

Greener Primary Care Wales

**A study exploring carbon
footprinting of the national
Scheme and individual
participating practices**

May 2025

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Acknowledgements

The authors would like to thank the practices who gave up their time to participate in the survey as part of the data gathering element of this report; Local Partnerships for responding to queries about the calculator they had developed; NHS Wales Shared Services Partnership for addressing queries regarding practice sizes; and Cardiff and Vale University Health Board (UHB) Improvement Team for liaising over the carbon calculator in development.

Executive Summary

NHS Wales is on the path towards decarbonisation and net zero by 2050. The Greener Primary Care Wales Framework and Award Scheme (the Scheme) is a tool to give primary care contractors structure, prompts and feedback to make changes within their practice in line with this goal. This report outlines the progress the Scheme has made in estimating the cumulative carbon dioxide equivalent (CO₂e) impact of participating practices over the three years 2022 to 2024, and a testing of what support is available to help practices estimate their CO₂e impact at practice level.

As part of a previous programme of work, Local Partnerships (LP) developed a bespoke carbon calculator (referred to as the LP calculator) based on the actions within the Greener Primary Care Wales Framework and Award Scheme using a bottom-up approach. Based on the concept of a model practice, the calculator has been used by the Greener Primary Care Wales Team to retrospectively estimate, for the first time, the cumulative CO₂e reduction within participating practices between 2022 and 2024 as 2,761 tonnes CO₂e. This is the equivalent of driving over 7 million miles or 46,600 one-way trips from Cardiff to London in an average gasoline-powered passenger vehicle.¹ Emission factors vary according to the conversion tool accessed and year of publication, however using the [UK Government GHG Conversion Factors for Company Reporting tool](#), equivalence calculated as 7 million miles is a conservative estimate.

This study assessed whether the LP calculator could also be used independently by participating primary care practices to estimate the CO₂e reduction of implementing the Scheme's actions within their own practice. The advantage of a bottom-up approach is that it can more accurately reflect local circumstances, but a limitation is that data collection can be very protracted. It was concluded that the challenge of accessing the data required for the calculator, alongside the complexity of primary care provision and shortage of staff time to carry this out, meant this was unfeasible.

Given the lack of specialist carbon calculators designed for community optometry, primary care dental and community pharmacy practices, this review surveyed the experiences of practices completing the carbon footprint action within the Scheme. Staff from eight non-GP practices across Wales were interviewed about their experiences of using online calculators to estimate their practice's carbon footprint.

Findings from the interviews demonstrated that the use of a calculator was a motivator for some to help identify where to prioritise their efforts. Others felt some frustration that the results were too generic to be useful. One expressed need is the desire of practices to compare their own carbon footprint with other similar practices. It is pleasing to note that a new bespoke calculator aimed at Community Dental Practices is in development at a UK level which may help towards addressing this gap. All the surveyed practices recommended that other practices try at least one of the calculators available, as a snapshot. Primary care practices are extremely heterogenous and currently there appears

¹ [Greenhouse Gas Equivalencies Calculator | US EPA](#)

to be no one perfect free online carbon calculator available to meet the carbon footprint estimation needs of a range of independent contractor settings.

These findings align with the findings of the [*Primary Care in Wales, A carbon footprint assessment of estimated emissions for primary care contractors in Wales*](#) about the significant challenges of measuring the carbon footprint in primary care settings.

This study also examined the suitability of a carbon calculator developed by Cardiff and Vale University Health Board (UHB). Although not aligned specifically to the Scheme's actions, the ease of use and reliability of this calculator, which uses top-down, bottom-up and hybrid approaches, for CO₂e reduction estimation suggests that it would be a useful decision-making aid and tool to improve carbon literacy amongst primary care staff and in evaluating their specific carbon reduction initiatives.

1 Introduction

1.1 Global context

Anthropogenic climate change poses the greatest threat to human health in the 21st century². The health impacts of climate change are happening now, with health professionals worldwide already responding to issues caused by the crisis. The Intergovernmental Panel on Climate Change (IPCC) Report 2022 highlights that climate change and extreme weather events disproportionately impact people and groups who are economically and socially marginalised, thereby exacerbating existing health inequalities³.

In December 2015, 196 parties (including the UK) adopted the Paris Agreement⁴ at the UN Climate Change Conference (COP21) in Paris, France. This was the first time all nations came together to combat climate change and adapt to its effect through a legally binding international treaty on climate change. It came into force on 4 November 2016 and the goal of the Agreement is to hold *'the increase in the global average temperature to well below 2°C above pre-industrial levels'* and pursue efforts *'to limit the temperature increase to 1.5°C above pre-industrial levels.'* The IPCC reports that that breaching the 1.5°C threshold risks severe climate change impacts, including frequent and severe droughts, heatwaves and rainfall.

To limit global warming, a rapid decline in greenhouse gas emissions is required by 2030.

1.2 Wales context

The Senedd was the first parliament in the world to declare a [climate emergency](#) in 2019, followed two years later by the declaration of a [nature emergency](#) in 2021. These declarations built upon the existing legislative landscape in Wales, namely the Environment (Wales) Act 2016 which sets out legally binding targets to work towards:

- A goal of net-zero emissions by 2050
- An ambition for the public sector in Wales to 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

The health sector in Wales is responsible for the largest carbon emissions in the public sector, with NHS Wales emissions alone estimated to be 1,001,378 tonnes of CO₂e⁵. This [NHS Wales carbon footprint](#) was reported in 2020, for the financial year 2018/19. The footprint focussed on health board and NHS trust emissions. Emissions from primary care were not included in the calculation. The report informed the development of the [NHS Wales Decarbonisation Strategic Delivery Plan \(2021\)](#) which outlines 46 initiatives for

² [Managing the health effects of climate change: Lancet and University College London Institute for Global Health Commission](#). Lancet 2009; 373: 1693–733

³ [Climate Change 2022: Impacts, Adaptation and Vulnerability](#)

⁴ [The Paris Agreement | UNFCCC](#)

⁵ [NHS Wales carbon footprint 2018 to 2019](#)

carbon reduction. Also in 2021, the Welsh Government issued guidance for [public sector net zero reporting](#)⁶.

