Highways England Electric Van Demonstrator Project

Final Report and recommendation for a full scheme

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Context

Energy Saving Trust (EST) is undertaking a Demonstrator Project for Highways England to achieve the following key objectives:

- Enable the on road trial of electric or plug in hybrid commercial vehicles up to 7.5 tonnes on a section of the Strategic Road Network in England (SRN), by making funds available for the hire or lease of these new vehicles and associated charging points
- To explore the barriers to their uptake and usage on a designated part of the SRN.

The project is now in the trial phase, with deliveries of vehicles completed in November 17. The organisations, and industries, taking part in this initial project are:

- South Yorkshire Police (Police)
- Z-tech (for Thames Water and United Utilities) (Utilities)
- Northern Gas Networks (Utilities)
- Southway Housing (Housing Trust)
- Forrest (Construction)

Across these organisations 17 electric vans are in use on a six month basis supplied by two providers: DriveElectric and Northgate Vehicle Hire. All vans replace diesel vans and are used on sections of the SRN with high levels of air pollution from exhaust emissions. The vans are be equipped with data loggers to assess usage patterns and emissions savings. A survey series and semi-structured interviews was carried out with key stakeholders to understand the user experience and further opportunities for helping organisations move to zero emission fleets.

Two notable themes emerged during the pre-trial phase. The first was the enhanced interest in trialling vehicles. While participation wasn't advertised, EST has been approached by organisations keen to participate and who heard about the project through word-of-mouth. There is appetite for many more vehicles than the capacity of the trial. The second theme was that a number of challenges emerged during the set-up of the trial that threatened the organisations' ability to participate. However, with participant consultation, this project has developed a template for an acceptable, low-risk model, by which organisations are able to trial vehicles for an extended period that would not have been available to them by other means.

Capitalising on these themes, EST has examined the viability of a full scheme to provide a "try before you buy" concept for ULEV commercial vehicles to fleets. The main aim is to accelerate uptake through a "try before you buy" offer combined with advice and support. Highways England has requested that for further investment to go ahead, there is an urgent requirement for greater evidence from the whole of the fleet market to understand the level of take up of any future scheme.

This final report outlines the qualitative and quantitative evidence gathered from four main sources:

- A fleet wide research project surveying a large number of fleet operators
- In depth interviews with senior managers of the fleets
- Survey analysis from fleets taking part in demonstrator project
- Interviews with the main vehicle manufacturers supplying vehicles for our trial

To complement this individual fleet based evidence from our small sample EST has surveyed the wider fleet market to gain a broader evidence base to support further investment. This document outlines our findings and provides recommendations on whether a fuller scheme is viable.

Project Aim

At the outset of our Demonstrator Project in April 2017, the aim was to test the model of financial assistance provided to fleets to see how van uptake could be positively influenced. These findings would inform the design and scope of a full scheme to support the uptake of commercial ULEVs. During the course of the project, a number of barriers to financial assistance have been found to be insurmountable. In most cases these are issues of state aid legislation.

In November and December 2017, Highways England asked the Energy Saving Trust (EST) to research the viability of a 'try before you buy' scheme delivered through Facilitation Centres in 4 cities to incentivise the long-term adoption of electric vans on sections of England's Strategic Road Network (SRN).

The research included, reviewing the current demonstrator project that EST manages on the behalf of Highways England as well as conducting a market-wide survey, a series of interviews and a review of wider publically available research. This executive summary outlines the key outcomes of this research.

Scope

EST has been working on a broad requirement provided by Highways England. This scope involved the following metrics:

