Pilot Green Transport Fund

Interim Report
On
Trial of Hybrid Public Light Bus for Green Minibus Service
(Goden Par Co)

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(Trial Period: 1 July 2021 – 31 December 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 innovative transport technologies, contributing to better air quality and public health for Hong Kong. Goden Par Co (Goden Par) was approved under the Fund for trial of one plug-in electric and diesel hybrid light bus for providing green minibus services in Kwun Tong. Through the tendering procedures stipulated in the Agreement signed with the Government, Goden Par procured one GMI Gemini 19-seats public light bus hybrid vehicle (HV) for trial.

1.2 PolyU Technology and Consultancy Company Limited (PTeC) has been engaged by the Environmental Protection Department (EPD) as an independent third party assessor to monitor the trial and evaluate the performance of the trial vehicles. Goden Par assigned a TOYOTA LPG 16-seats public light buses with 4,350 kg GVW and 4,104 c.c. cylinder capacity as the conventional counterpart for comparison with the HV.

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

2. Trial and Conventional Vehicles

2.1 Key features of the HV and GV are in Appendix 1 and their photos are provided in Appendix 2. Both vehicles were used for public light bus services serving a fixed route 22M between Kwun Tong MTR station and Lok Wah South Estate. According to the HV's manufacturer, the HV's gross vehicle weight is 7,000 kg with 2,776 cc cylinder capacity. The HV can be charged with a charger to be installed at the Kwun Tong MTR terminal.

3. Trial Information

3.1 The trial started on 1 July 2021 and would last for 24 months. Goden Par was required to collect and provide trial information including the distance travelled, fuel consumed, fuel cost as well as costs and downtime associated with scheduled and unscheduled maintenance of the HV. A similar set of data from the GV was also required. In addition to the cost information, reports on maintenance work, operational difficulties and opinions of the driver, passengers and Goden Par were collected and provided to reflect any problems of the HV.

4. Findings of Trial

4.1 Table 1 summarizes the statistical data of the HV and GV. The average fuel economy of the HV was 0.007 km/MJ (11%) higher than that of the GV. However, since the market fuel price of diesel was higher than that of LPG and the HV carried 3 more passengers than the GV hence with a higher loading, the average fuel cost of the HV was higher than that of the GV by HK$4.06/km (about 143%). The HV had no scheduled maintenance but one unscheduled maintenance while the GV had one scheduled maintenance involving vehicle repairing for annual renewal of vehicle license, the average total operating cost of the HV was higher than that of the GV by HK$3.09/km (about 81%).

Table 1: Key operation statistics of each vehicle (1 July 2021 – 31 December 2021)

		HV	**GV**
Total distance travelled (km)		18,392	19,422
Average distance travelled per working day (km/day)		104	108
Average fuel economy	(km/litre)	2.49	1.47
	(km/MJ) [1]	0.069	0.062
Average fuel cost (HK$/km) [2]		6.90	2.84
Average total operating cost (HK$/km) [3]		6.90	3.81
Downtime (working day) [3] [4]		7	4

[1] Assuming lower heating value of 36.13 MJ/litre for diesel fuel and 23.67 MJ/litre for LPG

[2] The market fuel price was used for calculation.

[3] Maintenance due to incident not related to the performance of the vehicle was not included for comparing the performance.

[4] 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 this reporting period, the HV had one unscheduled maintenance while the GV had one scheduled maintenance, causing 7 and 4 days downtime respectively; the utilization rates of HV and GV were 96% and 98% respectively.

4.3 The monthly average fuel economy of the HV ranged from 2.28 to 3.00 km/litre in the first 6 month of trial. There was no indication on the deterioration of the HV performance.

5. Summary

5.1 In the first six months of the trial, the average daily mileage of the HV was 104 km, while that of the GV was 108 km. Taking into account the fuel price discount, the average fuel cost of the HV was about 11% lower than that of the GV, and it has 11% higher average fuel economy than that of the GV even carrying 3 more passengers. The average fuel cost of the HV was HK$4.06/km (about 143%) higher than that of the GV mainly because the price of diesel was much higher than that of the LPG. HV had one unscheduled maintenance while the GV had one scheduled maintenance, the average total operating cost of HV was HK$3.09/km (about 81%) higher than that of the GV. Economic benefit of the HV was not obvious as far as fuel cost was concerned. The fuel cost difference was reduced to about 11% (HV lower than GV) with the discounted fuel rates. The utilization rates of HV and GV were 96% and 98% respectively.

5.2 The HV drivers had no problem in operating the HV and felt the HV was more environmentally friendly compared to the GV. The passenger felt that the air was cleaner within the vehicle. Goden Par was satisfied with the performance of the HV and did not detect any deterioration in the performance of the HV.

5.3 The findings only reflect the performance of the HV in the first six months of the trial. The performance and reliability of the HV will be continuously monitored in the 24 months of the trial.

Appendix 1: Key Features of Vehicles

1. Trial HV

Registration Mark:	**DG6306**
Make:	GMI
Model:	GEMINI
Class:	Public Light Bus
Gross vehicle weight:	7,000 kg
Seating capacity:	driver + 19 passengers
Cylinder capacity:	2,776 cc (diesel)
Year of manufacture:	2020

2. GV for comparison

Registration Mark:	**NN5765**
Make:	TOYOTA
Model:	BZB40RZCMSCYY
Class:	Public Light Bus
Gross vehicle weight:	4,350 kg
Seating capacity:	driver + 16 passengers
Cylinder capacity:	4,104 cc (LPG)
Year of manufacture:	2008

Appendix 2: Photos of Vehicles

1. Trial HV – DG6306

	
Front view	Right side view
	
Left side view	Rear view

2. GV for comparison – NN5765

	
Front view	Right side view
	
Left side view	Rear view