energy saving trust

Department for Transport

Using data to build a business case for ecargo bikes

Calculating fuel cost savings, carbon emission savings and the impact of modal shift.

For businesses, local authorities and other organisations, ecargo bikes are a great way to reduce costs and lower your environmental impact. If you are interested in using ecargo bikes for the first time or are looking to expand their use across your organisation, you can use data to support a business case.

This guide will explain how to calculate the annual fuel cost savings and the carbon savings that an ecargo bike could bring to your organisation. Additionally, this guide will show you what data you can collect to profile the modal shift that an ecargo bike can provide, as well as the user experience for your riders.

Annual fuel cost savings

eCargo bikes can help you save money, as they have lower fuel costs compared to cars and vans. In fact, ecargo bikes generally have low running costs as they do not need to pay Vehicle Excise Duty (VED), congestion charges or parking penalties[1]. eCargo bike fuel costs are based on the cost of charging the battery and the amount of times a battery would need to be charged. To calculate the annual fuel cost of an ecargo bike, you will need the following figures:

- **Annual bike mileage**. This can be approximated by using the annual mileage of the vehicle that the ecargo bike would be replacing. Average annual van mileage typically ranges between 20,000 to 30,000 miles for parcel operators and 25,000 to 50,000 miles for grocery home deliveries[2]. Please note that average van mileage figures vary a lot depending on what the van is used for (examples may include: logistics, couriers, deliveries, groceries), where it is used (for example, urban, semi-urban or rural) and geographic location.
- **Battery range**. The number of miles that can be travelled on a single battery charge. This figure will be dependent on several factors, such as the battery capacity, cargo weight and terrain[3]. However, you can ask the retailer or manufacturer for an approximate figure – this may be around 50 miles for a typical ecargo bike[1].
- **Battery capacity (kWh)**. Battery sizes typically range from 0.4 kWh to 1 kWh[1]. The manufacturer will include this figure on the bike specification.
- **Cost of electricity (kWh)**. A typical domestic cost would be 14.40p per kWh[4]. For businesses, these costs range from 16.74p for micro businesses to 12.93p for large businesses[5].

Once you have obtained these figures you can calculate the annual fuel cost for your ecargo bike using the formula below:

eCargo bike fuel cost = (annual mileage ÷ battery range) × battery capacity × cost of electricity

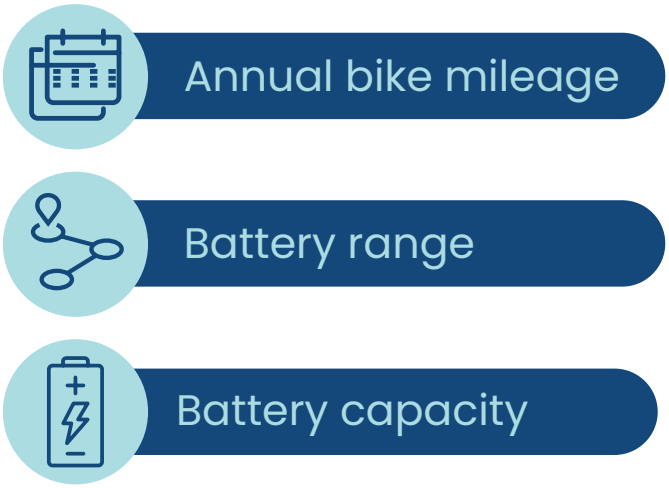
You can then compare the fuel cost of the ecargo bike to the fuel cost of a car or van using the formula below:

Car or van fuel cost = (annual mileage ÷ vehicle MPG) × 4.5 (converts gallons to litres)× fuel cost per litre

