eLCVs

Electric fleet transition powered by real-world data

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For the many journeys in life

INTRODUCTION

Understanding the realistic operational capabilities of an electric LCV (eLCV) is crucial to an effective electric fleet transition process. Two key questions routinely faced from fleet operators looking to adopt eLCVs are "what is the real-world range?" and "what impact, if any, does the payload have on this range?

Changes to the benefit-in-kind of company cars has triggered a sudden surge in electric car interest as drivers seize the opportunity to cut their tax costs.

However, the ban on the sale of new petrol and diesel cars and vans from 2030 has increased the focus on fleet electrification across all vehicle segments, moving the spotlight to the very real practical challenges of incorporating electric vehicles into a commercial vehicle fleet.

With many companies replacing their fleet vehicles every three to four years, businesses need to start planning now for this inevitability and assessing the situation earlier will only make the transition to electric vehicles easier to manage.

Although electric LCVs (eLCVs) have been available for more than 10 years, they have lagged somewhat behind electric cars in terms of their development and market growth. The number of models from different brands in the different vehicle segments has historically been extremely limited.

However, we are now seeing a strong increase in model availability across a number of manufacturers and segments with more to come. With this in mind, the opportunity for commercial fleet operators to begin the transition to eLCVs – which could be up to a 10-year process for some – is significantly improving.

There are also a number of well-defined and proven benefits to electric vehicles on top of the 2030 deadline.

Operational costs in terms of 'fuel' are significantly lower and servicing and maintenance costs are usually reduced due to EVs having fewer moving parts than diesel or petrol vehicles.

From a corporate social responsibility perspective, EVs are a positive contributor, cutting tailpipe emissions. This also helps fleets meet the requirements of low-emission or clean-air zones in UK cities.

It's for the above reasons that electric vans also offer a great option for last-mile delivery – something that's been growing significantly in the past year as home deliveries rise.

Understanding the realistic operational capabilities of an eLCV is crucial to an effective electric fleet transition process. Two key questions routinely faced from fleet operators looking to adopt eLCVs are "what is the real-world range?" and "what impact, if any, does the payload have on this range?"

It was for this very reason that Arval commissioned an independent scientific trial, to examine eLCV performance in a variety of real-world driving conditions.

This guide sets out the key results from that research as well as addressing other areas to consider when looking to start integrating eLCVs into your fleet:

- **How do you choose the right van?** When choosing a diesel van, there are certain criteria that can't be compromised, such as cargo capacity and payload, and these are no different for eLCVs. However, fleets also need to ensure that the van is capable of the range required.
- **How do eLCVs perform in the real world?** An increasing amount of information is becoming available under this topic and we've added to that with the new research featured in this guide.
- **How do I allow for charging?** Refuelling is a consideration for any fleet, but how does this differ for EV charging?
- **What's the cost impact?** Any fleet that contains more than one fuel type must be based on whole life cost (WLC) figures – the total cost of running the vehicle – because only this can give true and accurate comparisons.

Electric fleet transition won't happen overnight, so we're here to help you plan with confidence for a smooth, gradual and effective transition.

VEHICLE CHOICE AND SUITABILITY:

INCLUDING CAPACITY, PAYLOAD AND MILEAGE REQUIREMENTS

There are a growing number of models with much larger batteries and with a WLTP range in the region of 200 miles. Even allowing for a significant reduction in range due to payload, weather and route, these should easily be capable of daily operating profiles comfortably in excess of 100 miles.

Before we look at the real-world performance results, it's important to consider vehicle choice. While the car market has just as many plug-in hybrid models (if not more) as fully electric models, the LCV market is a bit different with the focus for vans being on fully electric vehicles (EVs).

So the first thing to consider, in your eLCV transition process, is whether there are any equivalent electric vehicles, from a payload and capacity perspective, to the ones that you currently operate. This may mean having to look beyond your current preferred brands to alternative manufacturers during the early stages of your transition, until a full model range comes to market.

