

GHG Footprint Calculator for Individuals

Methodology

The Lifestyle Calculator is the result of a collaboration between Doconomy and the UNFCCC.



United Nations
Climate Change

Introductory notes

1. Overarching principles

The Lifestyle calculator aims to follow the Greenhouse Gas (GHG) Protocol as an overarching framework. However, it's recognized that the GHG Protocol standards were not developed to be an accounting standard for individuals and that all principles might not be applicable to lifestyle calculations. In some instances, deviations from the GHG protocol calculation methods have been made for illustrative purposes to showcase the impact of a particular desired behaviour. In those cases it has clearly been stated under the question's assumptions when such deviations have occurred.

In calculations, emissions from all greenhouse gases covered by the Kyoto protocol have been covered. Values for the non-carbon dioxide greenhouse gases are expressed as CO₂-equivalents (CO₂e) using Global Warming Potential (GWP) factors from the Intergovernmental Panel on Climate Change (IPCC).

In order to avoid double counting of emissions, sources with a cradle-to-gate perspective for purchased products have been used. For example in the case of electronic products, the emissions from the use phase and the disposal of the products are accounted for by the electricity usage questions and the waste disposal questions.

2. Selection of sources

The sources of data used to perform the calculations were selected based on the following criteria:

- A. Publicly available: public availability helps to ensure full transparency of the calculations.
- B. Belonging to recognized, specialized organizations: provides credibility and robustness.
- C. Possibility to be updated regularly, ideally annually: maintains calculator current, relevant and credible.

The third criterion could not be fulfilled for a few categories (i.e. food), where some of the data may not have regular updates. In these cases, suitable updates will be identified in the future.

3. Emissions from electricity

According to the GHG protocol, emissions from electricity can be accounted for in two ways: the market-based method and the location-based method. In the market-based method contractual agreements are considered, and emissions allocated thereafter. A purchase of green energy with guarantee of origin is allocated zero emissions in scope 2, while a purchase of non-green electricity is allocated emissions from a residual mix. The location-based method uses the grid average emission factor for your location and contractual agreements are not taken into account. The GHG Protocol Corporate Accounting Standard requires that companies report scope 2 emissions using both methods.

European agencies have already published residual mixes and other markets are expected to develop similar mixes in the upcoming years. Read more regarding this, and the methodology for electricity accounting, at the GHG protocol website and the guidance documents published¹. Until the residual mixes are available for all countries, the Lifestyle Carbon Calculator uses the grid average emission factors for consistency reasons but allocates zero emissions to green electricity purchased with guarantees of origin (or similar contractual agreements).

4. Omitted emissions

The total carbon footprint of a country is caused by the sum of emissions from its citizens, the state and the private sector. Typical state and public emissions are caused by, for example, development of infrastructure, administration and the provision of several public services such as education or health. These emissions are usually distributed equally across all citizens when calculating the country's "per capita emissions" and form an emission "base load" that is unique for every country. These services are an important part of the welfare state, however, as

¹ <https://ghgprotocol.org/blog/top-ten-questions-about-scope-2-guidance>

they are controlled by the state there is little an individual can do to directly affect these emissions. As the purpose of the Lifestyle Calculator's is to address and capture emissions that the individual can control and influence through behavioral change, it was decided that the calculator will not take into account these so called "base load emissions".

Other emissions that the Lifestyle calculator will not account for, for the same reasons stated above, are emissions resulting from land use, land-use change and forestry (LULUCF) in the country. It will neither address the overall national emissions resulting from industry and agriculture, but will rather focus on the typical emissions associated with products and services bought by individuals.

5. Comparison of the result

Given the chosen structure of the calculator, comparisons of the result from the Lifestyle Calculator with other sources is difficult. Such an example is, for instance, the comparison with officially reported GHG emissions per capita per country. The reason for this is that the calculation of per capita emissions is based on the aggregated emissions of a nation (from all industries, agriculture, state services etc.) which is then divided equally across the population. Part of these emissions are therefore not at all associated with the chosen lifestyle of the individual inhabitants, but rather depends on the nature of the national industries and state policies. As the Lifestyle Calculator aims to capture the emissions resulting from individual behaviour the comparison therefore becomes inadequate.