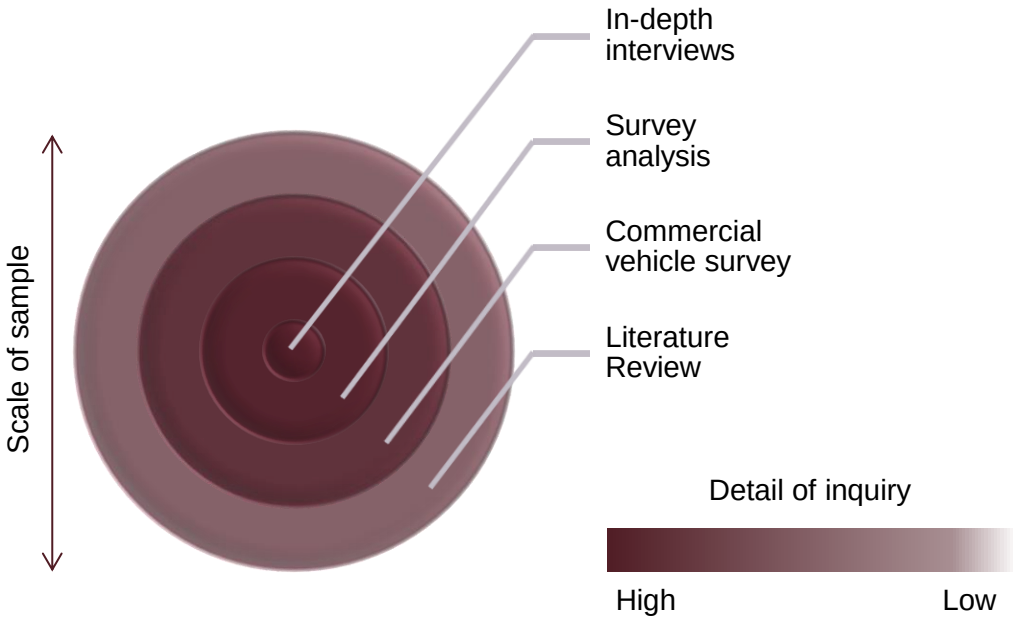
- 4 City Facilitation Centres (Leeds, Sheffield, Manchester, Birmingham)
- Target of 4000 additional electric vans on the road – from a demonstration fleet of 1000 vehicles.

Approach

EST adopted a mixed-method market research approach to combine findings from the demonstrator project and the wider landscape. This approach is made up of four elements:

1. In-depth interviews with senior decision makers
2. Project survey analysis
3. Commercial vehicle survey and analysis (15,000 surveyed)
4. Literature review

With this approach, evidence provided a varying level of detail and scale but within the limits of the budget available. The variation is indicated below:



The output from this approach is documented in this document.

Key Findings

The research was carried out with one key research question in mind: What would the level of uptake be should a “try before you buy” scheme be put in place? To answer this in detail, it has been broken down into a series of questions. The findings are outlined for each of these below:

1. Can electric vans work for users of the SRN?

Yes, for users of smaller vans travelling short distances.

The survey showed two categories of SRN-user, defined by particular characteristics:

	Minor User	Major User
Typical van size	Small (up to 2.5t)	Medium-large (over 2.5t)
% of mileage on SRN	10-30%	50-60%
% of survey sample	55%	42%
Likely journeys	Junction-to-junction use	Intercity commuting

The current electric van market is dominated by smaller models (up to 2.5t) and this is not expected to change within the next 12 months. Based on the SRN-user profiles above, electric vans are likely to work for the ‘Minor User’ category.

The successful use of electric vans is dependent on the availability of charging infrastructure and opportunity. Van users who travel from client to client, take their vehicles home each night and do not have access to off-street parking are likely to have difficulties in finding the time to locate and use a public chargepoint.

2. Is there appetite for a ‘try before you buy’ scheme?

Yes, this research found broad support for the introduction of a ‘try before you buy’ scheme but differences in opinion on what it should look like.

Registrations of electric vans are consistently increasing year on year (20% increase in 2015, 17% in 2016, 22% in 2017). The number of electric vans on UK roads is now greater than 4,000 but annual registrations remain less than 1% of the total UK van market.

However, the survey showed the demand could be greater than the current market situation. While only 3% said they operated electric vans, 43% suggested they were ‘actively interested’ in doing so.

78% said that a ‘try before you buy’ scheme would help their decision to adopt an electric vehicle. When asked to select the most useful support that could be offered, the ‘try before you buy’ scheme was the third most popular (after financial support for vehicle purchase and more public infrastructure).

Significantly, **survey participants considered a short duration to be appropriate for the scheme**; the most preferred options were ‘1-5 days’ and ‘1-2 weeks’. This is in direct contradiction to the response received from fleets involved in the demonstration project, who all agreed that a longer duration, such as, 3-6 months was needed.

Interviews with manufacturers and fleets showed that there was currently a limited opportunity for demonstration vehicles to be made available. It can be assumed that there is a high demand for demonstrator vehicles overall and a relatively small demonstrator fleet available from the vehicle manufacturers. The vehicle manufacturers also reported that long term demonstrators had resulted in a small number of large orders from significant fleet operators.

