Support to decarbonise

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Energy Saving Trust

Overview

- FD forum and wider EST support
- Funding picture 2022-23
- Progress with decarbonisation
- Key decarbonisation challenges
- Opportunities/solutions

Energy Saving Trust

- Independent organisation dedicated to promoting **energy efficiency**, **low carbon transport** and **sustainable energy use**.

- Aim to address the **climate emergency** and deliver the wider benefits of clean energy as we **transition to net zero**.

- Empower **householders** to make better choices, deliver transformative programmes for **governments** and support **businesses** with strategy, research, and assurance – enabling everyone to play their part in building a **sustainable future**.

Fleet decarbonisation forum

- Bi-monthly forum running for the last 2 years
- Open to all public sector fleet managers (LAs, NHS and others)
- 50-60 attendees at each session
- Peer-to-peer knowledge sharing and industry specialist guest speakers
- Topics covered so far include: vehicle selection, charging infrastructure, zero emission HDVs, grey fleet replacement, hydrogen transport, and digital tools
- **Aims to be a useful platform for sharing knowledge and new ideas**

Transport support package

Fleet decarbonisation reports

- Bespoke analysis of existing fleet and depot energy supplies to inform fleet decarbonisation plan
- Already engaged with 32 local authorities, 14 NHS trusts and multiple public sector orgs

BEV driving range

Two key considerations when adopting BEVs are:

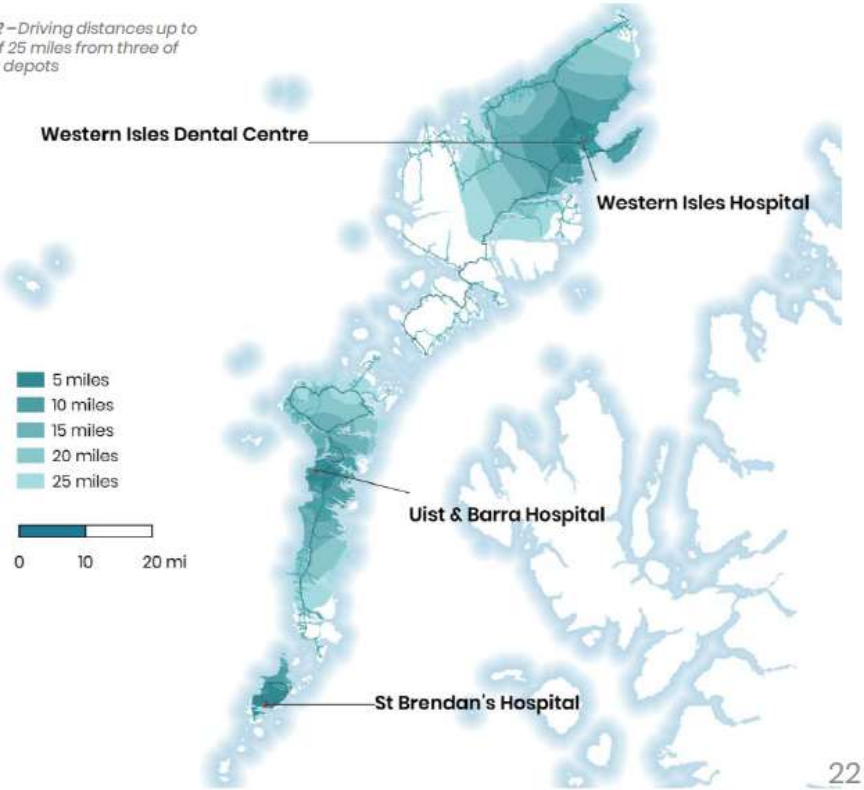
- **Vehicle range** - will a BEV be able to complete the same mileage as the vehicle it replaces?
- **Vehicle charging** - can a BEV be charged at or near the location the vehicle it replaces is currently stored?

This section breaks down your current fleet mileage and the suitability of BEV replacement vehicles based on your current operations. Vehicle charging will be outlined in the following section.

Figure 12 shows five mile driving distances up to a total of 25 miles from three of your key depots, representing potential 50 mile round trips from each. This illustrates that between these depots, the majority of the Western Isles area can be reached comfortably, even with vehicles with a relatively low driving range.

BEV driving range varies from model to model, but newer medium sized cars average over 200 miles, with vans averaging 70-100+ miles depending on size and loading. These ranges are increasing all the time as battery technology improves, with a number of car models able to reach over 300 miles and vans over 200. This paired with the expansion of the public charging network means that range should become less of an issue over time and will not constrain your fleet decarbonisation ambitions.

