

Pilot Green Transport Fund

Interim Report

On

**Trial of Hybrid Light Goods Vehicles for
Logistics Services (Atta-Trans Limited)**

(9 January 2018)

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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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Interim Report
(Trial Period: 1 February 2017 – 31 July 2017)

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 Atta-Trans Limited (Atta-Trans) to try out three hybrid light goods vehicles for logistics services.

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 this trial and evaluate the operational performance of the trial vehicles. The assessor regularly visited Atta-Trans to collect information for evaluating the performance of the three hybrid light goods vehicles (HVs) as compared with the three diesel light goods vehicles (DVs) which provided the same services 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 opinions of the HVs drivers from survey questionnaires.

1.3 This Interim Report summarizes the performance of the HVs for logistics services in the first six months of the trial as compared with their conventional counterparts, i.e. the DVs.

2. Trial Vehicles

2.1 Atta-Trans procured three Hino 300 series hybrid light goods vehicles (HV-1, HV-2 and HV-3) each of 5,500 kg gross vehicle weight (GVW) and 4,009 cc cylinder capacity for trial. Three Mitsubishi Fuso diesel light goods vehicles of 5,500 kg GVW, two of which of 2,998 cc cylinder capacity (DV-1; DV-3) and the other one of 4,899 cc cylinder capacity (DV-2), were assigned for comparison with the HVs. All vehicles were equipped with air-conditioning units.

2.2 Key features and photos of the HVs and DVs are in Appendices 1 and 2 respectively.

3. Trial Information

3.1 The 24-month trial started on 1 February 2017. Two pairs of vehicles (HV-1 and DV-1; HV-2 and DV-2) operated from Kwai Chung Depot to deliver freight to Kowloon and Hong Kong Island areas; the third pair of vehicles (HV-3 and DV-3) operated from Kwai Chung Depot to

deliver freight to Tsuen Wan and Kwai Chung areas. There was no fixed route. The vehicles provided services from Mondays to Saturdays (8:00 am – 6:00 pm) excluding Sundays and public holidays.

4. Findings of Trial

4.1 During this first six-month reporting period, the HVs travelled an average of 19,693 km whereas the DVs travelled an average of 18,603 km. The fuel costs comparisons are as follows: HV-1 was \$0.22/km (11.6%) lower than DV-1; HV-2 was \$0.01/km (0.8%) lower than DV-2; and HV-3 was \$0.13/km (6.7%) lower than DV-3. The performance of the HVs and their average operating costs as compared with the DVs in the first six months of the trial are summarized in Table 1.

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

	HV-1	HV-2	HV-3	DV-1	DV-2	DV-3
Average fuel economy, km/litre	6.81	6.66	6.35	6.03	6.63	5.92
Average fuel cost ^[1] \$/km	1.71	1.74	1.83	1.93	1.76	1.96
Average total operating cost ^[1] ^[2] \$/km	1.82	1.83	1.91	3.61	7.35	3.96

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

^[2] Including costs incurred from maintenance. Atta-Trans did not pay for the labour cost of the maintenance of the HVs because the vehicles were under warranty.

4.2 The average fuel cost of the HVs was lower than their conventional counterparts by 6.3%. The vehicles' operating conditions and the drivers' driving habit would affect its fuel saving performance.

4.3 In addition to fuel cost and maintenance cost, other cost associated with breakdowns, such as replacement of components and parts, were also accounted for in calculating the total operating cost. It should be noted that the maintenance cost of the HVs did not include labour cost as the vehicles were still under warranty, the labour cost was waived and only the parts to be replaced were charged. In this reporting period, the HVs had two scheduled maintenance each; HV-2 involved in a slight incident whereby it rubbed against the ceiling of the carpark causing damage to the front top of the vehicle. All DVs had one scheduled maintenance and one major unscheduled maintenance each, with DV-1 having two extra unscheduled maintenances and DV-3 having an extra scheduled annual vehicle examination. The average total operating cost of all HVs was 58.8% lower than the DVs because DV-1 and DV-2 broke down and each had a major overhaul and DV-3 had leakage of lubricating oil and subsequently had to replace many spare parts.

