# Cummins Civil Engineering Carbon Footprint Calculation 2021

6 C Free

# General Information Table

| | | |
|---|---|---|
| **Company Name** | Cummins Civil Engineering | |
| **Company Address** | Sunnycroft, Stocks Lane, Over Peover, WA16 8TZ | |
| **Reporting Period** | 01/01/2021-31/12/2021 | |
| **Number of full-time employees** | 50 | |
| **Scope Emissions Claim** | This calculation contains 100% of scope 1 and scope 2 emissions, and a subset of scope 3 emissions as outlined within this document. | |
| **Methodology** | This calculation follows the Greenhouse Gas Protocol: Corporate Standard. Scope 1 and 2 were calculated using activity data and scope 3 emissions were calculated using activity data where possible and a spend based method where activity data was not available. More details can be found in C Free's Calculation Methodology: https://c-free.notion.site/The-C-Free-Carbon-Footprint-Calculation-Methodology-f6a299ae0ed843fd801f9b3b079cc994 | |
| **Carbon Footprint** | **Scope 1** | 97.48 Tonnes CO2e |
| | **Scope 2** | 2.88 Tonnes CO2e |
| | **Scope 3** | 470.79 Tonnes CO2e |
| | **Total** | 571.15 Tonnes CO2e |
| | **Uncertainty on Calculation** | 518.81-628.77 Tonnes CO2e |
| | **Total per Employee** | 11.42 Tonnes CO2e |
| | **Total per pound Revenue** | 0.1 kgCO2e/ £ of Revenue |

# Executive Summary

This report presents the carbon footprint calculation for Cummins Civil Engineering, a family run civil engineering & groundworks contractor specialising in deep excavation operating across the UK. The report is structured as follows: it begins by explaining the importance of calculating greenhouse gas (GHG) emissions and outlines how this calculation contributes to a carbon management strategy. The report then provides a breakdown of Cummins Civil Engineering's emissions for the reporting period, including Scope 1 (97.48 tCO2e), Scope 2 (2.88 tCO2e), and Scope 3 (470.79 tCO2e). These emissions figures serve as a foundation for developing a reduction strategy and offsetting unavoidable emissions, ultimately working towards achieving carbon neutrality and net zero in the longer term.

Cummins Civil Engineering operations involve various construction activities, such as general and deep drainage, sheet piling and deep excavation, emergency deep excavation response, and general groundworks. As an engineering and groundworks company, Cummins Civil Engineering plays a significant role in shaping the built environment, which in turn has implications for energy consumption, resource utilisation, and GHG emissions. Acknowledging the potential environmental impacts associated with their industry, Cummins Civil Engineering recognises the importance of assessing and addressing their own emissions to contribute to a more sustainable construction sector.

The industry has a significant environmental footprint, primarily due to energy consumption, material extraction, and waste generation. As one of the largest industries globally, it has a considerable impact on natural resources, land use, and carbon emissions. By measuring and managing their GHG emissions, Cummins Civil Engineering demonstrates their commitment to environmental responsibility and sustainability in line with industry best practices.

"kgCO2e" or "tCO2e" stands for kilogram or metric tonne of carbon dioxide equivalent, which is a metric used to measure GHG emissions. It represents the amount of carbon dioxide that would have the same global warming potential as the combined emissions of different GHGs (such as carbon dioxide, methane, and nitrous oxide), over a specified time period.

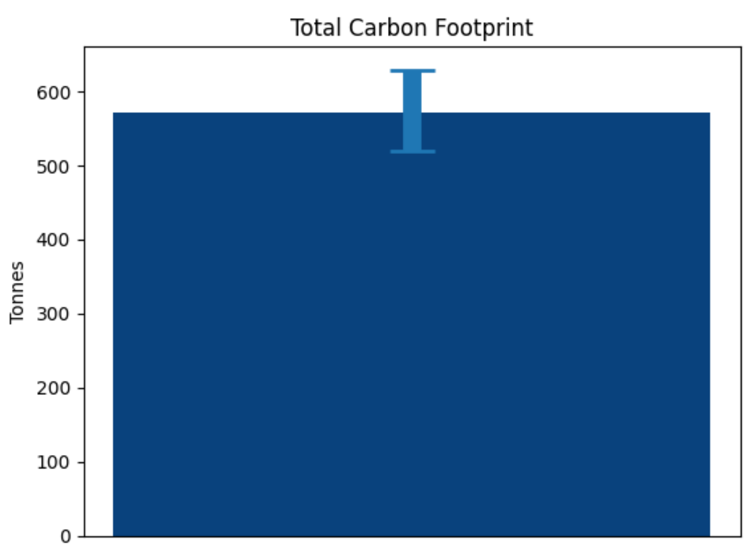
GHG reporting encompasses three scopes: Scope 1, Scope 2, and Scope 3 emissions. Scope 1 emissions refer to direct emissions from sources that are owned or controlled by the reporting company, such as on-site fuel combustion in construction equipment and vehicle fleets. Scope 2 emissions consist of indirect emissions associated with the consumption of purchased electricity and heat. Scope 3 emissions include the indirect emissions that occur due to the company's activities but are not owned or controlled by them, such as emissions from the extraction, production, and transportation of purchased materials and waste generated throughout the construction process.

In conclusion, this report highlights the importance of calculating and addressing GHG emissions for Cummins Civil Engineering. The findings serve as a foundation for developing a reduction strategy and offsetting unavoidable emissions, demonstrating Cummins Civil Engineering's commitment to environmental sustainability. By measuring and managing their carbon footprint, Cummins Civil Engineering aims to contribute to a more sustainable future while also enhancing their reputation and stakeholder relationships.