3. Would a 'try before you buy' scheme result in significant long-term adoption?

Investment in a 'try before you buy' scheme is estimated to stimulate considerable attention and achieve some long-term adoption. However, achieving this on a scale of several hundred is expected to be more realistic than several thousand within a time scale of two to three years and will demand considerable financial investment.

Some demonstrator participants are looking to procure as the result of the project. However, for the majority, it is unlikely that the experience will convert to long-term adoption immediately. It is too early to be accurate but from our engagement with participants we estimate **a minimum 30% adoption in the short term with another 30% in the long-term (2-5 years) as a result of the demonstration project.** This will be higher in the longer term but at this time, the likely short term conversion of around 30% is realistic. It should be noted that this is from engaged fleets who have volunteered to try the electric vans and so it could be argued they are not typical.

Interviews with those experienced in trials suggested that, **the greater the duration of the demonstration, the greater the likelihood of subsequent adoption**. This 30% rate of short term adoption would be expected to fall should the duration reduce to the preferences found in the survey.

There is no clear evidence about the likelihood of conversion following a demonstration period. We have sought advice and input from manufacturers, all of whom provide short and long term demonstrators, and in all cases there is no accurate measure of how successful a demonstrator vehicle is in persuading a fleet to purchase a vehicle. Demonstration fleets are seen as a tool for sales and marketing and their success is measured on the level of utilisation and the number of demos achieved. The overall picture is further complicated by the use of demonstrators by dealers. The number of such is encouraged and monitored by manufacturers, however the activity and results aren't centrally captured. Actual conversion rates are impossible to know.

It is important to note that demonstrators can negatively affect the likelihood of adoption. Unless potential customers are helped to manage the experience, the results are not always positive and if range, payload, costs, charging or operational factors prove too difficult, this could dissuade a fleet from going ahead. This was true of one of our fleets on the demonstration project who were disappointed with the range of their electric van on the motorway. The vehicle had to be redeployed to a more urban use.

Below are two scenarios which consider the likely adoption of vehicles over a two year demonstrator scheme. Either scenario could be put in place in isolation or as part of a combined scheme. An explanation of the assumptions is given in the next section.

Model Facilitation centre in City A

An illustrative mixed fleet of short term (up to 1 month) and longer term (3-6 months) with a total fleet size of 250 vehicles.

City A – Facilitation Centre Total fleet 250 vans			
Ref	Short term fleet Up to 1 month loan	Longer term fleet 3-6 month loan	
A	125 vehicles available	125 vehicles available	[1]
B	1500 rentals in 2 years	500 rentals in 2 years	[2]
C	66% of market interest	21% of market interest	[3]
D	10% conversion	30% conversion	[4]
E	**150 vans adopted**	**150 vans adopted**	[5]
F	2273 interested parties required represented in no. of vehicles	2381 interested parties required represented in no. of vehicles	[6]

From a demonstration fleet of 250 vans, 300 vans have been adopted i.e. purchased or leased permanently by the fleet. This does not necessarily assume these have replaced a diesel vehicle, they may be additional requirements. However in this event the additional vehicle would otherwise have been a diesel van, so the growth of conventional vehicles has been restrained in this instance. Over four similarly sized centres, the total number would be 1200 vehicles. This clearly falls short of the 4000 vehicle target that we originally discussed.

The electric van market is limited and there are considerable risks associated with scaling up production in the supply chain. Currently, manufacturers are not prepared for greater volumes than will be achieved from individual and small batch orders but are open to the opportunity of scaling up sales through a combination of bidding for a greater proportion of production to be allocated to the UK and increased vehicle production. Targeting the manufacturers with the vehicles with the greatest driving range (such models were not available at the time of the trial) is likely to boost adoption.

Some of our fleets are indicating they will continue with the current model vans and incorporate them into their fleets. **Most are likely to only adopt when a longer range model is available. The range figure quoted unprompted by most of the trial participants is 120miles real world range, this is 50-60 miles greater than the trial vehicles but should be achieved by the longer range vans being introduced by Renault and Nissan in 2018.**

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[1] 125 vehicles suggested as a number of vehicles that could be acquired and managed on a single site. This input is flexible.

[2] Based on the number of vehicles available and the number of rental periods possible within two years. A utilisation factor of 50% is applied (the vehicle is on rental 50% of the time).

[3] Market interest is based on the nationwide survey asking those interested in investing in electric vans, how long they would expect a ‘try before you buy’ scheme should last.

