

# **Pilot Green Transport Fund**

## **Final Report On Trial of Electric Light Goods Vehicle for Manufacture and Wholesale of Noodles (Real Best Limited)**

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PREPARED BY:  
Dr. C.S. Cheung

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

## **List of Monitoring and Evaluation Team Members**

**Dr. C.S. Cheung (Team Leader)**

Department of Mechanical Engineering  
The Hong Kong Polytechnic University

**Ir. Dr. C. Ng**

Department of Mechanical Engineering  
The Hong Kong Polytechnic University

**Mr. K.S. Tsang**

Department of Mechanical Engineering  
The Hong Kong Polytechnic University

**Dr. Edward W.C. Lo**

Department of Electrical Engineering  
The Hong Kong Polytechnic University

**Dr. W.T. Hung**

PolyU Technology and Consultancy Company Limited  
The Hong Kong Polytechnic University

**Pilot Green Transport Fund**  
**Trial of Electric Light Goods Vehicle for Manufacture and Wholesale of Noodles**  
**(Real Best Limited)**

**Final Report**  
**(Reporting Period: 1 July 2020 – 30 June 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. Real Best Limited (Real Best) was approved under the Fund for trial of one electric light goods vehicle for noodles delivery. Real Best, through the tendering procedures stipulated in the Agreement entered into with the Government, procured one JOYLONG EW4-A electric light goods vehicle (EV) for trial. The EV has a gross vehicle weight (GVW) of 3,700 kg, capable of carrying a driver with five passengers and goods. It has a 64.8 kWh lithium-ion battery pack. According to the manufacturer, the EV has a travel range of 260 km with its battery fully charged and air-conditioning off.

1.2 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 vehicle. Real Best assigned a TOYOTA HIACE diesel light goods vehicle (DV) with a GVW of 2,800 kg and 2,982 c.c. engine and provided similar service as the conventional counterpart for comparison.

1.3 This Final Report summarizes the performance of the EV in the 24 months of the trial as compared with its conventional counterpart.

**2. Trial and Conventional Vehicles**

2.1 Key features of the EV, the charging facility and the DV are in Appendix 1 and photos of the vehicles and the charging facility are in Appendix 2. The EV was normally parked at night inside the Transport City Building, Tai Wai, Shatin. The EV was used for the distribution of noodles in Hong Kong.

2.2 Real Best installed a 30 kW DC charging facility inside the Transport City Building, Tai Wai, Shatin for charging and recording the amount of electricity charged. The EV was charged when it was not in use, and was not charged every day.

### 3. Trial Information

3.1 The trial commenced on 1 July 2020 and lasted for 24 months. Real Best 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, and operation downtime due to charging, 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 driver and Real Best were collected to reflect any problems of the EV.

### 4. Findings of Trial

4.1 The following table summarizes the statistical data of the EV and the DV. The average fuel cost of the EV was HK\$1.30/km (about 77%) lower than that of the DV. The average total operating cost of the EV was HK\$1.24/km (about 67%) lower than that of the DV.

Table 1: Key operation statistics of each vehicle (1 July 2020 – 30 June 2022)

	EV <sup>[1]</sup>	DV
Total distance travelled (km)	33,189	138,903
Average daily mileage (km/working day)	50	191
Average fuel economy	(km/kWh)	3.16
	(km/litre)	-
	(km/MJ)	0.26 <sup>[2]</sup>
Average fuel cost (HK\$/km)	0.39 <sup>[3]</sup>	1.69 <sup>[4]</sup>
Average total operating cost (HK\$/km)	0.62	1.86
Downtime (working day) <sup>[5]</sup>	8	2

<sup>[1]</sup> No charging records in May 2021 and June 2021 as EV was not in operation in May 2021 and most of the time in June 2021 as no driver was available to drive the EV

<sup>[2]</sup> Assuming lower heating value of 36.13 MJ/litre for diesel fuel

<sup>[3]</sup> Electricity cost was based on HK\$1.218/kWh for 2020/2021 and HK\$1.289/kWh for 2022

<sup>[4]</sup> The market fuel price was used for calculation

<sup>[5]</sup> Downtime refers to the equivalent number of working days in which 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

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 24 months of the trial, there were two scheduled and two unscheduled maintenances for the EV, leading to 8 days of downtime. The DV also had two scheduled and two unscheduled maintenances, leading to 2 days of downtime. The scheduled maintenances of the EV and the DV were for conducting annual examinations. The first unscheduled maintenance of the EV was for checking condition of the battery charger and upgrading the computer system. The second unscheduled maintenance of the EV was for renewing the programme for battery charger. The unscheduled maintenances of the DV involved replacement of front wheel bearing, brake pads, valve and fuel filter.

