Pilot Green Transport Fund

Interim Report
On
Trial of Hybrid Light Goods Vehicle for Courier Services (R&B Express)

(14 June 2018)

PREPARED BY:
Prof. C.S. Cheung
Dr. W.T. Hung
Ir Dr. C. Ng

List of Monitoring and Evaluation Team Members

Prof. C.S. CHEUNG (Team Leader)
Professor
Department of Mechanical Engineering
The Hong Kong Polytechnic University

Dr. W.T. HUNG (Deputy Team Leader)
PolyU Technology and Consultancy Company Limited
The Hong Kong Polytechnic University

Ir Dr. C. NG
Senior Technical Officer
Department of Mechanical Engineering
The Hong Kong Polytechnic University

Pilot Green Transport Fund
Trial of Hybrid Light Goods Vehicle for Courier Services (R&B Express)

Interim Report
(Trial Period: 1 August 2017 – 31 January 2018)

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. The Fund has subsidized R&B Express Co. (R&B Express) to try out one hybrid light goods vehicle (HV) for logistics services.

1.2 PolyU Technology and Consultancy Company Limited (the assessor) has been engaged by the Environmental Protection Department (EPD) as an independent third party assessor to monitor the trials and evaluate the performance of the trial vehicles. The assessor regularly visited R&B Express to collect information for evaluating the performance of the HV as compared with the diesel light goods vehicle (DV) which provided the same service in the same area and road conditions. The information collected included the said vehicles' operation data, fuel bills, maintenance records, reports on operation difficulties, and opinion of the HV driver from survey questionnaires.

1.3 This Interim Report summarizes the performance of the HV for courier services in the first six months of the trial as compared with its conventional counterpart, i.e. the DV.

2. Trial Vehicles

2.1 R&B Express procured one MITSUBISHI FUSO HV of 5,500 kg gross vehicle weight (GVW) and 2,998 cc cylinder capacity for trial. One MITSUBISHI FUSO DV of 5,500 kg GVW and 4,899 cc cylinder capacity was assigned for comparison with the HV. All vehicles were equipped with air-conditioning.

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

3. Trial Information

3.1 The trial started on 1 August 2017 and will last for 24 months. Both the HV and the DV operated from Shum Shui Po depot to deliver freights to Hong Kong Island East and Aberdeen areas. There was no fixed route. The HV provided service every day from 08:30 to 19:30 daily with lunch hour break from 13:00 to 15:00 except Sunday and public holidays while the DV provided services from 19:00 to 23:00 Wednesday to Friday.

4. Findings of Trial

4.1 During this six-month reporting period, the HV travelled 15,125 km whereas the DV travelled 6,710 km. The fuel cost of the HV was $0.13/km (5.9%) higher than the DV. The performance of the HV and its average operating cost as compared with the DV in the first six months of the trial are summarized in Table 1.

Table 1: Average fuel economy and average fuel cost of the trial vehicle

	Hybrid light goods vehicle	**Diesel light goods vehicle**
	HV	**DV**
Total distance travelled, km	15,125	6,710
Average fuel economy, km/litre	5.17	5.43
Average fuel cost[1] HK$/km	2.39	2.26
Average total operating cost[1] HK$/km	2.39	2.26

[1] The market fuel price was used for calculation

4.2 The average fuel cost of HV was higher than its conventional counterpart by 5.9%. The vehicles' operating conditions and the drivers' driving habit would affect its fuel saving performance.

4.3 Besides fuel costs, maintenance cost and other costs associated with breakdowns, such as replacement of components and parts, were also accounted for in calculating the total operating cost. The HV had no maintenance action in this reporting period. The average total operating cost of the HV was 5.9% higher than the DV.

4.4 During the reporting period, the HV had no scheduled or unscheduled maintenance. The utilization rate of the HV was 100% same as the DV (excluding the downtime unrelated to the vehicle performance).

5. Summary

5.1 The vehicle operating conditions and the drivers' driving habit would affect the fuel saving performance of the hybrid vehicle. The HV had an average of 5.9% higher fuel cost per kilometer travelled as compared to the DV, indicating that the HV had lower fuel economy than the DV with the six months' data. Possible explanations are: the HV has less engine power (2,998 c.c.) than the DV (4,899 c.c.) that it needs more fuel to power at start and upslope operations; the HV has around 30 delivery points on average per day while the DV has around 3 points; the vehicles do not turn off their engines during these stops causing more fuel consumption per kilometer travelled.

5.2 The HV driver reflected that they had no problem in operating the vehicle. They in general felt the HV was clean and less polluted. However, they reflected that the HV responded slower and less powerful on uphill than the DV. R&B Express however satisfied with the performance of the HV.

5.3 The HV had no scheduled or unscheduled maintenance. The HV had 100% utilization rate, same as DV (excluding downtime unrelated to vehicle performance).

5.4 No deterioration in the performance of the HV was observed from the six months reported data.

5.5 The findings only reflect the performance of the HV in the first six months of the trial. More time is needed to test the performance and reliability of the HV.

Appendix 1: Key Features of Vehicles

1. Trial HV

Registration Mark:	**MW473 (HV)**
Make:	MITSUBISHI FUSO
Model:	FEB74ER3SDAL
Class:	Light goods vehicle
Gross vehicle weight:	5500 kg
Seating Capacity:	6 (including driver)
Cylinder capacity:	2998 cc
Year of manufacture:	2017

2. DV used for comparison

Registration Mark:	**HR6178 (DV)**
Make:	MITSUBISHI FUSO
Model:	FE83DEZSRDAA
Class:	Light goods vehicle
Gross vehicle weight:	5500 kg
Seating Capacity:	3 (including driver)
Cylinder capacity:	4899 cc
Year of manufacture:	2010

Appendix 2: Photos of the Trial Vehicles

1. Trial HV- MW473

	
Front view of HV	Side view of HV
	
Side view of HV	Rear view of HV

2. DV used for comparison - HR6178

	
Front view of DV	Rear view of DV