



GIG
CYMRU
NHS
WALES

Iechyd Cyhoeddus
Cymru
Public Health
Wales

Carbon Footprint Calculators for use by Primary Care Contractors

Summary Report

Nicholas Gregory, Public Health Practitioner

Angharad Wooldridge, Senior Public Health Practitioner

Ellie Messham, Specialty Registrar in Public Health

Sian Evans, Consultant in Public Health

February 2022



Canolfan Datblygu ac Arloesi
Gofal Sylfaenol a Chymunedol
Datblygu Gofal Sylfaenol yng Nghymru

Primary and Community Care
Development and Innovation Hub
Developing Primary Care in Wales

Carbon Footprint Calculators for use by Primary Care Contractors

Summary report

Contents

| | |
|--|----|
| Executive summary | 3 |
| Introduction | 4 |
| Background..... | 6 |
| Method | 7 |
| Main Findings..... | 7 |
| Analysis of the Sawyer (2020) paper | 7 |
| Logistics of producing a carbon footprint for primary care..... | 9 |
| Other carbon footprint calculators included in this review | 9 |
| Conclusion | 12 |
| Appendix 1:Summary of online carbon footprint calculators..... | 15 |



Executive summary

The health sector in Wales is responsible for the largest carbon emissions in the public sector with GP practices, community pharmacies, dental practices and optometric practices having an important role in reducing health sector emissions.

Wales now has legally binding targets to work towards set out in the Environment (Wales) Act 2016 of a goal of net-zero emissions by 2050 and an ambition for the public sector in Wales be net zero carbon by 2030. There is a target for Health and Social Care to deliver a reduction in emissions of 16% by 2025 and 34% by 2030.

One key step primary care settings can take is to calculate their current carbon footprint and identify ways in which they can reduce their energy use.

There are a large number of carbon footprint calculators available for both home and business use. Ten carbon footprint calculators were identified and reviewed during this exercise. From these, five are suitable for use by small and medium-sized business/small organisations and may be most relevant for use by individual primary care practices. Some, but not all are free of charge. There is no one, free of charge, carbon calculator that takes into account factors that satisfies its use across all four settings in primary care, general practices, community pharmacies, dental practices and optometric practices.

Based on the considerations, the four carbon footprint calculators below have, at least partial, suitability for use by primary care settings:

- [See Sustainability GP Carbon Footprint Calculator](#) (Recommended)
- The [Carbon Trust Carbon Footprint Calculator](#)
- The [National Energy Foundation Carbon Footprint Calculator](#)
- The [Climate Hero Carbon Footprint Calculator](#)



Introduction

The health sector in Wales is responsible for the largest carbon emissions in the public sector, with hospital emissions alone estimated to be 1,001,378 tonnes of CO₂eⁱ (NHS Wales carbon footprint, 2018/19). To put this in perspective one tonne of carbon dioxide equivalent amounts to around one month's emissions from an average person in the U.K. As Wales' largest public sector organisation, the NHS has a critical role to play in contributing towards reducing national emissions.

Wales now has legally binding targets to work towards set out in the Environment (Wales) Act 2016 which are:

- A goal of net-zero emissions by 2050
- An ambition for the public sector in Wales be net zero carbon by 2030
- As an absolute minimum, Health and Social Care to deliver a reduction in emissions of 16% by 2025 and 34% by 2030

Primary care settings such as GP practices, community pharmacies, dental practices and optometric practices have an important role to play in reducing health sector emissions. One key step primary care settings can take is to calculate their current carbon footprint and identify ways in which they can reduce their energy use. The ability to measure a setting's carbon footprint is a vital first step. Understanding where emission hotspots are can enable focused and effective carbon reduction plans to be put in place. It also supports the opportunity for primary care to work at pace and scale to contribute to the decarbonisation of healthcare across Wales.

Calculating carbon footprints is evolving and not an exact science. Usually one of three approaches are taken when calculating a carbon footprint.

ⁱ tCO₂e stands for tonnes (t) of carbon dioxide (CO₂) equivalent (e). Carbon dioxide equivalent is a standard unit for counting greenhouse gas (GHG) emissions regardless of whether they're from carbon dioxide or another gas, such as methane.