The [Primary Care in Wales, A carbon footprint assessment of estimated emissions for primary care contractors in Wales](#) was published in June 2024. It reflected the fact that carbon emissions relating to primary care were less readily accessible and were excluded in the initial carbon footprint assessments carried out in 2020. The exercise aimed to estimate and report an initial, high-level carbon footprint for the four primary care contractor groups in Wales from centrally available data. The carbon footprint attributable to primary care contractors providing NHS healthcare in Wales for the reporting period of financial year 2022/2023 was reported to be an estimated 227,627 tonnes of CO₂e. As a desktop exercise, the assessment applied several assumptions, data extrapolation and estimations due to the '*paucity of primary data*'. Highlighting the difficulty in estimating a carbon footprint in primary care, the authors note that caution should be expressed when interpreting the results.

Primary care settings such as GP practices, community pharmacies, dental practices and optometric practices, although not officially classed as the public sector when considering the Well-being and Future Generations (Wales) Act 2015⁷, have an important role to play in reducing health sector emissions.

1.3 Carbon footprinting

Before taking action to reduce carbon emissions at any level it is useful to understand the current carbon footprint as a baseline measure.

There are several different gases that contribute to global climate change. These are: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and F-Gases such as hydrofluorocarbons (HFC), perfluorocarbons (PFC), nitrogen trifluoride (NF₃) and sulphur hexafluoride (SF₆). The impact of different gases on the atmosphere is complex and depends on their duration and behaviour in the atmosphere. For example, methane produces 25 times more warming effect than an equivalent amount of carbon dioxide over an equivalent time-period⁸. To simplify this, data for all greenhouse gases are translated into a single comparable unit called a carbon dioxide equivalent (CO₂e), which is usually measured in kilogrammes or tonnes, and is often termed the 'carbon footprint'. To put this in perspective, one tonne of CO₂e equates to the carbon footprint of an average person in the UK over approximately one month.

Carbon footprinting can be applied to the activities of an individual, an organisation, or within a setting. It can also apply to systems, processes, products, services or events. Estimating healthcare greenhouse gas emissions, or carbon footprint, offers an environmental currency to identify hotspots, track progress and enable comparison of alternative clinical pathways and products.

⁶ [Welsh Public Sector Net Zero Carbon Reporting Guide 2021](#)

⁷ [Well-being of Future Generations \(Wales\) Act 2015: the essentials](#)

⁸ [Welsh Public Sector Net Zero Carbon Reporting Guide 2024](#)

The method for estimating carbon footprints is evolving and not an exact science. There are two main approaches to estimating a carbon footprint: top-down (Environment Extended Input-Output Analysis) and bottom-up (Process based carbon footprinting)⁹.

Each approach has its relative advantages and limitations, and many studies use, where data allows, a third hybrid approach (See [Table 1](#)). It is important to understand the type of approach and the boundaries of what is and is not included in any carbon footprint estimation. The choice of approach can make a difference to the final estimate.

Table 1: Advantages and limitations of different approaches to carbon footprinting

Approach	Advantages	Limitations
Top-Down: based on financial spend	<ul style="list-style-type: none"> - Cost data are often readily available - Analysis can often be completed quickly - Avoids truncation errors 	<ul style="list-style-type: none"> - Cost data are often aggregated, making detecting a change to one aspect, e.g. following an intervention, difficult to isolate - Costs may vary between items or over place/time for reasons other than a change in carbon footprint, e.g. change of supplier - In a healthcare context, limited availability of emission factors for specific products, e.g. oral and IV paracetamol would currently use the same generic medication emission factor in the UK
Bottom-Up: using component and activity data	<ul style="list-style-type: none"> - Simple to understand - Result is more accurate to specific local setting e.g. identifiable local energy source (therefore percentage renewable known) - Useful for simple comparison of products, e.g. re-usable versus disposable scissors - Increasing number of reputable and standardised government and peer-reviewed emission factors, available to source emission factors, which are updated regularly, e.g. Greenhouse gas reporting: conversion factors 2024 	<ul style="list-style-type: none"> - Analysis relies on inventory data which may be incomplete or poorly understood - Data sourcing can be time consuming and laborious. e.g. weighing of packing materials - Result may not be transferable to another setting - Can miss indirect impacts
Hybrid: Top-down and Bottom-Up	<ul style="list-style-type: none"> - Mixed method approach makes pragmatic use of readily available data - Can avoid truncation errors 	<ul style="list-style-type: none"> - Mixed methods can limit comparison between different analyses of the same product, service or pathway

⁹ Carbon footprinting is also part of the Life Cycle Analysis (LCA) approach. An LCA also includes the impact in other spheres, e.g. biodiversity. Although there is an increasing number of published healthcare related LCAs e.g. [HealthcareLCA | Data driven sustainable health care](#), the extent of this method puts it beyond the scope of this report.

1.4 Greener Primary Care Wales Framework and Award Scheme

To aid primary care practices to decarbonise, adapt and become more environmentally sustainable, the Primary Care Division (PCD), Public Health Wales, developed the [Greener Primary Care Wales Framework and Award Scheme](#) in 2022, referred to as 'the Scheme'. Consisting of over 50 climate friendly actions, the Framework provides a guide for primary care practices to take small steps to become more environmentally sustainable. One of the actions featured in the Scheme encourages practices to estimate their carbon footprint. The action states:

- *The practice has taken action to identify how sustainable their practice is by measuring their carbon footprint annually.*

To aid practices in completing this action, the PCD provides further information ([Appendix 1](#)) and signposts to the [Carbon Footprint Calculators for use by Primary Care Contractors](#) report, published by the PCD in 2022, which details 'suitable' and 'recommended' calculators.

2 Background

In 2023/24 the Welsh Government, through the Health and Social Care Climate Emergency National Programme, committed funding for primary care. The PCD, Public Health Wales, was successful in securing an element of this funding to commission Local Partnerships (LP) to develop a calculator to estimate the carbon reductions associated with the actions included in the Scheme. This is referred to hereafter as the LP calculator.

