OU Carbon calculatorFAQs

This item contains selected online content. It is for use alongside, not as a replacement for the module website, which is the primary study format and contains activities and resources that cannot be replicated in the printed versions.

Contents

OU Carbon calculator FAQs

1 The basis of the OU Carbon calculator

The OU carbon calculator aims to include all the greenhouse gases emitted in supplying what the UK consumes, including the emissions generated in producing imports. It then divides this total by the UK population to give the average emissions per person.

The calculator starts by assuming you are close to the UK average in all aspects of your carbon footprint. As you answer the calculator's questions, you can see how your choices make your personal footprint change from the average. You can also change your answers to see how this affects your footprint in order decide how best to reduce it.

It is important that you realise that this calculator is a computer model mainly intended as an educational tool. It is designed to be fairly quick and easy to use and to explore options for reducing individual carbon footprints, rather than to produce the most realistic results.

2 Frequently Asked Questions

This section contains a list of short answers to FAQs about the carbon calculator.

2.1 General questions

Why does the calculator not ask for real data?

Some carbon calculators ask users for ‘real data’ such as annual gas and electricity use, MOT car mileage records, exact flight distances, and so on. However, many users find them time-consuming to use. As an alternative, the OU calculator uses national statistics for the most typical cases, then refines this level with further questions. The result is usually quite close to that obtained from ‘real data’.

2.2 Your household

Why count both adults and children in the household?

The calculator gives its results in terms of the user’s *individual* emissions, both direct and indirect.

However, in calculating an individual’s fair share it is necessary to ask questions which apply to whole households, because a great deal of consumption (and hence responsibility for emissions) is shared. Shared items include heating, lighting, vehicle use, kitchen equipment, furniture, the house itself, many services like rents or mortgage payments, and household income. Each of these shared factors has its own weighting, based on research data.

The result of this sharing is that although a household’s total emissions tend to rise with more people, the rise does not keep pace with the number of people, and so the emissions per person are lower with more people in the household.

To calculate an individual share, we have to know how many people do the sharing, but it is reasonable to ask, which people should we count? It is sometimes argued that babies and young children should be discounted because they do not individually generate emissions and are unable to make choices. On the other hand, children are all part of the national population and their households can be considered responsible for them.

The calculator takes the latter view, and asks users to enter all persons in the household size box in the Your Household section. However, if you wish you can ignore small children (say, under three years old) and enter only the other members in the box. Notice the difference this makes.

2.3 Room heating

How do I find out the thickness of loft insulation?

If you have a loft and don’t know the thickness of the insulation, you may be able to check by accessing the loft. Homes built after 2000 should have over 150 mm insulation. Building regulations now require at least 270 mm of loft insulation.

Have I got cavity or solid walls?

UK homes built after the 1920s should have cavity walls, whereas those built before that are likely to have solid walls.

How do I find out if a cavity wall has been filled?

To insulate cavity walls, the installer drills small holes about 1 m apart in the outside wall of a building. Insulation is then blown into the cavity. The holes are then filled in. If you can see these filled holes, the cavity should have been insulated at some point.

Is it worth installing double or triple glazing?

UK homes built after 2000 should already have double glazing, and those built after 2010 should have high-performance double or triple glazing. Replacing single-glazed windows with double or triple glazing will significantly reduce their heat loss and hence associated carbon emissions from heating your home. They also have other benefits, including fewer draughts and cold spots and reduced noise and condensation, but can take many years to pay back in terms of energy cost savings.

Why no mention of installing an efficient condensing gas boiler?

About 85% of UK homes have gas central heating and, of these, over 80% already have condensing gas boilers, which have been required for new or replacement boilers since 2005. So, if you have a gas central heating system, it is assumed you already have one.

How does a heat pump reduce the home energy footprint?

For a well-insulated home, an air source heat pump can provide between 2.5 and 4 times as much heat output as the electrical energy supplied to it, making it an effective way to provide heat – whereas a condensing boiler can never convert all the energy in the fuel (gas) to useful heat, meaning there is always some waste energy. The UK electricity grid also supplies energy that includes an increasing proportion of renewable generation and thus has a lower carbon ‘intensity’ than energy from burning gas.

What are green energy tariffs?