4.4 During the reporting period, the utilization rates of the three HVs were 97%, 99% and 99% (excluding the downtime un-related to its performance) respectively, which were much higher than those of the DVs (80%, 68% and 89% respectively). The average utilization rate of the HVs was 98% and DVs was 81%.

5. Summary

5.1 The vehicle operating conditions and the drivers' driving habit would affect the fuel saving performance of the hybrid vehicles. According to the first six months' data, the three HVs had an average of 6.3% lower fuel cost per kilometer travelled lower than the DVs, indicating that the HVs had better fuel economy than the DVs.

5.2 The HV drivers reflected that they had no problem in operating the vehicles. They in general felt the HV was clean and less polluted. However, they reflected that the HVs responded slower than DVs. Atta-trans was satisfied with the HVs as they were reliable.

5.3 All HVs had two scheduled maintenance each. HV-2 had one unscheduled maintenance but unrelated to its performance in the six-month trial period. All DVs had one scheduled maintenance and one major unscheduled maintenance each, with DV-1 having two extra unscheduled maintenances and DV-3 having an extra scheduled annual vehicle examination. The HVs had an average of 98% utilization rate, which was better than the 81% of the DVs.

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

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

Appendix 1: Key Features of Vehicles

1. Trial HVs

Registration Mark: JZ9370 (HV-1)
Make: Hino
Model: 300 Series Hybrid XKU720R-HKUQS3
Class: Light goods vehicle
Gross Vehicle Weight: 5,500 kg
Seating Capacity: 2 passengers
Cylinder Capacity: 4,009 cc
Year of Manufacture: 2016

Registration Mark: KA239 (HV-2)
Make: Hino
Model: 300 Series Hybrid XKU720R-HKUQS3
Class: Light goods vehicle
Gross Vehicle Weight: 5,500 kg
Seating Capacity: 2 passengers
Cylinder Capacity: 4,009 cc
Year of Manufacture: 2016

Registration Mark: MM2862 (HV-3)
Make: Hino
Model: 300 Series Hybrid XKU720R-HKUQS3
Class: Light goods vehicle
Gross Vehicle Weight: 5,500 kg
Seating Capacity: 2 passengers
Cylinder Capacity: 4,009 cc
Year of Manufacture: 2016

2. DVs used for comparison

Registration Mark: **HX1383 (DV-1)**
Make: Mitsubishi Fuso
Model: FEC71GR3SDAD
Class: Light goods vehicle
Gross Vehicle Weight: 5,500 kg
Seating Capacity: 2 passengers
Cylinder Capacity: 2,998 cc
Year of Manufacture: 2012

Registration Mark: **NR2003 (DV-2)**
Make: Mitsubishi Fuso
Model: FE83DGZSRDAA
Class: Light goods vehicle
Gross Vehicle Weight: 5,500 kg
Seating Capacity: 2 passengers
Cylinder Capacity: 4,899 cc
Year of Manufacture: 2010

Registration Mark: **RB1500 (DV-3)**
Make: Mitsubishi Fuso
Model: FEC71GR4SDAD
Class: Light goods vehicle
Gross Vehicle Weight: 5,500 kg
Seating Capacity: 2 passengers
Cylinder Capacity: 2,998 cc
Year of Manufacture: 2012

Appendix 2: Photos of the Trial Vehicles

1. Trial HVs

	
Front view of JZ9370 (HV-1)	Side view of HV-1
	
Side view of HV-1	Rear view of HV-1
	
Front view of KA239 (HV-2)	Side view of HV-2



Side view of HV-2



Rear view of HV-2



Front view of MM2862 (HV-3)



Side view of HV-3



Side view of HV-3



Rear view of HV-3

2. DVs used for comparison



Front view of HX1383 (DV-1)



Front view of NR2003 (DV-2)



Front view of RB1500 (DV-3)