Using a bottom-up approach, the calculator developed by LP consisted of an Excel spreadsheet with emission factors against relevant actions designed to estimate the potential CO₂e reductions that a practice could make as a result of implementing actions across the Scheme.

The intention was for this LP calculator to be a tool to estimate both the cumulative CO₂e reductions arising from participating practices within the Scheme and also at individual practice level.

This paper reports the outcome of a study in applying the LP calculator to estimate CO₂e reductions and seeking insight into primary care practice experiences in calculating their practice carbon footprint.

3 Objectives

The objectives of this study were to:

- 1.** Identify the estimated cumulative CO₂e reductions yielded by practices participating in the Scheme between 2022 and 2024.
- 2.** Assess to what extent the LP calculator could be used independently by primary care contractors to quickly and easily estimate their own CO₂e reductions.
- 3.** Describe the experiences of primary care practices completing the carbon footprint action within the Scheme using a variety of available carbon calculators, drawing out learning and making recommendations for suitable carbon calculators for practices to use.
- 4.** Identify and explore the usability of other carbon calculators for use at Scheme and practice level.

4 Method

To assess and test the application of the LP calculator, additional capacity was provided to the PCD in the form of a part time external consultant working with the Division between September 2024 and March 2025. A meeting was arranged with LP to examine the detail of the assumptions and intended method of application.

The Scheme's activity data regarding participants, registration, and actions completed from the three-year period 2022 to 2024 was collated and used to estimate CO₂e reductions using the LP calculator.

4.1 Estimating cumulative CO₂e reductions of the Scheme

The LP calculator was interrogated to identify which actions within the Scheme were assigned a CO₂e reduction. The Scheme's activity data was collated by year and used to quantify the number of practices recording actions that had a CO₂e reduction assigned to it. A simple calculation was performed using the LP calculator factors and the activity data to identify the estimated carbon reduction per action per year to report the cumulative estimated CO₂e reduction over 3 years (2022 to 2024).

4.2 Estimating CO₂e reductions by individual practices

The calculator was reviewed in a desktop exercise, comparing its scope and ease of use with suitable existing online carbon calculators previously identified and reported by the PCD in the [Carbon Footprint Calculators for use by Primary Care Contractors](#).

4.3 Experiences of practices completing the carbon footprint action within the Scheme

The [SEE non-clinical carbon footprint calculator for General Practices](#) had previously been identified as a simple tool for use by General Practice, and was already recommended for use within the Scheme. It was therefore decided to focus on understanding the support needed by community pharmacies, dental practices and optometric practices in calculating their practice carbon footprint. A list of all practices completing the carbon footprint action within the Scheme between 2022 and 2024 was collated from registration data. Non-GP practices completing this action were identified.

A survey was designed for non-GP practices. The survey took the form of a telephone interview. A purposive sample of non-GP practices completing the carbon footprint action within the Scheme between 2022 and 2024 was invited by email to participate in an interview. Each practice was prompted on three occasions by telephone to make the appointment for the interview. The telephone interviews were carried out between December 2024 and January 2025, using a semi-structured interview approach ([Appendix 2](#)). Responses were recorded and the results tabulated.

4.4 Other carbon footprint calculators

A rapid review of available carbon footprint calculators [*Carbon Footprint Calculators for use by Primary Care Contractors*](#) was undertaken and reported, initially in 2022, by the PCD.

Further to the calculators recommended in the aforementioned report, it was identified that Cardiff and Vale UHB Innovation Team had developed an online carbon footprint calculator for use across the health board. As a result of liaison with the developer, an exercise was conducted to identify if this calculator could be used to estimate the cumulative CO₂e reductions yielded by practices participating in the Scheme and its suitability for independent use by primary care contractors. This involved examination of approaches and assumptions within the new calculator alongside sources of emissions factors.

A desktop exercise was conducted to establish the following:

- To compare the extent of overlap and gaps between the Cardiff and Vale UHB calculator items and the Scheme's actions.
- To identify the potential for using this new calculator to be a tool to estimate the cumulative CO₂e reductions yielded by practices participating in the Scheme.

5 Findings

5.1 Estimated CO₂e reductions of the Scheme using the LP calculator

5.1.1 Actions where a CO₂e reduction value could be assigned

Depending on the year, between 36% and 41% (n=20 to n=22) of the actions included in the Scheme could be assigned a CO₂e reduction value. ([Table 2](#))

Table 2: Number of actions within the Scheme, by year, assigned CO₂e reductions

	2022 Scheme	2023 Scheme	2024 Scheme
Total number of actions	50	54	61
Number of actions where CO ₂ e reduction estimated from Scheme data	20	22	22
Number of actions where bespoke practice data required	5	6	6

These actions were generally spread across the categories, except for the adaptation, healthy behaviours, and co-production & innovations actions where no specific CO₂e reductions could be assigned. ([Table 3](#))

Table 3: Number of actions within the Scheme, by year and category, assigned CO₂e reductions

Framework action categories	Number of actions with CO ₂ e reduction		
	2022	2023	2024
Generic actions – apply to any setting			
Adaptation	0	0	0
Buildings & estates	3	4	4
Carbon management	0	1	1
Healthy behaviours	0	0	0
Innovation & co-production	0	0	0
Procurement	1	1	1
Transport & smart working	2	2	2
Waste	2	2	2
SUB TOTAL	8	10	10
Contractor specific actions			
General practice	3	3	3
Community pharmacy	2	2	2
Optometry	4	4	4
Dental	3	3	3
SUB TOTAL	12	12	12
TOTAL	20	22	22

A further small number of actions in the Scheme would yield a CO₂e reduction but these would require local practice data to assign a value (n=6). The six actions that would require local practice data to estimate a CO₂e reduction are categorised as Procurement actions (n=3), Innovation & co-production actions (n=2) and a dental specific action (n=1).

The remaining actions within the Scheme were deemed to be 'enabling functions' e.g. engagement of staff and changing practice culture.

5.1.2 Estimated cumulative CO₂e reduction values of the national Scheme using the LP calculator

The cumulative CO₂e reduction within practices participating in the Scheme between 2022 and 2024 was estimated to be **2761 tonnes CO₂e**.

