

**Pilot Green Transport Fund**

**Final Report**  
**On**  
**Trial of Electric Light Goods Vehicle for**  
**Retail Industry**  
**(Kau Kee Development 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 Vehicle for Retail Industry  
(Kau Kee Development Limited)**

**Final Report  
(Trial Period: 1 January 2020 – 31 December 2021)**

**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. Kau Kee Development Limited (Kau Kee) was approved under the Fund for trial of one electric light goods vehicle for goods delivery service. Through the tendering procedure stipulated in the Subsidy Agreement signed with the Government, Kau Kee procured a NISSAN e-NV200 light goods vehicle (EV) for trial.

1.2 PolyU Technology and Consultancy Company Limited has been engaged by the Environmental Protection Department (EPD) as an independent third party assessor (the Assessor) to monitor the trial and evaluate the performance of the trial vehicle. Kau Kee assigned a diesel light goods vehicle (DV) providing the same type of service for comparing with the EV.

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

**2. Trial and Conventional Vehicles**

2.1 Key features and photos of the EV and DV are shown in Appendix 1 and Appendix 2, respectively. The two vehicles were used for goods delivery service in retail industry. The EV served Taipo, Tsuen Wan and Central & Western areas, whilst the DV served Tsim Sha Tsui, Tsuen Wan and Central areas. According to the EV's manufacturer, the EV's gross vehicle weight is 2,250 kg and it has a driving range of 317 km (air conditioning off). It is equipped with a battery capacity of 40 kWh.

2.2 Kau Kee installed a charging station at its own cost at its Fanling depot. However, due to the operational need, the EV was charged at public carparks in Tsuen Wan office building occasionally and Taipo overnight nearly every day. The electricity consumption was evaluated from the records of percentage of battery charged and the battery capacity, i.e., multiplying the electricity percentage charged with the battery capacity.

### 3. Trial Information

3.1 The trial started on 1 January 2020 and would last for 24 months. Kau Kee was required to collect and provide trial information including the EV 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 EV. A similar set of data from the DV was also required. In addition to the cost information, reports on maintenance work, operational difficulties and opinions of the driver and Kau Kee were collected to reflect any problems of the EV.

### 4. Findings of Trial

4.1 Table 1 summarizes the statistical data of the EV and DV.

Table 1: Key operation statistics of each vehicle (1 January 2020 – 31 December 2021)

	EV	DV
Total distance travelled (km)	88,859	68,944
Average daily distance traveled (km/day)	151	122
Average fuel economy	km/kWh	5.59
	km/litre	11.15
	km/MJ	0.31 <sup>[1]</sup>
Average fuel cost (HK\$/km) <sup>[2]</sup>	0.22	1.36
Average total operating cost (HK\$/km) <sup>[3]</sup>	0.30	1.36
Downtime (working day) <sup>[3][4]</sup>	4	30
Utilization rate (%)	99	95

<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> Maintenance due to incident not related to the performance of the vehicle was not included for comparing the performance.

<sup>[4]</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 The average fuel cost of the EV was HK\$1.14 (about 84%) lower than that of the DV. Taking into account the maintenance costs, the saving in average total operating cost of the EV over the DV was HK\$1.06 (about 78%).

4.3 In the 24 months trial, there were 593 working days for EV and DV. The EV had two scheduled maintenances causing 4 days downtime but no unscheduled maintenance. The DV had no scheduled maintenance but one unscheduled maintenance which involved the engine broke down causing 30 days downtime. The DV subsequently was replaced twice and no more scheduled nor unscheduled downtime was involved. The utilization rates of the EV and the DV were 99% and 95% respectively.

4.4 To remove the seasonal fluctuations, 12-month moving averages were used in this report to evaluate the trend of the EV's fuel economy. The results showed that the fuel economy the EV stabilized at comparative high level and no deterioration in the performance of the EV was observed in the trial period.

4.5 Compared with the carbon dioxide equivalent (CO<sub>2e</sub>) emissions of the DV (estimated based on the total mileage of the EV), there was a reduction of 16,206 kg (about 73%) CO<sub>2e</sub> emissions by using the EV.

4.6 The driver of the EV had no problem in operating the EVs, and felt the EV was clean and quiet. Kau Kee reckoned that the EV served their operational need and was satisfied with the performance of the EV, especially on the saving of operating cost.

## **5. Summary**

5.1 In the 24- months trial, the average daily mileage of the EV was 151 km, while that of the DV was 122 km. The average fuel cost of the EV was HK\$1.14/km (about 84%) lower than that of the DV.

5.2 Taking into account of the maintenance costs, the average total operating cost of the EV was HK1.06/km (about 78%) lower than those of the DV.

5.3 The utilization rates of the EV and the DV were about 99% and 95% respectively. Based on the 12-month moving average fuel economy, the fuel economy of the EV was at a very high level in the first five months of the trial and gradually stabilized at a comparative high level comparing to the same vehicle model, probably because the driver drove the vehicle with particular care, i.e., awareness of the eco-driving, especially in the first five months.

5.4 There was about 73% CO<sub>2e</sub> reduction by using the EV as compared with the DV in the trial.

5.5 The EV driver had no problem in operating the vehicle and the battery capacity was sufficient to support the full-day operation of the EV. Kau Kee was satisfied with the performance of the EV, especially on the saving of operating cost.

5.6 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

### 1. Trial EV

<b>Registration Mark:</b>	<b>WJ8371</b>
Make:	NISSAN
Model:	E-NV200 HALF PANELVAN (LGV)
Class:	Light goods vehicle
Gross vehicle weight:	2,250 kg
Seating Capacity:	driver + 4 passengers
Rated Power:	80 kW
Travel range:	317 km (air conditioning off)
Battery type	Lithium-ion
Battery capacity:	40 kWh
Year of manufacture:	2019

### 2. DV used for comparison

(From January 2020 to June 2020)

<b>Registration Mark:</b>	<b>TY8929</b>
Make:	VOLKSWAGEN
Model:	TRANSPORTER 2.0 TDI HL (6 SEATER)
Class:	Light goods vehicle
Gross vehicle weight:	2,800 kg
Seating Capacity:	driver +5 passengers
Cylinder capacity:	1,968 cc
Year of manufacture:	2015

(From July 2020 to May 2021)

<b>Registration Mark:</b>	<b>NN1194</b>
Make:	TOYOTA
Model:	HIACE DIESEL LWB
Class:	Light goods vehicle
Gross vehicle weight:	2,800 kg
Seating Capacity:	driver +5 passengers
Cylinder capacity:	2,755 cc
Year of manufacture:	2017

(From May 2021 to December 2021)

<b>Registration Mark:</b>	<b>CX2836</b>
Make:	NISSAN
Model:	NV350 URVAN 2.5L DIESEL
Class:	Light goods vehicle
Gross vehicle weight:	3,300 kg
Seating Capacity:	driver +5 passengers
Cylinder capacity:	2,488 cc
Year of manufacture:	2015

## Appendix 2: Photos of the Vehicles

### 1. Trial EV – WJ8371



Front view of EV



Right side view of EV



Left side view of EV



Rear view of EV

**2. DV used for comparison**

**DV - TY8929 (January to June 2020)**



Front view of DV



Right side view of DV



Left side view of DV



Rear view of DV



**DV – NN1194 (July 2020 to May 2021)**



Front view of DV



Right side view of DV



Left side view of DV



Rear view of DV

**DV – CX2836 (May to December 2021)**



Front view of DV



Right side view of DV



Left side view of DV



Rear view of DV