

New Energy Transport Fund

Final Report
On
Trial of Electric Light Goods Vehicle for
Civil Engineering Industry
(Smooth Contracting Limited)

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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 Civil Engineering Industry
(Smooth Contracting Limited)**

**Final Report
(Reporting Period: 1 June 2023 – 31 May 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. Smooth Contracting Limited (Smooth Contracting) was approved under the Fund for trial of one electric light goods vehicle for civil engineering industry. Smooth Contracting, through the tendering procedures stipulated in the Agreement entered into with the Government, procured a BYD T3 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. Smooth Contracting assigned a Ford Transit 2.2 DL LW LR 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, BYD T3 electric light goods vehicle, has a gross vehicle weight of 2,420 kg capable of carrying a driver with four passengers and goods. It has a 44.9 kWh lithium iron phosphate battery pack and a driving range of 300 km under NEDC conditions. The DV, Ford Transit 2.2 DL LW LR diesel light goods vehicle with a gross vehicle weight of 3,300 kg and a diesel engine with a cylinder capacity of 2,198 c.c., was used as the conventional counterpart for comparison in this trial. There were six designated drivers assigned to drive the EV and the DV. The vehicles were used for delivering tools and materials among container terminals in Kwai Chung and Tsing Yi in Hong Kong.

2.2 Smooth Contracting installed a designated 7 kW single-phase AC charging facility 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 June 2023 and lasted for 12 months. Smooth Contracting 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. 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 Smooth Contracting 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\$3.07/km (about 90%) 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\$5.95/km (about 94%) lower than that of the DV in the 12 months of the trial.

Table 1: Key operation statistics of each vehicle (1 June 2023 – 31 May 2024)

		EV	DV
Total distance travelled (km)		12,785	3,006
Average daily mileage (km/working day)		44	10
Average fuel economy	(km/kWh)	4.60	-
	(km/litre)	-	6.65
	(km/MJ)	1.28	0.18 ^[1]
Average fuel cost (HK\$/km)		0.33 ^[2]	3.40 ^[3]
Average total operating cost (HK\$/km) ^[4]		0.38	6.33
Downtime (working day) ^{[4][5]}		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\$1.559/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); 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); and HK\$1.499/kWh (May 2024) 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, the EV had one scheduled maintenance while the DV had one scheduled maintenance and two unscheduled maintenances. The scheduled maintenance of the EV included government annual vehicle inspection. The scheduled maintenance of the DV included government annual vehicle inspection, and the unscheduled maintenances of the DV included the replacement of serpentine belts and other mechanical parts.

4.3 In the 12 months of the trial period, the EV had 5 days of downtime due to charging while the DV had 2 days of downtime due to maintenance. Hence, the utilisation rates of the EV and the DV were 98.3% and 99.3%, respectively. Based on the above, the average daily driving distances of the EV and the DV were 44 km and 10 km, respectively.

4.4 The driver of the EV had no operation difficulties in driving the EV. Overall, he was satisfied with the performance of the EV. Smooth Contracting was satisfied with the EV since

the EV could meet the operational requirements and save the operation cost. Given the opportunity, Smooth Contracting 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 44.9 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 emission from the EV and the DV were 1,068 kg and 5,334 kg respectively. Hence, there was a 4,266 kg (about 80%) 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\$3.07/km (about 90%) 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\$5.95/km (about 94%) lower than that of the DV. The utilisation rates of the EV and the DV were 98.3% and 99.3%. There was a 4,266 kg (about 80%) 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 44.9 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 had no operation difficulties in driving the EV. Smooth Contracting was satisfied with the EV since the EV could meet the operational requirements and save the operation cost. Given the opportunity, Smooth Contracting 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:	HY58
Make:	BYD
Model:	T3
Class:	Light goods vehicle
Gross vehicle weight:	2,420 kg
Payload:	711 kg
Seating capacity:	Driver + 4 passengers
Rated power:	35 kW
Driving range:	300 km (under NEDC conditions)
Battery material:	Lithium iron phosphate
Battery capacity:	44.9 kW
Year of manufacture:	2022

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

Make:	Shenzhen EN Plus Technologies Co., Ltd.
Model:	AC7000-AE-25
Power:	7 kW, 230V AC / max 32A
Charging standard:	IEC 62196-2 Type 2

2. DV Used for Comparison

Registration mark:	HY66
Make:	Ford
Model:	Transit 2.2 DL LW LR
Class:	Light goods vehicle
Gross vehicle weight:	3,330 kg
Payload:	1,400 kg
Seating capacity:	Driver + 5 passengers
Cylinder capacity:	2,198 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
	
7 kW single-phase AC charging facility (at Recipient's own cost)	

2. DV Used for Comparison

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