To produce carbon reduction estimates at the Scheme level, the LP calculator uses national government carbon emission factors, a model size of practice, and a series of assumptions. The source for each emission factor, the assumptions, and the size of practice are detailed within the body of the calculator, at action level.

The assumptions comprise two types: general assumptions based on the experience of LP staff working with small or medium sized businesses (e.g. percentage of building electricity used for lighting), and specific assumptions based on industry or academic research papers (e.g. NICE guidance).

5.2 Estimated CO₂e reduction by individual primary care practices using the LP calculator

The data requirements for the calculator to be used independently by individual practices are detailed in [Table 4](#).

As a result of identifying the practice level data required to use the LP calculator it was concluded that:

- not all data required is routinely available and would require practices to collect it,
- some data that was available would require a considerable amount of time for practices to collate,
- the task of collating data in the format and quality necessary to use the LP calculator at an individual practice level was considered to be quite onerous,
- at an individual practice level, and given time pressures in primary care, the effort needed to use the proposed LP calculator to estimate CO₂e reductions as a result of their relevant actions was disproportionate to the benefit to be gained from more accurate carbon footprint estimates.

[Objective \(2\)](#), independent local use in test sites, was subsequently not pursued and therefore not reported.

Table 4: Data requirement to use the LP calculator

Action reference number in the Scheme (2023 version)	Category of data required to furnish calculator	Potential source
2/4/5/22	Electricity kWh/m ²	- Display Energy Certificate or Energy Performance Certificate - Meter readings/utility bill and measurement of floor space
3/5/22	Thermal Fuel kWh/m ²	
15	Number of WTE staff	- HR records
33	Quantity of paper used	- Practice procurement information
31/OPT02/OPT03/OPT04/OPT05/PHARM01/GP02/GP03/DENT02/DENT05	Number of patients	- Practice patient records
28/PHARM04/DENT06	Number of patients and estimate of distance travelled	- As above and individual patient records

The challenges emerging in accessing and collating practice level data echoed those identified in [Primary Care in Wales, A carbon footprint assessment of estimated emissions for primary care contractors in Wales](#), for example the potential number of practices in premises without access to a Display Energy Certificate (DEC) or an Energy Performance Certificate (EPC)¹⁰.

5.2 Other carbon footprint calculators

5.2.1 Calculators reported to be used by practices completing the carbon footprinting action within the Scheme

Analysis of the data held for the Scheme identified that between 2022 and 2024, 25 practices across all four primary care settings reported completing the carbon footprint action within the Scheme. Eighteen of the 25 practices reported using at least one carbon footprinting calculator.

A breakdown of the calculators used by these 18 practices is shown in [Table 5](#). A small number of practices used more than one calculator, which means the total number in the table is greater than 18.

The Scheme signposts practices to [Carbon Footprint Calculators for use by Primary Care Contractors](#) which identifies three calculators as 'recommended' or 'suitable' for use by primary care practices¹¹. On 12 occasions a practice used one of these three calculators.

¹⁰ From centrally held records the Energy Service Report 2024 has been able to locate less than half of the DEC/EPCs covering primary care premises, i.e. 855/1951 sites. Information explaining DEC and EPC is provided in [Appendix 3](#).

¹¹ Four were originally recommended in 2022. One of these, the [National Energy Foundation Carbon Footprint Calculator](#) is no longer available as a free resource.

Table 5: Carbon footprint calculators used by primary care practices participating in the Scheme, by profession, 2022 to 2024

Setting	Calculators listed in <i>Carbon Footprint Calculators for use in Primary Care (2022)</i>					Other	
	Recommended	Deemed suitable		Other		Greener Dentistry Global	Un-named
	SEE*	The Carbon Trust	Climate Hero	Carbon footprint	World Wildlife Fund (WWF)		
General Practices	4	1	0	1	0	0	0
Community Pharmacy	0	0	0	1	0	0	0
Community Optometry	1	3	0	0	1	0	1
Primary Care Dental	2	0	1	4	0	1	1
TOTAL	7	4	1	6	1	1	2

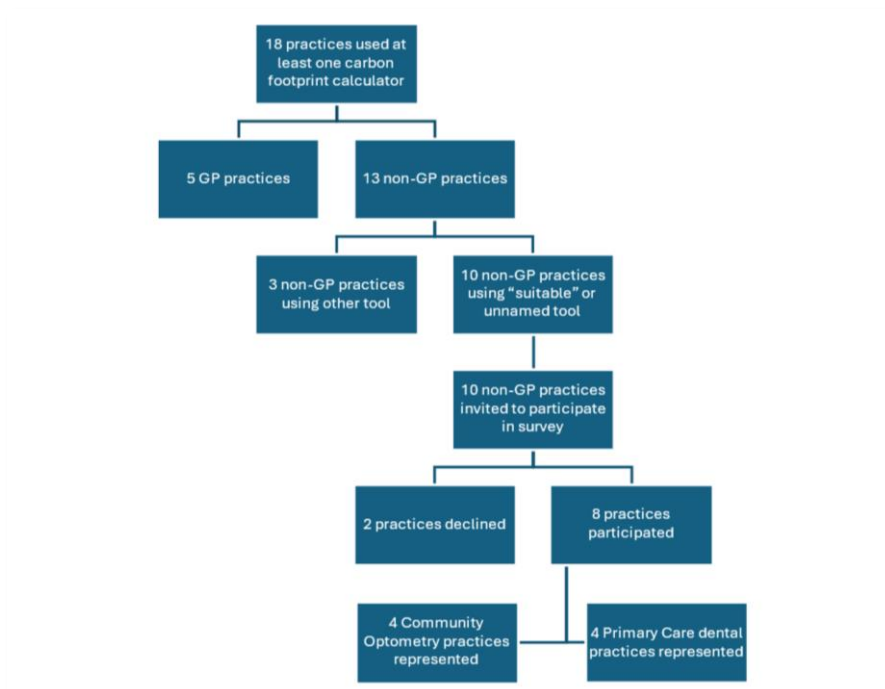
* [SEE non-clinical carbon footprint calculator for General Practices](#)

5.3 Experiences of practices completing the carbon footprint action within the Scheme

5.3.1 Participation in the survey

Of the 18 practices which had used at least 1 carbon footprint calculator, 10 non-GP practices (5 optometrists and 5 dentists) were approached: 8 agreed to be surveyed and 2 declined due to time and clinical pressures (Figure 1). Of the 8 surveyed, 4 were Community Optometry practices and 4 were Primary Care Dental practices.