Some electricity companies offer 100% low-carbon electricity, and it is sometimes argued that a customer of such a company has no emissions from electricity consumption. However, not all suppliers that claim to offer 100% renewable energy are genuinely doing so. Energy companies can label tariffs as ‘green’ or ‘100% renewable’ even if some of the electricity they supply comes from fossil fuels, if they offset the fossil-fuel power by buying certificates called Renewable Energy Guarantees of Origin (REGOs).

Rather than make a choice of either 0% or 100% renewable energy, the calculator takes into account the fact that many 100% green suppliers do invest in further renewable capacity from their profits, and some invest in green gas supply. So, green tariff electricity is assumed to produce 75% of the emissions of normal grid electricity.

2.4 Water heating

Is it worth installing solar water heating?

Solar water heating, or a solar thermal system, are a different technology from electricity generating solar photovoltaics. A solar thermal system provides an amount of hot water dependent on the size of the system and the amount of solar energy it receives, which is deducted from your hot water energy use. For most UK users $4m^2$ (or two) standard solar thermal panels will supply about half a household's hot water, and all or most in summer months. But if you have a low hot water consumption (e.g. by taking fewer, shorter showers) it can provide a bigger proportion.

2.5 Appliances

Is it worth installing solar PV panels?

A typical three-bedroom house would have enough roof space for a small array of, say, 2 kW capacity. This could generate 1700 kWh a year. A couple with one child living in such a house would typically use about 3500 kWh of electricity, so at 1800 kWh, net consumption would be almost halved.

If you say your home has solar PV, the calculator may show negative emissions on the 'Appliances' tab, which are deducted from the overall 'Home energy' total. The lower this total is, the larger the proportional contribution from a PV array.

Where can I find more information on reducing home energy use and generating my own energy?

A useful source of information is the Energy Saving Trust. They are an independent organisation with the overall aim of helping to combat climate change. Their website has information on energy in the home, including energy-saving measures (such as insulation and double glazing) and technologies (such as solar panels and heat pumps). There is also information on typical costs, the carbon and financial savings from such measures, and the financial support available. The website allows you to select your location, so the information is relevant to where you live. The website also provides information on low-carbon travel.

2.6 Travel

Should I include travel that I do for business?

Business travel by car and public transport, including flights, should not be included because it is counted as a business activity and included in the 'Infrastructure' component. However, commuting to work or to a voluntary role should be included.

How do estimate car use?

You probably know the engine size, vehicle type and your typical annual mileage (e.g. from MoT certificates) of household vehicles. Car club (see below) and other

people's car details for lifts may be more difficult to identify. Fill out the table using the information that fits best.

Guidance on vehicle size, type and mileage is provided in screen pop-ups.

How is vehicle occupancy countedfor household vehicles?

If four people share a car journey, the emissions are generally considered shared and are therefore much less than if a single person undertook the same journey. The calculator assumes that the total vehicle mileages are equally shared among all members of the household. Any other assumption runs into awkward questions. All journeys are deemed to be in some sense 'on behalf of' the whole household, even though in some cases this is clearly untrue, as when (say) Dad drives to play golf. It is supposed that such personal uses are spread evenly, as with Mum going to the gym, or driving her daughter to a dance class. Commuting to earn money is reasonably seen as serving the whole household, as is taking children to school. It is impossible to unpick all these special cases and evaluate the proportions of responsibility, so by default emissions are considered equally shared.

What about car clubs, lifts with others and taxi journeys?

Car clubs provide access to shared vehicles to members on a pay-as-you-drive basis. They provide much of the convenience of having a car without the hassle or costs of owning, repairs, insurance, servicing and parking. Car clubs tend to be organised on an area basis with cars located in clusters so that if one car is not available, a member will only have a short walk to access another car. Most car clubs enable members to reserve cars online or by smartphone app, unlock the vehicle with their membership card or smartphone app and drive off.

In the calculator for Car clubs (and Lifts with others), you have to specify occupancy (i.e. the number of people normally in the vehicle). Count taxi trips as lifts.

How are electric and hybrid cars considered in the calculator?

