Pilot Green Transport Fund

Final Report On
Trial of Hybrid Medium Goods Vehicle for Plastic and Metal Product Delivery (The Build-Up Plastic and Metal Company Limited)

(15 May 2020)

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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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Trial of Hybrid Medium Goods Vehicle for Plastic and Metal Product Delivery
(The Build-Up Plastic and Metal Company Limited)

Final Report
(Trial Period: 1 October 2017 - 30 September 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, contributing to better air quality and public health for Hong Kong. The Build-Up Plastic and Metal Company Limited (Build-Up) was approved under the Fund for trial of one hybrid medium goods vehicle (hereafter called HV) for hanger 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.

1.3 This report summarizes the performance of the HV in the twenty-four months of the trial as compared with its conventional counterpart.

2. Trial Vehicles

2.1 Through the tendering procedures stipulated in the Agreement, Build-Up procured one Hino 300 Series Hybrid Medium Goods Vehicle (HV) for trial. The vehicle is used to deliver plastic garment hangers and deliver button occasionally. One diesel medium goods vehicle (DV) providing similar services was assigned for comparison with the HV.

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 October 2017 and lasted for 24 months. Build-Up was required to collect and provide trial information including the HV odometer reading, 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 drivers and Build-Up were collected to reflect any problems of the HV.

4. Findings of Trial

4.1 The following table summarizes the statistical data of the HV and the DV. The average fuel cost of the HV was HK$1.24/km (i.e., about 32%) lower than the DV and the average total operating cost of the HV was HK$3.29/km (i.e., about 52%) lower than the DV.

Table 1: Key Operation Statistics of Each Vehicle (October 2017 to September 2019)

	HV	**DV**
Total distance traveled (km)	29,531	42,226
Average daily distance traveled (km/day)	50.1	71.6
Average fuel economy (km/litre)	5.19	3.54
Average fuel cost (HK$/km) [1]	2.63	3.87
Total operating cost (HK$)	91,423	269,449
Average total operating cost (HK$/km) [2]	3.09	6.38
Downtime (working day) [2] [3]	6	19

[1] Market rate was adopted for calculation.

[2] Maintenance due to incidents 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 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.

4.2 The total downtime for HV was 6 days while that for DV was 19 days in the trial period. There were 590 working days in the trial period, the utilization rates of HV and DV were therefore 99% and 97%, respectively. Maintenance due to incidents unrelated to the performance of the vehicle was not included for comparison.

4.3 Build-Up had a designated driver for the HV. The driver expressed that the power of the HV was not as good as that of the DV and the response of the gearbox was slow, especially driving uphill and sometime even flat road. Also, the driver mentioned that the HV was noisier when the engine was operating. However, the HV driver said that he has adjusted his driving habit to cope with that.

4.4 Build-Up agreed with the HV driver about the problem of the HV. Build-Up believed that this was a normal aging of the HV. Also, Build-Up and the driver are satisfied with the overall performance the HV. They found that the performance of the HV met the operational requirements and the HV could help improve the roadside air quality, and it was not particularly difficult to repair and perform maintenance for the HV. Build-Up was willing to replace the DV by the HV and encourage other transport operators to try the HV.

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. The fuel economy varied from 5.26 to 5.09 km/kWh) for HV. During the 24-month trial period, the variation in fuel economy of the HV is insignificant and hence there is no indication that the fuel economy and the batteries have deteriorated during the trial period.

4.6 The carbon dioxide equivalent (CO_2e) emission from the HV was 15,031 kg while that from the DV on HV mileage was 22,038 kg. The CO_2e emissions reduction from using the HV compared to the DV on same mileage (29,531 km) in this trial was 7,007 kg, i.e., around 32%.

5. Summary

5.1 The HV had a better fuel economy than the DV. On the average, the HV had about 32% average fuel cost saving as compared with the DV. Including the maintenance costs, the average total operating costs of the HV was about 52% lower than that of the DV. There was 7,007 kg (around 32%) CO_2e reduction during the 24-month trial period.

5.2 The HV and the DV had 6 days and 19 days of downtime, respectively out of the 590 working days in the 24-month trial period and thus the utilization rates of the HV and the DV were 99% and 97%, respectively.

5.3 The average fuel cost of the HV was significantly lower than that of the DV. The 12-month moving average fuel economy figures suggest the variation in fuel economy of the HV is insignificant during the 24-month trial period and hence there is no indication that the fuel economy and the batteries have deteriorated.

5.4 The HV's driver had no problem in operating the vehicles, except that the power of the HV was not as good as that of the DV and the response of the gearbox was slow. The fund recipient, Build-Up, was satisfied with the overall performance the HV. They found that the performance of the HV met the operational requirements and will encourage other transport operators to try the HV.