[4] Long-term adoption rates are based on estimated results from the demonstration project and an assumed reduction in this linked to the duration of the trial.

[5] Based on number of rentals multiplied by long-term adoption rate. $E = BxC$

[6] Based on the assumed number of interested parties required to achieve the number of rentals for the interest in that particular duration. $F = B/C$

Vehicle supply

A critical question is whether vehicles are available in large numbers to support a large scale adoption of electric vans. To answer this question, the project team spoke to three manufacturers whose vehicles are being used in the current demonstrator project with our five fleets. The manufacturers are: Renault, Nissan and PSA (Peugeot & Citroen). In addition, we spoke to Ford about their new Transit Custom Hybrid. The table below outlines the feedback provided in summary form and tackles a number of key questions.

	Renault	Nissan	Peugeot	Ford
Availability of large numbers of vans	Production can be ramped up if firm orders are confirmed.	Largest provider of electric vans. 80% market share to date. Production can be ramped up but 8-10 week lead times with firm orders.	Small numbers are realistic. PSA unlikely to ramp up production. Factories not geared to high volume.	Limited availability beyond London trial.
Range	120miles realistic for new Kangoo 33kWh real world	New e-NV200 40 kWh range is 100-120 miles real world	No longer range product until 2020.	Plugin Hybrid 310 miles – 31 miles zero emissions estimated
Demonstration Loans	Existing RUK fleet fully booked out	Nissan provide 2 months – 6 months would be preferable	EV demo 1 month minimum	None beyond London trial.
New small product	New Kangoo just launched	New eNV200 Just launched	Nothing new until 2020	Yet to come to market
New large van product	Master ZE trial vehicles arriving in 2018 but not for free sale until a lengthy evaluation period is complete. At least 2019 for open sale.	No plans	No plans	Transit Plugin Hybrid will be core product but not available for open sale until 2019-2020.

Additional feedback and intelligence

Challenges for fleets go beyond the availability, cost and range of vehicles. They include:

- Outright purchase WLC works for longer vehicle retention periods. Leasing rates are inconsistent across the market due to uncertainty around residuals.
- Rapid charging infrastructure on the SRN requires employees needing a smart phone linked to a credit card account.
- The cost of charging infrastructure in commercial properties is often prohibitively high needing investment and specialist site surveys. Work place charging grant is considered too low and onerous for applicants.
- Plug in van grant is uncertain, although a higher total amount is available, in reality it is inferior to that of cars due to the lower percentage figure and the cost of the smaller vans. There is confusion about VAT treatment in relation to vans and the grant which can be administratively burdensome for dealerships.
- Due to state aid rules it is not possible for businesses to take advantage of the plug-in van grant *in addition to* 100% first year capital allowances on the same vehicle.
- Additional support is required for fleets to understand the benefits and how they need to adapt their fleet management practices
- CAZ are focussed on cities not the SRN – this along with operational limitations will favour urban use of electric vans.

Manufacturer summary

All of the manufacturers are supportive of additional support from Government. However, the facilitation centres did not receive a resounding endorsement with other more pressing issues needing to be tackled first to open the door to an improved market environment for sales.

In all cases, the OEM sales expectations were far lower than the figures we were touting of 4000 additional new vans. Renault and Nissan can increase production with firm orders and lead times are not too long. There is only limited product available with only small vans currently featuring in product line ups. The performance of these is improving but is still limited to between 100-120 miles in the real world. Affordable, long range, larger van product is not likely to be available in the next 2-3 years.

Manufacturer support would be available but with investment in Go Ultra Low, this is unlikely to be financial. Rather, local dealer and manufacturer fleet sales representatives could support a facilitation centre is one was set up in a local city.

There is a long list of barriers to mass electric van adoption which go beyond the obvious range and costs barriers. This illustrates that more needs to be done at a policy level before mass adoption of electric vans can be expected.

In terms of vehicle supply, an additional 4000 vans over two years is stretching for the manufacturers. Renault and Nissan can boost production but will do so with firm orders. Peugeot are less flexible and will maintain production at current levels.