# Contents

# Breakdown of Carbon Footprint

| *Activity* | *Unit* | *TCO2e* |
|---|---|---|
| **Scope 1 - Direct Emissions** | **Total** | **97.48** |
| Fuel | | 97.48 |
| **Scope 2 - Emissions from Electricity Purchased** | **Total** | **2.88** |
| Electricity | | 2.88 |
| **Scope 3 - Indirect Emissions** | **Total** | **470.79** |
| Employee Commuting | | 32.54 |
| Expenses | | 192.48 |
| Travel | | 0.17 |
| Hotel | | 12.95 |
| Logistics | | 35.02 |
| Materials | | 190.84 |
| Waste | | 0.48 |
| Transmission And Distribution | | 0.28 |
| Water | | 0.93 |
| Work From Home | | 4.41 |
| Well-To-Tank | | 0.69 |
| **Total** | **Tonnes** | **571.15** |



# Introduction

To begin a carbon management strategy, businesses must first calculate their greenhouse gas (GHG) emissions. The GHG Protocol is the most widely used international accounting tool for this purpose, providing a standardised way of quantifying and reporting emissions. Once emissions are calculated, businesses can develop reduction targets and offset unavoidable emissions. This report presents the results of Cummins Civil Engineering's carbon footprint calculation, using the GHG Protocol methodology for the reporting period 01/01/2021-31/12/2021.

The report not only highlights the current environmental state of the business but also identifies potential areas for improvement. By providing a clear breakdown of GHG emissions, stakeholders can easily identify opportunities to reduce their carbon footprint. This report is the first step in Cummins Civil Engineering's sustainability journey, providing the foundation for a comprehensive carbon management strategy that will reduce costs and improve environmental performance.

## Organisational Boundaries

Setting boundaries is a crucial step in calculating a company's carbon footprint. The boundaries define the extent to which emissions will be measured and allow for consistency and comparability across different businesses. In this report, 100% of Cummins Civil Engineering's Scope 1, Scope 2, and a set of Scope 3 emissions outlined herein are included in the carbon footprint calculation carried out by C Free. However, it should be noted that this is not a complete Lifecycle Assessment of emissions. Nevertheless, this report provides valuable information on the carbon footprint of Cummins Civil Engineering's business operations and serves as a starting point for assessing and managing their environmental impact.

# Scope 1

In calculating a company's carbon footprint, it's important to understand the three different scopes of emissions. Scope 1 emissions are those that arise from sources owned or controlled by the company, such as their own fuel combustion and fugitive emissions.

## Fuel

The burning of fuel, both static and in transit, creates greenhouse gasses that must be accounted for. This is a result of activity directly under the control of Cummins Civil Engineering and therefore is included in scope 1.

### Methodology

The litres of fuel consumed was supplied by Cummins Civil Engineering. This number, multiplied by the UK governments conversion factor for fuel (Government, 2021) gives the emissions.

### *Formula*

$$V_{\text{fuel}}[\text{L}] * e_{\text{fuel}}\left[\frac{kgCO2_e}{\text{L}}\right] = E_{\text{fuel}}[kgCO2_e]$$

$$D_{\text{travel}}[\text{km}] * e_{\text{travel}}\left[\frac{kgCO2_e}{\text{km}}\right] = E_{\text{fuel}}[kgCO2_e]$$

***Where $V_{\text{fuel}}$ is the volume of fuel consumed, $e_{\text{fuel}}$ is the relevant emissions factor for the given fuel type, $D_{\text{travel}}$ is the distance travelled, $e_{\text{travel}}$ is the relevant emissions factor for travelling in the given vehicle type, and $E_{\text{fuel}}$ is the resultant emissions.***

### Result

*Red Diesel (Litre):*
26.88 Tonnes CO2e

*Petrol (Unleaded 95) (Litre):*
1.50 Tonnes CO2e

*Diesel (Litre):*
55.62 Tonnes CO2e

*Red Diesel (£):*
0.14 Tonnes CO2e

*Adblue (Litre):*
0.01 Tonnes CO2e

*Petrol (Unleaded 95) (£):*
0.72 Tonnes CO2e

*Lpg (Litre):*
6.53 Tonnes CO2e

*Diesel (£):*
6.07 Tonnes CO2e

*2Stroke Engine Oil (£):*
0.01 Tonnes CO2e

## Scope 2

Scope 2 in carbon accounting refers to the indirect greenhouse gas emissions associated with the consumption of purchased electricity, heat, or steam by an organisation. It involves assessing the carbon footprint resulting from the use of externally generated energy sources. Scope 2 emissions are typically categorised as an indirect emission source because the organisation does not directly control the generation of electricity or heat.

## Electricity

Emissions associated with consumption of electricity are often generated offsite by a power station. Once produced, the electricity is then sold to Cummins Civil Engineering and distributed to their facilities. It should be noted that this is a location-based calculation and does not include the purchase of renewable energy certificates as such a methodology was not relevant in this case.

## Methodology

Cummins Civil Engineering supplied the kWh used over the reporting period at their offices from their energy bills. This can be used in conjunction with the government conversion factors (Government, 2021) to give the carbon footprint associated with electricity purchased.

### *Formula*

$$x_{elec}[kWh] * e_{elec}\left[\frac{kgCO2_e}{kWh}\right] = E_{elec}[kgCO2_e]$$

***Where $x_{elec}$ is the kWh consumption of electricity over the given period, $e_{elec}$ is the relevant emissions factor, and $E_{elec}$ is the resultant emissions.***

### Result

*Head Office - Sunnycroft:*

2.54 Tonnes CO2e

*Yard - Saltersley Hall Farm:*

0.34 Tonnes CO2e

## Scope 3

For Cummins Civil Engineering, scope 3 emissions were the primary contributor to their overall carbon footprint. Scope 3 includes all indirect emissions not included in scope 1 and scope 2, which resulted from the activity of the company but not from sources owned or controlled by the company. This includes the production of raw materials, transportation of materials, or use of third-party services such as online meeting platforms. While obtaining data on scope 3 emissions can be challenging, the report used suitable proxies to estimate these emissions. The GHG protocol recommends focusing on scope 3 areas that have the most significant GHGs, the best opportunities for reducing emissions, and are most relevant to Cummins Civil Engineering's business goals. By identifying these specific areas, Cummins Civil Engineering can develop targeted strategies to reduce their carbon footprint and demonstrate their commitment to sustainability.

