

# **Pilot Green Transport Fund**

## **Final Report On Trial of Electric Light Goods Vehicles for Logistics Service (Take Well Limited)**

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The Monitoring and Evaluation Team's views expressed in this report do not necessarily reflect the views of the Environmental Protection Department, HKSAR.

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**Pilot Green Transport Fund  
Trial of Electric Light Goods Vehicles for Logistics Service  
(Take Well Limited)**

**Final Report  
(Trial Period: 1 June 2020 – 31 May 2022)**

**Executive Summary**

**1. Introduction**

1.1 The Pilot Green 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. Take Well Limited (Take Well) was approved under the Fund for trial of two electric light goods vehicles for providing logistics service. Through the tendering procedures stipulated in the Subsidy Agreement signed with the Government, Take Well procured two JOYLONG EW4-A electric light goods vehicles (EVs: EV1 and EV2) for trial.

1.2 The PolyU Technology and Consultancy Company Limited has been engaged by the Environmental Protection Department as an independent third party assessor to monitor the trial and evaluate the performance of the trial vehicles. Take Well assigned two TOYOTA diesel light goods vehicles (DVs: DV1 and DV2) providing same service as the conventional counterparts for comparison.

1.3 This Final Report summarizes the performance of the EVs in the 24 months of the trial as compared with their conventional counterparts.

**2. Trial and Conventional Vehicles**

2.1 The EVs, JOYLONG EW4-A electric light goods vehicles, have a gross vehicle weight (GVW) of 3,700 kg capable of carrying a driver and 5 passengers, and are equipped with a 64.8 kWh lithium-ion battery pack each. They have a driving range of 260 km with air-conditioning off. Designated drivers were assigned to drive the two EVs.

2.2 Take Well assigned two DVs, TOYOTA KDH201RSSPDY and TOYOTA HIACE, as DVs for comparison. Both DVs have the same GVW of 2,800 kg and are capable of carrying a driver and 5 passengers with a cylinder capacity of 2,982 c.c.

2.3 The EVs and DVs are mainly used to provide logistics service in the New Territories from Mondays to Sundays throughout the year, excluding first 3 days in Lunar New Year Holiday. The operating hours are from 7:30 to 23:00.

2.4 Take Well has installed two 30 kW, 3-phase DC chargers for charging the EVs. Each charger is dedicated to charge specific EV when they were park at Take Well's Lau Fau Shan office. Key features of the EVs, charging facilities and the DVs are presented in Appendix 1

and their photos are shown in Appendix 2.

### 3. Trial Information

3.1 The trial commenced on 1 June 2020 and lasted for 24 months. Take Well was required to collect and provide trial information including the EVs mileage reading before charging, amount of electricity consumed in each charging, time taken for charging, operation downtime due to charging, cost and downtime associated with scheduled and unscheduled maintenances of the EVs and charging facilities. Similar sets of data of the DVs were also required. In addition to the cost information, reports on maintenance work and operational difficulties and opinions of the drivers and Take Well were collected to reflect any problems of the EVs.

### 4. Findings of Trial

4.1 Table 1 summarizes the statistical data of the EVs and the DVs.

Table 1: Key operation statistics of each vehicle (1 June 2020 – 31 May 2022)

		EVs		DVs	
		EV1	EV2	DV1	DV2
Total distance traveled (km)		39,543	27,348	40,637	37,161
Average daily distance traveled (km/working day)		55	38	57	52
Average fuel economy	(km/kWh)	2.68	2.87	-	-
	(km/litre)	-	-	7.98	8.53
	(km/MJ)	0.74	0.80	0.22 <sup>[1]</sup>	0.24 <sup>[1]</sup>
Average fuel cost (HK\$/km) <sup>[2]</sup>		0.46	0.43	2.08	1.94
Fleet average fuel cost (HK\$/km)		0.45		2.01	
Average total operating cost per km (HK\$/km) <sup>[4]</sup>		0.65	0.71	2.38	2.35
Fleet average total operating cost (HK\$/km) <sup>[4]</sup>		0.68		2.37	
Downtime (working day) <sup>[3][4]</sup>		8	8	7	13

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

<sup>[2]</sup> The market fuel price was used for calculation.

<sup>[3]</sup> Downtime refers to the working days that the vehicle is not in operation due to maintenance, counting from the first day it stops operation till the day it is returned to the operator.

<sup>[4]</sup> Maintenance unrelated to the performance of the vehicle was not included for comparison.

4.2 During the 24 months of the trial, there were 724 working days. The total distance traveled of the EV1, EV2, DV1 and DV2 were 39,543 km, 27,348 km, 40,637 km and 37,161 km, respectively; while the average daily distance traveled by the EV1, EV2, DV1 and DV2 were 55 km/day, 38 km/day, 57 km/day and 52 km/day, respectively.