The simplest approach is a *top down approach* based on using the total cost of whatever it is you wish to carbon footprint and equate to the carbon emitted. This is a less specific approach and tends to be quite crude. The *bottom up approach* involves activity data depending on the boundaries and the scope of what it requiring carbon footprinting. Boundaries mean what activities to include whilst scope refers to whether direct or indirect carbon emissions or anything else that has an effect on carbon emissions is included in the calculations. The boundaries and scope may vary depending on whether it is an intervention, a setting, an item, or a process. This is a more specific and accurate approach but does take more time and effort. It will also help to identify hotspot areas that may require attention. Sometimes a hybrid approach of the top down and bottom up approach is used. It is useful to understand the type of approach and what is and isn't included in the carbon footprint calculation when reading published studies as these will vary depending on what was being researched and why the footprinting was being undertaken.

For the purpose of this paper, all the carbon footprint calculators reviewed took a bottom up approach, however there is slight variation between calculators in what activity is included.



Background

There are a large number of carbon footprint calculators available for both home and business use. The [Greener Primary Care](#) framework of actions is being developed by the Primary Care Hub to support general practices, community pharmacies, dental practices and optometric practices to improve the environmental sustainability of their day to day practice. An added objective is contributing to the Welsh Government decarbonisation targets. The importance of a setting understanding their carbon footprint is paramount to identify areas to target and to measure any changes made to improve a practice's environmental sustainability.

Dr Mathew Sawyer, a leading figure in helping primary care settings reach net zero emissions, reported on a study *Carbon footprint analysis for general practice* (May 2020; unpublished), to identify the carbon footprint of general practice. The paper reports key differences in the carbon footprint of two primary care practices, one in a ruralⁱⁱ setting and one in an urbanⁱⁱⁱ setting and makes suggestions on areas to reduce their respective carbon footprints. The paper was reviewed by the Primary Care Hub to establish what factors were used to determine the carbon footprint of the practices. The findings of the study helped inform a further investigation examining what other carbon footprint calculators were available and appropriate for use by the four primary care contractors. The findings are reported in this summary report.

Dr Sawyer has since published further work based on a study of eight urban general practices in Salford using the same methodology [Summary of a carbon footprint pilot scheme of urban medical practices in Salford V1.1](#). January 2021. In this paper an explanation of how carbon footprint calculations were made is reported.

ⁱⁱ Practice A is a rural medical practice on the outskirts of medium sized town. It has 3 GPs serving between 4-6,000 patients. It runs from a purpose built predominantly single storey building of approximately 450 m2

ⁱⁱⁱ Practice B is urban medical practice with 8-9,000 patients. It runs from a purpose built two-storey building of approximately 655 m2. There are 8-12 GPs with four doctors in training.



Method

The full text of the Sawyer (2020) paper was obtained and reviewed.

Further carbon footprint calculators were identified from a google search (October 2021) using the search terms: 'carbon footprint calculator UK' and 'carbon footprint calculator UK health settings'. Results were collated and individual calculators reviewed.

The main findings are detailed below with further detail summarised in the appendices.

Main Findings

Analysis of the Sawyer (2020) paper

The paper covered the carbon footprint analysis from an urban and rural general practice and provided recommendations as to how practices can reduce their carbon footprint. This study formed the basis for the development of the 'See Sustainability GP Carbon Footprint Calculator' discussed later in this paper.

For both settings, CO₂e use was categorised into:

- Patient travel
- Staff travel
- Gas
- Professional services (e.g. accountancy, payroll, fire servicing, PAT testing etc.)
- Electricity
- Business miles
- Medical supplies
- Electrical equipment
- Paper, printing and postage
- Misc. (inc. food and drink)
- Cleaning, waste, toilet roll
- Water



The biggest areas of carbon use in both the rural and urban practice were:

- travel of staff and patients, 68% in the rural practice and 50% in the urban practice,
- energy use, 18% in the rural practice and 26% in the urban practice, and
- professional services, 8% in the rural practice and 19% in the urban practice.

Table 1 below is included from the original paper and provides a comparison of a number of areas of CO₂e use between the urban and rural settings.

