

# **Pilot Green Transport Fund**

## **Interim Report On Trial of Electric Light Goods Vehicle for Civil Engineering Industry (Cinpek Engineering Limited)**

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PREPARED BY:

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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 Civil Engineering Industry  
(Cinpek Engineering Limited)**

**Interim Report  
(Reporting Period: 1 September 2019 – 31 August 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. Cinpek Engineering Limited (Cinpek) was approved under the Fund for trial of one electric light goods vehicle for civil engineering industry. Cinpek, through the tendering procedures stipulated in the Agreement entered into with the Government, procured a Nissan e-NV200 electric light goods vehicle (EV) for trial. According to the manufacturer, the EV has a travel range of 317 km with its battery fully charged and air-conditioning off.

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. Cinpek originally assigned a Toyota diesel light goods vehicle with a gross vehicle weight (GVW) of 2,800 kg and 2,494 c.c. engine and provided similar service as the conventional counterpart for comparison. However, it was scrapped in October 2019. A Mercedes Benz diesel light goods vehicle (DV) with a GVW of 3,050 kg and 2,142 c.c. engine, providing the same service, was assigned to replace the Toyota DV since November 2019.

1.3 This Interim Report summarizes the performance of the EV in the first twelve months of the trial as compared with its conventional counterpart i.e. the DV.

**2. Trial and Conventional Vehicles**

2.1 Key features of the EV, the charging facility and the DV are in Appendix 1 and photos of the vehicles and the charging facility are in Appendix 2. The EV was used for the delivery of tools and parts for civil engineering industry from Happy Valley to a construction site in Wanchai and occasionally returned to Sai Kung for charging.

2.2 Cinpek installed a 32-ampere AC charger for the EV. The AC charger is installed inside the car-park in Clear Water Bay, Sai Kung for charging and recording the amount of electricity charged. The EV was not charged every day due to the low travel distance involved each day. Occasionally the EV was charged at the construction site in Wanchai with a 13A AC power supply.

### 3. Trial Information

3.1 The trial commenced on 1 September 2019 and would last for 24 months. Cinpek was required to collect and provide trial information including the EV's mileage reading at charging, amount of electricity consumed and time used in each charging, and operation downtime due to charging, cost and downtime associated with scheduled and unscheduled maintenances of the EV and the charging facility. Similar set of data of the DV was also required. In addition to the cost information, Cinpek also reports on maintenance work, operational difficulties and opinions of the driver and Cinpek were collected to reflect any problems of the EV.

3.2 The following table summarizes the statistical data of the EV and the DV. The average fuel cost of the EV was HK\$0.678/km (75%) lower than that of the DV. The average total operating cost of the EV was HK\$0.504/km (56%) lower than that of the DV.

Table 1: Key operation statistics of each vehicle, 1 September 2019 – 31 August 2020

|   |            | EV                   | DV                   |
|---|------------|----------------------|----------------------|
| Total distance travelled (km)                   |            | 13185                | 18635                |
| Average distance travelled (km per working day) |            | 44.5                 | 63.0                 |
| Average fuel economy                            | (km/kWh)   | 5.28                 | -                    |
|   | (km/litre) | -                    | 15.62                |
|   | (km/MJ)    | 1.47                 | 0.432 <sup>[1]</sup> |
| Average fuel cost (HK\$/km)                     |            | 0.229 <sup>[2]</sup> | 0.907 <sup>[3]</sup> |
| Average total operating cost (HK\$/km)          |            | 0.403                | 0.907                |
| Downtime (days) <sup>[4]</sup>                  |            | 1                    | 0                    |

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

<sup>[2]</sup> Electricity bills not provided, electricity cost is based on HK\$1.177/kWh for 2019 and HK\$1.218/kWh for January to August 2020

<sup>[3]</sup> The market fuel price was used for calculation

<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.

3.3. Apart from the fuel cost, maintenance cost and other indirect costs which may include parking fee, towing fee, vehicle replacement fee and cost of operation downtime due to charging and maintenance of the EV are also included in Table 1. There were two scheduled maintenances for the EV, two unscheduled maintenances for the EV charger but no maintenance for the DV in the first twelve months of the trial. The scheduled maintenances of the EV included one for the inspection of new vehicle as required by the EV supplier and another one for annual examination, which incurred one-day downtime. The two unscheduled maintenances of the EV charger were due to failure to charge the EV but no downtime or maintenance cost was involved.

3.4 The utilization rates were 99.7% for the EV and 100% for the DV. Based on the above, the average daily mileages of the EV and the DV were 44.7 km/day and 63.0 km/day respectively.

#### **4. Summary**

4.1 The average fuel cost of the EV was 75% (HK\$0.678 per km) lower than that of the DV. The average total operating cost of the EV was 56% (HK\$0.504 per km) lower than that of the DV. The utilization rates were 99.7% for the EV and 100% for the DV.

4.2 In general, the driver of the EV had no problem in operating the EV and was satisfied with the performance of the EV, except that the power of the EV was considered not good for uphill driving.

4.3 Overall, Cinpek agreed that using EV is good because it can provide a greener and quiet environment as well as EV has a lower fuel cost. Cinpek would encourage other transport operators to try out the green vehicle, and would replace all existing conventional vehicles with the green vehicles.

4.4 The findings only reflect the performance of the EV in the first twelve months of the trial. The performance and reliability of the EV will be tested continuously.

## Appendix 1: Key Features of the Vehicles and Charging Facility

### 1. Trial EV and Charging Facility

#### a) EV

|                          |                               |
|--------------------------|-------------------------------|
| <b>Registration mark</b> | <b>RL9700</b>                 |
| 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) |
| Battery material:        | lithium-ion                   |
| Battery capacity:        | 40 kWh                        |
| Year of manufacture:     | 2019                          |

#### b) Charging Facility

|                    |                   |
|--------------------|-------------------|
| Make:              | EV Power          |
| Model:             | EVC-32NK          |
| Output:            | 220V AC / max 32A |
| Charging Standard: | IEC62196-2 Type 2 |

### 2. DV Used for Comparison

| <b>Registration mark</b> | <b>WG7876<br/>(September and<br/>October 2019)</b> | <b>TB127<br/>(Starting from<br/>November 2019)</b> |
|--------------------------|--|--|
| Make:                    | Toyota   | Mercedes Benz                                      |
| Model:                   | KDH200RSSPNY                                       | 116BTK   |
| Class:                   | Light Goods Vehicle                                | Light Goods Vehicle                                |
| Seating capacity:        | Driver + 5 passengers                              | Driver + 4 passengers                              |
| Gross vehicle weight:    | 2,800 kg   | 3,050 kg   |
| Cylinder capacity:       | 2,494 c.c.   | 2,142 c.c.   |
| Year of manufacture:     | 2005   | 2015   |

## Appendix 2: Photos of Vehicles and Charging Facility

### 1. Trial EV and Charging Facility

|   |  |
|---|--|
|    |    |
| EV – front view   | EV – end view  |
|   |   |
| EV – right side view  | EV – left side view  |
|  |  |
| EV – battery charger  | EV – watt-hour meter   |

**2. Diesel Vehicle (DV) for Comparison**

|   |  |
|---|--|
|  |  |
| <p>DV – front view (for September and October 2019)</p>                           | <p>DV – front view (starting from November 2019)</p>                               |