Similarly, comparisons with the results of other carbon calculators should be made with care. The reason here is that the scope and underlying assumptions of the calculators are likely to differ. Unless these differences can be established and accounted for, comparisons of the results can be misleading and should therefore be avoided.

High level categories

1. Home
2. Transportation
3. Shopping
4. Food

1. Home

1.1 Country of residence

When country-specific emission factors are available they will be used in the calculations. Grid emission factors are country-specific. The rest of the emission factors are based on UK DEFRA's "Government conversion factors for company reporting of greenhouse gas emissions"², ADEME's "Modélisation et évaluation du poids carbone de produits de consommation et biens d'équipement"³ or other suitable databases. See below for specific information on the factors used in each calculation.

The goal is that the database of emission factors for the calculator will grow over time as more country-specific data becomes available. We also aim to include city-specific emission factors when they become available.

1.2 Number of residents in household

The calculator aims to provide the individual with an estimation of personal GHG footprint, therefore, some calculations need to account for the fact that a household is occupied by several persons and the need to divide the total household-related emissions between the total number of residents in it. In these cases, the allocation to each individual is done by a simple division by the number of household residents.

1.3 Dwelling size

The size of the dwelling is useful to place an individual in a given economic level and to approximate emissions associated, for example, to heating or electricity consumption when concrete data is not provided by the user of the calculator. The user can choose to specify the area of dwelling exactly or opt for an average.

This question is included in the calculator for categorization purposes but does not influence the calculations in this version of the calculator.

Sources:

Technology options for earthquake resistant, eco-efficient buildings in Europe:

- Research needs; Negro, Paolo, 2014⁴
- CEIC, China Residential Area per Capita⁵
- Nomura research, International Comparison of Living Space Per Capita⁶

² <https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting>

³ <https://librairie.ademe.fr/consommer-autrement/1190-modelisation-et-evaluation-du-poids-carbone-de-produits-de-consommation-et-biens-d-equipement.html>

⁴ https://www.researchgate.net/figure/Average-useful-floor-area-per-dwelling-and-per-person-Dol-Haffner-OTB-2010_fig7_260434512

⁵ <https://www.ceicdata.com/en/china/residential-area-per-capita>

⁶ <http://www.maoxian.com/thoughts/international-comparison-of-living-space-per-capita>

1.4 Waste

1.4.1 Do you recycle? Choose among the following alternatives for each type of waste.

Options for types of waste/waste streams:

- A. Glass
- B. Plastic
- C. Metal
- D. Paper and cardboard
- E. Organic

Options for level of recycling:

- A. Always: 100% of the type of waste is recycled
- B. Almost always: 75% of the type of waste is recycled
- C. Rarely: 30% of the type of waste is recycled
- D. Never: 0% of the type of waste is recycled

Formula:

*Total Municipal Solid Waste per country / Country's total population x % composition of waste per type/waste stream x % level of recycling x emission factor for recycling **or** composting/anaerobic digestion*

+

Total Municipal Solid Waste per country / Country's total population x % composition of waste per type/waste stream x [1 - % level of recycling] x emission factor for household residual waste landfill

Assumptions:

The organic waste stream includes mixed food and yard/garden waste.

The paper and cardboard waste stream includes mixed paper and cardboard.

The metals waste stream includes metal and "other scrap metal".

Waste generation per waste stream (%) for countries with no data: All countries were divided into three categories, based on UN "World Economic Situation and Prospects (WESP)"⁷ And UNDS⁸. The averages for each category were used when data was not available.

If glass, paper and cardboard, metal or plastic are recycled, an emission factor for recycling is used. If organic material is composted, an emission factor for

⁷ https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/WESP2020_Annex.pdf

⁸ <https://unstats.un.org/unsd/methodology/m49/overview/>

composting/anaerobic digestion is used. Waste that is not recycled gets an emission factor for household residual waste landfill.

