

**Pilot Green Transport Fund**

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

**Final Report  
(Trial Period: 1 February 2018 – 31 January 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. Tong Shun Hing Poultry (HK) Company Limited (TSHP) was approved under the Fund for trial of three hybrid light goods vehicles (hereafter called HVs) for poultry products delivery service.

1.2 The 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 vehicles.

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

**2. Trial Vehicles**

2.1 Through the tendering procedures stipulated in the Subsidy Agreement, TSHP procured three Hino 300 series hybrid light goods vehicles (HV) for trial. Three diesel light goods vehicles (DV) providing the same type of service was assigned as the conventional counterparts for comparing with the HVs.

2.2 Key features of the HVs and DVs are in Appendix 1 and photos of the vehicles are in Appendix 2. The vehicles are used for distributing and delivering the well prepared poultry food to retail chain stores and business partners in the New Territories, Kowloon and Hong Kong Island.

**3. Trial Information**

3.1 The trial commenced on 1 February 2018 and lasted for 24 months. TSHP was required to collect and provide trial information including the HVs odometer reading at refueling, the date of refueling, the refueled amount, cost and operation downtime associated with scheduled and unscheduled maintenance of the HVs. Similar sets of data from the DVs were also required. In addition to the cost information, reports on maintenance work, operational difficulties and opinions of the drivers and TSHP were collected to reflect any problems of the HVs.

**4. Findings of Trial**

4.1 Table 1 summarizes the operational statistical data of the HVs and the DVs. The average fuel cost of HV-1 was HK\$0.05/km (about 2%) higher than that of DV-1; while those of HV-2 and HV-3

were HK\$0.09/km (about 3%) and HK\$0.29/km (about 9%) lower than those of DV-2 and DV-3, respectively. The fleet average fuel cost of the three HVs was HK\$0.11/km (about 3%) lower than that of the three DVs. Other than fuel cost, maintenance cost and other costs associated with breakdowns, such as replacement of components and parts, were also accounted for in calculating the total operating cost. The average total operating cost of HV-1 was HK\$0.03/km (about 1%) lower than that of DV-1, while those of HV-2 and HV-3 were HK\$0.15/km (about 4%) and HK\$2.22/km (about 41%) lower than those of DV-2 and DV-3 respectively. The fleet average total operating cost of all three HVs was HK\$0.8/km (about 20%) lower than that of the DVs.

Table 1: Key operation statistics of each vehicle (February 2018 –January 2020)

	HV			DV		
	HV-1	HV-2	HV-3	DV-1	DV-2	DV-3
Total distance traveled (km)	79,342	97,828	102,392	86,956	83,151	54,772
Average daily distance traveled (km/day)	117	136	142	122	130	101
Average fuel economy (km/litre)	4.33	4.46	4.50	4.39	4.33	4.09
Average fuel cost (HK\$/km) <sup>[1]</sup>	3.23	3.15	3.11	3.18	3.24	3.40
Fleet average fuel cost (HK\$/km) <sup>[1]</sup>	3.16			3.27		
Average total operating cost (HK\$/km) <sup>[2]</sup>	3.28	3.20	3.18	3.31	3.36	5.40
Fleet average total operating cost (HK\$/km) <sup>[2]</sup>	3.22			4.02		
Downtime (working day) <sup>[3]</sup>	10	10	11	3	61	188

<sup>[1]</sup> The market fuel price was used for calculation.

<sup>[2]</sup> Maintenance due to incidents unrelated to the performance of the vehicle was not included for comparison.

<sup>[3]</sup> 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 In the 24-month trial period (i.e, 730 working days), the downtimes of HV1, HV2, HV3, DV1, DV2 and DV3 were 10 working days, 10 working days, 11 working days, 3 working days, 61 working days and 188 working days respectively due to scheduled and unscheduled maintenances. Therefore, the utilization rates of HV-1, HV-2 and HV-3 were 98.6%, 98.6% and 98.5% respectively, while those of DV-1, DV-2 and DV-3 were 99.6%, 91.6% and 74.2% respectively.

4.3 TSHP has designated drivers for all HVs. The three HV drivers expressed that they had no problem in operating the HVs and felt the HVs were quiet and environmentally friendly. Furthermore, the drivers were satisfied with the performance of the HVs.

4.4 TSHP was satisfied with the overall performance of HVs. During the trial period, they found that the performance of the HVs did not have any significant performance degradation. TSHP also indicated that they might consider replacing all existing conventional diesel light goods vehicles with hybrid light goods vehicles.

4.5 To eliminate the effect of seasonal fluctuations, the 12-month moving average was used to evaluate the trend of the HVs' fuel economy. The fuel economy of HV-1, HV-2 and HV-3 varied between 4.09 km/litre and 4.35 km/litre, 4.40 km/ litre and 4.57 km/litre, and 4.35 km/litre to 4.67 km/ litre respectively. During the 24-month trial period, the variation in fuel economy of each HV was minor and hence there was no indication that the fuel economy and the batteries of the HVs had deteriorated during the trial period.