The following scope 3 emissions sources were included in the calculation:

- Digital
- Employee Commuting
- Expenses
- Travel
- Hotel
- Logistics
- Materials
- Waste
- Transmission And Distribution
- Water
- Work From Home
- Well-To-Tank

Some emissions sources were excluded from this report due to unreliable or inadequate information, a lack of research, or irrelevance to Cummins Civil Engineering's operations. While it is important to include as many emissions sources as possible in the calculation, some sources may fall outside the scope of the report due to data limitations. However, the report made every effort to include all relevant emissions sources required for a Carbon Reduction Plan.

Sources that were not included are as follows:

- Pensions and Investments
- Franchises
- Downstream Leased Assets
- Processing of Sold Products
- Use of Sold Products
- End of Life Treatment of Sold Products

## Employee Commuting

Employee commuting is an important component of a GHG emissions report as it contributes to a carbon footprint. Evaluating and addressing this allows Cummins Civil Engineering to develop effective strategies for reducing our overall environmental impact.

## Methodology

The emissions were estimated by finding the distance travelled, multiplying the total commuting distance by the relevant conversion factor for a given mode of transport, and then weight this by the frequency multiplier supplied (Government, 2021) and the number of days worked per month. Most employees answered the survey, so the previous calculation was used to find an average per person, then scaled by the number of employees to reflect the total workforce of the company.

## *Formula*

$$\sum d_{dist}\,[km] * f * e_{mode}\left[\frac{kgCO2_e}{km}\right] = E_{EC}[kgCO2_e]$$

***Where $d_{dist}$ is the distance of any given journey, $e_{mode}$ is the relevant emissions factor for the given journey leg, $f$ is the number of commutes over the period, and $E_{EC}$ is the resultant emissions. We then sum over all employees.***

### Result

*Driving:*

32.54 Tonnes CO2e

# Expenses

Organisations have a responsibility to consider the GHG emissions associated with the goods and services they purchase, as these emissions contribute to the organisation's overall carbon footprint.

## Methodology

It can be argued that the carbon footprint associated with the production of various commodities should be spread across their lifetime. However, for the purpose of this calculation, we treat them as a point source at the time of purchase as, in practice, the lifetime of such goods is highly variable. Furthermore, consumption is typically quite regular (on an annual basis) and therefore, treating emissions as a point source will not skew the resultant footprint.

### *Formula*

$$\mathrm{x[currency]} * e_{\mathrm{exp}}\left[\frac{kgCO2_e}{\mathrm{currency}}\right] = E_{\mathrm{exp}}[kgCO2_e]$$

> ***Where $\mathrm{x}$ is the amount spent on a type of expenses in the relevant currency, $\mathrm{e_{exp}}$ is th relevant emissions factor for that expense i the matching currency, and $\mathrm{E_{exp}}$ is the resul emissions. We then sum for every type of expense.***

## Result

*Consulting Advisory Services:*
2.68 Tonnes CO2e
*Entertainment And Media:*
3.24 Tonnes CO2e

*Food:*
24.13 Tonnes CO2e
*Maintenance Repair Services:*
8.96 Tonnes CO2e
*Building Materials Supplies:*
131.05 Tonnes CO2e
*Hand Held Tools:*
0.24 Tonnes CO2e
*Cleaning Janitorial Supplies:*
0.33 Tonnes CO2e
*Equipment Repairs:*
3.91 Tonnes CO2e
*Apparel And Clothing:*
4.26 Tonnes CO2e
*Furniture And Decor:*
0.15 Tonnes CO2e
*Software And Digital Products:*
1.27 Tonnes CO2e
*Staff Training:*
0.34 Tonnes CO2e
*Insurance Products And Services:*
0.11 Tonnes CO2e
*It Equipment:*
8.51 Tonnes CO2e
*Drink:*
0.09 Tonnes CO2e
*Stationery And Paper Products:*
0.21 Tonnes CO2e
*Financial Services Products:*
1.41 Tonnes CO2e
*Equipment Hire:*
0.24 Tonnes CO2e
*Courier Services:*
0.41 Tonnes CO2e
*Restaurant:*
0.24 Tonnes CO2e
*Health And Wellness Products:*
0.70 Tonnes CO2e

# Travel

Travel to and from client offices is an essential part of many businesses, enabling companies to interact with clients and provide services effectively. However, such travel generates greenhouse gas (GHG) emissions, contributing to the overall carbon footprint of the business.

## Methodology

Where possible, distances, frequency, and mode of transport was collected. This was used to calculate the travel based emissions. Where activity data was not available, the spend based method was used to estimate the resultant emissions.

## *Formula*

$$\sum \mathrm{d}\,[\mathrm{km}] * e_{\mathrm{mode}} \left[\frac{kgCO2_e}{\mathrm{km}}\right] = E_{\mathrm{travel}}[kgCO2_e]$$

> ***Where $\mathrm{d}$ is the distance travelled for a given journey, $\mathrm{e}_{\mathrm{mode}}$ is the relevant emissions factor for the provided mode of travel, and $\mathrm{E}_{\mathrm{travel}}$ is the resultant emissions. This is then summed for every journey for the various modes. (In some cases the spend based method may be used; see expenses section for relevant equation).***

### Result

*Van:*
0.17 Tonnes CO2e

# Hotel

Employees may occasionally need to stay in secondary locations to visit other sites or clients. Hotels used for this travel use electricity, heating and single use items which are all responsible for emissions.

## Methodology

Cummins Civil Engineering provided either the nights spent and rating of the hotel or the total cost. This data was used with either the conversion factors for that rated hotel or for hotel stays per unit price to calculate the emissions.