Appendix 1: Key Features of Vehicles

1. Trial HV

Registration Mark	**UU7045**
Make:	Hino
Model:	300 Series Hybrid XKU730R – HKUTS3
Class:	Medium Goods Vehicle
Gross vehicle weight:	8,500 kg
Seating capacity:	Driver + 2 passengers
Engine capacity:	4,009 c.c.
Maximum Output(ps/rpm):	150/2,500
Battery Type:	Nickel-Metal
Year of manufacture:	2017

2. DV for comparison

Registration Mark	**HP7215**
Make:	Hino
Model:	FD8JLKA
Class:	Medium Goods Vehicle
Gross vehicle weight:	10,400 kg
Seating capacity:	Driver + 2 passengers
Engine capacity:	7,684 c.c.
Year of manufacture:	2007

Appendix 2: Photos of Vehicles

1. Trial HV

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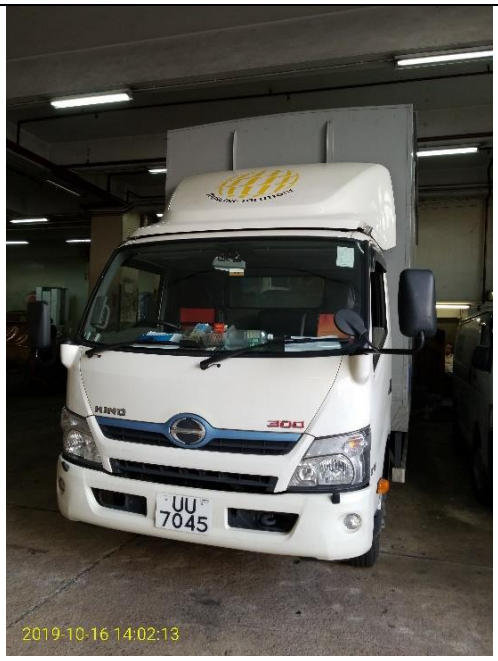