Sources:

- World Bank/What-a-Waste-Database⁹
- World Bank, Data/Population Total¹⁰
- UK DEFRA's "Government conversion factors for company reporting of greenhouse gas emissions"¹¹

1.5 Heating

1.5.1 What is the primary source of heating in your household?

Options:

- A. Solar energy: emissions are zero
- B. Electricity: more information needed
 - a. If the user has entered total electricity consumption in the previous question, the emissions here are zero (they are already included in the previous calculation).
 - b. If the user chose the option "I don't know" for the amount of electricity consumed in the electricity consumption question, then:

Formula:

Average heating consumption per capita for households for your country x grid emission factor per country

- C. Natural gas: more information needed
- D. District heating: more information needed
- E. Diesel: more information needed
- F. I don't know: more information needed
- G. No heating: emissions are zero

Assumptions:

The average heating consumption is based primarily on information from Eurostat and IEA. It includes energy consumption for space heating and water heating and the total energy consumption for each country is divided by the country's population to obtain the average energy per capita.

Average heating consumption for countries with no data: All countries were divided into three categories, based on UN "World Economic Situation and Prospects

⁹ <https://datacatalog.worldbank.org/dataset/what-waste-global-database>

¹⁰ <https://data.worldbank.org/indicator/SP.POP.TOTL>

¹¹ <https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting>

(WESP)¹² And UNDS¹³. The averages for each category were used when data was not available.

Sources:

- Eurostat, Disaggregated final energy consumption in households¹⁴
- IEA, Energy efficiency indicators¹⁵

1.5.2 What is the yearly heating usage?

Options:

A. I don't know

Formula:

Average heating consumption per capita for your country x emission factor for your selected heating source

Assumptions:

The average heating consumption is based primarily on information from Eurostat and IEA. It includes energy consumption for space heating and water heating and the total energy consumption for each country is divided by the country's population to obtain the average energy per capita.

Average heating consumption for countries with no data: All countries were divided into three categories, based on UN "World Economic Situation and Prospects (WESP)"[A] And UNDS[B]. The averages for each category were used when data was not available.

Sources:

- Eurostat, Disaggregated final energy consumption in households¹⁶
- IEA, Energy efficiency indicators¹⁷

B. Specify exactly: user enters value

Formula:

Yearly consumption value x emission factor for your selected heating source

Assumptions:

If fuel is unknown, use diesel as a conservative approach.

¹² https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/WESP2020_Annex.pdf

¹³ <https://unstats.un.org/unsd/methodology/m49/overview/>

¹⁴ https://ec.europa.eu/eurostat/databrowser/view/nrg_d_hhq/default/table?lang=en

¹⁵ <https://www.iea.org/reports/energy-efficiency-indicators-overview>

¹⁶ https://ec.europa.eu/eurostat/databrowser/view/nrg_d_hhq/default/table?lang=en

¹⁷ <https://www.iea.org/reports/energy-efficiency-indicators-overview>

Sources:

UK DEFRA's "Government conversion factors for company reporting of greenhouse gas emissions"¹⁸

1.6 Electricity consumption

1.6.1 What type of electricity contract do you have?

Options:

- A. Renewable electricity with guarantee of origin
- B. Source without guarantee of origin
- C. I produce my own renewable energy
- D. I don't know

1.6.2 How would you rate your households level of electricity usage?

Options:

- A. Low
- B. Medium
- C. High
- D. Specify exactly (kWh)

Formula:

Consumption amount (kWh) x country-specific grid emission factor

Assumptions:

Low: multiply average consumption of electricity in the country times 0.7.

Medium: use average consumption of electricity in the country.

High: multiply average consumption of electricity in the country times 1.3.

When the electricity consumption for a country was unknown: All countries were divided into three categories, based on UN "World Economic Situation and Prospects (WESP)"¹⁹ And UNDS²⁰. The averages for each category were used when data was not available.

When the total electricity consumption in a country was known, but the share allocated to the residential sector was unknown: The average share (residential electricity consumption/total country electricity consumption) per geographical

¹⁸ <https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting>

¹⁹ https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/WESP2020_Annex.pdf

²⁰ <https://unstats.un.org/unsd/methodology/m49/overview/>

region was used for the country, according to its region. See Annex I for the list of geographical regions used.

