

# Online Carbon Calculators



AN EVALUATION OF ONLINE CARBON CALCULATORS IN THE UK  
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## Abstract

Internet-based carbon calculators are potentially powerful tools which help people, organisations and communities to understand their energy use (mainly derived from fossil fuels) and for motivating to reduce carbon emissions. This report focuses on online carbon footprint calculators for the UK. These calculators vary significantly in depth and scope and more are becoming available and to light all the time, other research is emerging that may shed further light on those specifically available. The most straight-forward calculators derive a carbon emission value based on energy-related activities alone. More detailed calculators consider lifestyle or consumption choices such as food and travel. It may be of useful interest that Gareth Williams through links with local Hereford and national groups has started a funded engagement program that helps communities on “their” carbon journeys – whilst not a calculator in its self, earlier work during 2019 with this project has led to BEIS funding that is developing a calculator and again “we” are involved with that project.

Of further interest and perhaps reflecting lack of such tools is that in some recent climate action plan assessment work conducted by CSE, only 2 were found to contain carbon Audits and or set out carbon budgets.

## Introduction

The development of a low carbon energy society necessitates that all actors take responsibility for the greenhouse gas (GHG) emissions they release into the atmosphere from burning fossil fuels. To achieve this objective effectively, actors need accurate and appropriate information tools to help them make informed investment decisions and behavioral choices. These information tools should give actors the ability to identify, quantify and monitor GHG emissions as well as to access meaningful feedback on opportunities to reduce those emissions. The tools need to be designed to meet the specific needs of energy end-users, be they governments, organisations, companies, or citizens (Wilhite & Ling, 1995; Brandon & Lewis, 1999; Wood & Newborough, 2003; and Darby, 2006).

Carbon calculators are tools that allow people to assess their behaviour and how it does or could, impact the environment. These calculators are based on a questionnaire approach and ask people to input information in response to the specific questions. An estimate of carbon dioxide emissions or carbon equivalence is produced at the end of the process. The data used to make the calculations include gas and electricity bills, transport usage and so on. As Carbon calculators have the quality of being personalised and interactive, they may contribute significantly to change people's attitudes and behaviour. Carbon footprint calculators can play an essential role in educating and motivating lifestyle changes (Baker et al., 2007).

Carbon calculators, help in i) giving people the ability to monitor their energy use accurately, ii) providing meaningful feedback and guidance for altering the use of energy, iii) connect with other users who are also going through the same learning process of saving energy and conserving carbon.

Carbon calculator have and are being developed by a wide variety of bodies including non-government organisations, commercial companies, government agencies, universities and media groups. They have been developed primarily for increasing awareness on the connection between the use of fossil fuels and carbon emissions to enable people to invest in carbon-saving projects to offset their emissions.

Carbon footprint calculators have been developed for both public and private use, and they have focused on measuring the carbon footprint of nations, regions, organisations, and individuals alike.

The accuracy of a carbon calculator depends also on the type and quality of the data inputted. The calculators commonly use three types of data to calculate the carbon emissions of an individual or household i) building fabric- and technology-based, ii) energy expenditure-based and iii) energy quantity-based. Often calculators will use a combination of each of these.

Calculators ask users to input quantity-based data of expenditure on energy consumption, the private and public transport usage, the air travel data, food bills and waste. Considering domestic energy as an element alone - In the UK, energy bills do provide this information, but it is often only an estimation of household energy use rather than actual energy used. Furthermore, in the UK energy companies only provide energy consumption information for the month or quarter that the bill is for. Therefore, if users want to enter in a full year of home energy use into a calculator, they will need to decipher their bills carefully, and it still may only be an estimate unless they have provided energy meter readings to their utility (Bottrill, C, 2007)

## Approach for deriving carbon emissions

There are many different approaches to calculate personal carbon emissions. The accuracy of the feedback given by a carbon calculator is dependent on the quality of the information inputted by the user. A carbon emission profile drawn from actual energy use for total home energy and travel is a start. Carbon emission profiles derived from information on technology efficiencies, building fabric and energy expenditure will not be totally accurate as these are generally only theoretical proxies for energy use. Furthermore, calculations based on average energy consumption figures will not be able to give users an indication of where they fall within the population

distribution of personal carbon emissions (Bottrill, C 2007). Of course as technology and reporting evolves as do calculator complexity and the ability to measure accurately is improving. That said there is a danger of ‘too much info’ confusing the issues and complexity putting off engagement.