3. What criteria should be considered to make a 'try before you buy' scheme successful?

- **Engagement with manufacturers and suppliers** to ensure supply of vehicles is technically achievable within chosen timeframe. The successful recruitment of participants to the scheme will also depend on the vehicle manufacturers and their dealers locally promoting the vehicles.
- Provision of a **physical centre** and **events** to potential participants to visit and gain advice. Using an existing vehicle rental outlet would minimise set up, premises and scheme administration costs.
- **Marketing.** A considerable market reach is required for this to result in significant uptake. A wide-reaching campaign targeted both at fleet and self-employed audiences is required. The most effective campaign will reach the most likely group to adopt these vehicles – the 'Minor User' category as above.
- **Chargepoint investment.** Most people will be willing to contribute towards the cost of a chargepoint for a 'try before you buy' scheme, but will expect the scheme to support them with this. Consideration of how to support charging for those on a short-term trial is important. Installation of a rapid charger at the centre, although probably expensive could be considered to provide an easily accessible to the vehicles operating locally.

Indicative Costs

In order to support Highways England in making a decision on proceeding with a try before you buy scheme for electric vans, we have outlined our estimations for the cost of running a 250 vehicle fleet across from a virtual facilitation centre over 2 years:

Fleet £20,000 per vehicle new - fleet deal. RV = £9000 after 2 years Vehicle cost £11,000 per vehicle x 250 = £2,750,000 SMR £250 per vehicle for two years = £62,500	£2,812,500
Logistics Logistical costs of vehicle storage, booking, cleaning, delivery/collection and insurance	£1,000,000
Marketing and awareness raising Promotion of the service will be essential to its success e.g. events, media, PR.	£150,000
Advice and support Fleet advice on adoption of EVs	£300,000
Charging infrastructure support Given the large investment required for commercial business charging a contribution may be required to support this cost to encourage adoption. Optional contribution of £500 per vehicle. (Rapid charge option approximately £25,000 per site – not included)	£125,000*
TOTAL ESTIMATED BUDGET PER CENTRE	**£4,387,500***
TOTAL ESTIMATED BUDGET FOR 4 CENTRES	**£17,550,000***

* Includes support for standard charging as above (£500 per vehicle)

EST estimate, from the 250 demonstrator vehicles, this would deliver additional sales of 300 vehicles per centre. Over four centres, this equates to 1000 demonstrator vehicles converting leading to 1200 additional vehicle sales.

Summary and recommendations

Based on our findings from running the demonstration project, our fleet wide survey and from talking to a range of stakeholders, EST submits the following recommendations about the viability of a try before you buy scheme delivered through four virtual facilitation centres.

Market readiness

There are clearly barriers to large scale electric van adoption. In some applications the electric van makes perfect sense but this is largely in highly urban settings. We have seen some strong mileages in large metropolitan areas using some of our demonstrator vans but this is the exception.

There are clearly other factors that are hindering the large scale adoption that go beyond just the vehicles. Rules on tax, the structure of the plug-in van grant, charging infrastructure availability and cost amongst other factors that are outlined in the document above need to be resolved before vans can benefit from the same surge in popularity as electric and plug in cars.

EST recommendation:

The van market is not market ready for large scale van adoption with too many challenges yet to overcome.

Vehicle capability and availability

There are a remarkably small number of vehicles that are capable and affordable to fleets. Conversions of vehicle are for the early adopters willing to invest who are also prepared to take the risks involved in operating non-OEM vehicles. The factory made models consist of three small vans. This does not provide the choice and capability for most fleets. Range is improving but is limited to 100-120 miles in the real world and whilst this gives a good operational range, it has to be considered in the context of driver behaviour, access to charging infrastructure, weather, and terrain.

With no significant supply of large vans on the immediate horizon, there is a limited market of small van operators who exist in the sweet spot of being regular users of the SRN in the problems affected by poor air quality.

EST recommendation:

The vehicles are improving in capability and availability but slowly. With no cost effective large van freely available for the next two or three years, any try before you buy scheme would predominantly limited to small vans only. The market and operational requirements (use of SRN) is therefore limited and our assessment is that the choice and capability of electric vans is not sufficient to support large scale adoption at this time.

The car situation is different and why more work is being done through campaigns such as Go Ultra Low to promote ULEVs.

Impact on the Strategic Road Network air quality

From our trial, an average 14% of miles were driven on the motorway. This was from a sample preselected with a bias towards motorway use and so is a little disappointing. If this trend were to continue, most of the air quality benefit is likely to be felt outside of the SRN, and thus, outside of Highways England's responsibility. From our trial vehicles, the total extrapolated annual mileage was 7,000 and the average on the motorway was 14% covering a wide range of 1 -56%. So we could say for the 300 vans in each city the total mileage would be 300 X (7,000 X 14%) = 294,000 motorway miles out of 2.1 million or a total of 1.176m motorway miles out of 8.4m miles for all four cities.

