

Pilot Green Transport Fund

Final Report On Trial of Hybrid Medium Goods Vehicles for Poultry Delivery (Tong Shun Hing Poultry (HK) Co. Ltd)

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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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**Pilot Green Transport Fund
Trial of Hybrid Medium Goods Vehicles for Poultry Delivery
(Tong Shun Hing Poultry (HK) Co. Ltd)**

**Final Report
(Trial Period: 1 January 2017 – 31 December 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. Tong Shun Hing Poultry Hong Kong Co. Limited (TSHP) was approved under the Fund for trial of three hybrid medium goods vehicles (HVs) to provide delivery service for the company in the New Territories, Kowloon and Hong Kong Island. Through a tendering procedure stipulated in the Subsidy Agreement, TSHP procured three Hino 300 series 8.5-tonne HVs for trial.

1.2 PolyU Technology and Consultancy Company Limited (PolyU) have been engaged by the Environmental Protection Department (EPD) as an independent third party assessor (the Assessor) to monitor the trial and evaluate the performance of the trial vehicles. TSHP assigned three Isuzu NQR 9-tonne conventional diesel medium goods vehicles (DVs) providing same service as the conventional counterparts for comparing with the HVs.

1.3 This Final Report summarizes the performance of the HVs in the 24 months of the trial as compared with their conventional DV counterparts.

2. Trial Vehicles

2.1 Key features of the HVs and DVs and photos of vehicles are provided in Appendix 1 and Appendix 2, respectively. The vehicles were used for the distribution and delivery of the well prepared poultry food to retail chain stores and business partners in the New Territories, Kowloon and Hong Kong Island. In the 24-month of the trial, the average daily mileage travelled by the HVs varied from 76 km to 121 km.

3. Trial Information

3.1 The trial commenced on 1 January 2017 and lasted for 24 months. TSHP is required to collect and provide trial information including the HVs mileage reading before refilling, amount of fuel refilled in each refilling, cost and downtime associated with scheduled and unscheduled maintenance of the HVs. Similar data from the DVs were also required. In addition to the cost information, reports on maintenance work, operational difficulties and opinions of the drivers were collected and provided to reflect any problems of the HVs.

4. Findings of Trial

4.1 The following tables summarize the key operation statistical data of HVs and DVs.

Table 1: Key operation statistics of each vehicle (January 2017 - December 2018)

	Hybrid Vehicles			Conventional Vehicles		
	HV1	HV2	HV3	DV1	DV2	DV3
Total distance traveled (km)	53,938	86,064	59,143	59,246	65,362	68,955
Fuel consumed (litre)	12,654	18,758	13,810	16,624	18,001	18,630
Fuel cost (HK\$) ^[1]	161,218	241,385	174,624	212,788	226,576	236,096
Maintenance cost (HK\$) ^[2]	16,570 ^[3]	16,570 ^[3]	16,570 ^[3]	27,619	4,421	6,000
Average fuel cost (HK\$/km) ^[1]	2.99	2.80	2.95	3.59	3.47	3.42
Fleet average fuel cost (HK\$/km)	2.90			3.49		
Average fuel economy (km/litre)	4.26	4.59	4.28	3.56	3.63	3.70
Fleet average fuel economy (km/litre)	4.40			3.63		
Average total operating cost per km (HK\$/km) ^[2]	3.30	3.00	3.23	4.06	3.53	3.51
Fleet average total operating cost (HK\$/km)	3.15			3.69		
Downtime (working day) ^[4]	22	17	4	21	2	4

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

^[2] Maintenance due to incident not related to the performance of the vehicle was not included for comparing the performance.

^[3] The cost of 2nd year warranty for HVs was HKD16,570/year (July 2017 ~ July 2018)

^[4] Downtime refers to the equivalent number of working days in which the vehicle is not in operation due to 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 In the 24-month trial period, the average fuel costs of HV1, HV2 and HV3 were lower than that of DV1, DV2 and DV3 by HK\$0.60/km (about 17%), HK\$0.67/km (about 19%) and HK \$0.47/km (about 14%), respectively while the fleet average fuel cost of HVs was lower than that of DVs by HK \$0.59/km (about 17%). Including maintenance costs, the average total operating costs of HV1, HV2 and HV3 are HK\$0.76/km (about 19%), HK\$0.53/km (about 15%) and HK\$0.28/km (about 8%) lower than that of DV1, DV2 and DV3, respectively. The fleet average total operating cost of HVs is HK\$0.54/km (about 15%) lower than that of DVs.