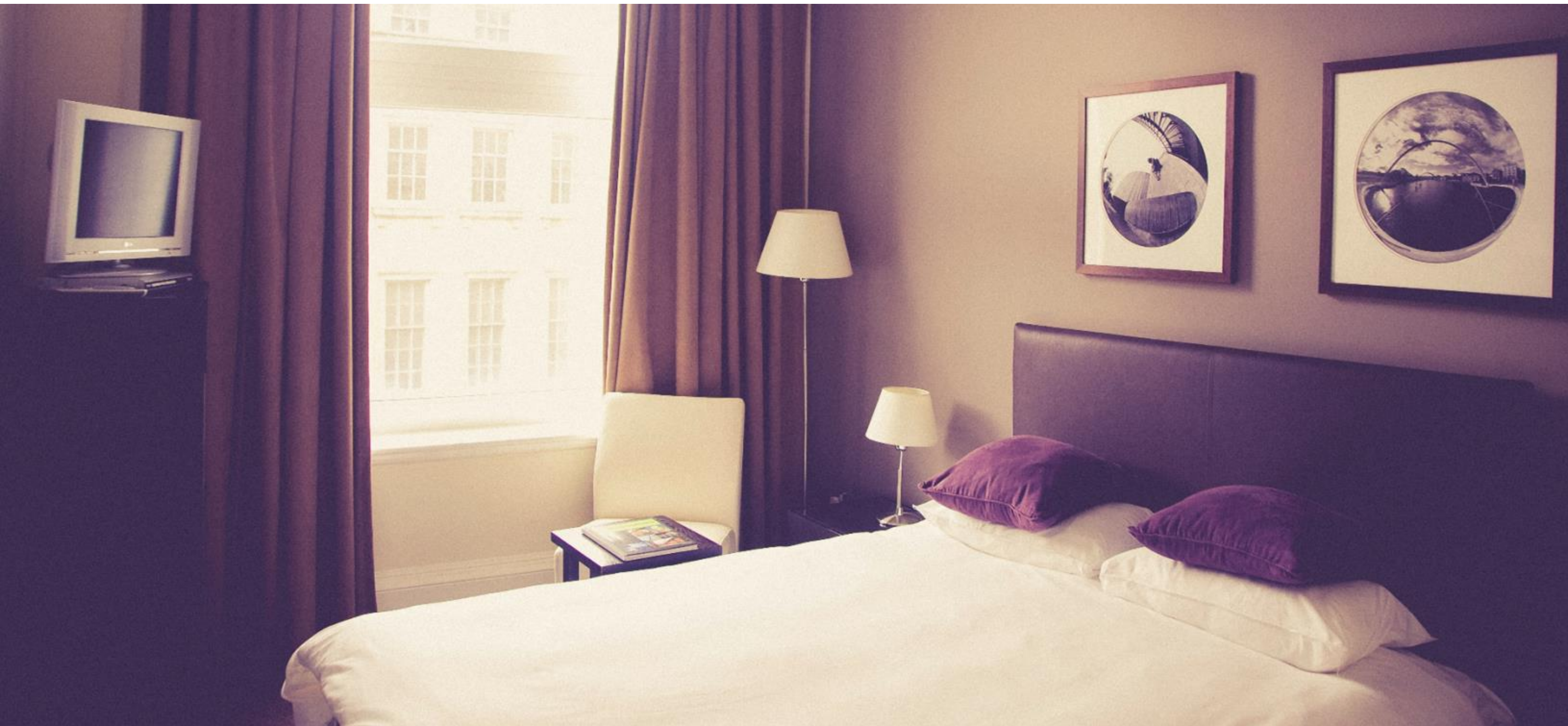
### *Formula*

$$n[\text{night}] * e_{\text{rating}} \left[\frac{kgCO2_e}{\text{night}}\right] = E_{\text{hotel}}[kgCO2_e]$$

***Where*** $n$ ***is the number of nights spent in a hotel of a particular rating,*** $e_{\text{rating}}$ ***is the relevant emissions factor for the given rating, and*** $E_{\text{hotel}}$ ***is the resultant emissions.***

### Result

*3 Star Hotel:*
6.77 Tonnes CO2e
*4 Star Hotel:*
5.88 Tonnes CO2e
*5 Star Hotel:*
0.30 Tonnes CO2e



# Logistics

Logistical deliveries for business operations, classified as "upstream transportation and distribution," can have a significant environmental impact. These deliveries require energy and generate greenhouse gas (GHG) emissions, contributing to the overall carbon footprint of the business.

## Methodology

Cummins Civil Engineering provided the origins, destination, mode of transport and weights of all their logistics. With this data we calculated the distance travelled for each journey and could therefore calculated the total emissions per mode of transport.

## Formula

$$\mathrm{d[km]} * \mathrm{w[kg]} * e_{\mathrm{mode}} \left[\frac{kgCO2_e}{\mathrm{km \cdot kg}}\right] = E_{\mathrm{logistics}}[kgCO2_e]$$

***Where*** $\mathrm{d}$ ***is the distance travelled for a given journey,*** $\mathrm{w}$ ***is the weight transported on that journey,*** $\mathrm{e_{mode}}$ ***is the relevant emissions factor for the provided mode of transport, and*** $\mathrm{E_{logistics}}$ ***is the resultant emissions.***

### Result

*Vacuum Excavator:*
2.31 Tonnes CO2e
*HGV:*
31.76 Tonnes CO2e
*Crane:*
0.03 Tonnes CO2e
*Vans:*
0.46 Tonnes CO2e
*Grab Wagon:*
0.46 Tonnes CO2e

## Materials

When purchasing goods, the emissions associated with them are typically hidden from us. However, there is often a carbon footprint resultant from the extraction and construction of these goods and therefore, these must be considered in scope 3.

## Methodology

To calculate the carbon footprint of purchased materials, the weight of each material purchased was multiplied by its specific carbon emission factor, which represents the emissions generated per unit weight of the material. This factor was sourced from industry databases or relevant environmental agencies. Summing the results for all materials provided the total carbon footprint.

### *Formula*

$$W[\text{kg}] * e_{\text{material}} \left[\frac{kgCO2_e}{\text{kg}}\right] = E_{\text{material}}[kgCO2_e]$$

$$x[\text{kg}] * n_{\text{unit}} * e_{\text{material}} \left[\frac{kgCO2_e}{\text{kg}}\right] = E_{\text{material}}[kgCO2_e]$$

***Where** $W$ **is the weight of a given material,** $x$ **is the weight per unit,** $n$ **is the number of units,** $e_{\text{material}}$ **is the relevant emissions factor, and** $E_{\text{material}}$ **is the resultant emissions.***

### Result

*Soil:*
1.59 Tonnes CO2e
*Steel:*
3.10 Tonnes CO2e
*Concrete Ready Mix:*
1.08 Tonnes CO2e
*Stone:*
11.14 Tonnes CO2e
*Sand:*
0.47 Tonnes CO2e
*Cement:*
173.46 Tonnes CO2e

# Waste

Different types of waste have varying carbon footprints, which must be taken into account for an accurate assessment. Recycling, though beneficial for the environment, requires energy for sorting and repurposing, which can contribute to GHG emissions. Similarly, organic waste that ends up in landfills produces carbon dioxide and methane, both of which are potent GHGs.