Figure 1: Practices participating in the survey



5.3.2 Key findings

Three non-GP Practices used the SEE non-clinical carbon footprint calculator for General Practices and three used the Carbon Trust calculator. The remaining calculators, Climate Hero, Carbon footprint, WWF and Greener Dentistry Global were each used by one practice only. The experience of using the calculators is shown in Table 6.

Table 6: Summary of survey findings

	<u>SEE*</u>	<u>The Carbon Trust</u>	<u>Climate Hero</u>	<u>Carbon footprint</u>	<u>WWF</u>	<u>Greener Dentistry Global</u>
Number of non-GP practices using the calculator	3	3	1	1	1	1
Usability (on a scale of 0-10)	6	4	4	3	4	6.5
How long does it take?	2-4 hours	10 mins – 4 hours	1 day	<1 hour	<1 hour	1-2 hours
Would you use it again?	Mixed	Mixed	Yes	Possibly	Yes	Possibly
Would you recommend it?	Yes	Yes	Yes	Yes	Yes	Yes

* [SEE non-clinical carbon footprint calculator for General Practices](#)

Scoring the ease of use “out of 10” (where 0 is very easy and 10 is very hard), all practices scored the calculator(s) they used in a range between 3-6.5. There were mixed views about whether the practice would use their calculator(s) again for monitoring purposes, but all practices would recommend that other practices used at least one of the tools they tried at least once, as part of being on the Scheme.

5.3.3 Calculator used

There was no one calculator identified by the respondents as being the perfect tool to estimate their carbon footprint. Some of the varying opinions described by the participants in the survey are indicated below.

- [SEE non-clinical carbon footprint calculator for General Practices](#)

Comments about the experience of using the SEE non-clinical carbon footprint calculator as a non-GP practice were mixed:

“Calculating the total carbon footprint of a dental practice is difficult ... due to dentists not having a registered dental list anymore to help calculate patient travel ... which together with staff travel makes up a substantial part of the footprint”.

Primary Care Dental Practice

- [The Carbon Trust](#)

Those practices which used the Carbon Trust calculator were mostly positive:

“We calculated this with The Carbon Trust Tool. We were pleased that our carbon footprint had reduced based on our continued efforts with zero waste, a whole year

of being completely paper free and our reduction in energy consumption since our new boiler”.

Community Optometry Practice

- [Climate Hero](#)

“The process (of collecting the data) raised our awareness of how much we use and that got us thinking about what we could do (to reduce our carbon impact)”

Primary Care Dental Practice

- [Carbon footprint](#)

The Carbon footprint calculator was not on the “suitable” list given its limited use for small businesses without charge. The simplicity of use had appeal for some and drawbacks for others:

“I used a simple carbon footprint calculator to assess our carbon footprint. We have already offset half of this output by having 2 trees planted in NHS forest on our behalf”.

Community Optometry Practice

“It was fairly meaningless in some ways. My question is, how bad are we, there was nothing to compare our score to”.

Community Optometry Practice

- [WWF](#)

Identified as a tool aimed at individuals, one practice used this calculator. Just starting the process of estimating the practice carbon footprint appeared to be a motivator:

“We found we are not able to work out our carbon footprint fully at this moment of time. However, we will be starting to keep track of how much energy we use each month etc, from the start of the new year. We will then be able to keep track of it and calculate our carbon footprint”.

Community Optometry Practice

- [Greener Dentistry Global](#)

One practice took the opportunity to also use a newly available bespoke tool for dental practices (Greener Dentistry Global - limited use as a free resource) and this work was a stimulus for a range of actions:

“We have looked at the footprint of different areas and focused how to bring these down. We have looked at carbon footprint for energy usage electricity /gas as this can more closely be monitored. Then we implemented as many of the recommendations in reports on net zero to bring down all other contributors i.e. working from home, reducing patient visits, staff travel, deliveries of stock and use of support companies e.g. labs”.

Primary Care Dental Practice

5.3.4 Time to complete carbon footprint estimations

Respondents using these carbon footprint calculators fell into two groups:

- those who had completed the task quickly, chosen a simpler calculator and used the findings as a general indication of their footprint, and
- those who had had to spend time finding the data, possibly tried more than one calculator to compare results in the hope of a more in-depth analysis.

The time taken to complete the calculator ranged from 10 minutes to one whole day and was heavily dependent on whether the data needed was already easily accessible, e.g. energy bills. All but one practice completed it within half a day.

5.3.5 Usefulness

The results were said to be “somewhat helpful” in planning any practice-based actions by most practices, however two practices (one dental and one optometric) felt the time was not well spent as the calculator was too basic:

“We have looked instead at our energy usage electricity /gas as this can more closely be monitored”.

Community Optometry Practice

Despite the challenges, 5 out of 8 practices using a calculator would do so again for monitoring purposes (and because they were now familiar with it).

All practices would recommend at least one of the calculators they had tried to other dentists or optometrists:

“It was a good place to start and to understand where we needed to improve – it was a bit of a reality check really”

Primary Care Dental Practice

5.4 Other carbon footprint calculators

5.4.1 Calculators cited in [Carbon Footprint Calculators for use by Primary Care Contractors](#)

In 2022, a rapid review of available carbon footprint calculators was undertaken and reported by the PCD in [Carbon Footprint Calculators for use by Primary Care Contractors](#). This report requires updating as one recommended calculator is no longer available.