Figure 12 – Driving distances up to a total of 25 miles from three of your key depots



Uist & Barra Hospital

Figure 20 – Current depot energy consumption

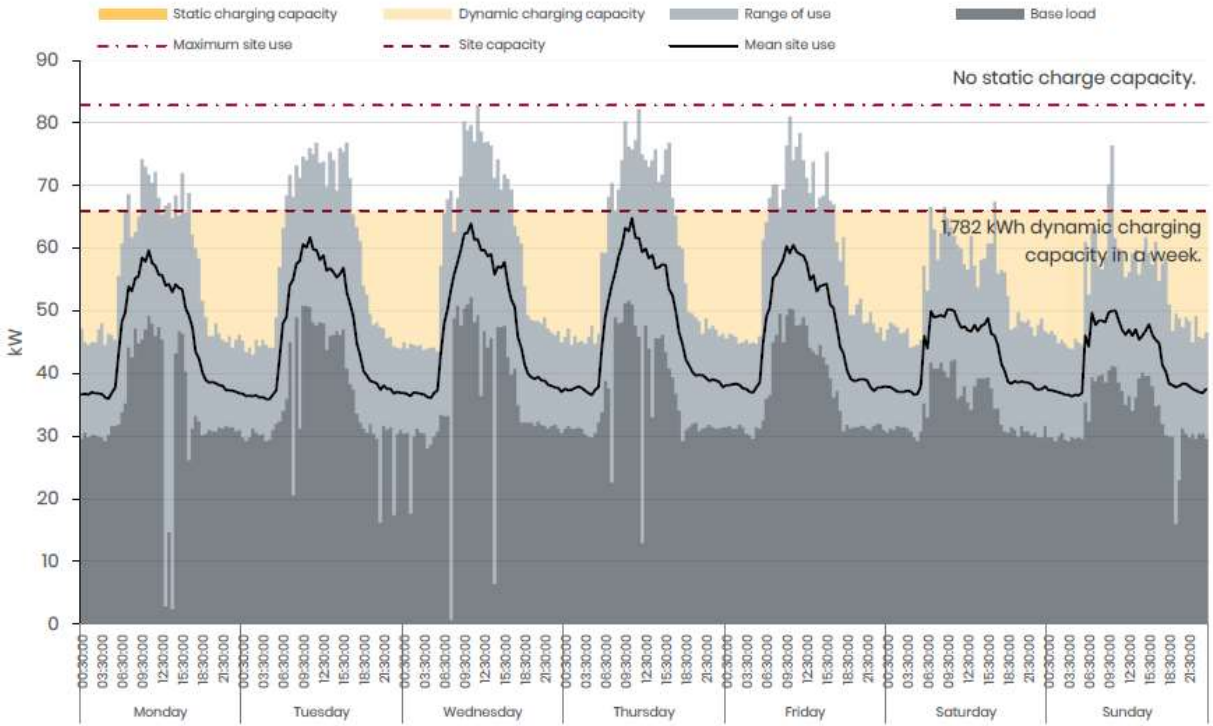


Figure 20 outlines your current energy consumption at the Uist & Barra Hospital. This shows average consumption over a whole year. The current total site capacity is 70kVA, if we assume a 95% power factor, the maximum consumption at the site would be 67kW. Your consumption peaks at 83kW, leaving no unused charging capacity per week.

Under these conditions you would not be able to install any static basic 'dumb' charging without any issues (the types of chargers are discussed in our Fleet Decarbonisation Guidance). You will need to upgrade your network connection at this site to have sufficient electrical capacity to install static basic chargers.

However, there is further spare dynamic capacity that could be used to charge electric vehicles overnight. Your electricity usage falls after 7pm. Between 7pm and 6am, your power requirement drops to around 22kW. This leaves around 1,782kWh of spare dynamic capacity each week that could be utilised to charge vehicles overnight.

Current energy consumption at your depot showing range of use (grey), static capacity (dark yellow) and dynamic capacity (light yellow):

Transport support package (cont.)

Fleet decarbonisation guide (FDG)

- Central resource of fleet decarbonisation guidance
- EST's accumulated knowledge on all things fleet decarbonisation
- Resource will evolve/develop through time
- Available imminently – check it out!

BEV range and efficiency

As BEVs have a lower range on a single charge than most ICE vehicles do on a full tank of fuel, it is important to understand vehicles' different journey requirement

If you have access to chargepoints on your vehicles routes, it is possible to operate a smaller battery size that meets the operational requirements of your fleet. This will reduce your capital costs as the battery is often the most expensive component in the vehicle. It will also reduce your CO_2e emissions as there are embedded CO_2e emissions in battery production. Driving with an unnecessarily large battery is also less efficient as batteries are heavy. Installing and using telematics will highlight how often vehicles are driving high mileages. You could then have dedicated vehicles for high mileage journeys and others for shorter trips.