4.6 The total carbon dioxide equivalent (CO<sub>2</sub>e) emission of the three HVs was 174,662 kg while that of the three DVs on same total HV mileage was 181,129 kg. The total CO<sub>2</sub>e emission reduction from using the HV fleet compared to the DV fleet in this trial was 6,467 kg, i.e., around 4%.

## **5. Summary**

5.1 The fleet average fuel cost of the HVs was HK\$0.11/km (about 3%) lower than that of the DVs in the 24-month trial period. Taking maintenance costs into account, the fleet average total operating cost of the HVs was HK\$0.8/km (about 20%) lower than that of the DVs.

5.2 In the 24-month trial period (i.e, 730 working days), the downtimes of HV1 HV2, HV3, DV1, DV2 and DV3 were 10 working days, 10 working days, 11 working days, 3 working days, 61 working days and 188 working days respectively due to scheduled or unscheduled maintenances. The utilization rates of HV-1, HV-2 and HV-3 were therefore 98.6%, 98.6% and 98.5% respectively, while those of DV-1, DV-2 and DV-3 were 99.6%, 91.6% and 74.2% respectively.

5.3 The 12-month moving average suggest the variation in fuel economy of each HV was minor during the 24-month trial period and hence there is no indication that the fuel economy and the batteries had deteriorated.

5.4 The total carbon dioxide equivalent (CO<sub>2</sub>e) emission of the three HVs was 174,662 kg while that of the three DVs on same total HV mileage was 181,129 kg. The total CO<sub>2</sub>e emission reduction from using the HV fleet compared to the DV fleet in this trial was 6,467 kg, i.e., around 4%.

5.5 In the 24 months of the trial, the drivers of the HVs had no problem in operating the HVs. TSHP was also satisfied with the HVs and indicated that they might consider replacing all existing conventional diesel light goods vehicles with the hybrid light goods vehicles.

## Appendix 1: Key Features of Vehicles

### 1. Trial HVs

<b>Registration Mark</b>	HV-1: WN1759 (LW1675) *
	HV-2: LV 2381 (HV-2)
	HV-3: VE 9132 (HV-3)
Make:	Hino
Model:	300 Series Hybrid XKU710R – HKUQS3
Class:	Light Goods Vehicle
Gross vehicle weight:	5,500 kg
Seating capacity:	Driver + 2 passengers
Engine capacity:	4,009 c.c.
Maximum Output(ps/rpm):	150/2,500
Battery Type:	Nickel-Metal Hydride Battery
Year of manufacture:	2017

\* : The vehicle registration mark of HV-1 was changed from LW1675 to WN1759 since 12/2019. It is the same vehicle but the registration mark was changed.

### 2. DVs for comparison

#### (a) DV-1

<b>Registration Mark</b>	<b>UW1857</b>
Make:	Hino
Model:	300 Series XZU710R-HKTQS3
Class:	Light Goods Vehicle
Seating capacity:	Driver + 2 passengers
Gross vehicle weight:	5,500 kg
Engine capacity:	4,009 c.c.
Year of manufacture:	2017

#### (b) DV-2

<b>Registration Mark</b>	<b>US9315</b>
Make:	Hino
Model:	300 Series XZU710R-HKTQS3
Class:	Light Goods Vehicle
Seating capacity:	Driver + 2 passengers
Gross vehicle weight:	5,500 kg
Engine capacity:	4,009 c.c.
Year of manufacture:	2016





#### (c) DV-3

<b>Registration Mark</b>	<b>NU5198</b>
Make:	Isuzu
Model:	NPR75HH
Class:	Light Goods Vehicle
Seating capacity:	Driver + 2 passengers
Gross vehicle weight:	5,500 kg
Engine capacity:	5,193 c.c.
Year of manufacture:	2009

Appendix 2: Photos of Vehicles

1. Trial HVs

(a) HV-1

 <p>2020-03-05 12:40:34</p>	 <p>2020-03-05 12:40:59</p>
Front view of HV-1	Rear view of HV-1
 <p>2020-03-05 12:40:46</p>	 <p>2020-03-05 12:40:46</p>
Left Side view of HV-1	Right Side view of HV-1

(b) HV-2



Front view of HV-2



Rear view of HV-2



Left Side view of HV-2



Right Side view of HV-2



(c) HV-3



Front view of HV-3



Rear view of HV-3



Left Side view of HV-3



Right Side view of HV-3

2. DVs for comparison

(a) DV-1



Front view of DV-1



Rear view of DV-1



Left Side view of DV-1



Right Side view of DV-1



(b) DV-2



Front view of DV-2



Rear view of DV-2



Left Side view of DV-2



Right Side view of DV-2

(c) DV-3



Front view of DV-3



Rear view of DV-3



Left Side view of DV-3



Right Side view of DV-3