4.3 The fleet average fuel cost of the EVs was HK\$1.56/km (about 78%) lower than that of the DVs. Including maintenance costs, the fleet average total operating cost of the EVs was HK\$1.69/km (about 71%) lower than that of the DVs.

4.4 Excluding non-performance related maintenance, the utilization rates of the EV1, EV2, DV1 and DV2 were 98.9%, 98.9%, 99.0% and 98.2%, respectively.

4.5 To remove the effect of seasonal fluctuations, the 12-month moving average were used to evaluate the trend of the EVs' fuel economy. The fuel economy of the EV1 kept steady over the trial period. While there was a trend of dropping in fuel economy of the EV2 over the trial period, but the variation was narrow that deterioration in fuel economy of the EV2 was insignificant.

4.6 Based on the total mileage of the EVs and the fuel economy of the DVs, the equivalent carbon dioxide (CO<sub>2</sub>e) emission from the DVs could be estimated for comparison purpose. The CO<sub>2</sub>e emission from EV1 and EV2 were 5,666 kg and 3,655 kg, respectively; while those from using DV1 and DV2 were 13,742 kg and 8,892 kg, respectively. Hence the total reduction of CO<sub>2</sub>e emission for EV1 was 8,076 kg (about 59%) and EV2 was 5,237 kg (about 59%) in the trial.

4.7 The operation of the EVs were smooth. The EV drivers had no problem in operating the EVs and considered they were clean and quiet. Take Well and drivers were satisfied with the EVs performance.

## **5. Summary**

5.1 In the trial, the average daily distance traveled of the EV1 and EV2 were 55 km and 38 km, respectively; while those of the DV1 and DV2 were 57 km and 52 km, respectively.

5.2 The EVs had a better fuel economy than the DVs. The fleet average fuel cost of the EVs was about HK\$1.56/km (i.e. 78%) lower than that of the DVs; while the fleet average total operating cost of the EVs was about HK\$1.69/km (i.e. 71%) lower than that of the DVs.

5.3 The utilization rates of the EV1, EV2, DV1 and DV2 were 98.9%, 98.9%, 99.0% and 98.2%, respectively.

5.4 The CO<sub>2</sub>e emission reduction by using the EVs instead of the DVs was about 59%.

5.5 The EV drivers had no problem in operating the EVs and considered they were clean and quiet. Take Well and drivers were satisfied with the EVs performance.

5.6 The findings showed electric light goods vehicle is becoming more affordable and feasible to the transport trade for saving operating cost and reducing CO<sub>2</sub>e emissions, provided that the vehicle can get easy access to charging facilities.

## Appendix 1: Key Features of Vehicles and Charging Facilities

### 1. Trial EVs and Charging Facilities

#### (a) Trial EVs

**Registration mark:** EV1 (JJ2038)  
**Make:** JOYLONG  
**Model:** EW4-A  
**Class:** Light goods vehicle  
**Gross vehicle weight:** 3,700 kg  
**Seating capacity:** Driver + 5 passengers  
**Rated power:** 50 kW  
**Travel range:** 260 km (air conditioning off)  
**Maximum speed:** 100 km/h  
**Battery material:** Lithium-ion  
**Battery capacity:** 64.8 kWh  
**Year of manufacture:** 2019

**Registration mark:** EV2 (LV2038)  
**Make:** JOYLONG  
**Model:** EW4-A  
**Class:** Light goods vehicle  
**Gross vehicle weight:** 3,700 kg  
**Seating capacity:** Driver + 5 passengers  
**Rated power:** 50 kW  
**Travel range:** 260 km (air conditioning off)  
**Maximum speed:** 100 km/h  
**Battery material:** Lithium-ion  
**Battery capacity:** 64.8 kWh  
**Year of manufacture:** 2019

#### (b) Charging Facilities

**Number of chargers:** 2 sets  
**Make:** Hangzhou AoNeng Power Supply  
**Model:** ANDC5-500V/60A-1  
**Power:** 30 kW, DC (max 500V / 60A)  
**Charging standard:** GB mode

## 2. DVs used for Comparison

**Registration mark:** DV1 (PX2232)  
Make: TOYOTA  
Model: KDH201RSPDY  
Class: Light goods vehicle  
Gross vehicle weight: 2,800 kg  
Seating capacity: Driver + 5 passengers  
Cylinder capacity: 2,982 cc  
Year of manufacture: 2011

**Registration mark:** DV2 (SS7277)  
Make: TOYOTA  
Model: HIACE DIESEL LWB  
Class: Light goods vehicle  
Gross vehicle weight: 2,800 kg  
Seating capacity: Driver + 5 passengers  
Cylinder capacity: 2,982 cc  
Year of manufacture: 2014

