Calculator Methodology

Goldilocks Carbon Footprint Calculator v1.1

Last updated October 2020

Background: Who can use this tool?

This document provides an overview of the method used to estimate organisational emissions using the Goldilocks Carbon Footprint Calculator. The Calculator is suitable for use by organisations that meet the following criteria:

- The organisation has five office locations or less.
- The majority of the organisation's activities occur in the country of the head office.
- The organisation provides services and its activities are predominantly office-based.

The Calculator is not designed for organisations in other sectors such as manufacturing, transportation or construction, as these sectors have different emissions boundaries and profiles.

Disclaimer

This tool is intended to provide an estimate of carbon emissions for organisations that meet the above criteria, striking a balance between accuracy and robustness on one hand, and ease-of-use on the other.

The Calculator draws on carbon accounting principles and methodologies from the GHG Protocol Corporate Accounting and Reporting Standard (WBCSD, WRI), and applies Point Advisory's extensive carbon accounting experience. However, the method does not strictly align with the GHG Protocol, which requires that organisations must set a bespoke emissions boundary to ensure a complete inventory. However, we believe that the boundary included in the Calculator will include the majority of emissions for the majority of organisations that meet the criteria above.

Users should note the above limitations when deciding how to use the outputs of the Calculator.

Methodology overview

The Calculator estimates emissions for seven (7) typical emissions sources for office-based organisations, covering scope 1 and 2 emissions and material scope 3 emissions. Emissions are calculated using best practice calculation methodologies and country-based emissions factors. Where necessary, the Calculator uses assumptions based on published standards and literature or, where necessary, Point Advisory's professional experience.

Location

Location has a significant impact on emissions. This especially applies to the emissions intensity of electricity use, which depends on a country or state's mix of energy generation sources (i.e. the proportion of coal, nuclear, natural gas and renewables used). Location also affects key assumptions for transport emissions, staff commuting, and accommodation. Version 1-beta of the tool includes the following locations:

- Australia
- New Zealand
- The United Kingdom
- Canada
- The United States of America.
- For all other locations, a 'Rest of World' emissions factor has been used (based on UK data).

Source overview

Table 1 summarises how emissions are calculated for the seven emissions sources included in the tool. Where country-specific emissions factors are not available, factors default to the UK Government's GHG Conversion Factors for company reporting, considered the most comprehensive set of international emissions factors.

Table 1: Overview of methodology and assumptions by emissions sources

Source	Method	Key assumptions & examples
Energy Electricity Gas	For highest accuracy, users can input actual electricity (in kWh) and gas (in GJ) consumed over 12 months, obtained from your energy utility (e.g. via a bill). If this data is not available, emissions can be estimated using office area (m^2 of net lettable area) and an average energy use intensity for each office for electricity and gas use based on how efficiently the office uses energy. Users can select 'low', 'average' or 'high' efficiency, and check boxes to provide additional detail. Emissions factors for electricity and gas use are then applied for the relevant country/state, and include scope 3 (upstream) emissions where available. Where estimates are used, users can refine energy use by selecting whether (i) there is a data centre onsite, (ii) lighting is predominantly LED, and (iii) laptops are used in preference to desktop computers for staff.	<u>Energy intensity</u>: Energy intensity is estimated for office tenancies (i.e. excluding base building) based on an average electricity and gas consumption per m^2, using appropriate benchmarks adopted for the selected country: - UK: 2017 Real Estate Environmental Benchmarks from the Better Buildings Partnership for typical and good practice. - Australia: NABERS ratings for a 3, 4.5 and 5.5 Star tenancy rating (and an 80/20 split of electricity to gas energy use). - USA and rest of world: Energy Star ratings (based on 2012 CBECS data) for 25th, 50th and 75th percentile office buildings. <u>Check boxes</u>: An on-site data room adds 30,000kWh to yearly energy use. An LED lighting upgrade decreases office energy use by 10%. The use of laptops decreases office energy use by 5%.
Flights	Users input the number of flight 'sectors' taken for three categories: 1. Short-haul – flights within the country 2. Medium-haul – flights in or outside the country, but within the same region of the world 3. Long-haul – all other flights (international) The average flight length for each flight can be tailored to match a company's average flight time and destination.	Total flight kilometres are estimated assuming an average speed of 500 - 600 km/hour. Emissions factors are taken from UK Defra and include radiative forcing. Emissions factors change slightly for short-haul and long-haul flights.
Accommodation	Users input the sum of the number of nights spent in one room hired for business travel.	Emissions factors are taken from UK Defra, and are country-specific. For countries not listed above, an international average is taken to be the 90th percentile country for emissions per room per night.