1. Energy Saving Trust, Electrifying last mile deliveries: A guide for businesses, 2020, https://energysavingtrust.org.uk/sites/default/files/EST007-01-EST%2BDFT-Electrifying%20last%20mile%20deliveries%20guide-WEB-02.pdf
2. RAC Foundation, The Implications of Internet Shopping Growth on the Van Fleet and Traffic Activity, 2017 https://www.racfoundation.org/wp-content/uploads/2017/11/The_Implications_of_Internet_Shopping_Growth_on_the_Van_Fleet_and_Traffic_Activity_Braithwaite_May_17.pdf
3. https://www.bosch-ebike.com/en/service/range-assistant/
4. https://www.ukpower.co.uk/home_energy/tariffs-per-unit-kwh
5. https://www.businesselectricityprices.org.uk/cost-per-kwh/

Annual carbon savings

One of the key benefits of an ecargo bike is that they do not produce any tailpipe emissions when in use. Carbon emissions are produced through electricity generation, though this amount is significantly less than the amount of tailpipe carbon emissions produced by cars and vans. To calculate the annual carbon emissions produced by an ecargo bike, you would first need to obtain the following figures:



Once you have obtained these figures you can calculate annual ecargo bike carbon production by using the formula below:

eCargo bike CO_2 (kg) = (annual mileage ÷ battery range)× battery capacity (kWh) × 0.23104

This formula works by first calculating the number of times the ecargo bike battery will need to be charged in a year – this is done by dividing the annual mileage by the battery range. This is then multiplied by the capacity of the battery in kilowatt hours (kWh). This amount is then further multiplied by the amount of carbon produced for each kWh of electricity generated, which is currently 0.23104 kg[6].

You can compare this to the amount of CO_2 produced by a car or a van using the following formulas below:

Annual car CO_2 (kg) = annual mileage × 0.26811

Annual van CO_2 (kg) = annual mileage × 0.39472

These formulas calculate annual CO_2 produced by a car or van, by multiplying the annual mileage by the amount of CO_2 a car or van produces per mile driven, which is currently 0.26811kg for a car and 0.39472 for a van[7].

Modal shift

If you are using ecargo bikes to replace cars, vans or other vehicles, data collection can help you understand this modal shift. Areas you could collect data include:

- **Data on the vehicle being replaced**. Recording the make, model and emission class of the vehicle being replaced can help you identify the impact on fleet and traffic composition.
- **Use purpose/cargo transported**. This can help you to understand the use cases of the bikes and understand where their use could be increased in the future.
- **Number of journeys**. By recording the number of journeys made on an ecargo bike, you can identify their popularity, as well as how ecargo bikes may impact the operation of your organisation.
- **Journey time**. Data on journey time can be used to demonstrate improvements to travel and delivery time.
- **Location data**. This can be recorded by using GPS trackers or by asking riders. You may also wish to record instances where ecargo bikes have accessed areas unavailable to cars and vans, such as bike lanes.
- **User demographics/protected characteristics**. Collecting data on users can allow you to understand who is using the bikes.

User experience

eCargo bikes have been shown to have health and wellbeing benefits, which can contribute to healthier and happier workforces[7]. Surveying riders can help you to record and measure these benefits along with other aspects of the user experience. In turn this data could be used to support a business case or even help produce best practice materials which can be used to supplement the level three Bikeability training that Energy Saving Trust recommend ecargo bike users partake in.[8] To collect this data, you may wish to survey riders about the following features:

- **Wellbeing**. You can record wellbeing impacts by asking riders to provide self-assessments on how their health and mental health have been impacted by ecargo bikes.
- **Ease of use**. Surveying riders about aspects of ecargo bike use, such as cycling in difficult terrain, can help you understand the overall user experience.
- **Mechanical issues**. By collecting data on common mechanical problems, you can help to identify issues which riders should be aware of.

6. https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2020
7. Sustrans, Reinventing transport: planning for e-cargo bikes, 2020, https://www.sustrans.org.uk/policy/life-after-lockdown/2020/briefing-paper/reinventing-transport-planning-for-e-cargo-bikes
8. https://bikeability.org.uk/

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Energy Saving Trust is an independent organisation dedicated to promoting energy efficiency, low carbon transport and sustainable energy use. We aim to address the climate emergency and deliver the wider benefits of clean energy as we transition to net zero.

We 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.

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