Table 1: Carbon footprint outputs between the rural and urban practices

| | Rural CO ₂ e (Kg) | % | Urban CO ₂ e (Kg) | % |
|-------------------------------------|------------------------------|-----|------------------------------|-----|
| Patient travel | 40,551 | 51 | 25,642 | 32 |
| Staff travel | 11,086 | 14 | 14,039 | 18 |
| Gas | 8,775 | 11 | 12,639 | 16 |
| Professional Services total | 6,358 | 8 | 15,220 | 19 |
| Electricity | 5,828 | 7 | 7,982 | 10 |
| Business miles | 2,086 | 2 | * | * |
| Medical supplies | 1,477 | 2 | 2,377 | 3 |
| Electrical equipment | 1,250 | 2 | 81 | 0.1 |
| Paper, printing and postage | 1,011 | 1 | 1,481 | 1.8 |
| Misc. (inc food and drink) | 401 | 0.5 | 156 | 0.2 |
| Cleaning, waste, toilet roll | 174 | 0.2 | 1,170 | 0.5 |
| Water | 173 | 0.2 | 86 | 0.1 |

The paper offers some recommendations for how practices in both settings can reduce their carbon footprint, these include:

- Staff travel - providing options to reduce travel, remote working and consultation, using public or shared transport, and decarbonising single use transport (transport used by a single person e.g. privately owned car).
- Patient travel - providing options to reduce travel, enable active transport, remote consultations (text, phone, video, e-consults), using public or shared transport and decarbonising single use transport.



- Energy use - options include reduced use, decarbonised heating systems, self-generated electricity or 100% green tariff electricity supplier.
- Professional services - using influence to start conversations with services supplied to the business, reducing their carbon footprint will have gains for the practice carbon footprint.

Logistics of producing a carbon footprint for primary care

Based on the information included in the paper by Sawyer (2020), primary care practices would need access to a range of information in order to accurately provide a carbon footprint estimate. This includes gathering data from patients and staff as to their travel to and from the practice, calculating utility and procurement costs and the costs of professional services received (e.g. accountancy, payroll, fire servicing, PAT testing etc.).

While the individual data sets are likely to be accessed with moderate ease in most instances, the capacity of practices to undertake comprehensive mapping of all contributing factors for carbon footprint calculation may be logistically difficult given the many competing demands and interests faced by practices. It is notable that routine collection and recording of data required for carbon footprint calculation is not a mandatory or contractual requirement for primary care settings.

Other carbon footprint calculators included in this review

Ten carbon footprint calculators were identified during the search. These are detailed in Appendix 1.

From the ten calculators reviewed, five are suitable for use by small and medium-sized business/small organisations and may be most relevant for use by individual primary care practices. No calculator accounts for direct clinical CO₂ emissions (e.g. pharmaceutical prescribing) which account for 60% of all primary care CO₂ emissions and includes any emissions from acute clinical care.



One of the five calculators reviewed (carbonfootprint.com) requires payment to access their business specific calculator for small and medium-sized businesses and therefore may be beyond the scope of many primary care settings. A summary of further information about the remaining four most relevant free of charge carbon footprint calculators is provided below.

Table 2. Carbon footprint calculators suitable for small/medium organisations and their applicability to factors listed in table 1.

| | Patient Travel | Staff Travel | Gas | Professional Services | Electricity | Business Miles | Medical Supplies | Electrical Equipment | Paper, Printing & Postage | Miscellaneous | Cleaning, Waste, Toilet roll | Water |
|--------------------------------|----------------|--------------|-----|-----------------------|-------------|----------------|------------------|----------------------|---------------------------|---------------|------------------------------|-------|
| See Sustainability | √ | √ | √ | √ | √ | | √ | √ | √ | √ | √ | √ |
| The Carbon Trust | | | √ | | √ | | | | | | | |
| The National Energy Foundation | | √* | √ | | √ | | | | | | | |
| Climate Hero | | √ | √* | | √* | √ | | √* | √* | √ | | |

*Limited data entry i.e. rather than being able to input specific numbers regarding an answer e.g. number of kW used for electricity, the question would provide a range of answers e.g. low, medium or high electricity use to pick from therefore the carbon footprint calculation may not be as specific as possible. The calculators that allow input of specific numbers would provide a more accurate estimation overall.