Sources:

- IEA's World Energy Balances and Statistics, 2019²¹
- UNFCCC's Harmonized Grid Emission factor data set, 2019²²
- CIA, The World Factbook/Electricity Consumption²³
- World Bank, Data/Population Total²⁴

1.7 Natural gas for cooking

1.7.1 Do you use natural gas for regular cooking?

Options:

- A. Yes: more information needed
- B. No: emissions are zero

1.7.2 Do you use natural gas regularly or irregularly?

Options:

- A. Regularly

Formula:

$2 \times 25 \text{ gallons} \times 12 \times \text{emission factor for natural gas}$

- B. Irregularly

Formula:

$1 \times 25 \text{ gallons} \times 12 \times \text{emission factor for natural gas}$

Assumptions:

If the user uses gas irregularly, it is estimated as one 100-pound propane tank per month (25 gallons of propane/month). If the user uses gas regularly, it is estimated as two 100-pound propane tanks per month (50 gallons propane/month). For Natural Gas conversion the Higher Heating Value (HHV) is used.

Sources:

UK DEFRA's "Government conversion factors for company reporting of greenhouse gas emissions"²⁵

²¹ <https://www.iea.org/subscribe-to-data-services/world-energy-balances-and-statistics>

²² https://unfccc.int/sites/default/files/resource/Harmonized_Grid_Emission_factor_data_set.xlsx

²³ <https://www.cia.gov/the-world-factbook/field/electricity-consumption/>

²⁴ <https://data.worldbank.org/indicator/SP.POP.TOTL>

²⁵ <https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting>

C. I know my yearly consumption (liter)

Formula:

Amount of natural gas x emission factor for natural gas

Sources:

UK DEFRA's "Government conversion factors for company reporting of greenhouse gas emissions"²⁶

1.8 Water

1.8.1 How would you rate your household's level of water usage?

Options:

- A. Low
- B. Medium
- C. High

Formula:

Municipal water withdrawal / country's population x level of usage (multiply by 0.7 for low, 1 for medium, 1.3 for high) x (Emission factor of water consumed + Emission factor of wastewater treatment)

D. Specify exactly (m3)

Formula:

Amount of water consumed x (Emission factor of water consumed + Emission factor of wastewater treatment)

Assumptions:

All water consumed is sent to treatment. For the following territories FAO had no data, therefore Our World in Data was used: Grenada, State of Palestine, Côte d'Ivoire

Average water consumption for countries with no data: All countries were divided into three categories, based on UN "World Economic Situation and Prospects (WESP)"²⁷ And UNDS²⁸. The averages for each category were used when data was not available.

²⁶ <https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting>

²⁷ https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/WESP2020_Annex.pdf

²⁸ <https://unstats.un.org/unsd/methodology/m49/overview/>

Sources:

- UK DEFRA's "Government conversion factors for company reporting of greenhouse gas emissions"²⁹
- Our World in Data/Water-use-stress/Total water withdrawal per capita³⁰
- FAO, Aquastat Dissemination Portal/Total water withdrawal and Water withdrawal by sector³¹
- World Bank, Data/Population Total³²

2. Transportation

2.1 Cars/Vehicles

2.1.1 Do you own a car?

Options:

- A. Yes
- B. No

2.1.2 Is it an electric/hybrid car?

Options:

- A. Yes
- B. No

2.1.3 How many kilometers do you typically drive per year?

Options: user selects distance range from drop-down list or specifies exactly

- A. When a distance range is selected:

Formula:

Average distance for the selected range x emission factor for the car type

- B. When distance is specified exactly:

Formula:

Distance driven x emission factor for the car type

²⁹ <https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting>

³⁰ <https://ourworldindata.org/water-use-stress>

³¹ <http://www.fao.org/aquastat/statistics/query/index.html>

³² <https://data.worldbank.org/indicator/SP.POP.TOTL>

Assumptions:

The calculation will use the average (middle point) when choosing a range. An electric/hybrid car is assumed to be hybrid. Unless electric/hybrid is chosen the car type is assumed to be an average petrol car.

