# New Energy Transport Fund

# Final Report
# On
# Trial of Electric Light Goods Vehicle for Electrical Engineering Industry (N-Power Investment Company Limited)

(10 July 2024)

PREPARED BY:
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**New Energy Transport Fund**
**Trial of Electric Light Goods Vehicle for Electrical Engineering Industry**
**(N-Power Investment Company Limited)**

**Final Report**
**(Reporting Period: 1 October 2022 – 30 September 2023)**

## Executive Summary

## 1. Introduction

1.1 The New Energy 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. N-Power Investment Company Limited (N-Power) was approved under the Fund for trial of one electric light goods vehicle for electrical engineering industry. N-Power, through the tendering procedures stipulated in the Agreement entered into with the Government, procured a Joylong EW5 electric light goods vehicle (EV) for trial.

1.2 Hong Kong Productivity Council has been commissioned by the Environmental Protection Department (EPD)[1] as an independent third party assessor (the Assessor) to monitor the trial and evaluate the performance of the trial vehicle. N-Power assigned a Nissan NV350 Urvan 2.5L Diesel A/T Half Panel Van Lux diesel light goods vehicle (DV) providing same services as the conventional counterpart for comparison.

1.3 This Final Report summarises the performance of the EV in the 12 months of the trial as compared with its conventional counterpart, i.e. the DV.

## 2. Trial and Conventional Vehicles

2.1 The trial EV, Joylong EW5 electric light goods vehicle, has a gross vehicle weight of 4,300 kg capable of carrying a driver with four passengers and goods. It has a 73.4 kWh lithium-ion battery pack and a driving range of 330 km with its battery fully charged and air-conditioning off. The DV, Nissan NV350 Urvan 2.5L Diesel A/T Half Panel Van Lux diesel light goods vehicle with a gross vehicle weight of 3,300 kg and a diesel engine with a cylinder capacity of 2,488 c.c., was used as the conventional counterpart for comparison in this trial. The EV and the DV were used for the delivering materials to different construction sites in Hong Kong.

2.2 N-Power installed a designated 30 kW DC charging facility at the house in Ping Shan, Yuen Long for charging and recording the amount of electricity charged. Key features of the EV, the charging facility and the DV are detailed in Appendix 1 and photos of the vehicles and the charging facility are shown in Appendix 2.

[1] The Administration of the New Energy Transport Fund was migrated to the Environment Branch of the Environment and Ecology Bureau [EEB (Environment Branch)] since 1 January 2023 after internal re-organisation of EEB (Environment Branch) and EPD.

## 3. Trial Information

3.1 The trial commenced on 1 October 2022 and lasted for 12 months. N-Power was required to collect and provide trial information including the EV's mileage reading before charging, amount of electricity consumed and time used in each charging, operation downtime due to charging, and cost and downtime associated with scheduled and unscheduled maintenances of the EV and the charging facility. Similar data of the DV were also required. In addition to the cost information, reports on maintenance work, operational difficulties and opinions of the driver and N-Power were collected to reflect any problems of the EV.

## 4. Findings of Trial

4.1 The following table summarises the statistical data of the EV and the DV. Both the average fuel cost and the average total operating cost of the EV were HK$2.13/km (about 82%) lower than those of the DV.

Table 1: Key operation statistics of each vehicle (1 October 2022 – 30 September 2023)

| | | **EV** | **DV** |
|---|---|---|---|
| Total distance travelled (km) | | 42,700 | 8,414 |
| Average daily mileage (km/working day) | | 144 | 28 |
| Average fuel economy | (km/kWh) | 3.14 | - |
| | (km/litre) | - | 8.11 |
| | (km/MJ) | 0.87 | 0.22 [1] |
| Average fuel cost (HK$/km) | | 0.48 [2] | 2.61 [3] |
| Average total operating cost (HK$/km) [4] | | 0.48 | 2.61 |
| Downtime (working day) [4][5] | | 0 | 0 |

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

[2] The electricity cost was calculated using average electricity tariff rates of HK$1.289/kWh (Oct 2022); HK$1.451/kWh (Nov 2022 – Dec 2022); HK$1.544/kWh (Jan 2023 – Feb 2023); HK$1.552/kWh (Mar 2023 – Apr 2023); HK$1.565/kWh (May 2023); HK$1.559/kWh (Jun 2023); HK$1.535/kWh (Jul 2023); HK$1.508/kWh (Aug 2023) and; HK$1.482/kWh (Sep 2023) as claimed by CLP.