4.3 There were 730 working days in the 24 months of the trial. The utilization rates of HV1, HV2 and HV3 were 97%, 98% and 99.5%, respectively while that of DV1, DV2 and DV3 were 97%, 99.7% and 99.5%, respectively.

4.4 To remove the effect of seasonal fluctuations, 12-month moving averages were used to evaluate the trend of the HVs' economy. There is a trend of dropping in fuel economy of the HVs over the trial period, but the variation is narrow that deterioration in fuel economy is insignificant.

4.5 The carbon dioxide equivalent (CO₂e) emissions from HV1, HV2 and HV3 were 35,082 kg, 52,004 kg and 38,287 kg, respectively; while those from using DV1 were 41,959 kg, 65,712 kg and 44,300 kg, respectively. Hence the total reduction of CO₂e emissions for HV1, HV2 and HV3 were 6,877 kg (about 17%), 13,708 kg (about 21%) and 6,013 kg (about 14%), respectively in the trial period.

5. Summary

5.1 During the 24 months of the trial, the fleet average fuel cost of HVs was lower than that of DVs by HK \$0.59/km (about 17%) while the fleet average total operating cost of HVs is HK\$0.54/km (about 15%) lower than that of DVs including maintenance costs. The CO₂e reduction by using HVs were from 14% to 21%.

5.2 There were 730 working days in the 24 months of the trial. The utilization rates of HV1, HV2 and HV3 were 97%, 98% and 99.5%, respectively while that of DV1, DV2 and DV3 were 97%, 99.7% and 99.5%, respectively.

5.3 There is a trend of dropping in fuel economy of the HVs over the trial period, but the variation is narrow that deterioration in fuel economy is insignificant.

5.4 The drivers of the HVs had no problem in operating the vehicles. The subsidy recipient, THSP, was satisfied with the HVs.

Appendix 1: Key Features of the Vehicles Involved in the Trial

1. Trial HVs

Registration mark	KZ3255 (HV1) / UB5900 (HV2) / UB6876 (HV3)
Make:	Hino
Model:	300 Series Hybrid XKU720R-HKUTS3
Class:	Medium goods vehicle
Gross vehicle weight:	8,500 kg
Seating capacity:	driver + 2 passengers
Cylinder capacity:	4,009cc
Year of manufacture:	2016

2. DVs Used for Comparison

DV1

Registration mark	SB9286
Make:	Isuzu
Model:	NQR75K-V
Class:	Medium Goods Vehicle
Gross vehicle weight:	9,000 kg
Seating capacity:	driver + 2 passengers
Cylinder capacity:	5,193 cc
Year of manufacture:	2013

DV2

Registration mark	RU6585
Make:	Isuzu
Model:	NQR75K-V
Class:	Medium Goods Vehicle
Gross vehicle weight:	9,000 kg
Seating capacity:	driver + 2 passengers
Cylinder capacity:	5,193 cc
Year of manufacture:	2012

DV3

Registration mark	SW659
Make:	Isuzu
Model:	NQR75K-V
Class:	Medium Goods Vehicle
Gross vehicle weight:	9,000 kg
Seating capacity:	driver + 2 passengers
Cylinder capacity:	5,193 cc
Year of manufacture:	2014

Appendix 2: Photos of Vehicles

1. Trial HVs

HV1



KZ3255 HV – front view



KZ3255 HV – rear view



KZ3255 HV – side view 1



KZ3255 HV – side view 2

HV2



UB5900 HV – front view



UB5900 HV – rear view



UB5900 HV – side view 1



UB5900 HV – side view 2

HV3



UB6876 HV – front view



UB6876 HV – rear view



UB6876 HV – side view 1



UB6876 HV – side view 2

2. DVs for Comparison

DV1



SB9286 DV – front view



SB9286 DV – rear view



SB9286 DV – side view 1



SB9286 DV – side view 2

DV2



RU6585 DV – front view



RU6585 DV – rear view



RU6585 DV – side view 1



RU6585 DV – side view 2

DV3



SW659 DV – front view



SW659 DV – rear view



SW659 DV – side view 1



SW659 DV – side view 2