As well as the manufacturers' own websites, there are comparison sites that can be useful to help you to understand and compare the full technical specification of differing models, whether electric or diesel. Our expert teams can also help you compare vehicles and identify the best choice for your needs.

Whether existing diesel LCVs are suitable for replacement with an eLCV comes down to their typical daily mileage. There is a perception that eLCVs are only suitable for low annual mileage driving profiles.

However, a vehicle doing between 80 to 100 miles a day, used five days a week for 46 weeks of the year, equates to 18,400 to 23,000 miles. This should not be considered low mileage.

So with eLCVs coming to the market with greater and greater ranges, a 100-mile daily route should not put fleets off the switch to electric.

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This means that traditionally 'low mileage' drivers aren't the only potential candidates for eLCVs and the opportunity for commercial fleet operators to transition to eLCVs is on the up.

REAL WORLD PERFORMANCE:

INCLUDING THE IMPACT OF WEIGHT, TEMPERATURE AND JOURNEY TYPE

This research examined eLCV performance in a variety of real-world driving conditions. The objective was to find out the real-world unladen performance of an eLCV compared to the WLTP range and then to assess the impact of increased payload weight, in percentage terms, on vehicle range measured in miles. The testing also examined the impact of temperature and journey type.

Being range-certain is vital for commercial vehicle operators. While the WLTP figure quoted by each manufacturer is a great starting point, it's also worth knowing the impact that factors such as ambient temperature, payload and the type of journey will have on the industry's official standard test.

Until now, accurate information for these variables has been far from plentiful.

To provide accurate and definable insights and give fleet operators a better understanding of what to expect from an eLCV in comparison to the WLTP range, the Arval LCV Centre of Excellence team commissioned an independent scientific trial.

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Feeding this data into purchasing decisions will give fleet managers far greater range certainty when choosing eLCVs and a better understanding of where the opportunities for switching lie.

TESTING METHOD

Arval selected world-renowned Millbrook Proving Ground to undertake this research. Based in Bedfordshire, Millbrook is a dedicated, independent vehicle test and validation centre.

The assessment provided accurate energy consumption data throughout the set of tests to allow a detailed understanding of the variance in efficiency in different driving environments.

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Benchmark eLCVs representing the three main LCV segments – small van (up to 2.4t GVW), medium van (2.4 to 3.0t GVW) and large van (over 3.0t GVW) – were selected from well-known manufacturers. Millbrook inspected the vehicles to check each was running as it should and fitted them with data tracking equipment.

The test process consisted of charging each vehicle to 100%, driving it around a 45 mile (72km) test circuit and then recharging again. The energy required to fully charge the battery after each test was recorded. Millbrook carried out this process for each vehicle with three different payload levels: 0%, 50% and 100%.

Conducting the tests over the EU and UK standard regulation Real Driving Emissions (RDE) test cycle not only ensured consistency in the performance measurement, but also enabled equal assessment of each vehicle in different operating scenarios (see panel).

In the true spirit of 'real-world' performance, even this research was subject to the challenges faced day-to-day by fleet operators – namely the unpredictable British weather. In order to minimise inconsistencies, the same driver and test course were used. However, each vehicle was tested on a separate day during November and as such the temperature varied.

RDE TEST DETAILS

The RDE test covers three types of operation: urban, rural and motorway, with the mix of operation distributed evenly between the three categories. These classifications are based purely on the vehicle's speed.

A vehicle travelling at:

UP TO:
37.5MPH (60KM/H)
(AVERAGE OF 9-25MPH OR 15-40KM/H)

URBAN CONDITIONS

37.5-56MPH (60-90KM/H)

RURAL CONDITIONS

ABOVE:
56MPH (90KM/H)

MOTORWAY CONDITIONS

Payload:

- 0%
- 50%
- 100%
- Average Temp

THE RESULTS

TEMPERATURE

Cold weather affects battery performance in terms of both capacity and braking regeneration.

Cold weather also has other implications for EVs compared to petrol or diesel vehicles, such as heating the cabin. In a traditional vehicle, this energy is drawn from waste heat escaping from the engine, which is not an option for the EV.