5.4.2 The Cardiff & Vale UHB calculator

The Cardiff & Vale UHB calculator incorporates emission factors for 60 items pertaining to healthcare, ranging from electricity kWh to number of GP appointments to plastic aprons avoided. It builds upon work done by University Hospitals Dorset, which in turn uses the

Centre for Sustainable Healthcare's Sustainable Quality Improvement methodology and adopts elements of their scanning exercises. Further details of their sources and assumptions can be found on the [Centre for Sustainable Healthcare](#) website. It uses a mix of bottom-up, top-down and hybrid approaches.

The findings regarding the potential use of the Cardiff & Vale UHB calculator at the Scheme and practice level show that:

- None of the actions within the Scheme could be estimated using the Cardiff & Vale UHB calculator on its own. This is because the Scheme's actions are more nuanced than the Cardiff & Vale UHB calculator items. In estimating the carbon footprint at Scheme level, the Cardiff & Vale UHB calculator adds no further value to using the LP calculator.
- In completing the Scheme's carbon footprint action at practice level, the Cardiff & Vale UHB calculator adds no further value to the online calculators already signposted to.
- The Cardiff & Vale UHB calculator could help a practice estimate the carbon footprint two of the actions within the Scheme:

Action 31 (letter reduction) The LP calculator uses a bottom-up estimate of the 'weight of paper and envelopes not used' * the 'emission factor for paper', whereas the Cardiff & Vale UHB calculator uses a generic top-down estimate of 'emission factor on office items' * '£ saved.' The practice should have easy access to the cost of paper and envelopes, but it would still have to estimate the percentage reduction in its own setting.

Action DENT06 (family appointments made together) The LP calculator uses an academically sourced 'average mileage distance to the practice' * 'number of appointments' * an assumption that 10% of visits will be avoided, whereas the Cardiff & Vale UHB calculator would need the practice to work out the average miles saved by some other method, e.g. travel audit, and then use an emission factor for 'average car miles'. Again, the practice would have to estimate the percentage reduction in its own setting.

In conclusion, given its focus on healthcare the Cardiff & Vale UHB calculator could readily be signposted to from the Scheme as a tool to assist in planning of local clinical interventions and to improve staff carbon literacy.

6 Limitations

6.1 Estimating cumulative CO₂e reductions of the Scheme using the LP calculator

Several limitations were identified. These are as follows:

- CO₂e reductions could be estimated for only a proportion of the actions included in the Scheme. The value of the 'enabling' actions are therefore not reported. Six actions could yield CO₂e reductions but would require bespoke data at practice level that was not available, and therefore the CO₂e reductions relating to these six actions were not included in the total CO₂e reductions reported for the Scheme between 2022 and 2024, thereby underestimating the CO₂e reductions.
- As there was no baseline estimate of CO₂e emissions prior to practices joining the Scheme, it cannot be assumed that the actions they have recorded were directly due to Scheme participation between 2022 and 2024. Practices may, for example, have installed LED lighting in 2020, before they joined. Although cause and effect cannot be proven, the estimation of CO₂e reduction provides an illustration of how change at practice level can contribute to national decarbonisation targets.
- Local Partnerships made assumptions when estimating the CO₂e reductions and designing the calculator. Specifically, for the CO₂e reduction for the Scheme within participating practices during the first three years of delivery, the CO₂e reductions were based on a model practice size of 3,630 patients and a total useful floor area of 319 square metres. Similarly, the estimation was based on a practice with 11 WTE staff. Verifying the validity of these figures in relation to Welsh primary care sites from centrally held data about patient list size, floor area and number of WTE staff is not currently possible for all independent contractors in Wales. Published GP patient numbers¹² put the practice patient list size average (mean) at approximately 8,800 and range from below 1,000 to over 26,000 patients. Floor area data are incomplete and only available where data are collected regarding reimbursement of rent to GP practices. The GP staff number per average practice is 21.7 FTE¹³. Work is underway nationally to establish WTE staff numbers for optometry, dental and community pharmacy services. Practice patient numbers are needed for 13/22 of the action estimations within the LP calculator. Without the equivalent list size, floor area and number of WTE staff for all independent contractors, there remains significant ambiguity around the concept of a model primary care practice in Wales.

These limitations echo the findings of the [Primary Care in Wales, A carbon footprint assessment of estimated emissions for primary care contractors in Wales](#): "Primary care is an extensive sector that has numerous complexities and interactions with other healthcare, private and commercial services. These complexities have contributed to challenges in undertaking detailed analysis".

¹² [Patients Registered at a GP Practice](#) StatsWales Oct 2024

¹³ [Average number of staff \(full-time equivalent\) per practice by local health board](#) Jan 2025

6.2 Estimating CO₂e reduction by individual primary care practices using the LP calculator

The conclusion drawn that the LP calculator was not suitable for use at individual practice level and the effort needed to estimate CO₂e reductions being disproportionate to the benefit gained, was in some part due to its limitations.

- The main limitation in using the LP calculator at individual practice level was paucity of accessible data. To reduce the inevitable margins of error around using a model practice size and assumptions for measuring CO₂e reduction at action/practice level, the LP calculator offers the opportunity for individual practices to insert their own data and/or assumptions. This could work for practices which know their patient list size, have a clear physical boundary to their practice accommodation, and have routine access to their own energy use data. The LP calculator will be less able to accurately reflect a CO₂e reduction estimation in situations where the practice does not routinely monitor its patient list size (e.g. community pharmacy), it shares accommodation/utility bills, or in some way has joint responsibility for other resources (e.g. health board community staff, being part of a chain or multiple).
- LP caveats, therefore, that the CO₂e reductions estimated within the calculator should be used as a guide. They further recommended that practices undertake regular monitoring of energy consumption, explore the locally available prescribing data of medicines and procurement of goods and services, to improve the accuracy of estimating CO₂e reductions.
- LP anticipated that time would be limited within primary care and proposed that practices refer to their DEC or EPC certificates from which practice energy data could be accessed. Energy data is needed to estimate 7 out of 22 of the actions within the LP calculator. However, in 2024 the [Primary Care in Wales, A carbon footprint assessment of estimated emissions for primary care contractors in Wales](#) found compliance with EPC/DEC appears low with only 50% of primary care sites aligning to a centrally held EPC and only 12% to a centrally held DEC.
- Upon further investigation it was revealed that holding a DEC or EPC was not mandatory for all practices as this would be dependent on the floor size and/or use of the building, plus history of tenure. DEC's are mandatory for public buildings in the UK where the floor area is larger than 250m² and are frequently visited by the public. At the date of issue, the certificate reflects the previous calendar year's energy consumption and for smaller sites, where the building has a total useful floor area of between 250m² and 1000m², the DEC and corresponding advisory report are valid for 10 years.
- EPC's are only required for domestic and non-domestic buildings that have been newly constructed, have undergone significant renovation, or are being sold or leased. EPC's are based on modelled energy use. An EPC is valid for 10 years so long as no alterations are made to the building. Although perhaps helpful as a snapshot, by definition these data within the site's EPC/DEC would in many cases not be helpful when monitoring energy use within a practice on an annual basis.