The [See Sustainability GP Carbon Footprint Calculator](#) was developed by Dr Sawyer and launched in 2021. As this tool has been designed with general practice in mind, it includes a segment on patients' travel based on practice list size. Use of the calculator is largely applicable to other primary care settings with the exception of the patient travel section (this section can be left blank and a carbon footprint score can still be generated). The calculator allows the responder to provide either broad or detailed information dependent on the data the responder has available to them (more data input will provide a more accurate carbon footprint calculation). Its specificity to general practice and applicability to other settings is a significant benefit and is the



main carbon footprint calculator recommended for use. This calculator is freely available to use, enabling any practice in the UK to measure their carbon footprint. It is recommended for use by the Royal College of General Practitioners (RCGP).

In 2010, the British Medical Journal reviewed the use of carbon footprint calculators in UK health settings, recommending the use of the Carbon Trusts' model. The free version of the [Carbon Trust Footprint Calculator](#) is also one of a number of calculators recommended for more general use by the RCGP and collects information on fuel consumption, energy consumption and top-ups made to air conditioning units and is suitable for use by small and medium businesses. Unfortunately, many of the other factors included in table 2 that are associated with primary care are not considered as part of the Carbon Trust model so care should be taken when interpreting the results.

A third calculator, developed by the [National Energy Foundation](#) (NEF) and free to access (limited service only), collects a considerable amount of information including; main source of electricity, second source of electricity, type of first car/bike used for mileage estimates, type of second car/bike used for mileage estimates, distance and class of air trip used, building or process energy values and transport energy values. This calculator has the additional benefit of using data on floor area and number of staff as part of the carbon footprint calculation. Similarly though to the Carbon Trust calculator, the NEF calculator omits many of the factors considered specific to primary care as outlined in table 2.

Lastly, the [Climate Hero Carbon Footprint Calculator](#) is split into three sections: office, travel and consumption with its basic calculator free to access while also offering a bespoke option at cost. While the three sections are relevant to primary care and will give an approximate estimate as to a practices carbon footprint, similarly to the two calculators discussed immediately above, the Climate Hero calculator does not encompass all factors outlined in table 2.



A table of the data used in the four calculators compared to the data used in the Sawyer (2020) paper is presented in table 2.

Many of the other organisations which have produced carbon footprint calculators offer a free, albeit limited, version. However, while bespoke services are also offered, fees do apply and may be expensive. Should a practice wish to generate a highly specific carbon footprint calculation, this is one option available.

Conclusion

There are numerous carbon footprint calculators that could be used to calculate a basic carbon footprint. The data that needs to be collected and entered varies between calculators and whether they are for business or personal use.

For practices wishing to calculate their carbon footprint there a number of calculators which are available. Some of these are free of charge whilst others are more bespoke and attract a fee. There is no one, free of charge, carbon footprint calculator that is relevant across all four settings in primary care.

Should a primary care practice wish to calculate their carbon footprint, they should consider the following:

- Ensure the calculator is designed for businesses/organisations (ideally a healthcare setting), not personal carbon use
- The cost of the calculator
- Ensure the calculator is based on recognised conversion factors relevant to the United Kingdom



Based on the considerations, the four carbon footprint calculators below have, at least partial, suitability for use by primary care settings:

- [See Sustainability GP Carbon Footprint Calculator](#) (Recommended)
- The [Carbon Trust Carbon Footprint Calculator](#)
- The [National Energy Foundation Carbon Footprint Calculator](#)
- The [Climate Hero Carbon Footprint Calculator](#)

From the carbon footprint calculators reviewed, the *See Sustainability GP Carbon Calculator* would be highly recommended for use by primary care contractors. Further detail and links to these calculators are presented in Appendix 1. If a primary care practice does utilise one of the above calculators, they should be aware it will only provide limited information as to their overall carbon footprint as they will not account for factors such as clinical CO₂ emissions. It is important that any practice which uses a carbon footprint calculator uses the same calculator when re-measuring or monitoring progress made in reducing their carbon footprint. This is to ensure results are comparable and based on the same conversion factors and data used during the initial carbon footprint calculation.