Sources:

UK DEFRA's "Government conversion factors for company reporting of greenhouse gas emissions"³³

2.1.4 Do you drive a motorcycle?

Options:

- A. Yes
- B. No

2.1.5 What kind of motorcycle do you own?

Options:

- A. Electric motorcycle
- B. Small motorcycle
- C. Medium motorcycle
- D. Large motorcycle

2.1.6 What kind of motorcycle do you own?

Options: user selects distance range from drop-down list or specifies exactly

\sum Distance traveled per type of motorcycle x emission factor for that type of motorcycle

Sources:

UK DEFRA's "Government conversion factors for company reporting of greenhouse gas emissions"³⁴

2.1.7 How many kilometers do you typically drive per year?

Options: user selects distance range from drop-down list or specifies exactly

Formula:

\sum Distance traveled per type of motorcycle x emission factor for that type of motorcycle

³³ <https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting>

³⁴ <https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting>

Sources:

UK DEFRA's "Government conversion factors for company reporting of greenhouse gas emissions"³⁵

2.1.8 Do you own a second motorcycle?

Options:

- A. Yes
- B. No

If yes; user goes through the same questions as with the first motorcycle.

2.2 Flights

2.2.1 How many flights per year do you typically take that lasts up to 4 hours? A return trip should be entered as two flights.

Option: user enter number of short flights

2.2.2 How many of those flights are typically business class?

Option: user enter number of business class flights

Formula:

*Number of business short flights x average distance for short flights x emission factor per km*passenger for short business flights*
+
*Number of economy short flights x average distance for short flights x emission factor per km*passenger for short economy flights*

Assumption:

Short flights are between 500 and 3000 km in total distance, with an average of 1750 km. All flights that are not business class are assumed to be economy class.

Sources:

ICAO Aviation Carbon Emissions Calculator, with data derived by the UNFCCC secretariat³⁶

2.2.3 How many flights per year do you typically take that lasts between 5-8 hours? A return trip should be entered as two flights.

Option: user enter number of medium flights

³⁵ <https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting>

³⁶ <https://www.icao.int/environmental-protection/Carbonoffset/Pages/default.aspx>

2.2.4 How many of those flights are typically business class?

Option: user enter number of business class flights

Formula:

*Number of business medium flights x average distance for medium flights x emission factor per km*passenger for medium business flights*

+

*Number of economy medium flights x average distance for medium flights x emission factor per km*passenger for medium economy flights*

Assumption:

Medium flights are between 3000 and 6000 km in total distance, with an average of 4500 km. All flights that are not business class are assumed to be economy class.

Sources:

ICAO Aviation Carbon Emissions Calculator, with data derived by the UNFCCC secretariat³⁷

2.2.5 How many flights per year do you typically take that lasts between 9-12 hours? A return trip should be entered as two flights.

Option: user enter number of long flights

2.2.6 How many of those flights are typically business class?

Option: user enter number of business class flights

Formula:

*Number of business long flights x average distance for long flights x emission factor per km*passenger for long business flights*

+

*Number of economy long flights x average distance for long flights x emission factor per km*passenger for long economy flights*

Assumption:

Long flights are between 6000 and 12000 km in total distance, with an average of 9000 km. All flights that are not business class are assumed to be economy class.

Sources:

ICAO Aviation Carbon Emissions Calculator, with data derived by the UNFCCC secretariat³⁸

³⁷ <https://www.icao.int/environmental-protection/Carbonoffset/Pages/default.aspx>

³⁸ <https://www.icao.int/environmental-protection/Carbonoffset/Pages/default.aspx>

**2.2.7 How many flights per year do you typically take that lasts more than 12 hours?
A return trip should be entered as two flights.**

Option: user enter number of very long flights

2.2.8 How many of those flights are typically business class?

Option: user enter number of business class flights

Formula:

*Number of business very long flights x average distance for very long flights x
emission factor per km*passenger for very long business flights*

+

*Number of economy very long flights x average distance for very long flights x
emission factor per km*passenger for very long economy flights*

Assumption:

Very long-haul flights are between 12000 and 16000 km in total distance, with an average of 14000 km. All flights that are not business class are assumed to be economy class.