This study of carbon footprint calculators is motivated by a need to assess the depth (defined as the range of activities assessed) and engagement (defined as user interaction features) of some of the currently available calculators, to aid awareness and to help further assist in the design and uptake calculators. In this report, a basic assessment of 11 carbon footprint calculators is done which were selected from desktop web search.

## Online Carbon Calculators

The website **Carbon Footprint** defines Carbon footprint calculator as "a measure of the impact human activities have on the environment in terms of the amount of greenhouse gases produced, measured in units of carbon dioxide".

We consume greenhouse gases in two ways. First, by direct use of fossil fuels when electricity / gas and other fuels are drawn to heat and power our homes; when the cars are filled with petrol and diesel; and when we fly. Second, indirectly through the energy "embedded" in the items we buy and the leisure activities, we participate.

As per a recent Guardian report, "the annual carbon footprint of the average Briton is around 10 tons, but the figure considered to be a sustainable yearly quota for the world's 6 billion inhabitants is just two tons apiece." This means that we all need to make serious and meaningful reductions in our carbon footprint. Further evolving advice is that these changes need to be done urgently – with many citing within this decade.....

The internet provides access to several websites that offer tips on leading a sustainable lifestyle and steps for reducing an individual's impact on the environment and reduce our carbon footprint, which begins by calculating its size. Fortunately, with the focus on climate change, the internet is full of such calculators which are designed to calculate the footprint. The carbon calculator helps individuals quantify the environmental impact of their lifestyle choices. The calculator is an essential part of the 'sustainable lifestyle tool kit' for green living enthusiasts, environmentalists and new sustainability advocates as it helps you understand your impact and identify ways further to mitigate your greenhouse gas (GHG) emissions. These allow measuring carbon dioxide emissions which are the major cause of climate change by asking questions about lifestyle, including heating and powering

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of home, transport and food. The results show the aspects of life, which result in the highest carbon emissions, indicating where to make the biggest changes.

Online carbon calculators are often quite simplified and may not cover all aspects (such as food), and will make assumptions and generalisations to simplify the questions. Some calculators often don't include the indirect emissions from industries and services which are used in day-to-day life.

Carbon calculators vary widely in the aspects of your carbon footprint they work out, and the level of accuracy they offer. As stated above, with a plethora of carbon calculators provided online, the report focuses on 11 carbon calculators. A review of these Internet-based carbon calculators developed for the UK are listed in this below (Refer Table 1). None of them appear to focus on community level calculations that a Parish council or community group could use. In wider context it is understood that many county / region wide calculations are based on extrapolated national data, often using what is understood to be ‘‘Scatter’’ data.

S.No.	Calculator	Web Address	Last accessed on
1	<a href="#">Carbon Footprint Calculator</a>	<a href="https://www.carbonfootprint.com/calculator.aspx">https://www.carbonfootprint.com/calculator.aspx</a>	July 1st, 2020
2	<a href="#">Resurgence</a>	<a href="https://www.resurgence.org/resources/carbon-calculator.html">https://www.resurgence.org/resources/carbon-calculator.html</a>	July 1st, 2020
3	<a href="#">Climate Care</a>	<a href="https://climatecare.org/">https://climatecare.org/</a>	July 1st, 2020
4	<a href="#">ChooseClimate's emissions calculator</a>	<a href="http://www.chooseclimate.org/flying/mf.html">http://www.chooseclimate.org/flying/mf.html</a>	July 1st, 2020
5	<a href="#">WWF Footprint Calculator</a>	<a href="https://footprint.wwf.org.uk/">https://footprint.wwf.org.uk/</a>	July 1st, 2020
6	<a href="#">Clevel Business Carbon Calculator</a>	<a href="https://www.clevel.co.uk/business-carbon-calculator/">https://www.clevel.co.uk/business-carbon-calculator/</a>	July 1st, 2020
7	<a href="#">National Energy Foundation</a>	<a href="http://www.carbon-calculator.org.uk/">http://www.carbon-calculator.org.uk/</a>	July 1st, 2020
8	<a href="#">Carbon Independent</a>	<a href="https://www.carbonindependent.org/">https://www.carbonindependent.org/</a>	July 1st, 2020
9	<a href="#">EcoPassenger calculator</a>	<a href="http://www.ecopassenger.org/bin/query.exe/en?L=vs_uic">http://www.ecopassenger.org/bin/query.exe/en?L=vs_uic</a>	July 1st, 2020
10	<a href="#">Ecological Footprint Quiz</a>	<a href="https://www.sustainable-economy.org/myfootprint.html">https://www.sustainable-economy.org/myfootprint.html</a>	July 1st, 2020
11	<a href="#">Bulb Carbon Calculator</a>	<a href="https://bulb.co.uk/carbon-calculator/">https://bulb.co.uk/carbon-calculator/</a>	July 1st, 2020