It is recommended that a baseline carbon footprint is calculated and repeated at a suitable time period. Annual measurements are a suggestion offered by some practices which have an interest in carbon footprint measurement.

At present, the [Greener Primary Care](#) framework contains an action for practices to identify how sustainable their practice is and / or to measure their carbon footprint. There is an assumption that practices will access the free of charge carbon footprint calculators. For the purpose of identifying a baseline carbon footprint these are acceptable.



However some practices may wish to undertake a more in-depth carbon footprint calculation. This will most likely involve accessing and compiling more detailed data, increased staff time responsible for completing the work, and often a charge. For practices who plan to conduct a more rigorous carbon footprint analysis, the Welsh Government have produced a [carbon emissions reporting guide](#).

As the data required to undertake a carbon footprint calculation is practice specific data and this is not routinely available, it is not possible to calculate the carbon footprint of practices across a cluster area without the input of every contractor and organisation within the cluster.



Appendix 1

Summary of online carbon footprint calculators (in alphabetical order)

| Carbon Footprint Calculator | Setting | Cost | Data required |
|------------------------------------|-----------------------|--|---|
| Bulb | Personal | Free | <p>This calculator asks questions about the day-to-day life of an individual, including how often they drive, eat meat or buy new gadgets. The calculator's development has been supported by Imperial College London in quality assuring the mathematical modelling in which the calculator is built up. Requires data on:</p> <ul style="list-style-type: none"> • Personal travel • Food • Personal purchases • Energy supply |
| Carbon Footprint | Personal and business | Personal: free Business: Charge | <p>The calculator includes six categories:</p> <ul style="list-style-type: none"> • House • Flights • Car • Motorbike • Bus and rail • Secondary (e.g. food and drink products, pharmaceuticals, clothing, IT equipment etc. – see link for other examples) <p>The calculator provides a breakdown of carbon emissions for each category and a resource link to help reduce carbon emissions. In addition, the calculator has a free and simple online emissions calculator suitable for small organisations with UK Government-approved calculations, covering emissions from buildings and transport.</p> |
| Carbon Independent | Personal | Free | <p>Requires data on the following:</p> <ul style="list-style-type: none"> • Section 1: enter household data, so that items such as household heating and car use are shared between the members of your household. • Section 2: personal lifestyle and travel choices that apply to the individual. <p>The calculator has been created by a Consultant in Medical Statistics with a personal interest in the climate emergency.</p> |



| | | | |
|------------------------------|---------------------------------|--|---|
| Carbon Trust | Small & medium-sized businesses | Online calculator: Free Bespoke support: Charge | <p>The Carbon Trust has designed this calculator to help UK based businesses (small and medium) manage and report energy consumption and their corporate emission footprint. It follows the Green House Gas Protocol Guidance, including direct emissions from fuel and processes and those emissions from purchased electricity for the assets they operate.</p> <p>The organisation's yearly footprint is calculated on its fuel consumption, energy consumption and top-ups made to air conditioning units. The reported data covers a selected 12 month data period. Estimated data can be provided where exact figures are not known. Requires data on:</p> <ul style="list-style-type: none"> • Fuel consumed by the organisation in its sites and owned vehicles. This can be natural gas, diesel or LPG. You may find this information in bills, fuel card data or meters • Electricity used in your sites. You may find this information through meter readings, utility bills, or automatic meter readings • Top ups made to air conditioning units - Many refrigeration, fire protection and air conditioning equipment contain a type of F gas (Fluorinated greenhouse gas), which has a large carbon footprint. <p>Review of the website suggests a more sophisticated carbon footprint analysis is available upon request although likely with an associated financial cost.</p> |
| Climate Care | Personal & Business | Charge | <p>To date, they report reducing 51 million tonnes of CO₂e and improved 46 million lives. They reportedly deliver some of the largest carbon offsetting programmes in the world. There is no free option with the calculator. Climate Care offers bespoke support to those with a complex footprint or those that know they will need to offset over 2,000 tonnes. Data gathered on:</p> <ul style="list-style-type: none"> • Travel (flights/road transport) • Energy use • Events attended • Accommodations • Food • Freight • Waste |
| Climate Hero | Personal & business | Basic calculator: Free. Bespoke services: Charge | <p>Business: the calculator is based on service companies and the questions are split into three sections:</p> <ul style="list-style-type: none"> • Office • Travel • Consumption. <p>Can also develop a bespoke carbon footprint calculator for colleagues and customers (requires a fee). Uses data sources that are internationally viable but supplements with country-specific data where necessary.</p> |