Sources:

ICAO Aviation Carbon Emissions Calculator, with data derived by the UNFCCC secretariat³⁹

2.2.9 Would you like to include the impact of RFI?

Options:

- A. Yes
- B. No

Assumptions:

The current calculation includes only CO₂ emissions, as recommended by the ICAO (International Civil Aviation Organization). However, some scientific bodies argue that non-CO₂ emissions (calculated using RFI, or Radiative Forcing Index) can also be significant. By including this factor the result will be a more conservative assessment of the environmental impact of air travel. The RFI-factor is assumed to be 2,7.

2.3 Accommodation

2.3.1 How many nights per year do you typically spend in hotels?

Option: user enters the total number of hotel nights

³⁹ <https://www.icao.int/environmental-protection/Carbonoffset/Pages/default.aspx>

Formula:

Number of hotel nights x emission factor for average hotel stay

Sources:

UK DEFRA's "Government conversion factors for company reporting of greenhouse gas emissions"⁴⁰

2.4 Public transportation

2.4.1 How many kilometers do you typically travel by train per year?

Option: user enters the estimated distance traveled by train

Formula:

Distance traveled by train x emission factor for national rail

Assumption:

Applicable emission factor is national rail, as it has the highest emission factor.

Sources:

UK DEFRA's "Government conversion factors for company reporting of greenhouse gas emissions"⁴¹

2.4.2 How often do you typically travel by taxi?

Options:

- A. Never
- B. Less than once a month
- C. Once or twice a month
- D. Once a week
- E. Several times a week
- F. Specify in km per year

Formula:

Distance traveled by taxi x emission factor for regular taxi

Assumption:

- Taxi type is "regular taxi" from the DEFRA database.
- A standard trip is assumed to be 10km.

⁴⁰ <https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting>

⁴¹ <https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting>

- Less than once a month: 0.5 standard trips per month (60km/year).
- Once or twice a month: 1.5 standard trips per month (180km/year).
- Once a week: 1 standard trip per week (520km/year).
- Several times a week: 5 standard trips per week (2600km/year).

Sources:

- UK DEFRA's "Government conversion factors for company reporting of greenhouse gas emissions"⁴²
- UITP Taxi & Ride-hailing Committee "GLOBAL TAXI BENCHMARKING STUDY 2019"⁴³
- Taxikurir - Average trip in Sweden⁴⁴
- European Commission "Study on passenger transport by taxi, hire car with driver and ridesharing in the EU"⁴⁵

2.4.3 How many minutes per day do you typically travel by bus?

Option: user enters the estimated time traveled by bus

Formula:

Time traveled by bus x 20 KPH x emission factor for average local bus

Assumptions:

Applicable emission factor is "average local bus" from the DEFRA database, as it has the highest emission factor. Average speed of the bus is assumed to be 20 kilometers per hour (KPH). The same time is traveled 5 days per week and 45 weeks per year.

Sources:

UK DEFRA's "Government conversion factors for company reporting of greenhouse gas emissions"⁴⁶

2.4.4 How many minutes per day do you typically travel by subway/tram?

Option: user enters the time traveled, in minutes, on weekdays, Saturdays and Sundays

Formula:

Time traveled by subway/tram x 40 kph x emission factor for subway, light rail and tram

⁴² <https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting>

⁴³ https://cms.uitp.org/wp/wp-content/uploads/2020/11/Statistics-Brief-Taxi-Benchmarking_NOV2020-web.pdf

⁴⁴ <https://www.taxikurir.se/stockholm>

⁴⁵ <https://ec.europa.eu/transport/sites/default/files/2016-09-26-pax-transport-taxi-hirecar-w-driver-ridesharing-country-reports.pdf>

⁴⁶ <https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting>

Assumptions:

Average speed of the subway is assumed to be 40 KPH. The same time is traveled 5 days per week and 45 weeks per year.