## Methodology

The amount of waste and method of disposal was provided by Cummins Civil Engineering. This in conjunction with the government conversion factors was used to calculate a figure for kgCO2e (Government, 2021).

### *Formula*

$$\sum_i \mathrm{x}_{w,i}\,[\mathrm{kg}] * e_{w,i}\left[\frac{kgCO2_e}{\mathrm{kg}}\right] = E_{\mathrm{waste}}[kgCO2_e]$$

***Where $\mathrm{x_w}$ is the weight of a particular type of waste, $\mathrm{e_w}$ is the relevant emissions factor for that type of waste, and $\mathrm{E_{waste}}$ is the resultant emissions. This is them summed for all types of waste disposal.***

### Result

*Water Waste:*

0.45 Tonnes CO2e

*Recycling:*

0.01 Tonnes CO2e

*Construction:*

0.02 Tonnes CO2e

# Transmission And Distribution

Transmission and Distribution losses must be considered when calculating the GHG emissions associated with electricity consumption. During the transfer of electricity from the power plant to the end-user, a small percentage of energy is lost in the form of heat. These losses are known as Transmission and Distribution losses, and they contribute to the overall carbon footprint of an organisation.

## Methodology

Multiplying the consumption of electricity consumed with the emissions factor for transmission and distribution gives the emissions associated with Transmission and Distribution.

## *Formula*

$$x_{elec}[kWh] * e_{T\&D}\left[\frac{kgCO2_e}{kWh}\right] = E_{T\&D}[kgCO2_e]$$

> ***Where $x_{elec}$ is the consumption of electricity in kWh, $e_{T\&D}$ is the relevant emissions factor for transmissions and distribution, and $E_{T\&D}$ is the resultant emissions.***

### Result

*Head Office - Sunnycroft:*
0.25 Tonnes CO2e
*Yard - Saltersley Hall Farm:*
0.03 Tonnes CO2e

## Water

The energy required to pump, treat and distribute water to homes and businesses can generate significant GHG emissions, which should be accounted for in a company's overall carbon footprint. Incorporating water usage in sustainability reporting and carbon management planning is crucial for companies committed to reducing their overall environmental impact.

### Methodology

To calculate water-related carbon emissions, we took the litres of water used at Cummins Civil Engineering's premises and applied corresponding emissions factors to estimate the total carbon footprint associated with water usage.

### *Formula*

$$\mathrm{x}[\mathrm{L}] * e_{\mathrm{water}} \left[\frac{kgCO2_e}{\mathrm{L}}\right] = E_{\mathrm{water}}[kgCO2_e]$$

***Where $\mathrm{x}$ is the amount of water used, $\mathrm{e_{water}}$ is the relevant emissions factor, and $\mathrm{E_{water}}$ is the resultant emissions.***

### Result

*Head Office - Sunnycroft:*

0.02 Tonnes CO2e

*Yard - Saltersley Hall Farm:*

0.91 Tonnes CO2e

## Work From Home

Due to the COVID-19 pandemic, many employees worked from home during the reporting period. This resulted in a shift of emissions associated with office life, such as electricity consumption and heating, to the homes of employees. It is important to include these additional emissions in the calculation of Cummins Civil Engineering's carbon footprint, as they are a direct result of their operations.

## Methodology

The Employees of Cummins Civil Engineering provided the days worked at home, this information and factors gathered from a paper regarding working from homes effect on utility usage (ecoact, 2020) was used to calculate the added gas and electricity used. Then with conversion factors kWh per pound spent on utilities and kWh emissions factors from (Government, 2021) we calculated the carbon footprint.

### *Formula*

$$\mathrm{h}_{\mathrm{FTE}}[\mathrm{hour}] * \mathrm{e}_{\mathrm{appliance}}\left[\frac{kgCO2_e}{\mathrm{hour}}\right] = E_{\mathrm{appliance}}[kgCO2_e]$$

$$\mathrm{h}_{\mathrm{FTE}}[\mathrm{hour}] * \mathrm{e}_{\mathrm{heating}}\left[\frac{kgCO2_e}{\mathrm{hour}}\right] = E_{\mathrm{heating}}[kgCO2_e]$$

***Where** $\mathrm{h}_{\mathrm{FTE}}$ **is the number of full-time equivalent hours worked,** $\mathrm{e}$ **is the relevant emissions factor for either appliances or heating, and** $\mathrm{E}$ **is the resultant emissions.***

### Result

*Heating:*

4.00 Tonnes CO2e

*Appliances:*

0.41 Tonnes CO2e

## Well-To-Tank

The carbon footprint associated with energy use extends beyond the combustion of fossil fuels to generate electricity or heat. The extraction, transportation and production of materials required to generate energy contribute to the overall carbon footprint. It is essential to consider the well-to-tank (WTT) emissions factors associated with the various energy generation facilities used in electricity grid mix. Additionally, in the case of gas, the carbon footprint must include the emissions during mining, transportation and production.

## Methodology

Data for fuel-based activities was collected for scope 1 and 2 calculations. The emissions factors associated with these were found and combined to calculate the carbon footprint.

