Pilot Green Transport Fund

Final Report
On
Trial of Hybrid Light Goods Vehicle for Logistics Service
(P & J Logistics (Hong Kong) Limited)

(5 August 2021)

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(Trial Period: 1 March 2019 – 28 February 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 and innovative transport technologies, contributing to better air quality and public health for Hong Kong. The Fund has subsidized P&J Logistics (Hong Kong) Limited (P&J (HK)) to try out one diesel-electric hybrid light goods vehicle (HV) for logistics service.

1.2 PolyU Technology and Consultancy Company Limited has been engaged by the Environmental Protection Department as an independent third-party assessor (the Assessor) to monitor the trial and evaluate the operational performance of the trial vehicle. The Assessor regularly visited P&J (HK) to collect information for evaluating the performance of the HV as compared with the diesel light goods vehicle (DV) which provided the same service as the HV. The information collected includes the said vehicles' operation data, fuel bills, maintenance records, reports on operation difficulties and opinions of the HV driver and P&J (HK) from survey questionnaires.

1.3 This Final Report summarizes the performance of the HV for logistics service in the 24-month trial as compared with the DV.

2. Trial and Conventional Vehicles

2.1 P&J (HK) procured one Mitsubishi Fuso diesel-electric hybrid light goods vehicle (i.e. HV) with gross vehicle weight (GVW) of 5,500 kg and cylinder capacity of 2,998 cc for trial. One Mitsubishi Fuso diesel light goods vehicle (i.e. DV) with GVW of 5,500 kg and cylinder capacity of 2,998 cc was assigned for comparison purpose.

2.2 Both the HV and the DV are stationed at a Kwai Chung car park near Tsuen Tsing Interchange. The HV ran from Mondays to Saturdays from 08:00 to 18:30 in Kwun Tong district while the DV ran from Mondays to Saturdays from 08:00 to 18:30 in Kwai Chung district. Both vehicles did not provide service on Sundays.

2.3 Key features and photos of the HV and the DV are in Appendix 1 and Appendix 2, respectively.

3. Trial Information

3.1 The 24-month trial started on 1 March 2019 and lasted for 24 months. P&J (HK) was required to collect and provide trial information including the HV's mileage reading before refueling, amount and cost of fuel in each refueling, as well as the cost and operation downtime associated with scheduled and unscheduled maintenances of the HV. P&J (HK) was also required to provide similar data of the DV. In addition to the cost information, reports on maintenance work, operational difficulties and opinions of the driver and P&J (HK) were collected to reflect any problems of the HV.

4. Findings of Trial

4.1 Table 1 shows a summary of all the key operation statistics for each vehicle. The average fuel cost of HV was lower than that of the DV by HK$0.17/km (i.e, about 7%) and the average fuel economy of the HV was higher than that of the DV by 0.43 km/litre (i.e., about 7%). The average total operating cost of the HV was HK$0.24/km (i.e. about 9%) lower than that of the DV taking the maintenance cost into account.

Table 1: Key operation statistics of each vehicle (1 March 2019 – 28 February 2021)

	HV	**DV**
Total distance travelled (km)	60,933	83,310
Average daily mileage (km/working day)	98	134
Average fuel economy (km/litre)	6.30	5.87
Average fuel cost (HK$/km) [1]	2.29	2.46
Average total operating cost (HK$/km) [2]	2.51	2.75
Downtime (working day) [2][3]	4	5

[1] The market fuel price was used for calculation

[2] Maintenance due to incident 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 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 During the reporting period, the HV had undergone three scheduled maintenances and two unscheduled maintenances while the DV had undergone four scheduled maintenances and three unscheduled maintenances. There were 626 working days in the 24 months of the trial. The HV and DV had 4 and 5 days of operation downtime respectively and thus the utilization rates of the HV and the DV were 99.4% and 99.2%, respectively.

4.3 P&J (HK) had a designated driver for the HV. The driver of the HV reflected that he had no problem in its operation. However, he reflected that the HV was less powerful than the DV when driving upslope, and responded slower than the DV. P&J(HK) was satisfied with the performance of the HV and considered that hybrid light goods vehicle could provide a greener environment.

4.4 To remove the effect of seasonal fluctuations, 12-month moving averages are used to evaluate the trend of the HV's fuel economy. The results show that fuel economy of the HV appeared to improve slightly towards the end of the trial. It appears that the engine of the HV was still in normal working condition and the fuel economy could be maintained through proper maintenance.

4.5 The carbon dioxide equivalent (CO_2e) emission from HV was 26,792 kg while that from DV on the respective HV mileage was 28,798 kg. Overall, there was a total reduction of 2,005 kg CO_2e emission (i.e., about 7%) in the trial by using HV. Therefore, the adoption of HVs in this trial could provide obvious environmental benefit.

5. Summary

5.1 In the 24-month trial period, the average daily mileages of HV was 98 km while that for DV was 134 km. The HV had a better fuel economy than the DV. The average fuel cost of the HV was HK$0.17/km (i.e., about 7%) lower than that of the DV. Including the maintenance costs, the average total operating cost of the HV was HK$0.24/km (i.e., about 9%) lower than that of the DV. There was 2,005 kg CO_2e emission reduction (i.e., about 7%) by using the HV during the 24-month trial period as compared with the DV.

5.2 Excluding the downtime of vehicles unrelated to their performance due to the scheduled and unscheduled maintenances, the HV and DV had 4 and 5 days downtime respectively in the 24-month trial period. The utilization rates of the HV and DV were therefore 99.4% and 99.2% respectively.

5.3 No deterioration in the performance of the HV was observed from the reported data.

5.4 In the 24-month trial period, the operation of the HV was smooth. The driver of the HV found no problem in operating the HV. However, the driver reflected that the HV was less powerful than the DV when driving upslope, and responded slower than the DV. P&J(HK) was satisfied with the performance of the HV and considered that using hybrid vehicle is good because it can provide a greener environment.

Appendix 1: Key Features of Vehicles

1. Trial HV

Registration Mark:	**VY1563 (HV)**
Make:	Mitsubishi Fuso
Model:	FEB74GR3SDAL
Class:	Light goods vehicle
Gross vehicle weight:	5,500 kg
Seating capacity:	driver + 2 passengers
Cylinder capacity:	2,998 cc
Year of manufacture:	2017

2. DV used for comparison

Registration Mark:	**VA2452 (DV)**
Make:	Mitsubishi Fuso
Model:	FEC71GR4SDAH
Class:	Light goods vehicle
Gross vehicle weight:	5,500 kg
Seating capacity:	driver + 2 passengers
Cylinder capacity:	2,998 cc
Year of manufacture:	2016

Appendix 2: Photos of Vehicles

1. Trial HV

	
HV (VY1563) (front view)	HV (VY1563) (rear view)
	
HV (VY1563) (side view)	HV (VY1563) (side view)

2. DV used for comparison

	
DV (VA2452) (front view)	DV (VA2452) (rear view)
	
DV (VA2452) (side view)	DV (VA2452) (side view)