Pilot Green Transport Fund

Final Report On
Trial of Hybrid Light Goods Vehicle
for Chemical Products Delivery
(Shing Hing Chemical Company Limited)

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Trial of Hybrid Light Goods Vehicle for Chemical Products Delivery
(Shing Hing Chemical Company Limited)

Final Report
(Trial Period: 1 April 2018 – 31 March 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. Shing Hing Chemical Company Limited (Shing Hing) was approved under the Fund for trial of one Hino 300 Series hybrid light goods vehicle (HV) for chemical products 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. Shing Hing assigned one Isuzu diesel light goods vehicle (DV) providing similar service as the conventional vehicle for comparing with the HV.

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

2. Trial Vehicle

2.1 Through the tendering procedures stipulated in the Subsidy Agreement that Shing Hing entered into with the Government, Shing Hing procured one Hino 300 Series hybrid light goods vehicle (HV) for trial.

2.2 Key features of the HV and the DV are in Appendix 1 and photos of the vehicles are in Appendix 2. The HV had a gross vehicle weight (GVW) of 5,500 kg and a cylinder capacity of 4,009 c.c. The DV had a GVW of 5,500 kg and a cylinder capacity of 4,751 c.c. The vehicles were used to deliver chemical products to clients without a fixed service area.

3 Trial Information

3.1 The trial started on 1 April 2018 and lasted for 24 months. Shing Hing was required to collect and provide trial information including the HV odometer reading before refueling, the date of refueling, the refueled amount, cost and operation downtime associated with scheduled and unscheduled maintenances of the HV. Similar set of monthly 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 Shing Hing were also collected to reflect any problems of the HV.

4 Findings of Trial

4.1 Table 1 below summarizes the statistical data of the HV and the DV. The average total operating cost of the HV was HK$0.52/km (16%) lower than the DV. The average fuel cost saving of HV was HK$0.24/km (9%) lower than the DV.

Table 1: Key Operation Statistics of Each Vehicle (April 2018 to March 2020)

	HV	**DV**
Total mileage (km)	37,197	37,494
Fuel cost (HK$) [1]	92,500	102,536
Average fuel economy (km/litre)	5.65	5.13
Average fuel cost (HK$/km) [1]	2.49	2.73
Average total operating cost (HK$/km)	2.80	3.32
Downtime (working day) [2] [3]	4	5

[1] The market rate was adopted 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 During the 24 months of the trial, the HV had 5 scheduled maintenances resulting in a downtime of 4 working days while the DV has 1 scheduled maintenance resulting in a downtime of 2 working days. Also, the DV had 3 unscheduled maintenances resulting in a downtime of 3 working days while the HV had no unscheduled maintenance during the trial. There were 615 working days in the reporting period, the utilization rates of HV and DV were both 99%.

4.3 The HV driver shared the view that driving the HV was more comfortable than driving the DV, and the HV was quieter than the DV. Also, the HV produced less air pollutants. However, both the HV driver and Shing Hing expressed that the HV had comparatively lower power when climbing uphill and also at start up.

4.4 Shing Hing was of the view that the HV provided a greener and quieter environment than the DV. However, Shing Hing expressed that the HV had comparatively lower power when climbing uphill and also at start up, so sometimes it needed to turn off ECO mode and increase the torque of the engine to meet the daily work needs.

4.5 To eliminate the effect of seasonal fluctuations, 12-month moving averages were used to evaluate the trend of the HV’s fuel economy. It is shown that the fuel economy was stable (between 5.44 km/litre and 5.93 km/litre). It appears that the engine of the HV was still in normal working conditions and the fuel economy could be maintained through proper maintenance.

4.6 The carbon dioxide equivalent (CO_2e) emissions from the HV and the DV was 18,252 kg and 20,102 kg, respectively, and hence there is an emission reduction of 1,850 kg CO_2e, which is about 9% reduction, in the trial.

5 Summary

5.1 The driver found no problems in operating the HV and was satisfied with the performance of it for the assigned daily driving duties. However, both the HV driver and Shing Hing expressed that the HV had comparatively lower power when climbing uphill and also at start up.

5.2 The trial results showed that the HV had lower fuel cost as compared with its conventional diesel counterpart, with a saving of HK$0.24/km (9%). The average total operating cost of the HV was HK$0.52/km (16%) lower than that of the DV. Overall, Shing Hing expressed that the fuel economy of the HV achieved expected results as the fuel economy of HV was stable (between 5.44 km/litre and 5.93 km/litre) and the HV could helpsave their operating costs.

5.3 There were 615 working days in the trial period, the utilization rates of the HV and the DV were both 99% respectively. In the 24 months of the trial, the average daily mileage of the HV and the DV were around 61km.

5.4 The CO_2e emission from the HV was 18,252 kg while that from the DV was 20,102 kg. Hence there was an emission reduction of 1,850 kg CO_2e (about 9%).

5.5 No deterioration in the performance of the HV was observed during the trial period.

Appendix 1: Key Features of Vehicles

1. Trial HV

Registration Mark	
Make:	Hino
Model:	300 Series Hybrid XKU710R-HKUQS3
Class:	Light goods vehicle
Gross vehicle weight:	5,500 kg
Seating capacity:	Driver + 2 passengers
Cylinder capacity:	4,009 c.c.
Maximum Output (ps/rpm):	150/2,500
Battery Type:	Nickel-Metal hydride
Year of manufacture:	2017

2. DV for comparison

Registration Mark	**CV8089**
Make:	Isuzu
Model:	NPR70LU-5JMF-D
Class:	Light goods vehicle
Gross vehicle weight:	5,500 kg
Seating capacity:	Driver + 2 passengers
Cylinder capacity:	4,751 c.c.
Year of manufacture:	2005

Appendix 2: Photos of Vehicles

1. Trial HV

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<tr><td>HV – front view</td><td>HV – rear view</td></tr>
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<tr><td>HV – left side view</td><td>HV – right side view</td></tr>
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2. DV for comparison

	
DV– front view	DV– rear view
	
DV– left side view	DV– right side view