Sources:

UK DEFRA's "Government conversion factors for company reporting of greenhouse gas emissions"⁴⁷

3. Shopping

3.1 Clothing

3.1.1 How many items of clothing do you typically buy per year?

Option: user enters number of clothing items purchased in the year. More information needed

3.1.2 How many of those are typically second hand?

Option: user enters the number of clothing items purchased in the year which are second hand

Formula:

Number of clothing pieces purchased x (1 - % second hand) x average cradle-to-grave emission factor for clothes listed in ADEME

Assumptions:

When the user does not know the exact number of clothing pieces purchased during the year, the user can enter the approximate number of pieces in general and the emission factor used is the average from options provided by ADEME. Emissions associated with second hand items are considered zero.

Sources:

ADEME, France, "Modélisation et évaluation du poids carbone de produits de consommation et biens d'équipement"⁴⁸

3.2 Shoes

3.2.1 How many pairs of shoes do you typically buy per year?

Option: user enters number of pairs of shoes purchased in the year. More information needed

⁴⁷ <https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting>

⁴⁸ <https://librairie.ademe.fr/consommer-autrement/1190-modelisation-et-evaluation-du-poids-carbone-de-produits-de-consommation-et-biens-d-equipement.html>

3.2.2 How many of those shoes are typically second hand?

Option: user enters the number of shoes purchased in the year which are second hand

Formula:

Number of pairs of shoes purchased x (1 - % second hand) x emission factor for shoes listed in ADEME

Assumptions:

Emissions associated with second hand shoes are considered zero.

Sources:

ADEME, France, "Modélisation et évaluation du poids carbone de produits de consommation et biens d'équipement"⁴⁹

3.3 Online shopping

3.3.1 Do you buy goods online to be delivered to your home?

Options:

- A. Yes: more information needed
- B. No: emissions are zero

3.3.2 How many times per month do you receive these deliveries?

Option: user enter number of deliveries to the home

Formula:

Number of deliveries per month x 12 months x last mile delivery factor/0.50

Assumptions:

400 grams of CO₂ are emitted per home delivery on average. This is the highest value for emissions in last mile delivery considered in the UBA study: 400 g/1 package delivery. Last mile delivery corresponds to 50% of the total emissions (packaging, operation of the storage center, and shipping to the package distribution center) as indicated in the UBA study. Emissions from delivered goods include returns.

Sources:

Umwelt Bundesamt (German Environmental Federal Agency) – The greening of online commerce (in German)⁵⁰

⁴⁹ <https://bibrairie.ademe.fr/consommer-autrement/1190-modelisation-et-evaluation-du-poids-carbone-de-produits-de-consommation-et-biens-d-equipement.html>

⁵⁰ https://www.umweltbundesamt.de/sites/default/files/medien/5750/publikationen/2020_12_03_texte_227-2020_online-handel.pdf

3.4 Appliances

3.4.1 If any, how many domestic appliances, such as washing machines or refrigerators, have you bought in the past year?

Options: user enters the number of appliances bought during the last year

Formula:

Number of domestic appliances x average emission factor for domestic appliances

Assumption:

The average emission factor for domestic appliances is based on items from the source belonging to this category.

Sources:

ADEME, France, "Modélisation et évaluation du poids carbone de produits de consommation et biens d'équipement"⁵¹

3.4.2 If any, how many smartphones have you bought in the past year?

Options: user enters the number of smartphones bought during the last year

Formula:

Number of smartphones x emission factor for smartphones

Assumption:

The average emission factor for smartphones is based on items from the source belonging to this category.

Sources:

ADEME, France, "Modélisation et évaluation du poids carbone de produits de consommation et biens d'équipement"⁵²

3.4.3 If any, how many laptops have you bought in the past year?

Options: user enters the number of laptops bought during the last year

Formula:

Number of laptops x average emission factor for laptops

Assumption:

The average emission factor for laptops is based on items from the source belonging to this category.