Even if the vehicles are taken up, this does not mean they will use the current generation of vehicles on the SRN. Evidence of users avoiding motorways with vehicles is limited but interviews suggested fleets were considering journeys that were less intensive for SRN use for their electric vans as their capability was compromised by motorway use. This would be expected to improve however for the longer range vans available during 2018.

EST recommendation:

Limited use on the motorway will not deliver significant NOx savings on hot spots where air quality is a problem. Our evidence shows that fleets are likely to favour urban use for electric vans. There may be some benefit to a particular urban road section but given each centre is estimated to generate 300 vans, not all of these would congregate in areas of poor air quality and so is unlikely to deliver significant air quality benefits.

Cost versus uptake (VFM)

There is no easy way to make a try before you buy scheme cheap. The £18.4m price tag is based on 1000 demonstrator vehicles. The management and logistics associated with these demonstrators is a significant cost and may have been understated in our estimates.

Our best estimate of take up following a demonstration vehicle of 10% and 30% depending duration takes into account the fleets who will be put off an EV during the trial period as well as those who decide to convert from diesel to EV. These conversion figures only deliver 1200 new vans from a fleet of 1000 demonstrators. This falls short of the target figure of 4000 vehicles which would require a 40% conversion for short term demonstrations, and 120% for longer term demonstrations.

It is not possible to predict large scale take up by individual organisations in the areas where the centres would be based.

EST recommendation:

EST does not consider this investment good value for money. A smaller scheme would be cheaper but will deliver less in terms of scale. It is hard to justify up to £20m of investment for the relatively modest number of vehicles which are likely to join the local vehicle parc.

A more feasible solution would be to create a centre of excellence in one city and concentrate on this for two years with a fleet of 250 vehicles over 2 years. During the time, the market matures and more product becomes available. A successful centre could then be the blueprint for further investment in the future.

Advice and Support

In feedback from both our fleet wide survey and our fleet interviews, there was a consensus that additional advice and support is critical to large scale fleet uptake of electric vans. There are a number of confusing areas and whilst financial support and the opportunity to try the vehicles are important tools, this needs to be provided hand in hand with support for implementation to ensure a positive user experience for fleets. Also, electric vehicles are confusing; particularly in terms of the charging infrastructure. Navigating the minefields of issues around implementing EVs is not straightforward and goes far beyond just making the costs stack up and ensuring the range is sufficient. In fact, there are a long list of issues that we have discovered through our project that were unforeseen and these need tackling before large scale EV adoption is successful.

EST recommendation:

With any potential project, there needs to be budget for in depth advice and support for fleets. This cannot be a token factsheet or website, but more of a handholding support service to secure long term success.

Appendix 1 - Data

Interviews

A series of interviews was conducted for this research. These were using fleets involved in the demonstrator project and manufacturers of the best-selling electric van models in the UK. The interviewees included the following:

- **Vicky Cabo** – Head of Systems and Compliance, Forrest
- **Phil Smith** – Head of Fleet, Forrest
- **Karl Anders** – National Electric Vehicles Manager, Nissan
- **Mark Squires** – Commercial Manager, Fleet and Facilities, Northern Gas Networks
- **Stevie Jones** – New Business Manager, Northgate
- **Helen Lees** – Head of Electric and Connected Cars, PSA
- **Claire Atkinson** – EV Manager, Renault
- **Jonny Berry** – EV Development Manager, Renault
- **Kayleigh Robson** – Product Manager, Kangoo and Trafic, Renault
- **Sarah Gilding** – Head of Vehicle Fleet Management, South Yorkshire Police
- **Derek Whitworth** – Operations Manager, Southway Housing Trust
- **Jon Loveday** – Group Director for Commercial and Transformation, Thames Water
- **Michelle Nasr** – Fleet Manager, Fleet Services, Thames Water
- **Michael Swinhoe** – CEO, Z-Tech Control Systems
- **Luke Stanbridge** – Marketing Director, Z-Tech Control Systems
- **David Petts** - Take it to Market Leader, Urban Electrified Van (UEV) Programme, Ford Motor Co.

Nationwide Survey

A nationwide survey was carried out in December 2017 to gauge the wider market for electric vans. The survey received 152 responses. These participants were collectively responsible for 5,104 LCV, of which, 2,874 were small vans. There are just over 4 million vans registered on UK roads. This makes our sample representative of over 1% of the van market.