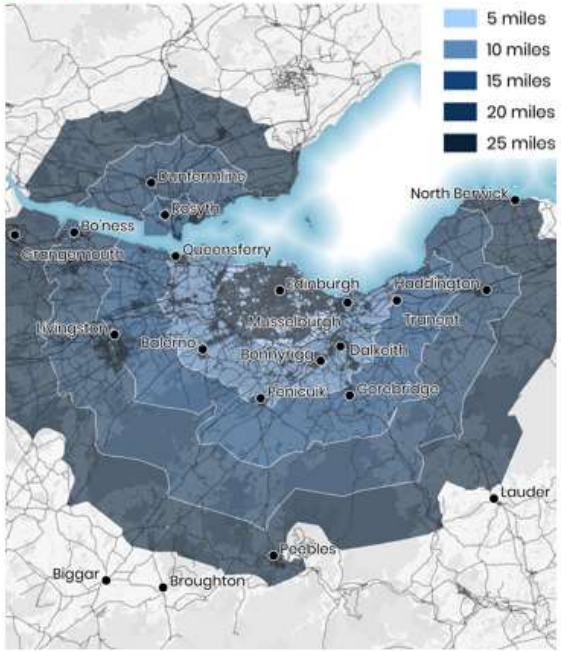
Most BEVs on the market can accept a DC rapid charge. Most of Scotland's current rapid chargers are rated at 50kW. This can add between 50 and 80 miles of range in 30-40 minutes (depending on the size and efficiency of the vehicle). Many second hand models are not capable of rapid charging and take longer to charge, but are cheaper to purchase, so may be a better option if rapid charging isn't a requirement. Your vehicles with regular, prolonged down time may never need to rapid charge, as they can charge entirely from AC fast chargers. Understanding your vehicle duty cycles is therefore important in selecting the best ZEV replacement options. It is important to avoid over-specifying vehicles, or automatically replacing them on a like-for-like basis, as this can add unnecessary costs and CO2e emissions.

A vehicle with high mileage, but regular stops throughout the day, may have time for multiple top-up charges. This type of work pattern can increase the maximum daily range of an electric vehicle, making lower specification models a viable option. Although you must first establish that there is suitable charging infrastructure in place to support this. Further information relating to charging infrastructure can be found here.

BEV efficiency (measured in Wh/km or kWh/km) can be affected by vehicle weight (which ties to battery size) drag, and motor type. Therefore, it is important to determine exactly what requirements are in terms of range (battery size), charging type and vehicle size, before buying. Purchasing the most efficient models possible will translate into the lowest running costs and largest CO_2e savings.

People's perceptions of BEV driving ranges are often lower than the reality. Figure 6 shows distances in 5 miles increments up to 25 miles from Edinburgh city centre. The largest distance shows a 50-mile round trip, a journey that would be possible in most BEVs. This includes a heavy, fully-laden battery-electric LCV driving in poor weather conditions. This illustrates the importance of understanding the true range of a BEV when deciding whether it could replace a particular ICE vehicle. As well as the importance of planning charging opportunities en-route or during shifts as necessary.

Figure 6 - 25 mile range map from Edinburgh in 5 mile increments



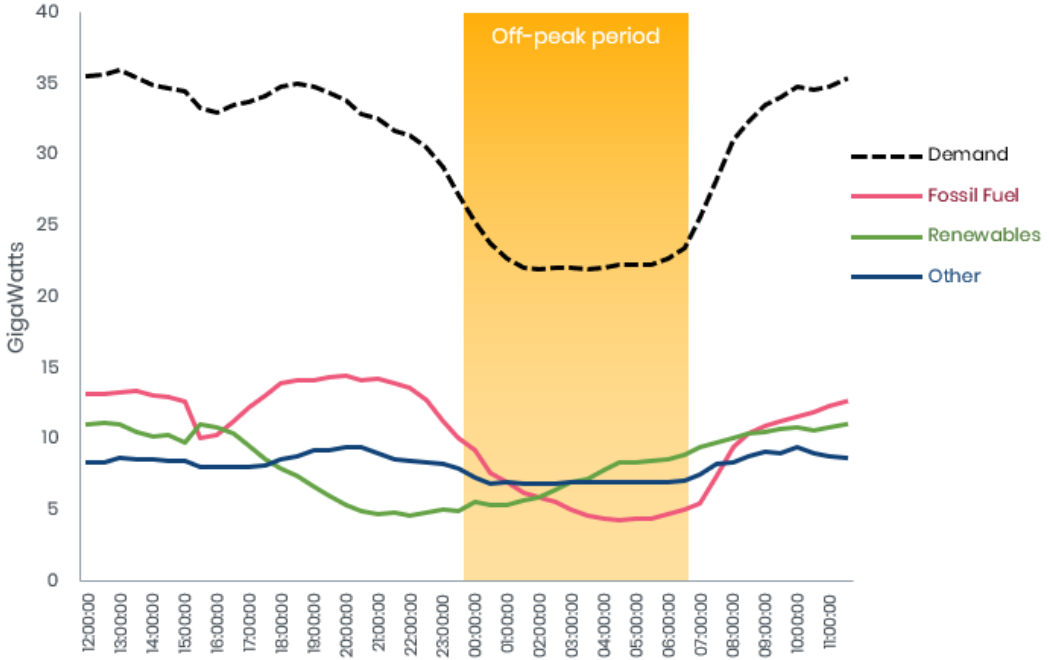
Charging timing

Ideally, vehicles should be charged overnight, to avoid large scale BEV charging demand negatively impacting the grid. During the working week, from 06:00 to 23:00 hrs, demand on the UK Grid is at its maximum. As meeting this demand may require increased use of fossil-fuel based electricity generation, GHG emission intensity ($kgCO_2e/kWh$) may be higher at these times