⁵¹ <https://librairie.ademe.fr/consommer-autrement/1190-modelisation-et-evaluation-du-poids-carbone-de-produits-de-consommation-et-biens-d-equipement.html>

⁵² <https://librairie.ademe.fr/consommer-autrement/1190-modelisation-et-evaluation-du-poids-carbone-de-produits-de-consommation-et-biens-d-equipement.html>

Sources:

ADEME, France, "Modélisation et évaluation du poids carbone de produits de consommation et biens d'équipement"⁵³

3.4.4 If any, how many desktop computers have you bought in the past year?

Options: user enters the number of desktop computers bought during the last year

Formula:

Number of desktop computers x average emission factor for desktop computers

Assumption:

The average emission factor for desktop computers is based on a number of items from the source belonging to this category.

Sources:

ADEME, France, "Modélisation et évaluation du poids carbone de produits de consommation et biens d'équipement"⁵⁴

3.4.5 If any, how many electronic appliances, such as TVs, gaming consoles, or smart speakers have you bought in the past year?

Options: user enters the number of electric appliances bought during the last year

Formula:

Number of electric appliances x average emission factor for electric appliances

Assumption:

The average emission factor for electric appliances is based on a number of items from the source belonging to this category.

Sources:

ADEME, France, "Modélisation et évaluation du poids carbone de produits de consommation et biens d'équipement"⁵⁵

3.5 Consumption of other products

3.5.1 How much do you typically spend (€) on furniture per year?

Options: user enters the cost associated with furniture purchase during the year

Formula:

∑ Cost of furniture x emission factor for furniture

⁵³ <https://librairie.ademe.fr/consommer-autrement/1190-modelisation-et-evaluation-du-poids-carbone-de-produits-de-consommation-et-biens-d-equipement.html>

⁵⁴ <https://librairie.ademe.fr/consommer-autrement/1190-modelisation-et-evaluation-du-poids-carbone-de-produits-de-consommation-et-biens-d-equipement.html>

⁵⁵ <https://librairie.ademe.fr/consommer-autrement/1190-modelisation-et-evaluation-du-poids-carbone-de-produits-de-consommation-et-biens-d-equipement.html>

Sources:

ADEME, France, "Modélisation et évaluation du poids carbone de produits de consommation et biens d'équipement"⁵⁶

3.6 General services

3.6.1 How much do you typically spend (€) on cultural and sports events per year?

Option: user enters the amount of money spent for these services in the year

Formula:

Amount spent x emission factor per unit money spent

Assumptions:

Different countries have the same emission factor.

Sources:

Exiobase, Input-output model⁵⁷

3.6.2 How much do you typically spend (€) on beauty salon/hairdresser services per year?

Option: user enters the amount of money spent for these services in the year

Formula:

Amount spent x emission factor per unit money spent

Assumptions:

Different countries have the same emission factor.

Sources:

Exiobase, Input-output model⁵⁸

4. Food

4.1 Diet

4.1.1 What diet most accurately describes a regular week for you?

Options: user selects the diet type that comes closer to their own

- A. Vegan
- B. Vegetarian

⁵⁶ <https://bibrairie.ademe.fr/consommer-autrement/1190-modelisation-et-evaluation-du-poids-carbone-de-produits-de-consommation-et-biens-d-equipement.html>

⁵⁷ <https://github.com/tmrowco/bloom-contrib/tree/master/CO2eq/purchase/exiobase>

⁵⁸ <https://github.com/tmrowco/bloom-contrib/tree/master/CO2eq/purchase/exiobase>

C. Pescetarian

D. Meat-based

Formula:

Based on the country of the user and the selected diet type, the calculator selects the corresponding emissions value

Sources:

Country-specific dietary shifts to mitigate climate and water crises, in Science Direct, 2019⁵⁹

⁵⁹ <https://www.sciencedirect.com/science/article/pii/S0959378018306101?via%3Dihub>

Annex I

List of Geographical Regions

- A. Northern Europe
- B. Western Europe
- C. Southern Europe
- D. Eastern Europe
- E. Northern Africa
- F. Middle Africa
- G. Southern Africa
- H. Middle East
- I. Western Asia
- J. Eastern Asia
- K. Southern Asia
- L. South-Eastern Asia
- M. Australia and New Zealand
- N. Northern America
- O. South America
- P. Eastern Africa
- Q. Western Africa
- R. Caribbean
- S. Central America
- T. Central Asia
- U. Melanessia
- V. Micronesia
- W. Polynesia