### *Formula*

$$\mathrm{x_{elec}}[\mathrm{kWh}] * \mathrm{e_{WTT\ elec}}\left[\frac{kgCO2_e}{\mathrm{kWh}}\right] = E_{\mathrm{WTT\ elec}}[kgCO2_e]$$

$$\mathrm{x_{gas}}[\mathrm{kWh}] * \mathrm{e_{WTT\ gas}}\left[\frac{kgCO2_e}{\mathrm{kWh}}\right] = E_{\mathrm{WTT\ gas}}[kgCO2_e]$$

***Where $\mathrm{x_{elec}}$ is the amount of electricity consumed, $\mathrm{x_{gas}}$ is the amount of gas consumed, $\mathrm{e_{WTT}}$ is the relevant emissions factor for either gas or elec, and $\mathrm{E_{WTT}}$ is the resultant emissions.***

### Result

*Head Office - Sunnycroft Electricity:*
0.61 Tonnes CO2e
*Yard - Saltersley Hall Farm Electricity:*
0.08 Tonnes CO2e

# Conclusion

In conclusion, we find that Cummins Civil Engineering have emitted 571.15 tonnes over the reporting period of 01/01/2021-31/12/2021. This is approximately 11.42 tonnes per full time equivalent employee.

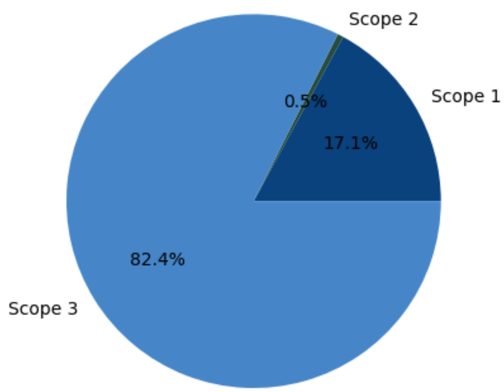



Figure 1: All emissions by scope

Figure 1 displays the emissions breakdown by scope, with the majority of emissions stemming from scope 3 sources. This chart highlights the significance of indirect emissions throughout Cummins Civil Engineering's value chain, such as business travel and supply chain activities. Understanding the dominance of scope 3 emissions emphasises the importance of implementing sustainable practices in these areas to effectively reduce the company's overall environmental impact. The data provided in this plot provides valuable insights to guide strategic decision-making and prioritise initiatives targeting scope 3 emissions reduction.

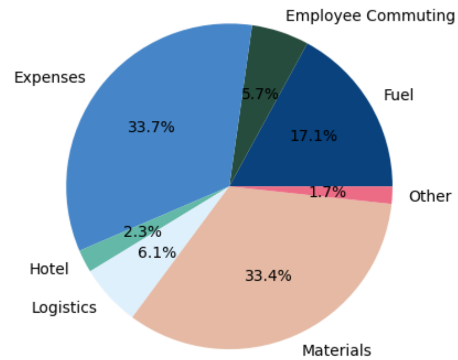



Figure 2: All emissions contributing 2% or more

Figure 2 presents a breakdown of emissions contributions that are 2% or more of the total footprint. The plot reveals that expenses account for slightly less than half of the emissions, indicating the influence of operational activities on the company's environmental impact. Materials contribute to just under a third of the emissions, highlighting the importance of sustainable procurement practices. Additionally, the presence of fuel as a significant emission source suggests the relevance of energy management and exploring more sustainable alternatives.

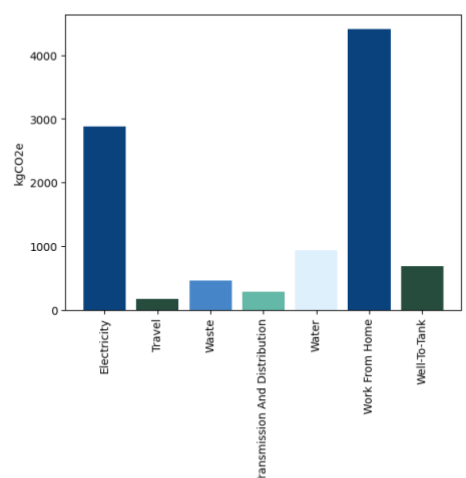



Figure 3: All emissions contributing less than 2%

Figure 3 illustrates the emissions that individually contribute less than 2% to the total footprint, collectively labelled as 'Other' in Figure 2. This plot allows for a closer examination of the smaller contributors to the company's emissions. While individually these sources may have a lesser impact, they should not be overlooked. Significant emissions from these sources can compound and become substantial in the overall carbon footprint. Therefore, it is essential to evaluate and address each of these smaller contributors to achieve comprehensive emissions reduction and ensure a more sustainable environmental performance.

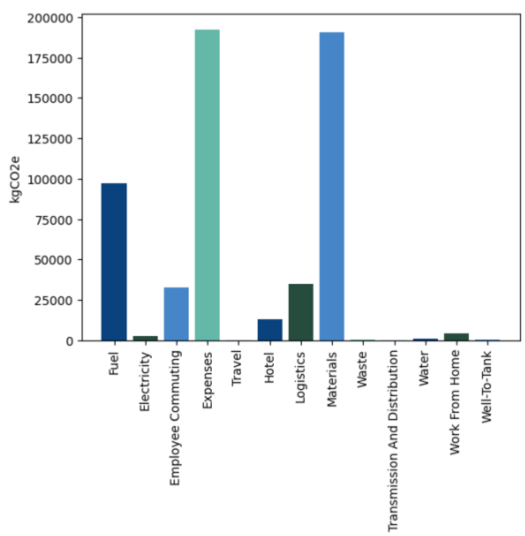



Figure 4: All emissions by category

Figure 4 provides a breakdown of emissions by category, revealing that expenses contribute the highest emissions, closely followed by materials. Fuel emissions are notable, albeit about half the amount contributed by materials. This plot highlights the varying magnitude of emissions from different categories, emphasising the importance of addressing emissions from both operational activities and supply chain management. By focusing on reducing emissions from expenses, materials, and fuel, Cummins Civil Engineering can effectively prioritise their efforts and target areas that will have the most significant impact on their overall carbon footprint.