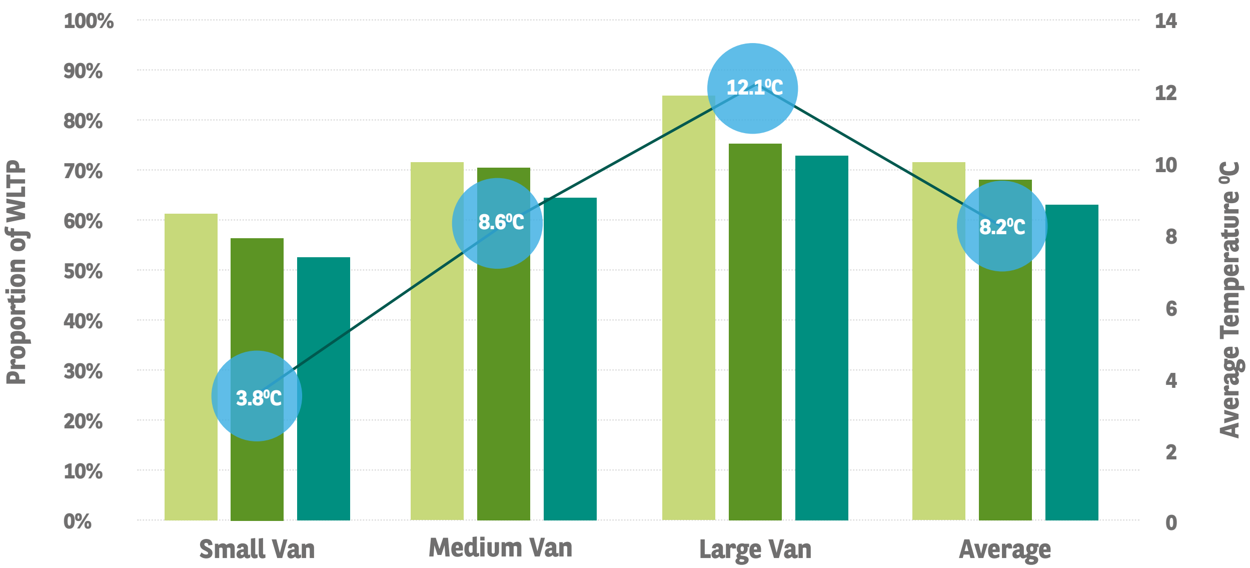
During our testing, the temperature was at its lowest when assessing the small van, and predictably this is where the most significant impact on performance was observed. The medium and large vans, tested on much warmer days, showed a lesser difference. We can therefore consider the results to be a true reflection of cold weather performance, which is extremely valuable for fleet operators.

The results show a clear correlation between temperature variation and performance.

On a combined cycle, fleet operators should expect the real-world range in winter conditions to be in the region of 60-70% of the stated WLTP figure.

From a fleet operator perspective, understanding the base line range scenarios that will be achieved in colder conditions is extremely important to the effective adoption of eLCVs. It's important to plan for these reductions throughout the winter months, but you will then benefit from improved performance as the temperature warms up.

Payload Impact of Real-Life Range against WLTP Range (Combined Cycle)



Overall, and perhaps unsurprisingly, at rural (mid) speeds, electric vans are at their most efficient. On average, across all three-payload scenarios, the three types of van recorded 82% of the WLTP range.

THE RESULTS

DUTY CYCLE VS PAYLOAD

As with diesel vans, the type of driving has the greatest impact on the performance of an eLCV.

Overall, and perhaps unsurprisingly, at rural (mid) speeds, electric vans are at their most efficient. On average, across all three-payload scenarios, the three types of van recorded 82% of the WLTP range.

This positive performance for the rural figures was also evident at colder temperatures.

For slower urban speeds, this figure was 68% and for higher motorway speeds the average was 61% of WLTP.

The energy required during the 'stop, start' nature of the urban cycle to repeatedly accelerate a heavy vehicle from stationary (which is not fully regained through braking regeneration) appears to have a more noticeable impact on the energy consumption than perhaps would be anticipated.

