New Energy Transport Fund

Final Report
On
Trial of Electric Medium Goods Vehicle for Logistics Service
(Regal Transportation Services (Asia) Limited)

(3 December 2024)

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(Reporting Period: 1 March 2023 – 29 February 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. Regal Transportation Services (Asia) Limited (Regal) was approved under the Fund for trial of one electric medium goods vehicle for logistics service. Regal, through the tendering procedures stipulated in the Agreement entered into with the Government, procured a BYD Q1R electric medium 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. Regal assigned a Scania P370LA4X2MSZ diesel medium 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 Q1R electric medium goods vehicle, has a gross vehicle weight of 16,000 kg capable of carrying a driver with a passenger and goods. It has a 217 kWh lithium iron phosphate battery pack and a driving range of 150 km with air-conditioning off.

2.2 The DV, Scania P370LA4X2MSZ diesel medium goods vehicle with a gross vehicle weight of 16,000 kg and a diesel engine with a cylinder capacity of 12,742 c.c., was used as the conventional counterpart for comparison in this trial. There were 2 designated drivers assigned to drive the EV, while no designated driver was assigned to drive the DV. Both EV and the DV were used for transporting container boxes within the Container Terminal 9. The EV is a non-road vehicle and can only be driven within the Container Terminal 9.

2.3 Regal installed a designated 150 kW DC charging facility 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 March 2023 and lasted for 12 months. Regal 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 driver and Regal 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$16.63/km (about 81%) 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$16.17/km (about 78%) lower than that of the DV in the 12 months of the trial.

Table 1: Key operation statistics of each vehicle (1 March 2023 – 29 February 2024)

		EV	**DV**
Total distance travelled (km)		18,115	32,387
Average daily mileage (km/working day)		55	89
Average fuel economy	(km/kWh)	0.40	-
	(km/litre)	-	1.08
	(km/MJ)	0.11	0.03 [1]
Average fuel cost (HK$/km)		3.81 [2]	20.44 [3]
Average total operating cost (HK$/km) [4]		4.53	20.70
Downtime (working day) [4][5]		38	1

[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$1.552/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); HK$1.431/kWh (Dec 2023); HK$1.523/kWh (Jan 2024 – Feb 2024) as claimed 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 unscheduled maintenance while the DV had 1 scheduled maintenance in the 12 months of the trial period. The unscheduled maintenance of the EV included the repair of the air-conditioning system while the scheduled maintenance of the DV included regular service and government annual vehicle inspection.

4.3 In the 12 months of the trial period, the EV and the DV had 23 days and 1 day of maintenance-related downtime, respectively. In addition, the EV had another 15 days of downtime due to charging. Hence, the utilisation rates of the EV and the DV were 89.6% and

99.7%, respectively. Based on the above, the average daily driving distances of the EV and the DV were 55 km and 89 km, respectively.

4.4 The drivers of the EV liked driving the EV and had no problem in operating the EV. Overall, they were satisfied with the performance of the EV and would promote the EV to other drivers. Regal was satisfied with the EV since the EV could meet the operational requirements and save the operation cost. Given the opportunity, Regal 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 217 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 17,688 kg and 44,300 kg respectively. Hence, there was a 26,612 kg (about 60%) 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$16.63/km (about 81%) 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$16.17/km (about 78%) lower than that of the DV. The utilisation rates of the EV and the DV were 89.6% and 99.7%. There was a 26,612 kg (about 60%) 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 217 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 problem in operating the EV. Overall, they were satisfied with the performance of the EV. Regal was satisfied with the EV since the EV could meet the operational requirements and save the operation cost. Given the opportunity, Regal would encourage other transport operators to try the EVs.

5.4 The findings showed electric medium 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:	**RT88**
Make:	BYD
Model:	Q1R
Class:	Medium goods vehicle (tractor type)
Gross vehicle weight:	16,000 kg
Seating capacity:	Driver + 1 passenger
Rated power:	150 kW
Driving range:	150 km (air conditioning off)
Battery material:	Lithium iron phosphate
Battery capacity:	217 kWh
Year of manufacture:	2019

EV Charging Facility (at Recipient's own cost)

Make:	BYD Auto Industry Company Limited
Model:	EVD150KG/04
Power:	150 kW, 250 – 850 VDC / max 250A
Charging standard:	GB Mode

2. DV Used for Comparison

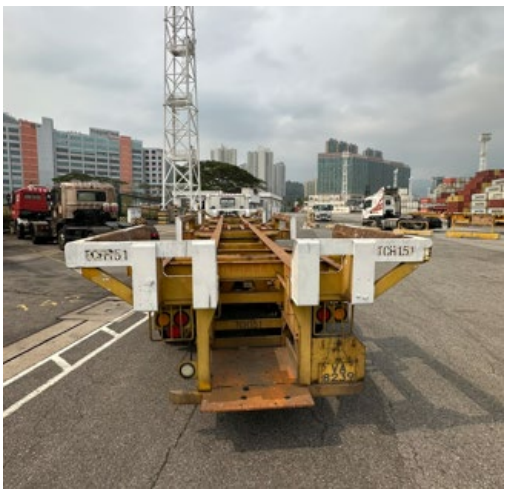
Registration mark:	**VA8239**
Make:	Scania
Model:	P370LA4X2MSZ
Class:	Medium goods vehicle (tractor type)
Gross vehicle weight:	16,000 kg
Seating capacity:	Driver + 1 passenger
Cylinder capacity:	12,742 c.c.
Year of manufacture:	2016

Appendix 2: Photos of Vehicles and Charging Facility

1. Trial EV (RT88) and Charging Facility

	
Front view of EV	Rear view of EV
	
Left side view of EV	Right side view of EV
	
150 kW DC charging facility (at Recipient's own cost)	

2. DV (VA8239) used for Comparison

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