

Pilot Green Transport Fund

Final Report On
Trial of Hybrid Light Goods Vehicle
for Bread Delivery
(Multi-Asia Investment 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 Hybrid Light Goods Vehicle for Bread Delivery
(Multi-Asia Investment Development Limited)**

**Final Report
(Trial Period: 1 December 2017 – 30 November 2019)**

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 (the green innovative technology), contributing to better air quality and public health for Hong Kong. Multi-Asia Investment Development Limited (Multi-Asia) was approved under the Fund for trial of one hybrid light goods vehicle for bread delivery.

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. Multi-Asia assigned one diesel light goods vehicle (DV) providing similar service as the conventional vehicle for comparing with the HV.

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

2 Trial Vehicle

2.1 Through the tendering procedures stipulated in the Subsidy Agreement that Multi-Asia entered into with the Government, Multi-Asia procured one Mitsubishi Fuso hybrid light goods vehicle (HV) for trial.

2.1 The HV has a gross vehicle weight (GVW) of 5,500 kg and a cylinder capacity of 2,998 c.c. The DV has a GVW of 5,500 kg and a cylinder capacity of 4,899 c.c. The vehicles were used for providing bread delivery service in Hong Kong.

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

3 Trial Information

3.1 The trial started on 1 December 2017 and lasted for 24 months. Multi-Asia was required to collect and provide trial information including the HV odometer reading at refueling, the date of refueling, the refueled amount, cost 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 Multi-Asia were collected and provided to reflect any problems of the HV.

4 Findings of Trial

4.1 Table 1 below summarizes the statistical data of EV and DV. The average total operating cost of the HV was HK\$0.30/km (11%) lower than that of the DV. The average fuel cost of the HV was HK\$0.28/km (10%) lower than that of the DV.

Table 1: Key operation statistics of each vehicle (December 2017 – November 2019)

	HV	DV
Total mileage (km)	157,406	169,493
Average fuel economy (km/litre)	5.69	5.10
Average fuel cost (HK\$/km) ^[1]	2.43	2.71
Average total operating cost (HK\$/km)	2.43	2.73
Downtime (working day) ^{[2] [3]}	0	0

[1] The market fuel price was used for calculation.

[2] Downtime refers to the equivalent number of working days in which the vehicle is not in operation due to charging, and the period 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.

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

4.2 There were three unscheduled maintenances for the HV and two unscheduled maintenances for the DV but no downtime was incurred for both vehicles as the maintenances were unrelated to the performance of the vehicle. The utilization rates of HV and DV were both 100% in this reporting period.

4.3 The driver found no problem in operating the HV and felt the HV ran quieter than the DV and produced less pollutants. The HV driver also expressed that the HV had less power compared to the DV when climbing uphill and also at start-up. The response time of auto-transmission gearbox of the HV was slow during acceleration and start-up. However, the driver expressed he encountered less difficulties in driving the HV when the trial went on, and he started to like driving the HV.

4.4 Multi-Asia claimed that the performance of HV met the operational requirements and there was no sign of performance degradation during the reporting period. However, Multi-Asia expressed that it was inconvenient to use automotive grade aqueous urea for the HV. In general, Multi-Asia and the driver were satisfied with the performance of HV.

4.5 To eliminate the effect of seasonal fluctuations, 12-month moving averages are used to evaluate the trend of the HV's fuel economy. The fuel economy varied between 5.94 km/litre and 5.47 km/litre for the HV in the reporting period. It can be observed there was a slight deterioration of the HV's fuel economy.

4.6 The carbon dioxide equivalent (CO₂e) emissions from the HV and the DV are 76,680 kg and 85,416 kg, respectively, and hence there is an emission reduction of 8,735 kg CO₂e, which is about 10% reduction, in the trial.

5 Summary

5.1 The driver found no problem in operating the HV and felt the HV ran quieter than the DV and produced less pollutants. The HV driver also expressed that the HV had less power compared to the DV when climbing uphill and also at start-up. The response time of auto-transmission gearbox of the HV was slow during acceleration and start-up. However, the driver expressed he encountered less difficulties in driving the HV when the trial went on, and he started to like driving the HV. In general, Multi-Asia and the driver were satisfied with the performance of HV.

5.2 The utilization rates of HV and DV were both 100%. The average fuel cost of the HV was 10% lower than that of the DV. The average total operating cost of the HV was 11% lower than that of the DV. In the reporting period, there was a slight deterioration of the HV's fuel economy.

5.3 In the 24 months of the trial, the CO₂e emission from the HV was 10% less than that from the DV.

Appendix 1: Key Features of Vehicles

1. Trial HV

Registration Mark	LT705
Make:	Mitsubishi Fuso
Model:	FEB74GR3SDAL
Class:	Light Goods Vehicle
Gross vehicle weight:	5,500 kg
Seating capacity:	Driver + 5 passengers
Engine capacity:	2,998 c.c.
Maximum Output (ps/rpm):	150/3,500
Battery Type:	Lithium ion
Year of manufacture:	2017

2. DV for comparison

Registration Mark	RC4700
Make:	Mitsubishi Fuso
Model:	FE83DGZSRDAA
Class:	Light Goods Vehicle
Gross vehicle weight:	5,500 kg
Seating capacity:	Driver + 5 passengers
Engine capacity:	4,899 c.c.
Year of manufacture:	2011

Appendix 2: Photos of Vehicles

1. Trial HV



Front view of HV



Rear view of HV



Left side view of HV



Right side view of HV

2. DV for comparison



Front view of DV



Rear view of DV



Left side view of DV



Right side view of DV