It is not surprising that the motorway cycle had the highest impact on the energy consumption of the eLCVs, similar to that experienced with diesel vehicles.

Duty cycle (average results across the three payload tests)

Cycle	Small Van	Medium Van	Large Van	Average
Urban	65%	48%	92%	68%
Rural	74%	79%	94%	82%
Motorway	45%	74%	64%	61%
Average Temp (ºC)	3.8	8.6	12.1	8.2

The performance of the vans varies quite significantly in the different duty cycles. This has real implications for fleet operators depending on how their vehicles are typically used.

For those vans operating mostly at urban and rural speeds, as many who operate on a local basis do, a blend of these two cycles (rather than including motorway figures) is useful to note, which would indicate a range more in the region of 75% of the WLTP figures.

On average there's only an 8 percentage point difference between a fully loaded van and one that's empty. Individual fleets will vary as to whether the focus should be on the 100% payload figures compared to 50% depending on the operational role of the vehicle.

Payload findings (Combined Duty Cycle)

Payload	Small Van	Medium Van	Large Van	Average
0%	61%	72%	85%	72%
50%	57%	71%	76%	68%
100%	53%	64%	74%	64%
Average Temp (ºC)	3.8	8.6	12.1	8.2

Interestingly, the eLCV figures are broadly similar to the impact load has on diesel vans, which typically see a 20% increase in fuel use for a 75% payload compared to 0% load.

As well as the averages, it's important to look at how the different vans perform.

Overall, although the combined performance figure for the small van with 100% payload is quite low, the figure is dragged down by the motorway cycle. For those operators using small vans for purely local work without motorway use, it could be safe to assume a greater range. That said, we must also consider that the small van was tested at a lower temperature than the other two vehicles so the impact of both is reflected in the results.

For the small van with a half payload, the drop in range was just 4 percentage points, for the medium van a single percentage point, while the large van saw a range reduction of 9 percentage points. However, it's important to note that the large van moving from 50% to 100% load saw only a further 2 percentage point range impact.

Interestingly, the eLCV figures are broadly similar to the impact load has on diesel vans, which typically see a 20% increase in fuel use for a 75% payload compared to 0% load.

Looking at the impact of payload at different speeds – rather than overall – shows that across all three van sizes, payload has minimal impact at higher speeds. Even at urban and rural speeds, range holds up well when load increases with a typical off-set of around 10 percentage points.

UN-LADEN	Small Van	Medium Van	Large Van	Average
Urban	71%	53%	99%	74%
Rural	82%	82%	104%	89%
Motorway	46%	74%	68%	63%
Combined	61%	72%	85%	72%
Average Temp (ºC)	1.6	8	12	7.2

50% PAYLOAD	Small Van	Medium Van	Large Van	Average
Urban	63%	48%	92%	68%
Rural	75%	82%	91%	83%
Motorway	45%	77%	62%	61%
Combined	57%	71%	76%	68%
Average Temp (ºC)	4.6	13.7	12	10.1

100% PAYLOAD	Small Van	Medium Van	Large Van	Average
Urban	60%	43%	86%	63%
Rural	67%	72%	86%	75%
Motorway	43%	72%	61%	59%
Combined	53%	64%	74%	64%
Average Temp (ºC)	5.2	4.2	12.2	7.2

EV charging may require slightly more up-front planning than refuelling a petrol or diesel vehicle, but it can be worth it for the potential cost savings.

CHARGING

Now that we've looked at real-world eLCV performance, we also need to consider the charging of an EV, as this is a key part of the decision process to go electric, whether it is a car or an LCV. For operational vehicles, where the vehicle charging will happen is even more important a consideration, as the fleet operator is making the decision to go electric on behalf of the driver.

It's a good idea to map out daily journeys and routes, asking the following questions:

- Can the van operate for the whole day on a single charge?
- Where does the vehicle stop en route? This could be at a depot, home location or public place
- Is EV charging currently available at those locations?