6.3 Experiences of practices completing the carbon footprint action within the Scheme

Carbon footprinting in healthcare is a relatively new activity. This is further demonstrated by the small proportion of practices completing the Greener Primary Care Wales Framework and Award Scheme carbon footprinting action over the three years studied. This gives rise to potential limitations in gaining insight into the experiences of practices completing this action in the Scheme.

- The sample of practices interviewed in the survey was small. Whether the findings of the survey are generalisable is non-conclusive. It does however provide some insight into practice experience in conducting carbon footprinting activity.
- Some practices completed this action in 2022 which is 2 years prior to being surveyed. Participants may therefore have recall bias which could affect their recollection of experiences.

7 Conclusion

Using the LP calculator has enabled the Greener Primary Care Wales Framework and Award Scheme to retrospectively estimate, for the first time, the cumulative CO₂e reduction within participating practices between 2022 and 2024 as 2,761 tonnes CO₂e. This figure encompasses the work of over 500 practices and is the equivalent of driving over 7 million miles or 46,600 one-way trips from Cardiff to London in an average gasoline-powered passenger vehicle.¹⁴

The study further examined whether the LP calculator could also be used independently by participating practices to estimate the CO₂e reduction of taking actions within their own practice. A review of the quality and format of the data required to be inputted concluded that the time and effort at practice level required to estimate the CO₂e reduction in a range of actions would be disproportionate to the benefit gained from having a more detailed measure.

This finding is disappointing but not totally unexpected. The LP calculator uses the bottom-up approach to carbon footprinting where activity is measured and multiplied by the appropriate carbon emissions factor. The advantages of this approach are that it is simple to understand and often produces a more accurate estimate specific to local circumstances. The main disadvantage of this approach is that data sourcing is often time consuming and laborious. The LP calculator used a series of assumptions in its estimations, for example that lighting will use approximately 40% of the electricity in a primary care practice, and that there would be a 60% reduction in electricity used through the introduction of LED lighting. One advantage of the LP calculator is that these assumptions are transparent, and most can be manipulated to reflect local circumstances. Using patient list size, floor space and staffing level characteristics of a 'model' practice within the calculator, LP have enabled an estimation to be made of CO₂e reductions at Scheme level. Currently in Wales there are no centrally monitored sources of these three types of data for all the independent contractors and so the validity of LP's 'model' practice cannot be fully interrogated.

This study also sought to describe the experiences of practices completing the carbon footprint action within the Scheme. Having established that GP practices had access to a bespoke, free online calculator for general practice, the study focussed on assessing the experiences of optometry, community pharmacy and dental practices. Staff from eight non-GP practices across Wales were interviewed about their experiences of using online calculators to estimate their practice's carbon footprint as an action within the Scheme. Practices fell into two groups, those who had completed the task quickly, chosen a simpler calculator, using the findings as a general indication of their footprint, and those who had had to spend time finding their data, and possibly tried more than one calculator to compare results, whilst seeking a more in-depth analysis.

¹⁴ [Greenhouse Gas Equivalencies Calculator | US EPA](#)

One unfulfilled gap is the desire practices have to be able to compare their own footprint with other similar practices. It is pleasing to note that a new bespoke calculator aimed at community dental practices is in development at UK level which may help towards filling this gap. Although all the surveyed practices recommended that other practices try at least one of the calculators available, as a snapshot, there were mixed views about whether doing so would lead to specific decarbonisation actions, given the high-level of analysis. Primary care practices are heterogenous and currently there appears to be no one perfect free carbon calculator available to meet the carbon footprint estimation needs of a range of independent contractor settings.

The study also examined the suitability of a carbon calculator developed by Cardiff and Vale UHB. The calculator added no value to the use of the LP calculator at Scheme or individual practice level when assessing the Scheme actions. However, the ease of use and reliability of this calculator, which used top-down, bottom-up and hybrid approaches for CO₂e reduction estimation suggests that it would be useful decision-making aid and tool to improve carbon literacy amongst primary care staff, for example:

- When identifying the carbon footprint benefit of reducing the number of clinical waste bags per month, the practice would calculate their kilograms of waste and use the calculator to estimate carbon footprint of “high temperature incineration”
- When estimating the reduction in greenhouse gas emissions if staff commuted by public transport as opposed to car, perhaps to review the feasibility of adapting their working schedule to accommodate the local bus timetable.

For more detailed estimations the Cardiff & Vale UHB calculator could help the practice to estimate the benefit of, or to evaluate, practice specific interventions contained within their bespoke green plan. For example:

- Revision of a care pathway and reduction in number of GP appointments (estimated carbon footprint one GP appointment, including travel, is 9.9KgCO₂e)
- Evaluation of a medicine management campaign to reduce inappropriate repeat prescribing (e.g. over a six-month period, the practice reduced their footprint by the equivalent of 139 return car journeys from Newport to Cardiff).