In the calculator, the carbon emissions per km for a medium-sized, fully electric car with average annual mileage are approximately 60% lower than for a petrol or diesel car. For hybrid and plug-in hybrid vehicles, the figures are approximately 20% and 40% lower respectively. These reductions are likely to be overestimates, but whole life-cycle studies show that electric and plug-in hybrid vehicles generally produce lower emissions than petrol or diesel cars – depending, for example, on the proportion of renewable electricity used to charge them.

How should I estimate public transport use?

Journeys by public transport (and by flying in the next section) are not shared by the household, so are attached only to the individual.

The calculator does not distinguish between different modes of public transport but uses averaged official emissions data.

Examples of regular trips are commuting to work and monthly visits to family or friends. Irregular trips might be a one-off trip for a short break or for a sports event. When estimating the hours spent on public transport, only include the time you spend travelling on public transport, not the time it takes to get to the bus, train, ferry, etc. or any waiting time.

2.7 Flying

Business flights are excluded, because they are counted as a business activity and included in the Infrastructure component.

Why not use accurate flight distances?

Although there are online calculators that will provide flight distances between airports, we have decided to use a simpler method of choosing flying from the UK to a broad regional area of the world. Typical journeys to the different regions are provided in pop-ups. This is to avoid users having to access another website while using the calculator.

If you fly to a particular destination less than once per year, use a decimal fraction. For example, if you fly to New York (Eastern North America) about every three years to visit relatives, enter = 0.33.

2.8 Food

How do I estimate my diet?

We all generally eat a variety of food that would be time-consuming to enter accurately into a carbon calculator. Instead, the calculator offers a selection of types of diet. Try not to worry too much about the accuracy of the one you select – just pick the one that is closest to your usual diet.

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Why doesn’t growing lots of fruit and vegetables make a big difference?

‘Growing your own’ is sometimes thought to make a particularly significant contribution to reducing food emissions, but this is very rarely the case. It only works if the food grown replaces other parts of the diet, rather than supplementing them. Householders almost never produce staple foods, such as grains or oils; mostly they produce fruit and vegetables, which are a smaller part of many diets and generally have a low carbon intensity. However, a bigger impact can be made if the household is fortunate enough to have access to a larger growing area and has a largely or completely vegetarian or vegan diet.

Why no mention of ‘food miles’ or buying local food?

Extensive research on ‘food miles’ has shown that bulk food transport tends to be a small amount in the overall emissions, except for air-freighted products, a factor covered by the ‘seasonal vegetables’ question. So buying local doesn’t make much difference to your carbon footprint.

Why no mention of organic food?

It might be queried why there are no questions on organic foods. This is because, for all their other benefits, according to the academic data they make little difference to the GHG emissions. Organic production reduces emissions by avoiding carbon-intense fertilisers and pesticides, but generally has lower yields, so the emissions per unit of output are about the same. Emissions of nitrous oxide from natural nitrogen fixation are about the same as those from chemical fertilisers.

2.9 Income

Why is household income so important?

Emissions occur as a result of consumption activities, and the activities performed by, or generated by a household are usually paid for in money. Generally, the more money a household spends, the more emissions are generated. People usually do not know how much they spend, but they often know how much income per week or month they *have* to spend from bank statements, annual tax statements, etc. Most households do actually spend all or most of it, so this is used as a 'proxy' or close estimate of expenditure. It is sometimes called *household disposable income*.

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Income is used to estimate emissions from goods and services, because there is no other way to do this without an exhaustive questionnaire. Goods and services is usually the largest single category of household spending and also the largest category of emissions, so inevitably income makes an important contribution to the total carbon footprint.

Income is not used to calculate emissions from home energy, travelling or food, because these are estimated directly from the answers in their respective sections.

What if I/we save or invest some household income?

Some people manage to save some money rather than spending it, accumulating it in a bank, building society, etc. This money does not just 'sit in the bank', but is used by financial institutions to invest in other activities. The emissions associated with these activities might be greater or less than those that would have been generated had you spent the money yourself. And eventually you might claim all that money back, with interest – and then spend it. Due to this complexity, the calculator only makes adjustments to the emissions associated with income based on your responses to the statements in the 'Goods' tab.

2.10 Goods

How is 'green' or 'non-green' behaviour taken into account?

Emissions from goods and services consumption depend not only *how much* income you have to spend, but *how* the money is spent.

