Pilot Green Transport Fund

Interim Report On Trial of Hybrid Public Light Bus for Green Minibus Service (Nam Kee Transport Company Limited)

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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 Public Light Bus for Green Minibus Service
(Nam Kee Transport Company Limited)

Interim Report
(Trial Period: 1 May 2018 – 31 October 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. Nam Kee Transport Company Limited (Nam Kee) was approved under the Fund for trial of one diesel-electric hybrid public light bus for green minibus service. Through the tendering procedures stipulated in the Agreement, Nam Kee procured one GMI diesel-electric hybrid public light bus (HV) for trial.

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. Nam Kee assigned a Toyota liquefied petroleum gas (LPG) public light bus (GV) providing the same type of service was for comparing with the HV.

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

2. Trial Vehicles

2.1 The HV had a gross vehicle weight (GVW) of 7,000 kg and a cylinder capacity of 2,776 cc, while the GV had a GVW of 4,350 kg and cylinder capacity of 4,104 cc. Both vehicles were used for providing green minibus services between Lok Wah Estate and Kwun Tong Yue Man Square in Kwun Tong.

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

3. Trial Information

3.1 The trial commenced on 1 May 2018 and would last for 24 months. Nam Kee 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 GV was also required. In addition to the cost information, reports on maintenance work, operational difficulties and opinions of the drivers were also collected to reflect any problems of the HV.

4. Findings of Trial

4.1 Table 1 summarizes the statistical data of the HV and the GV. The average fuel cost of the HV was higher than that of the GV by HK$2.38/km (85.9%) because the cost of diesel was higher than the cost of LPG. The average total operating cost of the HV was higher than that of the GV by HK$2.68/km (96.8%) during this reporting period. However, the average fuel economy of the HV (0.074km/MJ) was 34.5% higher than that of the GV (0.055km/MJ).

Table 1: Key Operation Statistics of Each Vehicle (May 2018 to October 2018)

		HV	**GV**
Total mileage	(km)	18,751	24,576
Average fuel economy	(km/litre)	2.67	1.31
	(km/MJ)	0.074[4]	0.055[5]
Average fuel cost (HK$/km) [1]		5.15	2.77
Maintenance cost/ HK$ [2]		5,550	0
Average total operating cost/ (HK$/km) [2]		5.45	2.77
Downtime/ working day [3]		12	0

[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 was not in operation due to maintenance, counting from the first day it stopped operation till the day it was returned to the operator.
[4] Assuming lower heating value of 36.13 MJ/litre for diesel fuel.
[5] Assuming lower heating value of 23.67 MJ/litre for LPG fuel.

4.2 During the first six months of the trial, the HV had four scheduled maintenances resulting in a downtime of twelve working days while the GV had no scheduled maintenance.

4.3 There was no unscheduled maintenance for both the HV and the GV.

4.4 The HV had a total of twelve days of operation downtime while the GV had none in this reporting period. Utilization rates of the HV and the GV were 93.5% and 100% respectively.

5. Summary

5.1 In the first six months of the trial, the average daily mileage of the HV was 109 km, while that of the GV was 134 km. Although the average fuel economy of the HV in terms of km/MJ was 34.5% higher than that of the GV, the average fuel cost of the HV was higher than that of the GV by HK$2.38/km (85.9%). It is because the HV and the GV consume diesel and LPG respectively, and the average unit price of diesel (HK$13.75) was higher than that of the LPG (HK$3.62) by HK$10.13 (279.8%).

5.2 Nam Kee had a designated driver for the HV. The driver expressed that he had no problem in operating the HV and felt the HV produced less air pollutants. However, the driver was not satisfied with the HV's acceleration rate, especially during climbing uphill. Also, he expressed that the stairs level of the HV was too high and it caused inconvenience to the elderly and disabled persons getting on and off the HV. The recipient claimed that the HV had slower response at start up and had comparatively less power for climbing uphill, but it was suitable for running the fixed route, i.e. GMB Route No. 22M.

5.3 The passengers felt that the HV emitted less air pollutants and improved the roadside air quality. They liked the HV and support on replacing the existing diesel vehicles by hybrid vehicles.

5.4 In general, Nam Kee and the driver were moderately satisfied with the performance of the HV despite the comparatively less power and lower acceleration rate for climbing uphill and also at start up.

5.5 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 further tested under this 24-month trial.

Appendix 1: Key Features of Vehicles

1. Trial HV

Registration Mark	**VG4255**
Make:	GMI
Model:	Gemini
Class:	Public Light Bus
Gross vehicle weight:	7,000 kg
Seating capacity:	1 driver + 19 passengers
Engine capacity:	2,776 c.c.
Battery Type:	Lithium iron phosphate
Year of manufacture:	2017

2. GV for comparison

Registration Mark	**DG6306**
Make:	Toyota
Model:	BZB40RZCMSCYY
Class:	Public Light Bus
Gross vehicle weight:	4,350 kg
Seating capacity:	1 driver + 16 passengers
Engine capacity:	4,104 c.c.
Year of manufacture:	2005

Appendix 2: Photos of Vehicles

1. Trial HV

Front view of HV

Rear view of HV

Side view of HV

Side view of HV

2. GV for comparison

Front view of GV

Rear view of GV

Side view of GV

Side view of GV