If the vehicle can go all day on a single charge, then the simplest solution is to recharge overnight. If the vehicles are kept on site, you may need to think about installing workplace charge points.

There are different suppliers and schemes in place to support with this depending on your needs. We can work with you to define your requirements, and share our experience having been through the process of installing 50 charge points at our own head office location.

If your drivers take the vehicle home overnight, you could consider home charging options. At Arval, our partnership with NewMotion means that we can offer smart charge points at offices and homes throughout the UK, so we're happy to help with those conversations.

The number of public charging points across the UK is also increasing rapidly. Many can be found at motorway service areas, but there are now a rapidly growing number appearing at supermarkets and retail outlets as well as conventional fuel stations. You can see the number of charging points that are available across the UK on websites such as zap-map.com/live/.

EV charging may require slightly more up-front planning than refuelling a petrol or diesel vehicle, but it can be worth it for the potential cost savings. The cost to charge an EV using a home charging point depends on your electricity tariff and the amount of electricity (kWh) used. For example, a domestic tariff is around 16p/kWh. At this level, it would cost about £8 to fully charge an EV with a 50kWh battery, whereas a vehicle with an 80kWh battery would cost around £13.

If a 50kWh battery in an eLCV gives a range of 100 miles, that's 8p per mile.

Energy suppliers are increasingly offering off-peak tariffs to encourage EV drivers to charge their vehicles at different times of the day, particularly late at night. These rates can be as low as 5p/kWh. At this level, the cost per mile drops to 2.5p.

WHOLE LIFE COST

Fuel Cost

Total Maintenance

Total Finance

A whole life cost model should be used for any vehicle comparison, but it is particularly relevant when comparing different fuel types such as electric and diesel as it highlights the different distribution of costs between technologies. For example, EVs generally have higher vehicle purchase costs, but much lower fuel and running costs.

The panel to the right shows that although the initial price of the electric van is higher, the in-life costs are lower and thus the total costs throughout the contract are very similar.

We have based this example on the following profile:

80 MILES PER DAY

18,400 MILES PER ANNUM

48 MONTH CONTRACT

NO PRIVATE MILEAGE

46 WEEKS USE PER ANNUM/5 DAYS PER WEEK

FIXED FUEL PRICE FOR THE TERM

MAINTENANCE PACKAGE INCLUDED

Overall Life Cycle Cost

*Example costs only. Actual values will vary depending on vehicle choice, contract terms and usage.

CONCLUSION

The most important point to take away is that transitioning to an electric fleet needs to be planned using all the data available both for electric vans and also for the existing diesel fleet.

Data and the knowledge that it can provide plus the growing number of increasingly capable products are making the transition to electric light commercial vehicles easier and more viable for fleets.

This report considers the pros and cons of adopting and running eLCVs backed by independent, empirical data. It sheds light on the impact of factors such as temperature, payload and vehicle speed on range so that businesses can make informed judgements about where and how electric vehicles will fit into their fleets.

While we already know that these factors have an impact on conventional, internal combustion engine LCVs, what we haven't known, until now, is their impact on eLCVs.

Armed with this valuable information, businesses can also calculate accurate running costs and carry out vital comparisons with their existing vehicles so they know what to expect after the switch to electric.

By investigating how each variable impacts EV range, van operators can tailor this information to their typical use or uses and arrive at the most accurate range information possible.

Information such as this means that fleets will be able to take on and run eLCVs with range certainty, rather than range anxiety.

The most important point to take away is that transitioning to an electric fleet needs to be planned using all the data available both for electric vans and also for the existing diesel fleet.

As a trusted partner and EV expert, Arval is here to help ensure that your transition to eLCVs goes as smoothly as possible and results in increased efficiency, lower running costs and greater corporate social responsibility.

Arval UK Limited (Whitehill House, Windmill Hill, Swindon, SN5 6PE. Registration number 1073098. VAT Registration GB 202 1441 76). Email: info@arval.co.uk | Telephone: 01793 887000