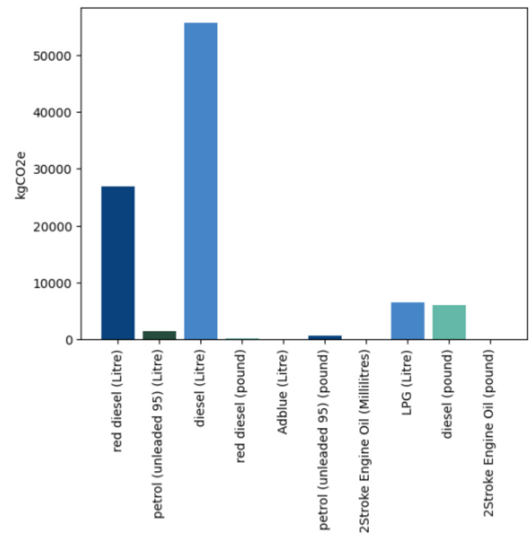



Figure 5: Fuel emissions by fuel type and methodology

Figure 5 displays the emissions breakdown from different fuel types and related items, highlighting that diesel (vehicle fuel) has the highest emissions, followed by red diesel (site fuel). This plot sheds light on the significant contribution of these specific fuel types to Cummins Civil Engineering's overall carbon footprint.

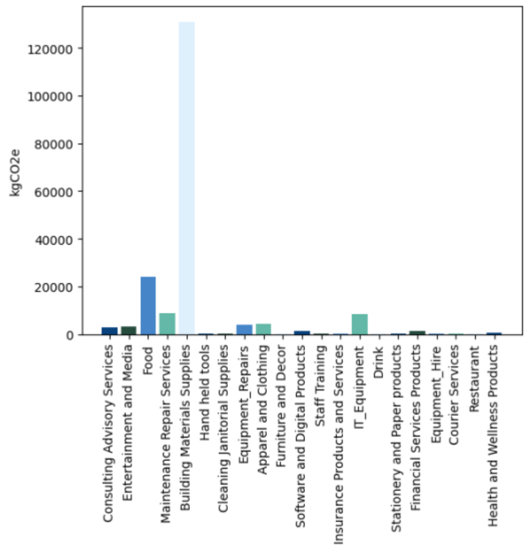



Figure 6: Expenses emissions by source

Figure 6 highlights the emissions attributed to expenses, with building materials and supplies showing the highest contribution. Given that Cummins Civil Engineering specialises in the engineering industry and their central business involves purchasing these materials, this finding is reasonable. The plot also emphasises the significance of fuel emissions, indicating that it plays a vital role in Cummins Civil Engineering's operations.

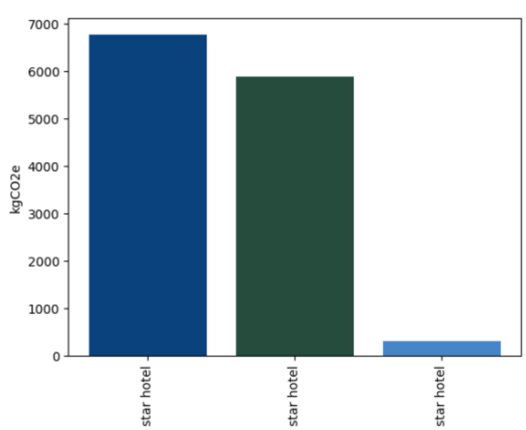



Figure 7: Hotel emissions by hotel rating

Figure 7 illustrates the emissions related to hotel stays categorised by hotel rating. The plot reveals that 3-star hotels have the highest emissions, which may seem counterintuitive considering that these hotels typically have the lowest carbon footprint. However, this rating is also the most common, which could explain the higher overall emissions. It is crucial to consider not only the carbon footprint per hotel stay but also the frequency of stays at different hotel ratings.

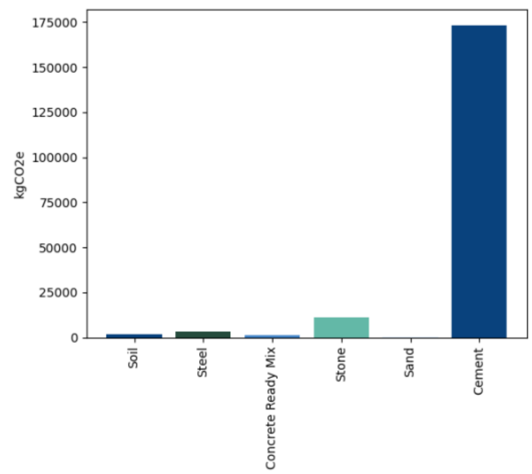



Figure 8: Material emissions

Figure 8 presents the emissions breakdown by material, revealing that cement has the highest emissions. This aligns with the well-known fact that cement production is associated with significant greenhouse gas emissions. As a notoriously high-emitting material, addressing emissions related to cement is crucial for Cummins Civil Engineering to effectively reduce their carbon footprint. Exploring alternative construction materials or adopting more sustainable production practices can be potential strategies to minimise the environmental impact associated with cement use.

# Reduction Strategy

## 1. Equipment & Machinery

- Efficient Machinery: Ensure all machinery is regularly serviced and maintained for optimal efficiency. Use equipment that meets the latest emission standards.
- Electric Equipment: Invest in electric or hybrid construction equipment where viable. These can range from mini excavators to heavy machinery depending on the availability and feasibility.
- Idle Reduction: Train operators to minimise idling time of machinery, implementing auto shut-off systems if possible.
- Optimised Use: Use machinery scheduling to ensure that the least number of machines are used at any given time, thereby reducing emissions.

## 2. Construction Methods

- Alternative Materials: Explore the use of low-carbon or recycled materials in construction, like recycled aggregates or alternative cements.
- Pre-fabrication: Where possible, use pre-fabricated components to reduce on-site energy consumption and waste.
- Deep Excavation Techniques: Consider alternative, less carbon-intensive techniques for deep excavation and sheet piling, including techniques that require less machinery or shorter operation times.

## 3. Transport & Logistics

- Local Sourcing: Source materials locally to reduce transportation emissions.
- Fuel-efficient Vehicles: Ensure all transportation vehicles, from trucks to vans, are fuel-efficient or consider transitioning to electric models.
- Consolidated Deliveries: Plan deliveries to ensure that materials for multiple projects are transported together when possible, reducing the number of trips.

## 4. On-site Practices

- Renewable Energy: Use renewable energy sources, like solar panels, to power on-site operations, including lighting and temporary buildings.
- Waste Management: Implement robust waste sorting and recycling protocols on site, aiming for a circular economy approach where materials are reused or recycled.
- Water Management: Use sustainable water management practices, including rainwater harvesting and greywater recycling.