| | | | |
|---|---------------|--|--|
| National Energy Foundation | Small offices | Limited services: Free Bespoke services: Charge | <p>This is a simple 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, it provides more comprehensive help and support on a paid-for basis. Requires data on:</p> <ul style="list-style-type: none"> • Main source of electricity • Second source of electricity • Type of first car/bike used for mileage estimates • Type of second car/bike used for mileage estimates • Distance & class of air trip used • Energy value from your bill or records: <ul style="list-style-type: none"> ○ Building or Process Energy Values ○ Transport Energy Values <p>Optional Extra Data:</p> <ul style="list-style-type: none"> • Floor area (m2) • Number of staff |
| Gov.UK | Business | Free | <p>There are 2 online versions of the calculator, a simple version called My2050 and a detailed version. Both versions contain moveable levers of decarbonisation. You select your level of ambition of decarbonisation effort using the levers, ranging from Level 1 - minimal effort, to Level 4 - maximum effort. Popup descriptions explain what the levels represent in terms of behavioural change or infrastructure investment. This does not appear to calculate your current carbon footprint but provides a forecast as to your future carbon footprint should you implement the actions relating to your stated ambitions.</p> |
| Normative | Business | Charge | <p>Normative calculates 100% of your climate footprint following the GHG Protocol.</p> <p>Limited further information available.</p> |
| Resurgence Quick Carbon footprint calculator: Full Carbon footprint calculator: | Personal | Free | <p>Resurgence provides two versions of their carbon footprint calculator, a quick version and a full version. The full version calculator requires the respondent to provide detailed information as to their electricity use for each quarter in kilowatts and the mileage of different journeys taken by air, rail and road. In addition, it collects information on dietary habits and leisure habits. The principal source of data for this calculator is the "Guidelines to DEFRA's GHG Conversion Factors for Company Reporting - Annexes". Requires data on:</p> <ul style="list-style-type: none"> • Home • Transport • Food • Leisure <p>Each category is broken down into multiple subsections</p> |



| | | | |
|------------------------------------|------------------|----------------------------|---|
| See Sustainability | General practice | Online calculator: Free | <p>The See Sustainability calculator is a free online non-clinical carbon footprint calculator designed for use by General Practices in the UK. The calculator measures and identifies the non-clinical greenhouse gas emission hotspots from running practices and produces a carbon equivalent footprint. There are 4 sections for completion which are:</p> <ul style="list-style-type: none"> • Energy • Travel • Services used • Goods/equipment bought with the data covering a full calendar year. <p>The calculator also asks the responder to provide the floor size of the practice with a tool provided to assist the responder in making this estimate. Responders have the option to add a limited amount of information or provide greater detail. The more information inputted into the calculator, the more accurate the carbon footprint estimation will be.</p> <p>This is a <u>non-clinical</u> calculator which will account for around 40% of the emissions produced by primary care. The calculator may be used by other primary care settings alongside general practice although the information required about patient travel will not be relevant to some settings. This section can be left empty and a carbon footprint score can still be given once all other sections are complete.</p> |
| WWF | Personal | Free | <p>The WWF Calculator is a questionnaire about lifestyle choices and behaviours and is divided into four sets of questions:</p> <ul style="list-style-type: none"> • Food: diet, food waste and buying habits. • Home: energy type and usage in the house and the presence of energy-saving measures. • Travel: personal and public transport usage for leisure, work, and flights. • Stuff: the purchases of consumable items. <p>The questionnaire is quick and easy to complete, and the calculator is user-friendly accompanied by additional information and explanations for each question which help in giving the best answer.</p> <p>The calculator uses data from the Office for National Statistics, which undergoes regular assurance reviews and supplemented by data from the Eora MRIO database, which has undergone reliability testing.</p> <p>Defra, Shrink That Footprint, and the Energy Savings Trust provide additional data on home, travel and diet-related emissions as part of the calculator.</p> |