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

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

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

4.2 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. Both the EV and the DV had one scheduled maintenance in the 12 months of the trial period. The scheduled maintenance of the EV and the DV included government annual vehicle inspection.

4.3 In the 12 months of the trial period, neither the EV nor the DV had any maintenance related downtime. Hence, the utilisation rates of the EV and the DV were both 100%. Based on the above, the average daily driving distances of the EV and the DV were 144 km and 28 km, respectively.

4.4 The driver of the EV liked driving the EV and had no problem in operating the EV. Overall, he was satisfied with the performance of the EV and would promote the EV to other

drivers. N-Power was satisfied with the EV since the EV could meet the operational requirements and save the operation cost. Given the opportunity, N-Power would consider replacing all existing conventional vehicles with EVs and encourage other transport operators to try the EVs.

4.5 It is observed that the amount of electricity stored in the battery after a full charging operation could be maintained at the level of 73.4 kWh after the 12-month trial period. Thus, the deterioration in battery capacity within the 12-month trial period was insignificant, if any.

4.6 Based on the total mileage of the EV and the fuel economy of the DV, the equivalent carbon dioxide ($CO_2e$) emission from the DV could be estimated for comparison purpose. In the 12-month trial period, the $CO_2e$ emission from the EV and the DV were 5,307 kg and 14,595 kg respectively. Hence, there was a 9,288 kg (about 64%) reduction of $CO_2e$, with the replacement of the DV by the EV in the trial.

## 5. Summary

5.1 The average fuel cost and the average total operating cost of the EV were HK$2.13/km (about 82%) lower than those of the DV. The utilisation rates of the EV and the DV were both 100%. There was a 9,288 kg (about 64%) reduction of $CO_2e$, with the replacement of the DV by the EV in the trial.

5.2 It is observed that the amount of electricity stored in the battery after a full charging operation could be maintained at the level of 73.4 kWh after the 12-month trial period. Thus, the deterioration in battery capacity within the 12-month trial period was insignificant, if any.

5.3 The driver of the EV liked driving the EV and had no problem in operating the EV. Overall, he was satisfied with the performance of the EV. N-Power was satisfied with the EV since the EV could meet the operational requirements and save the operation cost. Given the opportunity, N-Power would consider replacing all existing conventional vehicles with EVs and encourage other transport operators to try the EVs.

5.4 The findings showed electric light goods vehicles are becoming more affordable and feasible to the transport trade for saving operating cost and reducing $CO_2e$ emissions, provided that the vehicles can get easy access to charging facilities.

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

### 1. Trial EV and Charging Facility

**EV**

| | |
|---|---|
| **Registration mark:** | **HJ2386** |
| Make: | Joylong |
| Model: | EW5 |
| Class: | Light goods vehicle |
| Gross vehicle weight: | 4,300 kg |
| Payload: | 1,300 kg |
| Seating capacity: | Driver + 4 passengers |
| Rated power: | 100 kW |
| Driving range: | 330 km (air conditioning off) |
| Battery material: | Lithium-ion |
| Battery capacity: | 73.4 kWh |
| Year of manufacture: | 2022 |

**EV Charging Facility**

| | |
|---|---|
| Make: | Only Power Supply |
| Model: | ANDC5-500V/60A-1 |
| Power: | 30 kW, 500V DC / max 60A |
| Charging standard: | GB Mode |

### 2. DV Used for Comparison

| | |
|---|---|
| **Registration mark:** | **RK2260** |
| Make: | Nissan |
| Model: | NV350 Urvan 2.5L Diesel A/T Half Panel Van Lux |
| Class: | Light goods vehicle |
| Gross vehicle weight: | 3,300 kg |
| Payload: | 1,340 kg |
| Seating capacity: | Driver + 5 passengers |
| Cylinder capacity: | 2,488 c.c. |
| Year of manufacture: | 2017 |

## Appendix 2: Photos of Vehicles and Charging Facility

### 1. Trial EV (HJ2386) and Charging Facility

<table>
<tr><td> 
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<tr><td>Front view of EV</td><td>Rear view of EV</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Left side view of EV</td><td>Right side view of EV</td></tr>
<tr><td> 
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<tr><td>30 kW DC charging facility</td><td></td></tr>
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## 2. DV (RK2260) used for Comparison

| | |
|---|---|
|  |  |
| Front view of DV | Rear view of DV |
|  |  |
| Left side view of DV | Right side view of DV |