However, avoiding the peak entirely leaves a narrow window of only seven hours in which to charge vehicles. The reduction in GHG emissions from avoiding the higher "daytime" intensity is around 10%-15% over the entire charging period (data from Morley, 2021). As the grid decarbonises, the amount of CO_2e saved by charging off peak will reduce.

During the summer months, on-site solar PV generation can be used in the late afternoon and early evening to charge vehicles at a time when the "domestic" site load is falling. Using the solar PV to displace grid import will have a significant cost saving and GHG emission reduction.

Figure 8 – Typical demand for energy over a 24 hour period

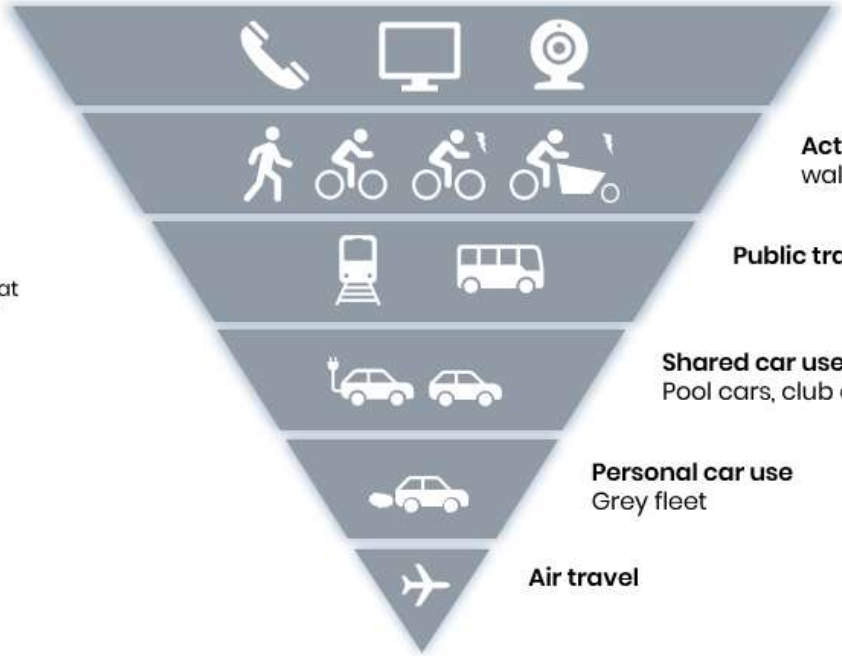


Based off live data from the National Grid on the 25/05/2021, (Morley, 2021)

Sustainable transport hierarchy

All journeys should be justified against the sustainable transport hierarchy framework. As a society, we need to move away from the car being the default for getting from A to B.

The aim of the sustainable transport hierarchy is to guide people through a decision-making process that will help them choose the most sustainable mode of transport.



