

Pilot Green Transport Fund

Final Report
On
Trial of Electric Light Goods Vehicle for
Cleaning Services
(New Method Cleaning Services Limited)

(17 February 2022)

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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 Electric Light Goods Vehicle for Cleaning Services
(New Method Cleaning Services Limited)**

**Final Report
(Trial Period: 1 February 2020 – 31 January 2022)**

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. New Method Cleaning Services Limited (New Method Cleaning) was approved under the Fund for trial of one electric light goods vehicle. Through the tendering procedures stipulated in the Subsidy Agreement entered into with the Government, New Method Cleaning procured one Nissan e-NV200, electric light goods vehicle (EV) for trial.

1.2 PolyU Technology and Consultancy Company Limited 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 vehicle. New Method Cleaning assigned a diesel light goods vehicle (DV) providing same services as the conventional counterpart for comparison.

1.3 Due to New Method Cleaning's commercial decision, an original counterpart – Toyota diesel light goods vehicle (DV1) was disposed to stop service on 14 September 2021. New Method Cleaning has assigned a Hyundai diesel light goods vehicle (DV2) with the same registration mark of DV1 to replace DV1 as the conventional counterpart for comparison with the EV since 15 September 2021. New Method Cleaning was required to record all the operational data of the trial and conventional vehicles during the trial for comparison purpose.

1.4 This Final Report summarizes the performance of the EV in the 24 months of the trial as compared with its conventional counterpart.

2. Trial and Conventional Vehicles

2.1 The trial EV, Nissan e-NV200 electric light goods vehicle, has a gross vehicle weight (GVW) of 2,250 kg capable of carrying a driver with four passengers and goods. It has a 40 kWh lithium-ion battery pack and the driving range is 317 km with air-conditioning off. No designated driver used the EV.

2.2 New Method Cleaning assigned a Toyota KDH201RSSMDY. diesel light goods vehicle (DV1) which had a GVW of 2,800kg and a cylinder capacity of 2,982 c.c. for comparison purpose. DV1 was in operation from 1 February 2020 to 14 September 2021, but it was disposed to stop service thereafter. New Method Cleaning assigned a Hyundai diesel

light goods vehicle (DV2) with a GVW of 3,250 kg and a cylinder capacity of 2,497 c.c. to replace DV1 with the same registration mark for comparison with the EV from 15 September 2021 to 31 January 2022.

2.3 The vehicles were mainly used to provide cleaning services in the New Territories, Kowloon and occasionally on Hong Kong Island.

2.4 New Method Cleaning has installed a 4 kW, single phase AC charger at its own cost for charging the EV. Key features of the EV, charging facility and the DV are in Appendix 1 and their photos are shown in Appendix 2.

3. Trial Information

3.1 The trial commenced on 1 February 2020 and lasted for 24 months. New Method Cleaning was required to collect and provide trial information including the EV mileage reading before charging, amount of electricity consumed in each charging, time taken for charging, operation downtime due to charging, cost and downtime associated with scheduled and unscheduled maintenances of the EV. Similar data of the DV were also required. In addition to the cost information, reports on maintenance work, operational difficulties and opinions of the drivers and New Method Cleaning were collected and provided to reflect any problems of the EV.

4. Findings of Trial

4.1 Table 1 summarizes the statistical data of the EV and the DV.

Table 1: Key operation statistics of each vehicle (1 February 2020 – 31 January 2022)

		EV	DV ^[1]
Total mileage (km)		58,442	53,940
Average daily distance travelled (km/working day)		99	92
Average fuel economy	(km/kWh)	8.72	-
	(km/litre)	-	9.46
	(km/MJ)	2.42	0.26 ^[2]
Average fuel cost (HK\$/km) ^[3]		0.14	1.66
Average total operating cost per km (HK\$/km)		0.14	1.79
Downtime (working day) ^[4]		2	6

^[1] DV1 provided cleaning consumable and tools delivering service from 1 Feb 2020 to 14 Sep 2021. Due to New Method Cleaning's business operation arrangement, DV1 was disposed and its service was replaced by DV2 from 15 Sep 2021.

^[2] Assuming lower heating value of 36.13 MJ/litre for diesel fuel.

^[3] The market fuel price was used for calculation.