4.3 The utilization rates were therefore 98.8% for the EV and 99.7% for the DV. Based on the above, the average daily mileages of the EV and the DV were 50 km/day and 191 km/day respectively.

4.4 The driver had no problem in operating the EV. However, he did not like driving the EV compared with the DV because the EV was less powerful on uphill driving, its driving range was shorter and its performance deteriorated with time. Nevertheless, the operational data submitted by Real Best did not indicate that the EV's performance deteriorated with time. Overall, Real Best agreed that using the EV is good because it can provide a greener and quieter environment as well as having a lower fuel cost. However, Real Best was not satisfied with the low daily travel range of the EV which could not meet their daily operation requirement. Real Best would replace all existing conventional vehicles(s) with green vehicles(s) with longer driving range.

4.5 Based on the 12-month moving average fuel economy, the fuel economy of the EV increased by 12% in the 24-month trial period, which was associated with less driving on heavy slope and less cargo carried in the last twelve months of the trial. There was no indication of deterioration in the battery capacity of the EV.

4.6 In the 24-month of the trial, the total carbon dioxide equivalent (CO<sub>2e</sub>) emission from the EV was 4,060 kg. For comparison purpose, based on the mileage of the EV and the fuel economy of the DV, the total CO<sub>2e</sub> emission from the DV was 9,771 kg. Hence, there was a 5,711 kg (i.e., about 58%) reduction of CO<sub>2e</sub> if the DV was replaced by EV in the trial.

## 5. Summary

5.1 The average fuel cost of the EV was HK\$1.30/km (i.e., about 77%) lower than that of the DV. The average total operating cost of the EV was HK\$1.24/km (i.e., about 67%) lower than that of the DV. The utilization rates were 98.8% for the EV and 99.7% for the DV. There was a 5,711 kg (i.e., about 58%) reduction of CO<sub>2e</sub> if the DV was replaced by EV in the trial.

5.2 Based on the 12-month moving average fuel economy, there was 12% increase in the fuel economy of the EV in the 24-month trial. Also, there was no indication that the battery charge capacity had deteriorated in the trial period.

5.3 The driver had no problem in operating the EV. However, he did not like driving the EV compared with the DV because the EV was less powerful on uphill driving, its driving range was shorter and its performance deteriorated with time. Nevertheless, the operational data submitted by Real Best did not indicate that the EV's performance deteriorated with time. Overall, Real Best agreed that using the EV is good because it can provide a greener and quieter environment as well as having a lower fuel cost. However, Real Best was not satisfied with the low daily travel range of the EV which could not meet their daily requirement. Real Best would replace all existing conventional vehicles(s) with green vehicles(s) with longer driving range.

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<sub>2e</sub> 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) EV

<b>Registration mark</b>	<b>WR5507</b>
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)
Battery material:	lithium-ion
Battery capacity:	64.8 kWh
Year of manufacture:	2019

#### (b) Charging Facility

Make:	Hangzhou AoNeng Power Supply Equipment Co. Ltd
Model:	ANDC5-500V/60A-1
Power:	30 kW, DC (max 500V / 60A)
Charging Standard:	GB

### 2. DV Used for Comparison

<b>Registration mark</b>	<b>UL3224</b>
Make:	TOYOTA
Model:	HIACE Diesel LWB
Class:	Light goods vehicle
Seating capacity:	Driver + 5 passengers
Gross vehicle weight:	2,800 kg
Cylinder capacity:	2,982 cc
Year of manufacture:	2016

## Appendix 2: Photos of Vehicles and Charging Facility

### 1. Trial EV and Charging Facility

#### (a) EV (WR5507)





**(b) Charging Facility**



30kW DC charging facility

2. DV for Comparison

DV (UL3224)



DV- Front view



DV- End view



DV- Right side view



DV- Left side view