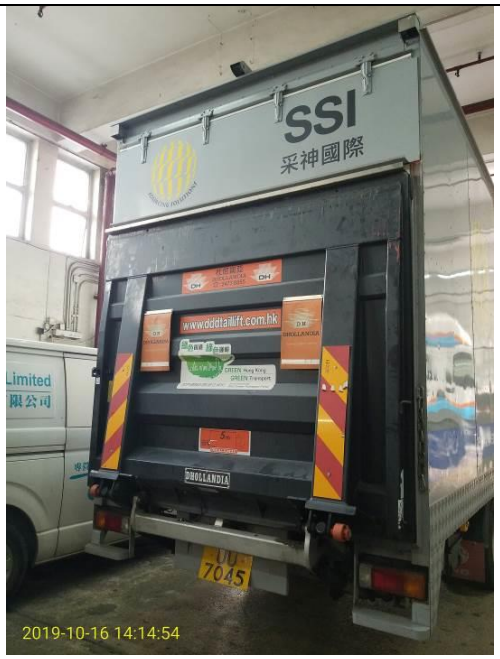
<tr><td> 
</td><td> 
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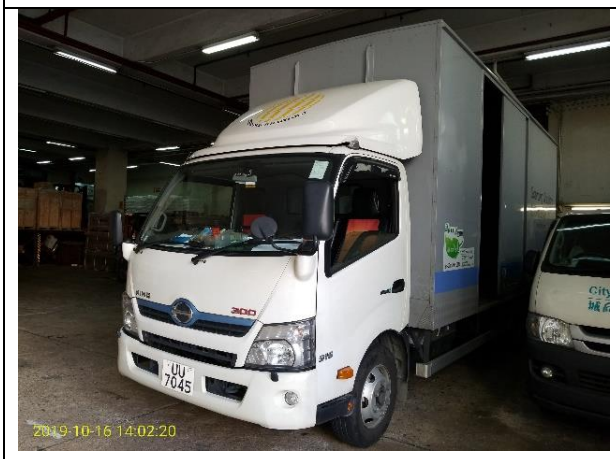
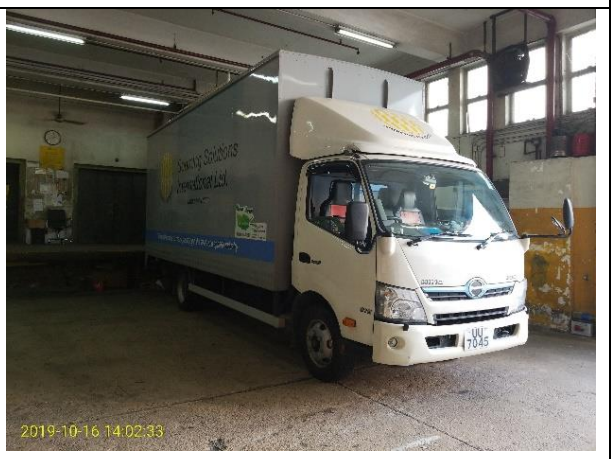
<tr><td>Front view of HV</td><td>Rear view of HV</td></tr>
<tr><td> 
</td><td> 
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<tr><td>Left side view of HV</td><td>Right side view of HV</td></tr>
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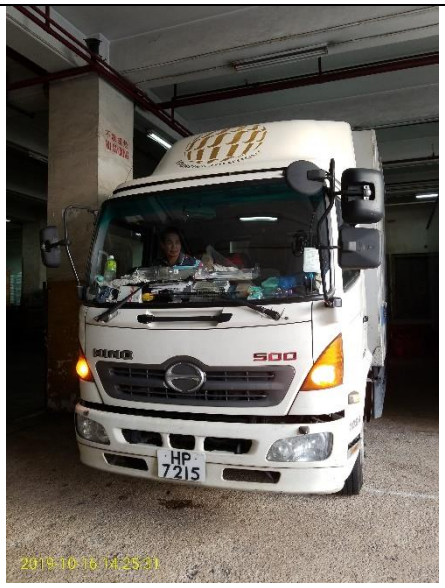
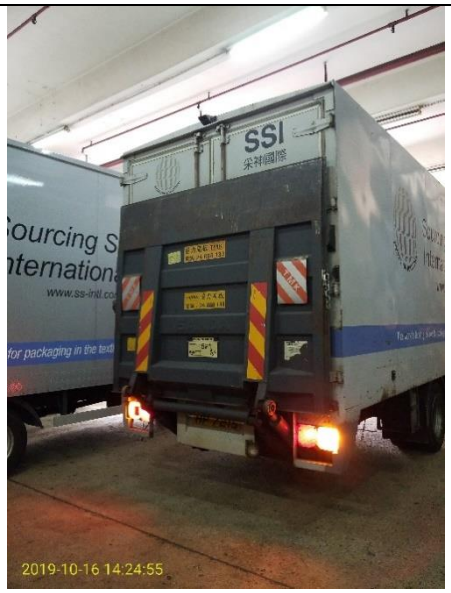
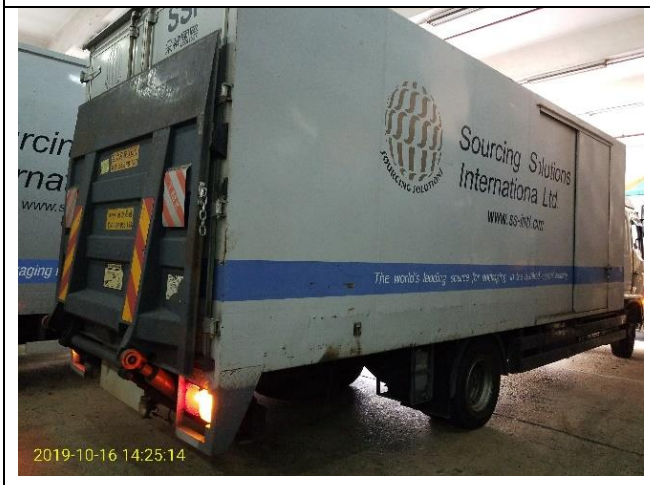
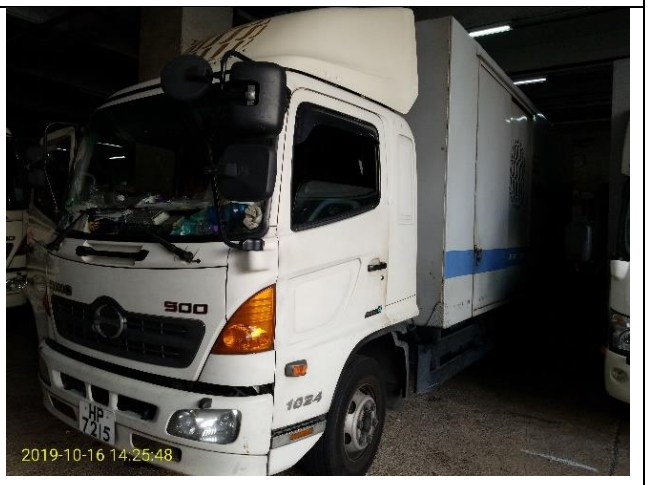
2. DV for comparison

	
Front view of DV	Rear view of DV
	
Left side view of DV	Right side view of DV