^[4] Downtime refers to the working days that 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 the 24 months of the trial, there were 595 working days. The total mileage and the average daily mileage of the EV were 58,442 km and 99 km/day, respectively while those of the DV were 53,940 km and 92 km/day, respectively. The average fuel cost of the EV was

HK\$1.52/km (about 92%) lower than that of the DV. Taking maintenance fee for both the EV and the DV into account, the average total operating cost of the EV was HK\$1.65/km (about 92%) lower than that of the DV.

4.3 Excluding non-performance related maintenance, the utilization rates of the EV and DV were 99.7% and 99.0%, respectively.

4.4 To remove the effect of seasonal fluctuations, the 12-month moving average were used to evaluate the trend of the EV's fuel economy. The 12-month moving average fuel economy varied narrowly from 8.52 to 8.74 km/kWh. There was no sign of the deterioration in fuel economy over the trial period.

4.5 Based on the total mileage of the EV and the fuel economy of the DV, the equivalent carbon dioxide (CO₂e) emission from the DV could be estimated for comparison purpose. The CO₂e emission from the EV and DV were 2,480 kg and 17,126 kg, respectively and hence the EV emitted 14,646 kg CO₂e (about 86%) less than the DV in this trial.

4.6 The operation of the EV was smooth. The EV drivers had no problem in operating the EV and considered it was clean and quiet. Both the drivers and New Method Cleaning were satisfied with the EV performance.

5. Summary

5.1 In this trial, the average daily mileages of the EV and the DV were 99 km and 92 km, respectively.

5.2 The EV had lower fuel cost than the DV, with an average fuel cost saving of about 92%. Accounting the maintenance costs incurred for both the EV and the DV, the average total operating cost of the EV was also about 92% lower than that of the DV.

5.3 The utilization rates of the EV and the DV were 99.7% and 99.0%, respectively. In the trial period, there was no sign of deterioration in fuel economy of the EV.

5.4 Compared with the DV, there was about 86% CO₂e emission reduction by using the EV.

5.5 The drivers had no problem in operating the EV and considered it was clean and quiet. New Method Cleaning was also satisfied with the EV performance in general.

5.6 The findings showed electric light goods vehicle is becoming more affordable and feasible to the transport trade for saving operating cost and reducing CO₂e emissions, provided that the vehicle can get easy access to charging facilities.

Appendix 1: Key Features of Vehicles and EV Charging Facility

1. Trial EV and Charging Facility

(a) EV

Registration mark:	SU2629
Make:	Nissan
Model:	e-NV200
Class:	Light goods vehicle
Gross vehicle weight:	2,250 kg
Seating capacity:	Driver + 4 passengers
Rated power:	80 kW
Travel range:	317 km (air conditioning off)
Maximum speed:	120 km/h
Battery material:	Lithium-ion
Battery capacity:	40 kWh
Year of manufacture:	2019

(b) EV Charging Facility (At Recipient's own cost)

Make:	EV Power
Charging standard:	IEC62196 Type 2
Charging mode:	220V / 20A, AC

2. DV Used for Comparison

	1 Feb 2020 to 14 Sep 2021	15 Sep 2021 to 31 Jan 2022
Registration mark	DV1: TN2629 ^[1]	DV2: TN2629 ^[2]
Make:	Toyota	Hyundai
Model:	KDH201RSSMDY	H-1 A/T EURO 6 FACELIFT
Class:	Light goods vehicle	Light goods vehicle
Gross vehicle weight:	2,800 kg	3,250 kg
Seating capacity:	Driver + 5 passengers	Driver + 5 passengers
Cylinder capacity:	2,982 cc	2,497 cc
Year of manufacture:	2009	2021

^[1] DV1 provided cleaning consumables and tools delivering service from 1 Feb 2020 to 14 Sep 2021.

^[2] Due to New Method Cleaning's business operation arrangement, DV1 was disposed and its service was replaced by DV2 from 15 Sep 2021.

Appendix 2: Photos of Vehicles and Charging Facility

1. Trial EV and Charging Facility

	
<p>Front view of EV</p>	<p>Rear view of EV</p>
	
<p>Left side view of EV</p>	<p>Right side view of EV</p>
	
<p>4 kW, single phase AC charger (At Recipient's own cost)</p>	

2. DV for Comparison

DV1: TN2629, Toyota (1 Feb 2020 to 14 Sep 2021)



Front view of DV1



Rear view of DV1



Left side view of DV1



Right side view of DV1

DV2: TN2629, Hyundai (15 Sep 2021 to 31 Jan 2022)



Front view of DV2



Rear view of DV2



Left side view of DV2



Right side view of DV2