

**Pilot Green Transport Fund**

**Interim Report**

**On**

**Trial of Electric Light Goods Vehicles**  
**for Construction Engineering Industry**  
**(Darwin Engineering Limited)**

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PREPARED BY:  
Ir Dr. Edward Lo

The Monitoring and Evaluation Team's views expressed in this report do not necessarily reflect the views of the Environmental Protection Department, HKSAR.

## **List of Monitoring and Evaluation Team Members**

**Dr. C.S. Cheung (Team Leader)**

PolyU Technology and Consultancy Company Limited  
The Hong Kong Polytechnic University

**Ir Dr. Edward W.C. Lo (Deputy Team Leader)**

PolyU Technology and Consultancy Company Limited  
The Hong Kong Polytechnic University

**Ir Dr. Curtis Ng**

Department of Mechanical Engineering  
The Hong Kong Polytechnic University

**Dr. W.T. Hung**

PolyU Technology and Consultancy Company Limited  
The Hong Kong Polytechnic University

**Dr. David Yuen**

PolyU Technology and Consultancy Company Limited  
The Hong Kong Polytechnic University

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Trial of Electric Light Goods Vehicles for Construction Engineering Industry  
(Darwin Engineering Limited)**

**Interim Report**

**(Reporting Period: 1 June 2020 – 31 May 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. Darwin Engineering Limited (Darwin) was approved under the Fund for trial of two electric light goods vehicles (EVs) providing general moving services of workers, construction materials and light equipment/machine among its site office, its warehouse and a number of construction sites in various locations throughout Hong Kong. Through the tendering procedures stipulated in the Agreement signed with the Government, Darwin procured 2 EVs (EV1 and EV2) of model Nissan e-NV200 for the trial.

1.2 PolyU Technology and Consultancy Company Limited has been engaged by the Environmental Protection Department as an independent third-party assessor to monitor the trial and evaluate the performance of the two trial vehicles. Darwin assigned 2 diesel light goods vehicles (DVs), Hyundai H1 (DV1) and Mercedes Benz Vito (DV2), providing similar services as the conventional counterpart for comparing with the EVs.

1.3 This Interim Report summarizes the performance of the EVs in the first 12 months of the trial as compared with the DVs.

**2. Trial and Conventional Vehicles**

2.1 Key features and photos of the EVs, the EV charging facilities and the DVs are provided in Appendix 1 and Appendix 2, respectively. As the nature of the services being provided, there were no fixed daily routes for the four vehicles. The daily distance travelled by each vehicle varies from day to day, with routes covering the whole area of Hong Kong. In the first 12 months of the trial, the average working daily mileages of EV1 and EV2 were 67 km and 70 km respectively, while those of DV1 and DV2 were 19 km and 64 km respectively.

### 3. Trial Information

3.1 The trial commenced on 1 June 2020 and will last for 24 months. Darwin was required to collect and provide trial information including the EV mileage reading before recharging, amount of energy in each recharging, time taken for charging, operation downtime due to charging, cost and downtime associated with scheduled and unscheduled maintenances of the EVs. 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 Darwin were collected and provided to reflect any problems of the EVs.

### 4. Findings of Trial

4.1 The following table summarizes the statistical data of the EVs and DVs.

Table 1: Key operation statistics of the vehicles (June 2020 – May 2021)

		EVs		DVs	
		EV1	EV2	DV1	DV2
Total mileage (km)		19,900	20,696	5,605	18,913
Average daily mileage (km/working day)		67	70	19	64
Average fuel economy	(km/kWh)	5.67	5.16	-	-
	(km/litre)	-	-	9.34	11.56
	(km/MJ)	1.57	1.43	0.26 <sup>[1]</sup>	0.32 <sup>[1]</sup>
Fleet average fuel economy (km/MJ)		1.50		0.29	
Average fuel cost (HK\$/km) <sup>[2]</sup>		0.21	0.24	1.62	1.26
Fleet Average fuel cost (HK\$/km)		0.23		1.44	
Average total operating cost (HK\$/km) <sup>[3]</sup>		0.21	0.24	1.62	1.26
Fleet average total operating cost (HK\$/km)		0.23		1.44	
Downtime (working day) <sup>[3][4]</sup>		0	0	0	0

<sup>[1]</sup> Assuming lower heating value of 36.13 MJ/litre for diesel fuel

<sup>[2]</sup> The market fuel price was used for calculation

<sup>[3]</sup> Maintenance unrelated to the performance of the vehicle was not included for comparison. Neither scheduled maintenance nor unscheduled maintenance was reported in this trial period.