## Appendix 2: Photos of Vehicles and Charging Facilities

### 1. Trial EVs and Charging Facilities

#### EV1 (JJ2038)

	
<p>Front view of EV1</p>	<p>Rear view of EV1</p>
	
<p>Left side view of EV1</p>	<p>Right side view of EV1</p>

**EV2 (LV2038)**



Front view of EV2



Rear view of EV2



Left side view of EV2



Right side view of EV2

**Charging Facilities**



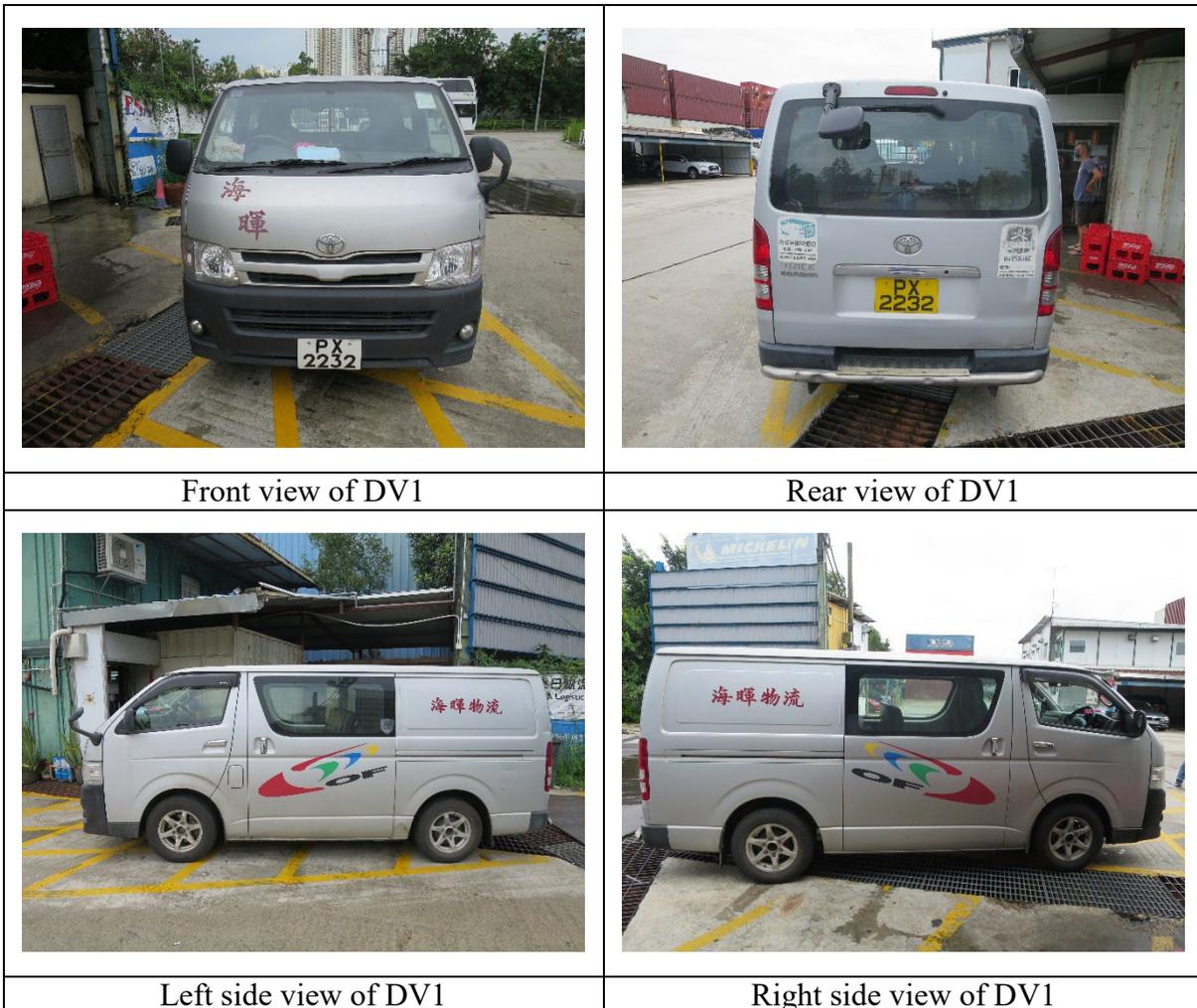
30 kW, 3-phase DC charger 1 for EV1



30 kW, 3-phase DC charger 2 for EV2

## 2. DVs for Comparison

### DV1 (PX2232)



DV2 (SS7277)



Front view of DV2



Rear view of DV2



Left side view of DV2



Right side view of DV2