Table 1. List of Carbon Calculators in the UK

The below section briefly discuss the features of the calculators listed above.

## Carbonfootprint.com

This carbon calculator quantifies the environmental impact of individuals and households. The calculator allows selecting the country one resides in, allowing comparison of one's footprint with the country and global averages. The calculator consists of various 'tabs' with six categories: house, flights, car, motorbike, bus and rail and secondary that can be tapped through and populate the data as required in each tab. It gives a choice in the beginning to calculate the individual or household carbon footprint itself.

The calculator asks for more information and considers broader facets of one's lifestyle. It requested more details about consumptive habits and behaviour and is a much more accurate way to calculate environmental impact. The calculator's reliability calculator is enforced by the methodology, along with the details and qualification of each team member. Also, it provides the breakdown of carbon emissions for each category and provides a resource link to help reduce carbon emissions. As an example of how limitations can evolve, the calculator has limited airport locations limiting the correct calculation of the air travel.

The carbon footprint calculator also has a free online emissions calculator suitable for small organisations. It is easy to use, and the calculations are Government-approved. It covers emissions from buildings and transport.

## Resurgence

Resurgence is a more in-depth general carbon calculator. The calculator requires to provide more detailed information, such as electricity use for each quarter in kilowatts (provided in the electricity bill), and the mileage of different journeys taken by road, rail and air. It also tries to include some indirect greenhouse contributions in sections such as "fuel-intensive leisure activities".

## Climate Care

It is a dedicated flight emissions calculator and calculates greenhouse gas emissions resulting from flights. These estimate the footprint of holiday flights and show you how to offset them by contributing to carbon-reducing projects

## ChooseClimate's Emissions Calculator

The calculator enables to specify the type of ticket, model of plane and occupancy rate as well; hence one of the better one. It displays its findings as kilograms of fuel used, kilograms of CO<sub>2</sub> generated, and the total warming effect. It takes into account other emissions from aviation, such as nitrogen oxides and water vapour, and the fact that CO<sub>2</sub> emitted at high altitude has an enhanced warming effect.

## WWF Ecological Footprint Calculator

The World Wildlife Fund's 'Ecological Footprint Calculator' is a straight-forward questionnaire about your lifestyle choices and habits. The footprint score is calculated using the answers provided. The questions are classified under four main categories: food, home, travel and stuff.

The questionnaire is quick and easy to complete, and the calculator is user-friendly accompanied by additional information and explanations with each question which help in giving the best answer. Although the calculator is simple, however, doesn't offer an exact match for each question. The score is calculated on approximation.

## Guardian Calculator

This calculator helps individuals get a meaningful sense of their contribution to climate change and what steps can be taken by them to reduce it.

The calculator takes into account the direct emissions from consumption of gas, electricity, car fuel and flights and indirect emission from the other goods and services, i.e. from food to gadgets to healthcare. These "indirect" emissions are often missed out by other calculators.

