the DV could be estimated for comparison purpose. In the 12-month trial period, the CO₂e from the EV was 4,004 kg while that from the DV based on its average fuel economy was 11,240 kg. Hence, there was a total reduction of 7,236 kg (about 64%) reduction of CO₂e, 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\$2.09/km (about 84%) 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\$2.79/km (about 84%) lower than that of the DV. The utilisation rates of the EV and the DV were 99.8% and 99.3%. There was a 7,236 kg (about 64%) reduction of CO₂e, 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 73.4 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 driver of the EV liked driving the EV and had no operation difficulties in driving the EV. However, he stated that the recharge of the EV affected his operation and the mileage for each recharge of the EV had deteriorated. Overall, he was satisfied with the performance of the EV. Sang Kee was satisfied with the EV since the EV could meet the operational requirements and save the operation cost. Given the opportunity, Sang Kee 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 CO₂e 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) Trial EV

Registration mark:	YN3260
Make:	Joylong
Model:	EW5
Class:	Light goods vehicle
Gross vehicle weight:	4,300 kg
Payload:	1,300 kg
Seating capacity:	Driver + 4 passengers
Rated power:	50 kW
Driving range:	330 km (air-conditioning off)
Battery material:	Lithium-ion
Battery capacity:	73.4 kWh
Year of manufacture:	2023

(b) EV Charging Facility

Make:	Schneider Electric
Model:	EVlink Pro AC EVB3S22N4B
Power:	22 kW, 380 V AC / max 32A three-phase
Charging standard:	IEC 61851-1, IEC 61851-21-2 Equipped IEC 62196-2 Type 2 Socket

2. DV Used for Comparison

Registration mark:	PS8018
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:	2015

Appendix 2: Photos of Vehicles and Charging Facility

1. Trial EV and Charging Facility

	
Front view of EV	Rear view of EV
	
Left side view of EV	Right side view of EV
	
22 kW DC charging facility	

2. DV Used for Comparison

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