<sup>[4]</sup> Downtime refers to the working days the vehicle is not in operation, which counted from the first day it stops operation till the day it is returned to the operator.

4.2 In the first 12-month trial period, the average fuel cost of the EV1 was lower than that of the DV1 by HK\$1.41/km (87%), while the average fuel cost of the EV2 was lower than that of the DV2 by HK\$1.02/km (81%). The fleet average fuel cost of the EVs was HK\$1.21/km (84%) lower than that of the DVs.

4.3 As no the maintenance cost for all related vehicles in the reporting period, the average total operating cost of the EV1 was lower than that of the DV1 by HK\$1.41/km (87%), while the total average operating cost of the EV2 was lower than that of the DV2 by HK\$1.02/km (81%). The fleet average total operating cost of the EVs was HK\$1.21/km (84%) lower than that of the DVs.

4.4 There were 296 working days in the first 12 months of the trial. The utilization rates of all the EVs and DVs were 100%. There was no indication on the deterioration in the performance of the EVs in this period.

4.5 The drivers have no difficulty in operating the EVs and the EVs have caused them no major problem. They were very satisfied with the performance of the EVs in this trial period, especially for better air quality inside the EVs, quieter, and no deterioration in their performance. Darwin was also satisfied with the performance of the EVs.

## **5. Summary**

5.1 In the first 12-month trial period, the average fuel cost and the average total operation cost of the EV1 were lower than those of the DV1 by HK\$1.41/km (87%), while the average fuel cost and the average total operating cost of the EV2 were lower than those of the DV2 by HK\$1.02/km (81%). Overall, the fleet average fuel cost and the fleet average total operation cost of the EVs were HK\$1.21/km (84%) lower than those of the DVs.

5.2 In the first 12 months of the trial, the utilization rates of all the EVs and DVs were 100%. There was no indication on the deterioration in the performance of the EVs.

5.3 The drivers had no problem in operating the EVs. The drivers and Darwin were satisfied with the performance of the EVs.

5.4 The findings only reflect the performance of the EVs in the first 12 months of the trial. The performance and reliability of the EVs will be continuously monitored in the 24 months of the trial.

## **Appendix 1: Key Features of the Vehicles and Charging Facilities**

### **1. Trial EVs and Charging Facilities**

#### **(a) Trial EVs**

<b>Registration mark:</b>	<b>HD730 (EV1) &amp; EE7068 (EV2)</b>
Make:	Nissan
Model:	e-NV200
Class:	Light Goods Vehicle
Gross vehicle weight:	2,250 kg
Seating capacity:	Driver + 4 passengers
Expected travel range	317 km (air-conditioning off)
Battery material	Lithium ion
Battery Capacity	40 kWh
Maximum motor power	80 kW
Year of manufacture	2019

#### **(b) Charging Facilities (two identical sets)**

Make:	Hong Kong EV Power Limited
Model:	EVC-32NK
Input Voltage:	single -phase, 220V
Type:	IEC 62196-2 Type-2
Output:	7 kW

### **2. DVs for Comparison**

#### **DV1**

<b>Registration mark:</b>	<b>SE539</b>
Make:	Hyundai
Model:	H1 Van Standard EURO 5
Class:	Light Goods Vehicle
Gross vehicle weight:	3,230 kg
Seating capacity:	Driver + 5 passengers
Cylinder capacity:	2,497 cc
Year of manufacture:	2014

#### **DV2**

<b>Registration mark:</b>	<b>TV836</b>
Make:	Mercedes Benz
Model:	Vito Model 116BT
Class:	Light Goods Vehicle
Gross vehicle weight:	3,050 kg
Seating capacity:	Driver + 4 passengers
Cylinder capacity:	2,143 cc
Year of manufacture:	2015

## Appendix 2: Photos of Vehicles & Charging Facilities

### 1. Trial EVs & Charging Facilities

#### (a) EV1

	
Front view	Rear view
	
Right side view	Left side view

EV2



Front view



Rear view





Right side view



Left side view



**(b) Charging Facilities**

	
<p>Charging facility 1 (mainly for charging EV1)</p>	<p>Charging facility 2 (mainly for charging EV2)</p>

## 2. DVs for comparison

### DV1



Front view



Rear view



Right side view



Left side view

DV2



Front view



Rear view



Right side view



Left side view