That is the function of the ten pairs of opposite broadly 'green' and 'non-green' consumption behaviours offered in the Goods (and Services) section. Note the green and non-green choices are *not* consistently at the left and right extremes.

For example, if you spend a lot on clothes and shoes and frequently throw away the old ones, or let them accumulate unused, you might select the far right button on the ‘Keeping things repaired and maintained’ vs ‘Replace often with new things’ pair. If you are the opposite type of consumer and rarely replace your clothes and shoes you might select the far left button. In you are in the middle or tend towards one or other behaviour you select the relevant button.

This is another question where estimates or even guesswork will have to be used.

2.11 Infrastructure

What is ‘infrastructure’ and why is it included?

In principle the entire UK economy, including all its imports (plus international aviation and shipping), exists for the benefit of the whole UK population. From this perspective, the population is collectively responsible for the emissions generated by the economy. However, some people have greater responsibility than others. So, a wealthy family with three cars, living in a large house and taking frequent holidays in exotic locations are likely to generate higher emissions per person than a low-income family, living in a small, efficient home, who use public transport and take infrequent holidays in less exotic locations.

But there are some emissions that cannot be directly controlled by consumers. An important part of this is all the goods and services provided by the government and paid for through taxes. It includes roads, schools, the NHS, social services, defence, administration, public investment, etc. This component is allocated almost equally to each personal footprint, although slightly less for high-income households which tend to spend more on private provision (e.g. private health or schools).

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The ‘Infrastructure’ component also covers emissions from universities, cities and local authorities, non-profit organisations, and business activities that are unaffected by consumer choices and not directly controlled by consumers or national governments.

2.12 Targets

Why these reduction targets?

The calculator provides two types of carbon footprint reduction targets: Government and Personal.

The three Government targets of 50%, 65% and 75% are percentage reductions in the average 2021 UK consumption-based carbon footprint per person. These reductions are approximately equivalent to percentage reductions of 52%, 68% and 78% in 1990 territorial GHG emissions, set in the UK Government’s official ‘carbon budgets’ for 2027, 2030 and 2035 in order for the UK to reduce its territorial emissions to net zero by 2050.

The Personal target is a percentage reduction on your existing footprint and can be set at any level.

What reduction should I choose for a personal target?

This depends on the existing personal carbon footprint. If it is already well below average, there may be little scope to reduce it further. If it is high, but based on things the user cannot change easily like the size of their house or income, there also may be little scope for major reductions. But to make Activity 10 worthwhile it should probably be at least 20%.

What if I can't achieve my reduction target?

Depending on your existing income and circumstances, it may be difficult, or impossible, to reach government reduction targets of 46% or more by changes in the Home energy, Travel, Food, etc. sections. People with a high household income may find there is not enough scope in other sections to reduce the high carbon footprint arising from their assumed spending on goods and services (or their savings and investments). In which case they will need to consider using some of their income to pay for taxes or offsets in the Decarbonisation section (see below).

2.13 Decarbonisation

What is decarbonisation?

'Decarbonisation' means reducing or removing carbon dioxide emissions from economic activities. This is usually done through actions by government or industry, such as replacing fossil fuels by renewable sources or nuclear power; removing carbon dioxide from the atmosphere by carbon capture and storage; increasing industrial energy efficiency and producing, and perhaps subsidising, low carbon goods such as electric cars. You could say that some of the individual and household level actions in the calculator (e.g. home insulation) also achieve decarbonisation, but the term is usually reserved for larger-scale, non-household emission reduction measures.

The 'Decarbonisation' screen provides some options that can contribute towards reducing your personal footprint by decarbonising the national or global economy. This is done via emission reduction measures by government that are paid for by you through new or increased carbon taxes, or voluntary carbon offsets that are paid for by you but undertaken by others, often projects in the Global South.

Why invest in voluntary carbon offsets?

As a consumer, this is deliberately paying for investment in carbon reduction projects, such as energy-efficient cooking stoves or reforestation, to offset your personal emissions, e.g. from taking a holiday flight. These projects are often in the Global South.

It's important that any percentage of your income you decide to invest in carbon offsets to reduce your footprint must be regular monthly or annual payments over more than one year, (at least two to three years) and not a one-off payment to offset a single flight.

How does decarbonisation affect my personal carbon footprint?

