

BP Target Neutral Lifestyle GHG calculator Method for calculating greenhouse gas emissions

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1.1 EXECUTIVE SUMMARY

BP Target Neutral has committed to help individuals understand the personal carbon footprint associated with individual lifestyle choices.

This methodology statement, provides an overview of BP Target Neutral's approach for calculating greenhouse gas (GHG) emissions from lifestyle choices associated with the categories of travel, home, food and purchased goods & services set out in BP Target Neutral's online lifestyle GHG emissions calculator, hereafter referred to as the 'lifestyle calculator'.

1.2 CATEGORIES

BP Target Neutral's lifestyle calculator focuses on the following lifestyle categories:

- Travel
- Home
- Food
- Purchased goods & services

1.3 TRAVEL

1.3.1 Land Travel

The question on land travel within the travel category focuses on the following modes of transportation:

- Personal car
 - Diesel car
 - Petrol car
 - Hybrid car
 - Plug-in Hybrid electric car
 - Battery electric car
- Taxi
- Cycling/walking
- Bus
- Train

Users are provided with the option to enter the time they spend travelling per mode of land transportation. Each mode of land based transportation is assigned a default speed as detailed in table below, and this information, combined with the number of hours entered by the user is multiplied with the appropriate emission factor to calculate an individual's emissions from land travel.

Emission factors for the different modes of transportation are derived from the UK

Government Greenhouse Gas (GHG) Conversion Factors for Company Reporting¹, with the exception of walking/cycling which has zero emissions associated with use as a mode of transportation.

Emissions are determined taking into account the vehicle and fuel types, and are based on distance travelled using the appropriate average emission factors for different modes of travel. When calculating emissions, not only are direct emissions of CO₂, CH₄ and N₂O from the combustion of fuel accounted for, but the indirect emissions associated with the extraction and transport of primary fuels as well as the refining, distribution, storage and retail of finished fuels, also known as the ‘well-to-tank’ emissions are also taken into consideration.

The applicable ‘well-to-tank’ emissions, relating to fuels or different travel modes, are derived from the specific ‘WTT’ table in the GHG Conversion Factors for Company Reporting¹ document and added to the relevant emission factor. Table 1 below shows a sample of emission factors used in the land travel section of the lifestyle calculator.

Table 1: Example emission factors used for the land travel calculations

Type of transportation	Fuel Type	Emission Factor	WTT Factor	Final Emission Factor	Unit
Car	Petrol	0.1808	0.0491	0.2300	kgCO ₂ e/km
	Diesel	0.1734	0.0414	0.2147	kgCO ₂ e/km
	Hybrid	0.1147	0.0292	0.1439	kgCO ₂ e/km
Bus	N/A	0.1208	0.0288	0.1496	kgCO ₂ e/km

Default speeds for car/taxis and buses are obtained from averaging data provided by the UK Department for Transport statistics² and default speed for trains is obtained by taking the most conservative figure across EU countries, as published by the European Commission Directorate General for Mobility and Transport³.

Table 2: Default speeds assigned for land based transportation

Type of transportation	Speed	Unit
Car/Taxi	71	km/hr
Bus	54	km/hr
Train	160	km/hr

1.3.2 Air Travel

The question on air travel focusses on the following classes of air travel:

- Domestic flights
- Short haul flights
 - Economy class
 - Business class
- Long haul flights
 - Economy class
 - Premium Economy class
 - Business class
 - First class

Users are asked to input the total number of return flights per domestic, short haul and long haul travel. Additionally, for short haul and long haul travel categories, users have the option to detail which class of travel, or apply the average or default emission factor for short/long haul flights for the calculations.

Band distances⁴ are provided as a guide for users to determine which category to log their flight as, and a default band distance per flight type is used for the calculations as detailed in Table 2 below.

Table 3: Band distances used for the air travel calculations

Flight type	Band range (km)	Band distance used for Lifestyle Calculator (km)
Domestic flights	0 - 400	400
Short-haul international flights	400 - 3700	2050
Long-haul international flights	Over 3700	5000

As with the land travel emission factors, the Emission factors for the air travel transportation are derived from the UK Government Greenhouse Gas (GHG) Conversion Factors for Company Reporting¹.

Two key elements that form the basis of air travel emission factors, which are incorporated into the UK government GHG conversion factors, are listed below:

- (1) An uplift factor of 8% applied to the flight distance to factor in sub-optimal routing and stacking at airports during periods of heavy congestion; and
- (2) Radiative Forcing Index (RFI) of 1.9 applied to the CO₂e emissions factor of any given flight type to account for climate change effects of aviation that are not captured in fuel combustion factors, for example, those associated with vapour trails or NO_x emissions.

As with the land travel emission factors, 'WTT' emissions have been included in the relevant emission factors for air travel as well.

1.4 HOME

This category covers emissions from use of electricity, natural gas and other fuels for powering and heating an individual's home. The total energy related emissions from the home category are divided by the total number of adults living in the user's home.