## 5. Employee Training & Engagement

- Sustainability Workshops: Offer regular training sessions for employees about sustainable construction practices and the importance of carbon reduction.
- Green Champions: Designate or hire environmental or sustainability officers to oversee and implement green initiatives.
- Feedback Mechanisms: Set up a feedback system where employees can provide insights and suggestions for more sustainable practices.

## 6. Emergency Response Protocol

- Rapid Deployment: For emergency deep excavation responses, ensure a rapid deployment strategy that minimises transportation and machinery use.
- Preparedness: Regular drills and simulations can ensure the efficiency of emergency response, reducing the carbon footprint by cutting down on unnecessary procedures or delays.

## 7. Continuous Monitoring & Improvement

- Carbon Auditing: Regularly assess the company's carbon footprint, identifying areas for improvement.
- Technology Integration: Stay updated with the latest sustainable construction technologies and methods, integrating them into practices when viable.

## Employee Recommendations

- *"Electric Vehicles in fleet Heat pump for Heating Solar panels for power in office"*
- *"change work vans to electric. reducing pointless trips/ sharing vehicles. "*
- *"Car Share & more working from home"*
- *"Van share for employees on site"*

# Sources

| Factor | Unit | Source | Date | Comment |
|---|---|---|---|---|
| **Vans Km Kg** | km.kg | UK Government | 2021 | Average emissions to travel 1 km in a van of unknown fuel |
| **Hgv Km Tonnes(Metric)** | km.tonnes(metric) | UK Government | 2022 | Average emissions per km travelled by an HGV per tonne |
| **Hgv Km** | km | UK Government | 2022 | Average emissions per km travelled in an average laden HGV |
| **Vans Miles Kg** | miles.kg | UK Government | 2022 | Emissions per mile travelled by a van carrying 1 kg |
| **Hgv Miles Tonnes(Metric)** | miles.tonnes(metric) | UK Government | 2022 | Emissions per mile travelled in a hgv per tonne it carried |
| **Cloud Storage Gb** | Gb | Cloud Carbon Footprint | 2021 | Average emissions to store 1 Gb of data a year |
| **Electricity Kwh** | kWh | UK Government | 2022 | Average emissions per kwh of electricity used |
| **Driving** | km | UK Government | 2022 | Average emissions per km driving an averag ecar of unknonw fuel |
| **Consulting Advisory Services Pound** | pound | U.S EPA Office of Research and Development | 2020 | Average emissions per pound spent on consultancy fees |
| **Red Diesel Litre** | Litre | UK Government | 2022 | Average emissions per litre of red diesel (or gas oil) produced |
| **2Stroke Engine Oil Millilitres** | Millilitres | UK Government | 2021 | average emissions per mililitre of engine oil produced |
| **Medium Hotel Night** | night | GreenView | 2021 | Average emissions for a night stay at a 3 star hotel |
| **Soil Tonnes(Metric)** | tonnes(metric) | UK Government | 2022 | Average emissions per tonne of soil used |
| **Concrete Ready Mix M^3** | m^3 | ecoinvent | 2019 | Average emissions for a cubic meter of concrete |
| **Sand Kg** | kg | GEMIS | 2021 | Average emissions per kg of sand produced |
| **Recycling Number Of Binbags** | number of binbags | UK Government | 2021 | Average emissions to recycle a 5kg binbag of recyclable waste |
| **Wfh:Heating Hour** | hour | UK Government | 2022 | Average emissions per hour spent working from home due to heating |

# Glossary of Terms

| | |
|---|---|
| **Accessories** | For the purposes of report 'Accessories' refers to purchasing of office equipment excluding otherwise stated like computers, furniture, etc. |
| **Base year** | A year of accounting GHG emissions against which of organisation emissions can be tracked. |
| **Carbon sequestration** | The uptake of Carbon Dioxide. In context, the removal of greenhouse gases from the atmosphere. |
| **CO2e** | Carbon Dioxide and Equivalent Greenhouse gases. |
| **Conversion factor** | A factor also known as an emissions factors which allows GHG emissions to be estimated from a unit of available activity data (e.g. tonnes of fuel consumed, tonnes of product produced) and GHG emissions. |
| **Direct GHG emissions** | Emissions that are from sources controlled or owned by the organisation. |
| **Double counting** | Accounting for emissions or reductions more than once. This can be done either through two separate reporting companies accounting for the same emissions/reductions, or one company including emissions/reductions related to one activity more than once. |
| **Emission factor** | A factor allowing GHG emissions to be estimated from a unit of available activity data (e.g. tonnes of fuel consumed, tonnes of product produced) and GHG emissions. |
| **Emissions** | The release of Greenhouse Gases into the atmosphere. |

| | |
|---|---|
| **GHG protocol** | The Greenhouse Gas protocol is a comprehensive, global, standardized framework for measuring and managing GHGs from private and public sector operations, value chains, products, cities, and policies. |
| **Greenhouse gasses (GHGs)** | GHGs are the sic gases listed in the Kyoto Protocol |
| **Indirect GHG emissions** | Emissions that are a consequence of the operations of an organisation but occur at sources owned or controlled by another organisation. |
| **IT Equipment** | Throughout this report IT equipment refers to computers. |
| **Kyoto protocol** | A protocol to the United Nations Framework Convention on Climate Change (UNFCCC). It requires countries listed to meet reduction targets of GHG emissions relative to their 1990 levels during the period of 2008-12. |
| **PAS:2060** | PAS:2060 is an internationally renowned standard detailing how to demonstrate carbon neutrality produced and published by the British Standards Institution. |
| **Renewable energy** | Energy taken from sources that are not limited, e.g. wind, water, solar, geothermal energy, and biofuels. |
| **Scope 1** | All direct GHG emissions under an organisation control. |
| **Scope 2** | An organisation's emissions associated with the generation of electricity, heating/cooling, or steam purchasing for own consumption. |
| **Scope 3** | All organisation's indirect GHG emissions not covered in Scope 2. |
| **Spend-based method** | This is a way of estimating emissions for goods and services by collecting data on the value of goods and services purchased and multiplying it by relevant |

emission factors.

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