Tunbridge Wells Borough Council

Greenhouse Gas Emissions: Calculation Guidance

17th June 2024

TWBC CLIMATE ACTION

Tunbridge Wells Borough Council

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1. Calculating Emissions

- The most common way to calculate greenhouse gas (GHG) emissions is through the application of an emissions factor to a purchased quantity of energy (electricity, gas, combustion fuels etc) or material.

- GHG emissions are expressed in kilograms (kg) of Carbon Dioxide Equivalent (CO_2e). CO_2e expresses the impact on the climate from Carbon Dioxide (CO_2), Methane (CH_4) and Nitrous Oxides (N_2O) under one unit of measurement.

- To calculate emissions, you must first collect data on the energy or material in which you are looking to measure. In most cases, this will be electricity, gas, diesel, petrol, or water.

  E.g., Company X consumed 40,000 kWh of natural gas in the 2023/2024 financial year.

- You can collect this data for your organisation by looking at your energy and water bills or fuel usage records.

- Once you have decided what you are looking to measure, you then need to find the relevant emissions conversion factor from the official UK Government greenhouse gas reporting emissions factors release. You can find the latest release here: Greenhouse gas reporting: conversion factors 2023 - GOV.UK (www.gov.uk)

  *E.g., The natural gas emissions factor (found under the 'Fuels' tab) was **0.1829 kgCO_2e** per gross kWh of natural gas consumed.*

- Once you have found the relevant emissions factor, you simply multiply this factor by data you collected earlier.

  *E.g. 40,000 kWh x 0.1829 kgCO_2e = **7,317.2 kgCO_2e***

- Furthermore, it is also best practise to calculate 'Well to Tank' emissions (WTT), as these emissions account for the extraction, refinement, transportation of raw fuel prior to combustion. For example, the drilling of crude oil, refinement to create petroleum fuel, and transportation to petrol stations.

  *E.g., Gas WTT emissions factors (found in the 'WTT – fuels' tab) was **0.03021 kgCO_2e** per gross kWh of natural gas consumed.*

  *E.g., 40,000 x 0.03021 = **1,208.4 kgCO_2e***

- Please see Appendix A and Appendix B for further worked examples.

2. Monitoring Emissions Changes

- Monitoring emissions changes over time is key to understanding the impact on your organisation's emissions, following the implementation of decarbonisation measures.

- Therefore, it is very important to calculate emissions from specific sources prior to the implementation of measures. For example, if you are looking to install LED lighting, you first need to know how much electricity is consumed prior to the LEDs, to calculate their impact following installation.

- Having a baseline number for energy consumed (and associated emissions) allows you to accurately track progress over time and quantify the impact that interventions have on your organisation.

- For example:

    - If you are looking to install insulation, you need to know the total amount of gas consumed (and its associated emissions) prior to installation. This way, you can monitor how much gas is needed post installation and therefore, identify the impact (reduction in gas consumption).

    - If you are wanting to install solar panel, you need to know how much electricity you consume. Therefore, once the panels are installed, the previous consumption can be compared to the current data, allowing for the impact of this measure to be identified.

- TWBC has developed a simple spreadsheet which can be used to calculate a basic baseline footprint. It can then be used to calculate monthly or annual emissions, to show progress before and after intervention installation.

2. Appendix A: Petrol Emissions

- Petrol emissions from company Y were **17,534 litres** in the 2023/2024 financial year.
- The 2023 UK Government conversion factor for petrol (average biofuel blend) emissions factor is identified as **2.0975 kgCO_2e** per litre of petrol consumed.
- This emissions factor is then multiplied by the total litres of petrol consumed to identify the total emissions from petrol consumption.
- 17,534 x 2.0975 = **36,777.1 kgCO_2e.**
- Then, the 2023 UK Government conversion factor, UK Petrol (average biofuel blend) Well to Tank emissions factor is identified as **0.58094 kgCO_2e** per litre of petrol consumed.
- 17,534 * 0.58094 = **10,186.2 kgCO_2e.**
- Therefore, total emissions from petrol consumption are **46,963.3 kgCO_2e.**

3. Appendix B: Electricity Emissions

- Electricity consumption from company Z were **272,486 kWh** in the 2023/24 financial year.

- The 2023 UK Government conversion factor for UK Electricity emissions factor is identified as **0.207074 kgCO_2e** per kWh of electricity consumed.

- This emissions factor is then multiplied by the total kWh of electricity consumed to identify the total emissions from electricity consumption.

- 272,486 x 0.207074 = **56,424.8 kgCO_2e.**

- Then, the 2023 UK Government conversion factor, UK Electricity Well to Tank emissions factor is identified as **0.0459 kgCO_2e** per kWh of electricity consumed.

- Like before, emissions factor is then multiplied by the total kWh of electricity consumed to identify the total emissions from electricity consumption.

- 272,486 x 0.0459 = **12,507.1 kgCO_2e.**

- It is also best practise to calculate emissions from electricity transmission and distribution (T&D) losses. These are emissions associated with grid losses from electricity transportation from the power plant to the site of consumption.

- T&D losses calculations simply require the total electricity consumed (in this case 272,486 kWh) to be multiplied by its own dedicated emissions factor.

- The 2023 UK Government conversion factor for UK Transmission and Distribution emissions factor is identified as **0.017945 kgCO_2e** per kWh of electricity consumed.

- 272,486 x 0.017945 = **4,881.6 kgCO_2e.**

- Well to Tank Emissions are also associated with T&D Losses. Therefore, we use the 2023 UK Government conversion factors the UK Transmission and Distribution Well to Tank emissions factor, identified as **0.00397 kgCO_2e** per kWh of electricity consumed.

- 72,486 x 0.00397 = **1,081.8 kgCO_2e.**

- Therefore, total electricity emissions are **74,895.3 kgCO_2e.**