The map below shows the location of the contacted individuals targeted for the survey. All participants were required to be working for organisations that operate vans.

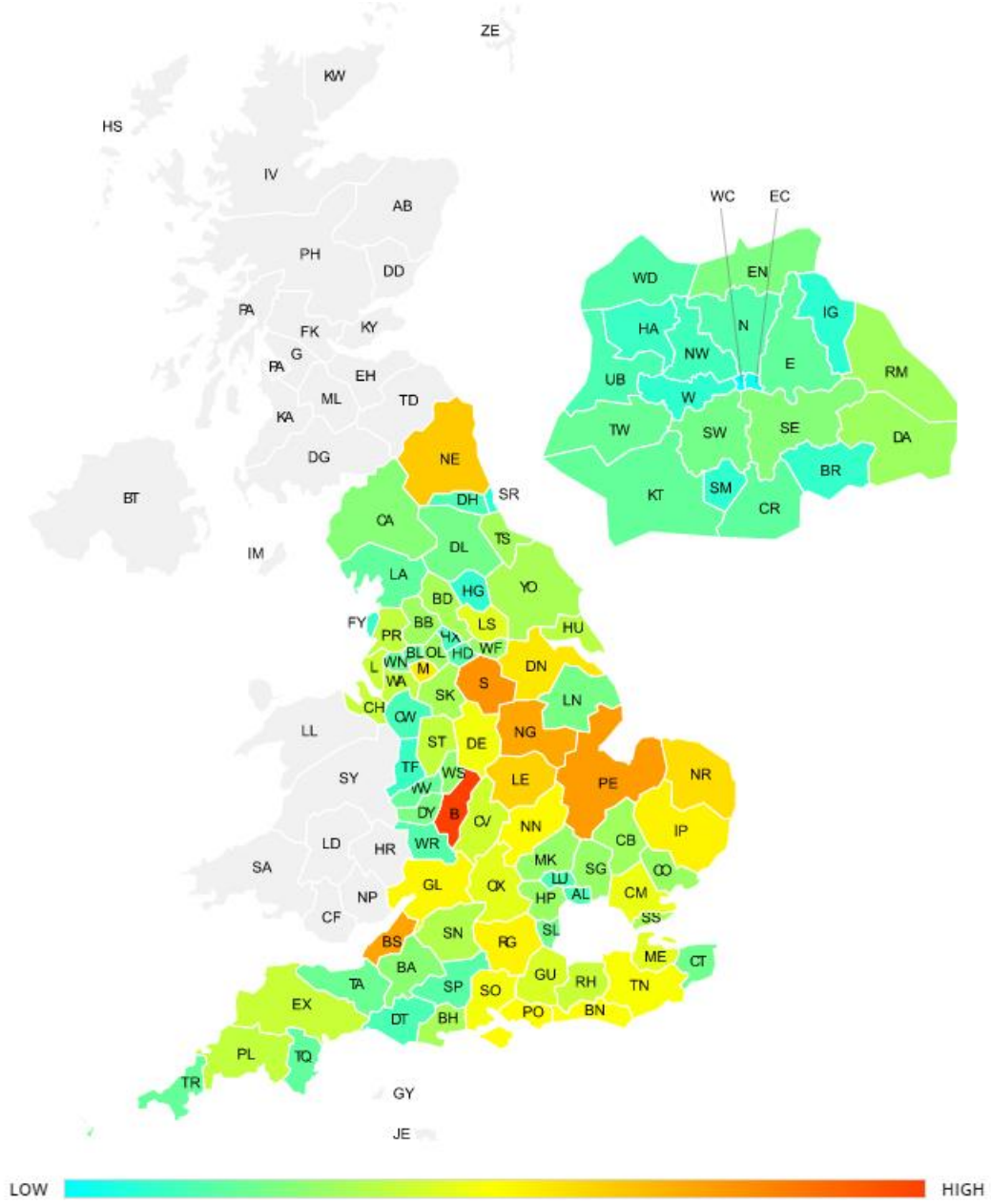

Figure 1 - Density map of organisations contacted for nationwide survey.

Further Research

Our investigation also included reviewing other research available to EST. These included the following:

- The UK Van Fleet Market 2017, Sewells Research & Insight
- Future of Fuel Report, December 2017, Hitachi Capital Vehicle Solutions
- Vehicle Licensing Statistics, Department for Transport