1.4.1 Electricity

Users are asked to enter the annual electricity kWh (kilowatt-hour) consumption, or if they do not know their kWh consumption, to choose one of the options below:

- Small house or a flat (2500 kWh)
- Medium house or flat (4200 kWh)
- Large house (7100 kWh)

Each of the above three options are associated with a default kWh consumption as detailed above and are based on low, medium and high energy consumption for typical domestic electricity consumption values in the UK, published by Ofgem⁵.

Average emission factor for the world’s electricity consumption is derived from the International Energy Agency Emissions Factors for World Energy⁶. This emission factor has been built including direct emissions of CO₂, CH₄ and N₂O, corrected for transmission and distribution losses induced emissions, and corrected for trade induced emissions.

Additionally, to account for the associated ‘well-to-tank’ emissions, the specific WTTs are derived from the GHG Conversion Factors for Company Reporting document and added to the relevant IEA world electricity emission factor.

Furthermore, in relation to electricity use, the lifestyle calculator asks users if they have a contract that commits to a specific percentage of renewable energy in the electricity that they purchase. The International Energy Agency reports that renewables account for 25% of global energy⁷ – therefore the lifestyle calculator credits those users that enter a value greater than 25% for renewable energy in their purchased electricity mix.

Moreover, the Energy Savings Trust⁸ estimates that total standby consumption of lights and appliances can amount to 9%-16% of total domestic power demand. Therefore, if a user reports that they sometimes or always turn off lights and appliances when not in use, the lifestyle calculator credits them with an electricity saving of 9% and 16% respectively.

1.4.2 Gas

Users are asked to enter their annual natural gas kWh (kilowatt-hour) consumption, or if they do not know their kWh consumption, to choose one of the options below:

- Small house or a flat (8000 kWh)
- Medium house or flat (12000 kWh)
- Large house (17000 kWh)

Each of the above three options are associated with a default kWh consumption as detailed above and are based on low, medium and high energy consumption for typical domestic gas consumption values in the UK, published by Ofgem³.

Emission factor for the use of natural gas as well as associated WTT emissions are derived from the UK Government Greenhouse Gas (GHG) Conversion Factors for Company Reporting¹.

Table 4: Emission factor used for natural gas related calculations

Fuel Type	Emission Factor	WTT Factor	Final Emission Factor	Unit
Natural Gas	0.1844	0.0239	0.2083	kgCO ₂ e/kWh

1.4.3 Other fuels

Users are asked to enter their annual consumption of kerosene (in litres), coal (in kilograms) and wood (in kilograms). Emission factors for these fuels, along with the associated WTT

emissions are derived from the UK Government Greenhouse Gas (GHG) Conversion Factors for Company Reporting¹.

Table 5: Emission factors used for other fuel related calculations

Fuel Type	Emission Factor	WTT Factor	Final Emission Factor	Unit
Kerosene	2.5404	0.5282	3.0686	kgCO ₂ e/litre
Coal	2.7447	0.3962	3.1409	kgCO ₂ e/kg
Wood	0.0638	0.0521	0.1160	kgCO ₂ e/kg

1.5 FOOD

1.5.1 Diet

This category focusses on emissions related to an individual's dietary choices. Users are asked to select the diet option that best describes their own diet:

- Meat in most meals
- Meat in some meals
- No red meat
- Vegetarian
- Vegan

The emission factors for diet related emissions are referenced from Shrink That Footprint website⁹, which uses data from US Department of Agriculture's Economic Research Service (ERS/USDA) and various Economic Input-Output Life Cycle Assessment (EIO-LCA) data to calculate food supply emissions. Total diet related emission factors (per person per annum) are obtained by adding food supply emissions, storage emissions and cooking emissions⁷ together as detailed in the table below.

Table 6: Emission factors used for diet related emissions

Diet	Food supply emissions (tCO ₂ e/person)	Storage emissions (tCO ₂ e/person)	Cooking emissions (tCO ₂ e/person)	Total Diet related emissions (tCO ₂ e/person)
Meat in most meals	3.29	0.04	0.02	3.35
Meat in some meals	2.52	0.04	0.02	2.58
No red meat	1.90	0.04	0.02	1.96
Vegetarian	1.70	0.04	0.02	1.76
Vegan	1.50	0.04	0.02	1.56

1.5.2 Food miles

This category covers emissions related to the transportation of food. Users are asked to answer whether they buy ingredients or food produced locally:

- I ensure all of the food I buy is locally sourced
- Some of the food I buy is locally sourced
- I do not worry about where my food comes from

Webber and Matthews¹⁰ details that delivery food miles from producer to retailer account for 0.4 tCO₂e/year per US household and total freight miles account for 0.9 tCO₂e/year per US household. By dividing the transport emissions by the average US household size per the UN¹¹, the total transport related emissions per person per annum are obtained as detailed below.

