

Pilot Green Transport Fund

Final Report On
Trial of Hybrid Light Goods Vehicle
for Gardening Service
(Wai Men Yuen Gardening & Engineering Co. Ltd.)

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PREPARED BY:

Dr. Joe LO Ka Wah
Mr. Elvin NG Cheuk Yin
Mr. CHAN Ka Chun
Mr. Ricky CHONG Ka Ho

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. Joe K. W. LO (Team Leader)

Centre Manager

Jockey Club Heavy Vehicle Emissions Testing and Research Centre
Hong Kong Institute of Vocational Education (Tsing Yi)

Mr. Elvin C. Y. NG (Team Member)

Test Engineer

Jockey Club Heavy Vehicle Emissions Testing and Research Centre
Hong Kong Institute of Vocational Education (Tsing Yi)

Mr. K. C. CHAN (Team Member)

Technician

Jockey Club Heavy Vehicle Emissions Testing and Research Centre
Hong Kong Institute of Vocational Education (Tsing Yi)

Mr. Ricky K. H. CHONG (Team Member)

Executive Assistant

Jockey Club Heavy Vehicle Emissions Testing and Research Centre
Hong Kong Institute of Vocational Education (Tsing Yi)

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(Wai Men Yuen Gardening & Engineering Co. Ltd.)**

**Final Report
(Trial Period: 1 February 2018 – 31 January 2020)**

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. Wai Men Yuen Gardening & Engineering Co. Limited (Wai Men Yuen) was approved under the Fund for trial of one hybrid light goods vehicle (hereafter called HV) for gardening service. Through the tendering procedures stipulated in the Subsidy Agreement, Wai Men Yuen procured one Hino 300 series hybrid light goods vehicle for trial.

1.2 Hong Kong Institute of Vocational Education (Tsing Yi) 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. One Hino diesel light goods vehicle (DV) providing similar type of service was assigned as the conventional vehicle for comparing with the HV.

1.3 This report summarizes the performance of the HV in the 24 months of the trial as compared with its conventional counterpart.

2. Trial Vehicles

2.1 The HV has a gross vehicle weight (GVW) of 5,500 kg and a cylinder capacity of 4,009 c.c. The DV has a GVW of 5,500 kg and a cylinder capacity of 4,613 c.c. The vehicles were used for gardening service.

2.1 Key features of the HV and the DV are in Appendix 1 and photos of the vehicles are in Appendix 2.

3 Trial Information

The trial started on 1 February 2018 and lasted for 24 months. Wai Men Yuen was required to collect and provide trial information including the HV odometer reading before refueling, the date of refueling, the refueled amount, costs and operation downtime associated with scheduled and unscheduled maintenance of the HV. 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 Wai Men Yuen were also collected to reflect any problems of the HV.

4 Findings of Trial

4.1 Table 1 summarizes the statistical data of the HV and the DV. The average fuel cost of the HV was HK\$0.17/km (7%) lower than that of the DV and the average total operating cost of the HV was HK\$0.92/km (27%) lower than that of the DV.

Table 1: Key Operation Statistics of Each Vehicle (February 2018 – January 2020)

		HV	DV
Total mileage	(km)	7,112	9,390
Average fuel economy	(km/litre)	6.56	5.96
Average fuel cost (HK\$/km) ^[1]		2.13	2.30
Average total operating cost/ (HK\$/km) ^[2]		2.44	3.36
Downtime (day) ^[3]		3	7

^[1] Market rate was adopted for calculation.

^[2] Maintenance due to incidents unrelated to the performance of the vehicle was not included for comparison.

^[3] Downtime refers to the equivalent number of working days in which the vehicle was not in operation due to maintenance, counting from the first day it stopped operation till the day it was returned to the operator. For incidents with operation downtime less than 1 hour, the no. of working days for the vehicle out of service would be counted as 0.

4.2 During the 24 months of the trial, two scheduled maintenances were recorded for both HV and DV, resulting in downtime for 3 and 7 working days respectively. No unscheduled maintenance was recorded for both HV and DV. In the trial period, there were 730 working days. The utilization rates of the HV and DV were 100% and 99% respectively.

4.3 To eliminate the effect of seasonal fluctuations, 12-month moving averages were used to evaluate the trend of the HV's fuel economy. The fuel economy varied between 7.32 km/litre and 6.29 km/litre for the HV in the reporting period, and there was a slight deterioration of the HV's fuel economy.

4.4 The carbon dioxide equivalent (CO₂e) emission from the HV was 3,007 kg while that from the DV was 3,311 kg. Hence, there is a reduction of 304 kg (about 9%) CO₂e emission.

5 Summary

5.1 In the 24 months of the trial, the average daily mileages of the HV and the DV were 9.7 km/day and 12.8 km/day respectively. The HV incurred a lower average fuel cost which was HK\$0.17/km (7%) lower than that of the DV. The average total operating cost of the HV was HK\$0.92/km (27%) lower than that of the DV.

5.2 The utilization rates of the HV and the DV were 100% and 99% respectively in the trial period. However, there was a slight deterioration of the HV's fuel economy. Besides, the CO₂e emission from the HV was about 9% less than that from the DV.

5.3 Wai Men Yuen had a designated driver for the HV. The HV driver felt the HV ran quieter than the DV and produced less pollutants. However, both the HV driver and Wai Men Yuen expressed that the HV had insufficient power when climbing uphill and at start up. In addition, the HV driver expressed that the HV took about 15 minutes to burn off the soot in diesel particulate filter manually after being driven for a certain period of time, but it would not affect the business operation.

5.4 Wai Men Yuen claimed that the performance of HV met the operational requirements and agreed that the HV helped reduce roadside air pollution. They will think about replacing all existing conventional vehicles with green vehicles. Wai Men Yuen also claimed that the performance of DV was declining and the hydraulic platform of the DV did not function properly, so the DV had not been used frequently since March 2019. As a whole, Wai Men Yuen and the driver were satisfied with the performance of HV.

Appendix 1: Key Features of Vehicles

1. Trial HV

Registration mark	LB662
Make:	Hino
Model:	300 Series Hybrid XKU720R-HKUQS3
Class:	Light Goods Vehicle
Gross vehicle weight:	5,500 kg
Seating capacity:	driver + 5 passengers
Engine capacity:	4,009 c.c.
Maximum Output (ps/rpm):	150/2,500
Battery Type:	Nickel-Metal Hydride Battery
Year of manufacture:	2017

2. DV for comparison

Registration mark	KM8748
Make:	Hino
Model:	XZU414RHKMMW3
Class:	Light Goods Vehicle
Seating capacity:	driver + 5 passengers
Gross vehicle weight:	5,500 kg
Engine capacity:	4,613 c.c.
Year of manufacture:	2005

Appendix 2: Photos of Vehicles

1. HV (LB662)



Front view of HV



Rear view of HV



Left side view of HV



Right side view of HV

2. DV (KM8748)



Front view of DV



Rear view of DV



Left side view of DV



Right side view of DV