Source	Method	Key assumptions & examples
Transport fleet	Emissions are calculated using estimated litres of petrol and diesel fuel consumed, calculated from the total kilometres travelled for the fleet by vehicle type. For example, if a vehicle fleet was 10 cars which travelled 100,000 kms combined over the year, 'average distance travelled per year' should be set to 10,000 kms. All cars are assumed to be petrol cars. All other vehicles are assumed to be diesel. Country-specific average vehicle efficiencies are used for each vehicle type. Emissions factors for petrol and diesel consumption are taken from UK Defra factors.	Average vehicle efficiency is based on official published data specific to the head office country/state. For example, in the UK, petrol cars consume 5.6 litres per 100 kilometres and trucks consume 30.7 l/100 km (9.2 MPG) (Department of Transport, 2018). In the Australian state of Victoria, passenger vehicles have an average efficiency of 9.5 litres/100kms, LCVs an efficiency of 15 l/100km, and trucks 60 l/100km (Australian Bureau of Statistics, 2016).
Staff commute	Emissions are estimated by mode of travel, based on 42 weeks of commuting days per year. Driving emissions are estimated based on average vehicle fuel efficiency per country, and an estimated trip length per city based on available travel survey data . Train and bus emissions are estimated using a country-specific emissions intensity factor ($kgCO_2$-e/trip).	Average emissions per trip are estimated for the location selected using best available travel survey data for mode intensity and average commute distance. For example, in Australia: • Car trip emissions are estimated based on a vehicle consuming 9.5 l/100km. • Train and bus emissions per trip are based on EPA Victoria's published scope 3 emissions factors.
Waste	Estimated based on number of employees, a waste generation rate per employee, and a simplified waste emissions factor that captures lifetime emissions generated from solid waste. A conversion factor is then applied to estimate the waste sent to landfill, based on recycled content.	Commercial waste generation assumes 500 kg of waste per person per year based on data from two sources (Cundall Johnstone and Partners, 2019 and CitySwitch). The waste emissions factor is adjusted for each conversion factor to coarsely considered the percentage of paper, organics and other mixed C&I percentage of the waste, based on factors in Australia's National Greenhouse and Energy Reporting Measurement Determination. 'Low' assumes 70% of the waste is recycled, 'medium' assumes 50% of the waste is recycled, and high assumes 25% of the waste is recycled,

Source	Method	Key assumptions & examples
Office materials	Estimated based on number of employees, and a water use, paper use, and IT server memory use rate per employee. 'Low' assumes 80% of average rate and 'high' assumes 120% of average rate, to add flexibility if an office is observed to perform poorly or better than average based on available infrastructure and/or staff behaviour.	Water use is based on US Energy Information Administration 2012 survey of commercial office water use for gallons per office worker (equal to 70 kL/worker/year). Emissions factors are based on factors from Victoria, Australia and are assumed to be representative of energy intensity for all countries. Paper use is based on PaperSave's estimate. Emissions factors are based on Australia's National Greenhouse Accounts factors, and are assumed to be representative of emissions intensity for all countries. IT server emissions assume off-site data storage, whereby one worker requires 28 GB of data storage, and at an emissions intensity published by Stanford University (2017).

Other sources

Users are free to expand their emissions inventory to include additional sources, where they can identify relevant and material emissions sources that are not included in the Calculator. Emissions for these sources must be calculated separately, and the total emissions from that source can be input directly into the calculator in the unit tonnes CO_2-equivalent.

Optional input: personal emissions

Personal emissions were calculated based on the total reported greenhouse gas emissions from each country under the Kyoto Protocol reporting requirements, and divided by the population of the country, to calculate per capita emissions in tonnes CO_2-e/person. This is calculated for the head office country only. Users set the percentage of employees to cover for offsetting.

Further queries

Should you have any questions or need clarification on any aspect of this methodology, please contact Point Advisory at info@pointadvisory.com.