Table 7: Food transportation related emissions

Transportation	Transport emissions (tCO ₂ e/US-HH)	US HH size	Transport emissions (tCO ₂ e/person)
Final delivery from producer to retailer	0.4	2.5	0.16
Freight miles	0.9	2.5	0.36

Transportation emissions from using locally sourced food is therefore assumed to only include those emissions that arise from final delivery of food from producer to retailer (0.16 tCO₂e/person), whereas freight emissions are added when the user is not concerned about where their food comes from (0.52 tCO₂e/person). The average of the two (0.34 tCO₂e/person) is used when the user claims to ensure some of their purchased food is locally sourced.

1.5.3 Food wastage

This category covers emissions related to wastage of food. Users are asked to detail how much of the food they cook or buy is wasted or thrown away:

- None
- 0-5%
- 5-10%
- 10-20%
- 20-30% or more

In all of the above categories, the higher figure of the range is used to increase the food related emissions proportionally. The highest figure of food wastage undertaken is 30%, in line with guidance from Food and Agriculture Organisation of UN (FAO)¹².

1.6 PURCHASED GOODS & SERVICES

This category covers emissions from the purchase of goods and services. Users are asked to detail the amount of money spent on the following subcategories:

- TV, laptop or PC, mobile phone or tablet
- Contracts for Phone, Internet and TV
- Large item of furniture or other equipment e.g. washing machine, dishwasher or freezer
- Clothes and footwear
- Health, beauty and grooming products
- Hotels, restaurants and recreational activities e.g. having a night out with friends

The emission factors for purchased goods and services are referenced from UK Government's Official Statistics UK's carbon footprint¹³, which include an estimate of the total upstream emissions associated with the supply of a particular product. Where multiple supply chain

emission factors are applicable for a category (e.g. clothes and footwear), the highest applicable emission factor is applied to ensure a conservative result.

Table 8 below shows a sample of emission factors used in the purchased goods and services section of the lifestyle calculator.

Table 8: Example emission factors used for purchased goods and services calculations

Purchased Goods & Services	Total Emission Factor	Unit
Clothes and footwear	0.6757	kgCO ₂ e/GBP
Health, beauty and grooming products	1.4422	kgCO ₂ e/GBP

¹ 2019 UK Government GHG Conversion Factors for Company Reporting.

Available online at:

<https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2019>

² 2018 UK Department for Transport statistics, Table SPE0111 - Free flow vehicle speeds by road type and vehicle type in Great Britain, 2018

Available online at:

<https://www.gov.uk/government/statistical-data-sets/vehicle-speed-compliance-statistics-data-tables-spe>

³ European Commission Directorate General for Mobility and Transport, Study on the prices and quality of rail passenger services, 2016

Available online at:

<https://ec.europa.eu/transport/sites/transport/files/modes/rail/studies/doc/2016-04-price-quality-rail-pax-services-final-report.pdf>

⁴ GHG Emissions Resulting from Aircraft Travel, Carbon Planet, 2009

Available online at:

http://www.trpa.org/documents/reisc/5_Comment%20References/LTSLT_FOWS_TASC_references/Airport/Flight_Calculator_Information_v9.2.pdf

⁵ Ofgem Typical UK Domestic Consumption Values published 2017

Available online at:

<https://www.ofgem.gov.uk/gas/retail-market/monitoring-data-and-statistics/typical-domestic-consumption-values>

⁶ 2018 International Energy Agency – Emission Factors for World Energy

Available online at:

<http://data.iea.org/payment/products/122-emissions-factors-2017-edition.aspx>

⁷ Global Energy & CO2 Status Report - The latest trends in energy and emissions in 2018, produced by the International Energy Agency

Available online at:

<https://www.iea.org/geco/renewables/>

⁸ Powering the Nation, Household electricity using habits revealed, Energy Savings Trust 2012

Available online at:

<https://www.energysavingtrust.org.uk/sites/default/files/reports/PoweringthenationreportCO332.pdf>

⁹ Shrink that footprint, Carbon footprints of five diets compared

Available online at:

<http://shrinkthatfootprint.com/shrink-your-food-footprint>

<http://shrinkthatfootprint.com/food-carbon-footprint-diet>

¹⁰ Food-Miles and the Relative Climate Impacts of Food Choices in the United States, Webber and Matthews 2008

Available online at:

<https://pubs.acs.org/doi/pdf/10.1021/es702969f>

¹¹ United Nations Database, US Household size and composition, 2018

Available online at:

<https://population.un.org/Household/index.html#/countries/840>

¹² FAO, Key facts on food loss and waste

Available online at:

<http://www.fao.org/save-food/resources/keyfindings/en/>

¹³ UK Government's Official Statistics UK's carbon footprint, Table 13 – Indirect emissions from the supply chain, Updated March 2014

Available online at:

<https://www.gov.uk/government/statistics/uks-carbon-footprint>