Avoid travel where possible
video/teleconferencing

Active travel
walking/cycling/ebikes/ecargo bikes

Public transport

Shared car use
Pool cars, club cars, hire cars

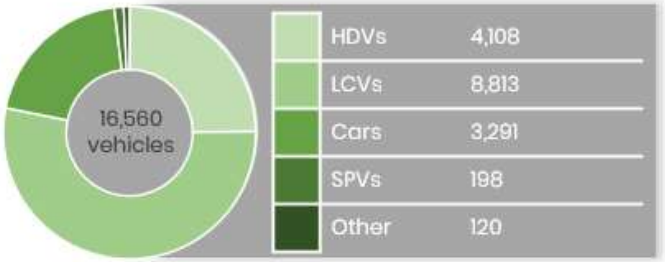
Personal car use
Grey fleet

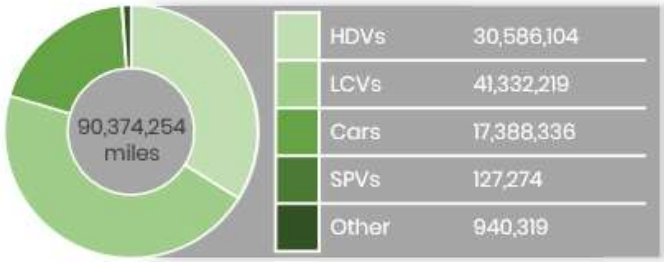
Air travel

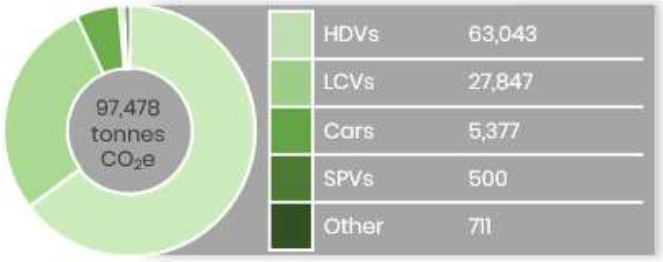
Funding available in 2022–23

- Funding support from Transport Scotland for 2022-23 is yet to be confirmed
- Funding model shifting more towards private sector investment in public sector charging infrastructure and vehicles
- Transport Scotland working with Scottish Futures Trust to investigate alternative financing and operational models