Decarbonisation is given a separate line in the Summary and deducted from your personal footprint total. You could end up with a negative emissions score. This means that you are 'in credit' and can claim to be helping to heal the damage caused by GHG emissions.

What does the bar chart show on the ‘Decarbonisation’ tab?

Figure 3 shows an example of the bar chart on the ‘Decarbonisation’ tab after applying decarbonisation options. The student’s existing carbon footprint remains at 12.70 tonnes CO_2e per year, as applying the decarbonisation options changes none of the other components of their footprint. The carbon calculator takes account of the decarbonisation payments by including a component below zero, which reduces the total footprint (‘You’) value by 1.71 tonnes CO_2e per year to 10.99 tonnes CO_2e per year (12.70 − 1.71). The student’s target to reduce their carbon footprint by 25% to 9.53 tonnes CO_2e has not changed. However, as they have paid for a carbon reduction of 1.71 tonnes CO_2e, the amount they now need to reduce their carbon footprint to reach the target has fallen from 3.17 to 1.46 tonnes CO_2e per year. Hence, the red target line for ‘You’ has moved to show that the gap between the target and the total footprint is now 1.46 tonnes CO_2e. The student could reach or exceed their target by further decarbonisation, or through behavioural or technical changes. The red target line across the right-hand bar has not moved and shows the reduction target relative to the ‘Average’ UK footprint.

This result is also shown on the ‘Summary’ tab.

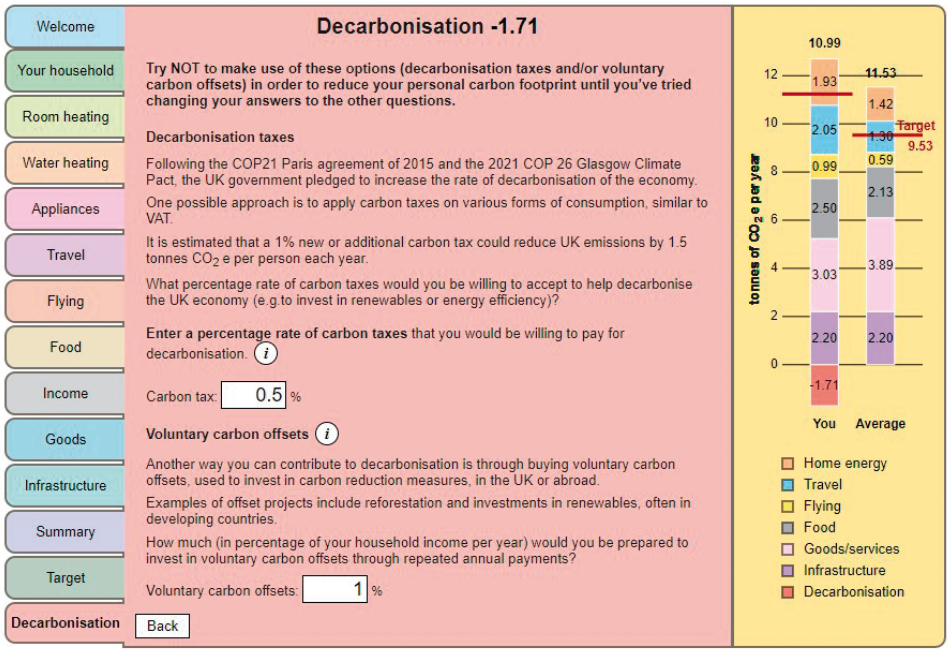

Figure 1 Bar chart on ‘Decarbonisation’ tab after applying decarbonisation options

3 Non-UK residents

3.1 I don’t live in the UK, will the OU Carbon calculator work for me?

The OU carbon calculator is designed for people living in the UK. However, if you live in a European country with a similar winter climate to the UK, such as the Irish Republic, the Netherlands, Belgium, north and mid France, western and northern parts of Germany or northern Italy, you can use the OU carbon calculator. There are some other locations around the world with a similar climate to the UK. You can find details on the UK Met Office website (climate zone map).

If you live outside these areas, the OU calculator’s results won’t be accurate and some questions may not be applicable. We suggest that you use an alternative online calculator called Carbonfootprint.com. Please note there is no need to create an account for this site or any obligation to pay for carbon off-setting.

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