This study’s findings align with the findings of the [Primary Care in Wales, A carbon footprint assessment of estimated emissions for primary care contractors in Wales](#) about the significant challenges of measuring the carbon footprint in primary care. The findings here show evidence to support three of the recommendations of the above report, in particular:

- *Communicate the footprint, alongside basic carbon literacy resources, to primary care service providers to increase their understanding of emissions and awareness of NHS Wales’s ambitions and build momentum for the net zero transition.*
- *Targeting survey work to understand compliance with DEC and to ask for data.* A key feature of obtaining a DEC is that it includes a recommendations report, citing practical

changes which would pay for themselves in 3-5 years and the potential impact on carbon emissions of those changes¹⁵. Having this specific bespoke advice in a practice setting would be a significant step towards the NHS Wales decarbonisation goal.

- *Smart meters are free to install through the energy supplier and provide more accurate site-specific energy consumption data.* This can be recorded centrally and would be an improvement on DEC data for emissions reporting.

¹⁵ For an example recommendations report, see [Appendix 3](#).

Appendix 1

Information to aid practices in completing the carbon footprinting action in the Scheme

1. Further information contained in the online Framework to support practices implementing the carbon footprint action within the Greener Primary Care Wales Framework and Award Scheme [April 2025]

Framework action	Further information
<p>The practice has taken action to identify how sustainable their practice is by measuring their carbon footprint annually.</p>	<p>Measuring your practice's carbon footprint will help you figure out key priority areas for reducing your environmental impact and improving sustainable practices.</p> <p>There are numerous carbon footprint calculators available, some of these are more suitable for primary care than others. The PCD reported on the carbon footprint calculators for use by primary care contractors and recommended calculators include Carbonfootprint, the Carbon Trust Calculator, or the General Practice non-clinical carbon calculator.</p> <p>Individuals can measure their carbon footprint by completing the WWF Footprint Calculator. It takes a few minutes to complete a series of questions and then estimates your footprint and compares it with the UK and world average. It also suggests tips on how to reduce your footprint.</p>

2. The [Greener Primary Care Wales Yearbook 2022](#) provides a case study describing how a practice in Wales achieved this action as part of the Scheme in 2022.
3. The [Carbon Footprint Calculators for use by Primary Care Contractors](#) was published by the PCD, Public Health Wales in 2022. This report recommends the most suitable carbon footprint calculators for use by practices to determine you're their carbon footprint. The report concluded that '*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*'. The report signposts to a small number of calculators most suitable for use in primary care, and recommends the [SEE Non-clinical Carbon Calculator for General Practice](#) for use across primary care settings, despite being designed specifically for general practice.

Appendix 2

QUESTIONNAIRE: The experience of using carbon footprint calculators by non-GP practices

Introduction at start of the telephone interview

Thank you for your time, it should only take 10-20 minutes. Our aim is to capture any learning from practices like yours who have had a go at estimating their carbon footprint. This is for us to identify how we can help optometry/dental practices undertaking the carbon footprinting action in the future. Your answers will be kept confidentially, and if we quote from anything you say, it will be anonymised as "one optometry/dental practice said..."

1. Do you recall which calculator you used to estimate your carbon footprint?
2. Why did you select it? And/or, what were the negatives of others (*list...*)
3. Was SEE/Carbon Trust/Climate Hero (as applicable) carbon footprinting calculator the only one you have tried? YES/NO/DON'T KNOW (*list others ...*)
4. On a scale of 0-10 where 0 is very easy and 10 is very hard, how would you rate using it?
5. Approximately how long did it take you?

<1 hour	1-2 hours	half day	whole day	>whole day
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6. How have you found estimating the footprint useful in planning any practice-based actions?

Very helpful	Somewhat helpful	Unhelpful	Complete waste of time
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 For example...If useful, what actions? (*list...*)
7. What seemed to work well in using a calculator to estimate your footprint for your situation? (*list...*)
8. What didn't seem to work in using a calculator to estimate your footprint for your situation? (*list...*)
9. What, if any, were the issues in how the calculator related to yours being an optometry/ dental practice (as opposed to another independent contractor practice)? (*list...*)
10. Would you use it again? When? Why?
11. Would you recommend the calculator to other optometry/dental practices? YES/NO/DON'T KNOW. *If not, why not?...*
12. Is there anything else you'd like to tell us about your experience in estimating your footprint?

Thank you for taking the time to help us plan our support for optometry/dental practices. If you think of any further feedback after the call, please feel free to email greenerprimarycare@wales.nhs.uk

Appendix 3

Energy Performance Certificates (EPCs) and Display Energy Certificates (DECs)

The three main differences in summary¹⁶

- **EPCs** are required for all domestic and non-domestic buildings that have been newly constructed, have undergone significant renovation, or are being sold or leased, while **DECs** are required for a much smaller selection of buildings; they are only required for non-domestic buildings with a floor area greater than 250m² that are occupied by a public authority or provide a public service (*250m² = half a basketball court*)
- While **EPCs** are based on a modelled energy use, **DECs** are based on the actual annual energy use of a building for the previous year.
- An **EPC** is valid for 10 years so long as no alterations are made to the building. Where the building has a total useful floor area of more than 1,000m², the **DEC** is valid for 12 months. The accompanying advisory report is valid for 7 years. Where the building has a total useful floor area of between 250m² and 1000m², the DEC and advisory report are valid for 10 years.
- Both **EPCs** and **DECs** have accompanying recommendations report, citing changes which would pay for themselves in 3-5 years, and potential impact on carbon emissions of those changes. See below for an example.

Screen shot showing example contents of DEC Recommendation Report

Operational rating and DEC

This building's operational rating is C.

For more information on the building's energy performance, [see the DEC for this building](#).

Recommendations

Changes that may pay for themselves within 3 years

Recommendation	Potential impact on carbon emissions
Boiler plant should be regularly tested and adjusted by experts for optimum operating efficiency.	Medium
Consider adjusting existing, or installing new, automatic external door closers, or consider adopting revolving door solutions.	Medium

Changes that may pay for themselves within 3 to 7 years

Recommendation	Potential impact on carbon emissions
Consider applying reflective coating to windows and/or fit shading devices to reduce unwanted solar gain.	Medium
Consider implementing regular inspections of the building fabric to check on the condition of insulation and sealing measures and removal of accidental ventilation paths.	Low

¹⁶ [Energy performance certificates explained - Energy Saving Trust](#)