The calculator requests more approximate information instead of precise numbers for only a part (gas and electricity bills) for calculating the carbon footprint. It is simple, and is designed just for individuals; it doesn't look at households or includes emissions from the workplace. The tool is specially designed by taking into account a summary of the UK's total carbon footprint. The summary is broken down into 15 key areas, including everything from domestic electricity use through to the manufacture of paper products and cars. These 15 key areas are further divided by the UK's population to provide a comprehensive breakdown of the carbon footprint of a typical UK resident. A set of sliders are also available that enable to change each figure reflecting one's lifestyle.

## Carbon Trust SME Carbon Footprint Calculator

Carbon Trust has designed the Carbon Footprint Calculator to help UK based SMEs help manage and report energy consumption and their corporate emission footprint. It followed the GHG Protocol Guidance, including direct emissions from fuel and processes (Scope 1 emissions) and those emissions from purchased electricity (or Scope 2 emissions) for the assets they operate.



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The organisation's yearly footprint is calculated on its fuel consumption, energy consumption and top-ups made to air conditioning units. The reported data must cover the chosen 12 months of data. If the exact data for the whole year isn't available, then an estimated average is used. Seasonal changes in energy demand due to various factors should be taken into account. It only includes selected emission sources, common to the majority of SMEs.

The calculator is free to use and does not require a login. The Carbon Trust has also produced a 27-page guide to carbon footprinting in more detail, taking in organisational, supply chain and product footprints and how to measure and communicate them.

### [CLevel Business Carbon Calculator](#)

The C-Level Business Carbon Calculator quickly work out the carbon footprint of the business. It is easy and is for small businesses. It is a paid calculator and does customised reports and invoicing as per the business requirement.

### [National Energy Foundation Carbon Calculator](#)

The National energy business carbon calculator is a simple carbon calculator for use by UK organisations and based upon the recommended conversion factors provided by Defra as part of its Environmental Reporting Guidelines report, July 2017. It offers limited services for free, and for a more sophisticated service, or help in setting the boundary or scope, it provides more comprehensive help and supports on a paid-for basis.

### [Carbon Independent Calculator](#)

The calculator is designed to do either a quick estimation (no bills needed) or a more accurate calculation of the CO<sub>2</sub> and other greenhouse gas emissions that an individual is responsible for, for a period of 12 months.

It is divided into two sections. Section 1 asks the individual to enter household data for items such as household heating, and car use is shared between the members of the household. Section 2 asks to enter the personal lifestyle and travel choices that apply to you as an individual. The calculator then gives a chart which can be printed:

### [Mossy Earth Carbon Footprint Calculator](#)

It is a simple calculator for calculating individual or household carbon footprint. It takes into account the energy, air travel, transport, diet, waste and other lifestyle factors.

## Bulb Carbon Calculator

Bulb Carbon Calculator asks questions about the day-to-day life of an individual, like how often one drive, eat meat or buy new gadgets. It then comes up with the carbon footprint by crunching those numbers. The number given by the calculator is an estimated figure only.

It is simple and helps in making changes to the lifestyle for reducing the carbon footprint right away. It uses some heavy-duty maths to work out the carbon emissions of every product or activity along with workings. It takes Energy consumption. Land travel, and air travel into account for calculating the carbon footprint

## Carbon Independent Calculator

Carbon Independent calculate that each person living in the UK is responsible for 1.1 tonnes of CO<sub>2</sub>e emissions over which they have no direct control. Carbon Independent estimates food, waste, water consumption into account while calculating the carbon footprint.

## Conclusion

As discussed above, there are a good number of online calculators available for calculating the carbon footprint of an individual and households, these are just a selection. This scene is constantly evolving and there have been developments, some calculators are providing the facility to business and organisations to calculate their contributions in carbon emissions, others are industry specific such as the [cool farm tool](#) for agriculture. During this limited research, it was observed that the work on developing more comprehensive calculators ([like UBoC](#)) for communities is being done; however, there is no concrete evidence of their usability and results. As the focus is more than ever on carbon emission, it is suggested that calculators for SMEs and communities should be developed. As stated in the opening Abstract – As part of the project we developed and are working with in Fownhope a carbon specific calculator for Parishes is now in development as is Fownhopes / HGN's engagement tool that should be available for use by all UK parishes in the early part of 2021.

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