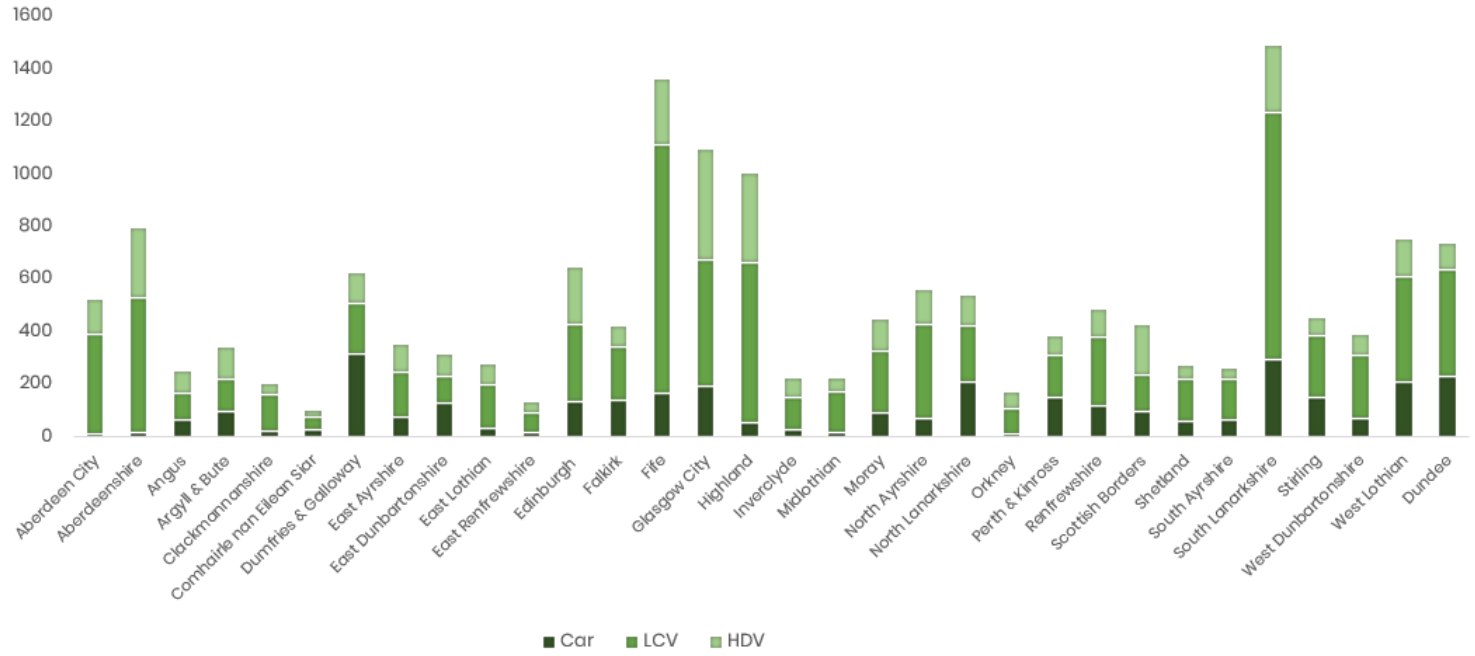
Scottish local authority fleet



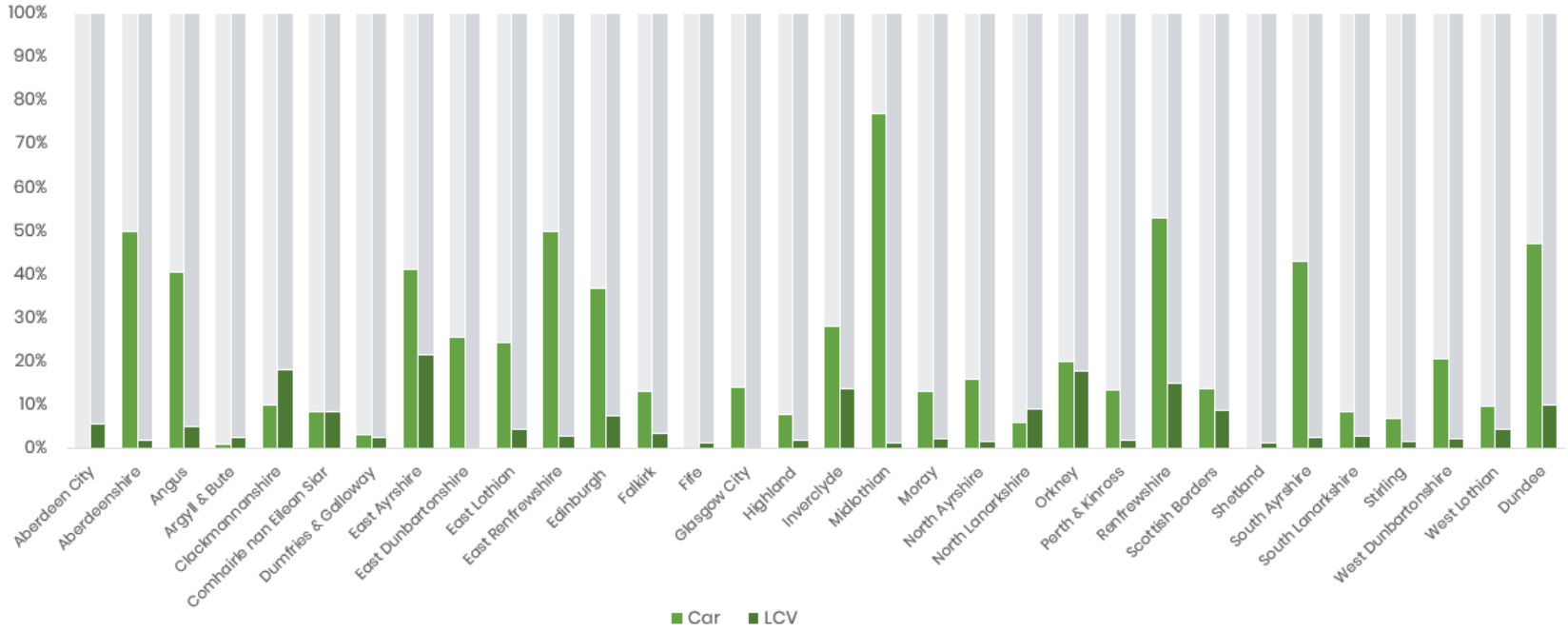




Fleet profile – Scottish local authorities

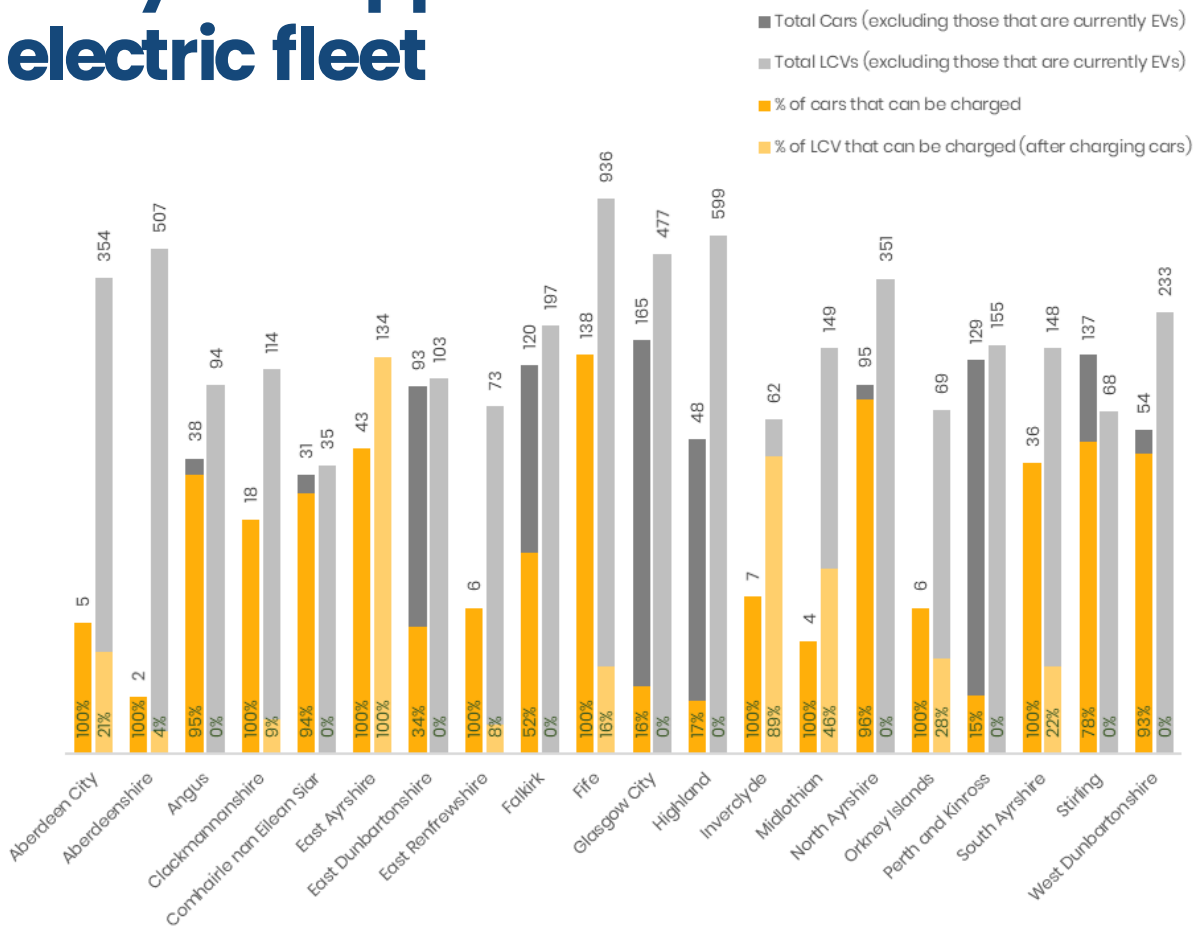


Progress so far – ZEV adoption

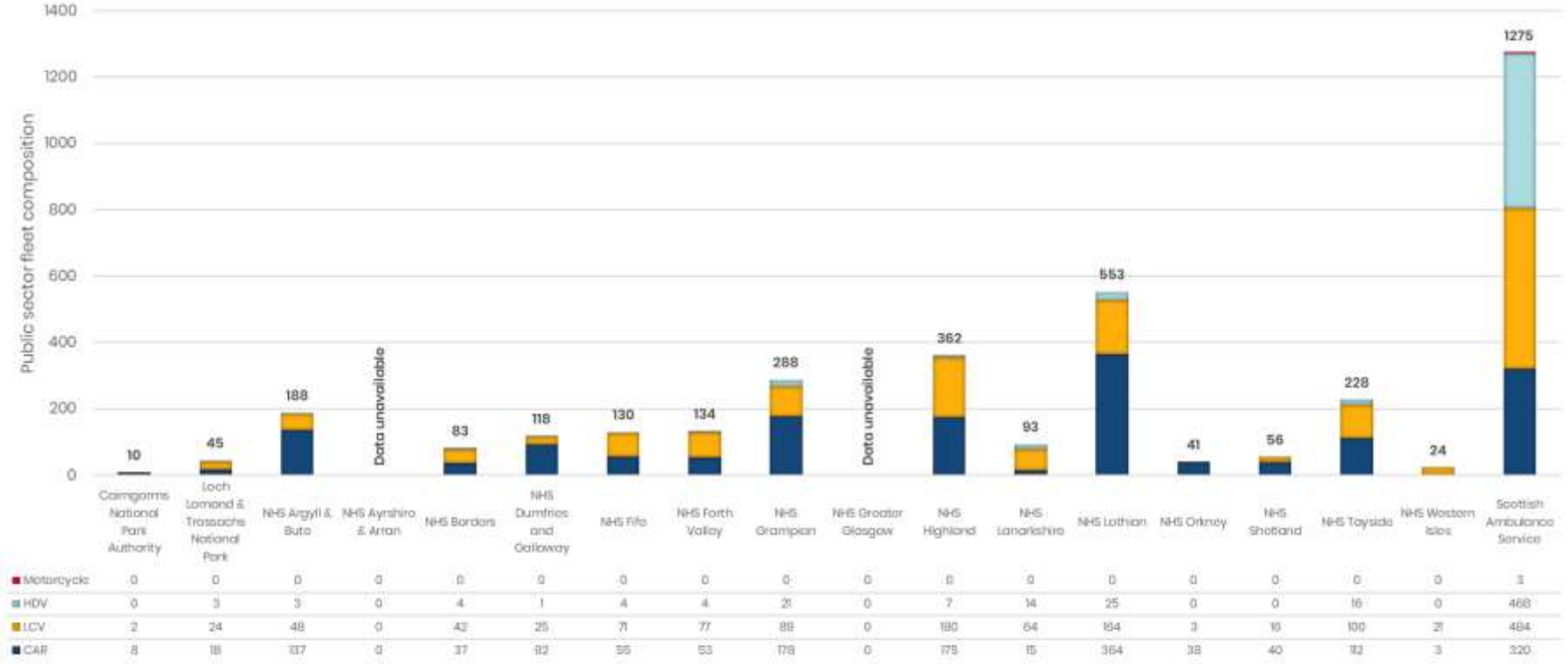


Data as of April 2020

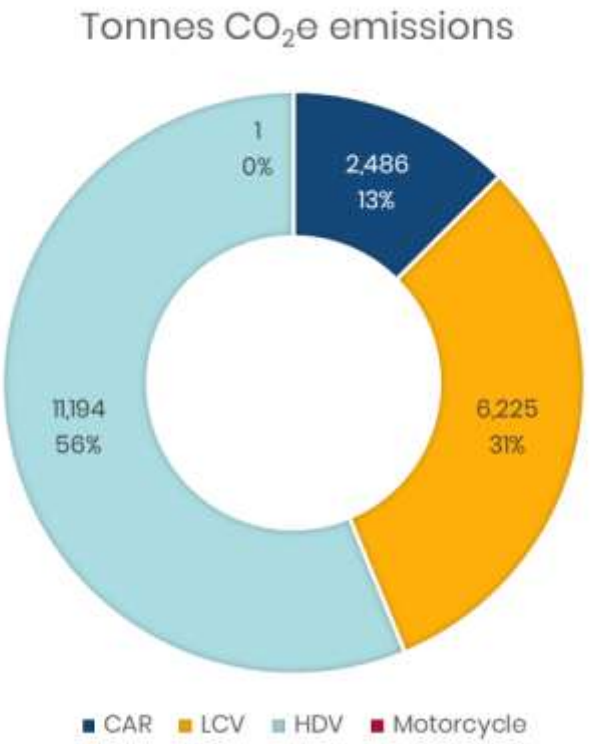
Capacity to support electric fleet



Fleet profile – NHS other public bodies



Fleet emissions – NHS other public bodies



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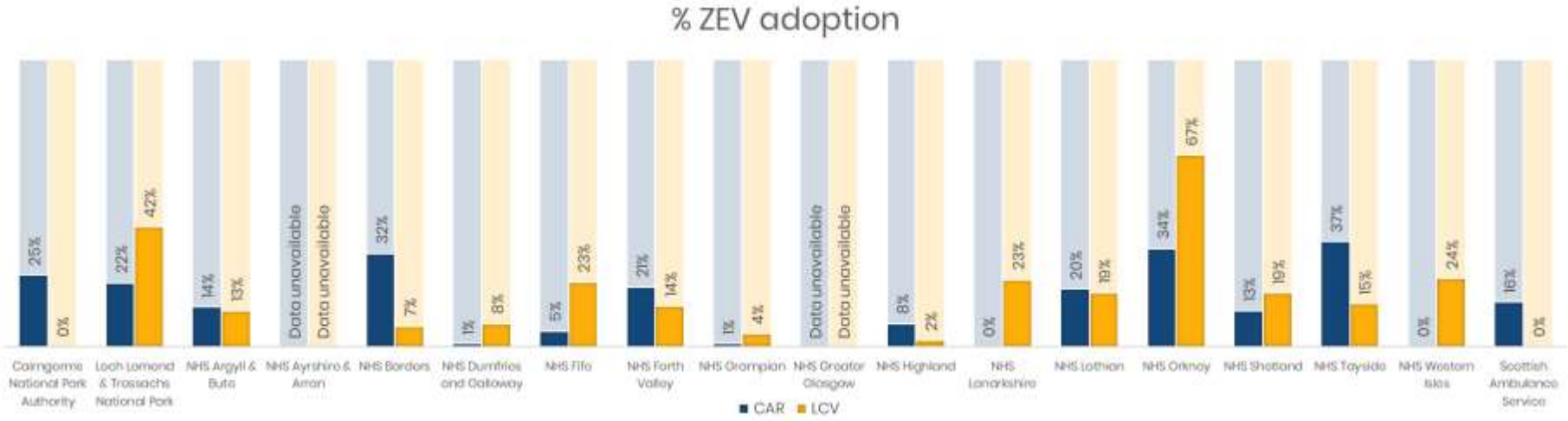

Data as of April 2021

Key challenges

- High capital cost of vans, HDVs and charging infrastructure
- Limited viable vehicle options for vans and HDVs
- Lack of staff resource and skills
- Uncertainly over charging infrastructure strategy (i.e. depot charging or home charging, sharing with other orgs)
- Limitations to depot power supply (big challenge re. vans and larger vehicles, expensive upgrades)

Key challenges (cont.)

- Working in partnership with other internal departments (e.g. fleet team working effectively with estates dept)
- Uncertainty over strategy re. hydrogen vs electric for HDVs
- Long vehicle supply lead times for ZEVs
- Staff mindset issues re. EVs (i.e. range anxiety, lack of change management)

Opportunities/solutions

- Rapidly increasing choice of ZEV models
- Good quality data collection supports fleet decisions
- Focus on rationalising both fleet and charge points
- ‘home start’ charging solutions
- Innovative funding solutions - private sector capital looking to support LA depot charging (SFT project)
- Share knowledge and experiences as widely as possible

Final thoughts

- Innovative solutions developing at pace
- Public sector already setting great example for rest of society
- Some significant challenges but they **will** be overcome
- EST is here to support as best we can – check out the FDG
- Really looking forward to seeing a fully clean, green public sector fleet improving air quality and reducing emissions

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