Project Reference Number: 2020-1-FR01-KA203-080260

IO2 - Development of a CO2 visualisation tool to reduce the Erasmus+ carbon footprint.

T2.1. Inventory of visualisation tools

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KA203 - Strategic Partnerships for higher education

Contents

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1. Introduction

This report is intended to present the main tools and methodologies that are used for the calculation of the carbon footprint and are publicly available online, in order to pave the way for the development of a visualization tool to reduce the Erasmus+ carbon footprint, as it is described in the Intellectual Output 2 of the project.
The calculators presented in this report are widely used and aim at providing information regarding the impact of one's lifestyle in CO_2 emissions, free of charge.

2. Available carbon footprint calculators

2.1 Carbon Footprint

The "Carbon Footprint" calculator was developed by the Carbon Footprint Ltd., a private company, consisting of environmental consultants, climate change engineers and scientists, which provides expert support on carbon reductions and sustainability management. Among else, the company has developed several tools to calculate the carbon footprint of individuals and small or large businesses. The use of the calculator is free for the individuals who wish to calculate their carbon footprint and understand their impact on environment.

Figure 1 The trademark of the Carbon Footprint calculator

The free calculator for individuals, is structured as a form consisting of the following eight (8) tabs:

- ***"Welcome"***, in which the user enters their country and the period of for the calculation.
- ***"House",*** which addresses the energy consumption of the user's household.
- ***"Flights",*** which calculates the carbon dioxide equivalent (CO_2e[1]) of the user's flights.
- ***"Car",*** which allows the user to choose up to two (2) cars available at their car database or simply enter their efficiency.
- ***"Motorbike",*** in which the user is allowed to enter up to two (2) motorbikes and their mileage and type or their efficiency.
- ***"Bus & Rail"***, in which the user can fill the miles they used for various means of public transport (bus, coach, local train, long distance train, tram, subway and taxi)

[1] Carbon dioxide equivalent (CO_2e) is a metric measure used to compare the emissions from various greenhouse gases on the basis of their global-warming potential (GWP), by converting amounts of other gases to the equivalent amount of carbon dioxide with the same warming potential. (https://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Carbon_dioxide_equivalent)

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- ***"Secondary"***, in which the user enters an estimation of the amount spent in various activities, in order to calculate their secondary carbon footprint. The activities vary from food products to pharmaceuticals and from clothes to recreational activities.
- ***"Results"***, where the calculator results are presented. Finally, the user can compensate their emissions by funding a CO_2e saving elsewhere, via "Carbon Offset Projects".

The methodology used by the Carbon Footprint calculator is aligned with the "Greenhouse gas reporting: conversion factor 2020" by the UK Government with a few exceptions, as it is described in detail by the website.

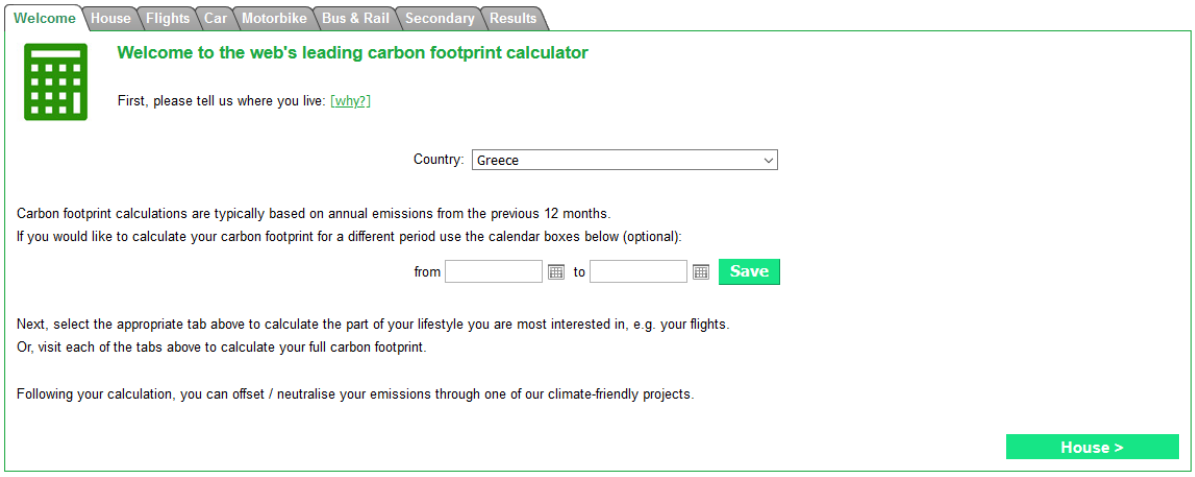

Image 1 The "welcome" tab of the Carbon Footprint calculator

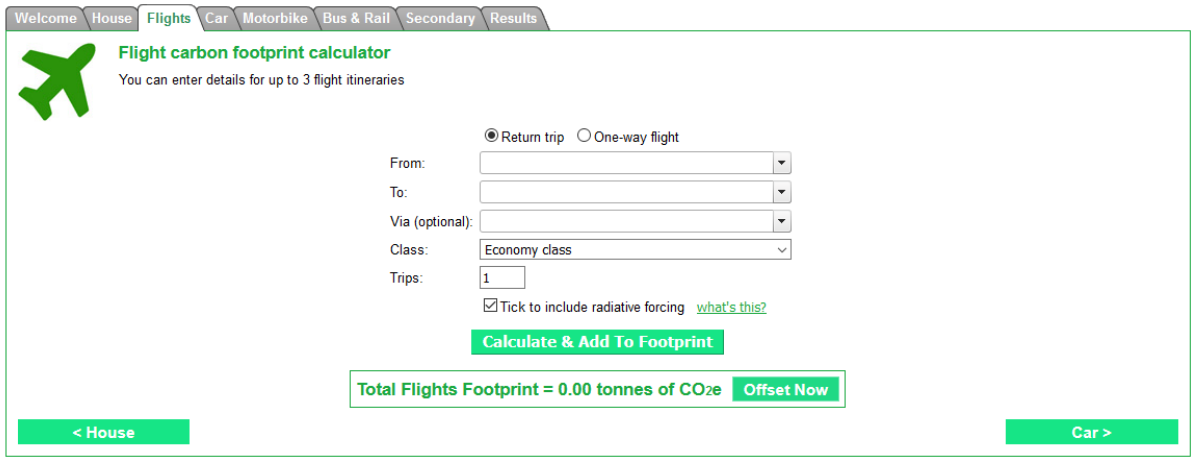

Image 2 In the "Flight" tab the user is prompted to enter details regarding their flight itineraries (max. 3). Such details are the departure/arrival airport, whether they have any stops and ticket's class.

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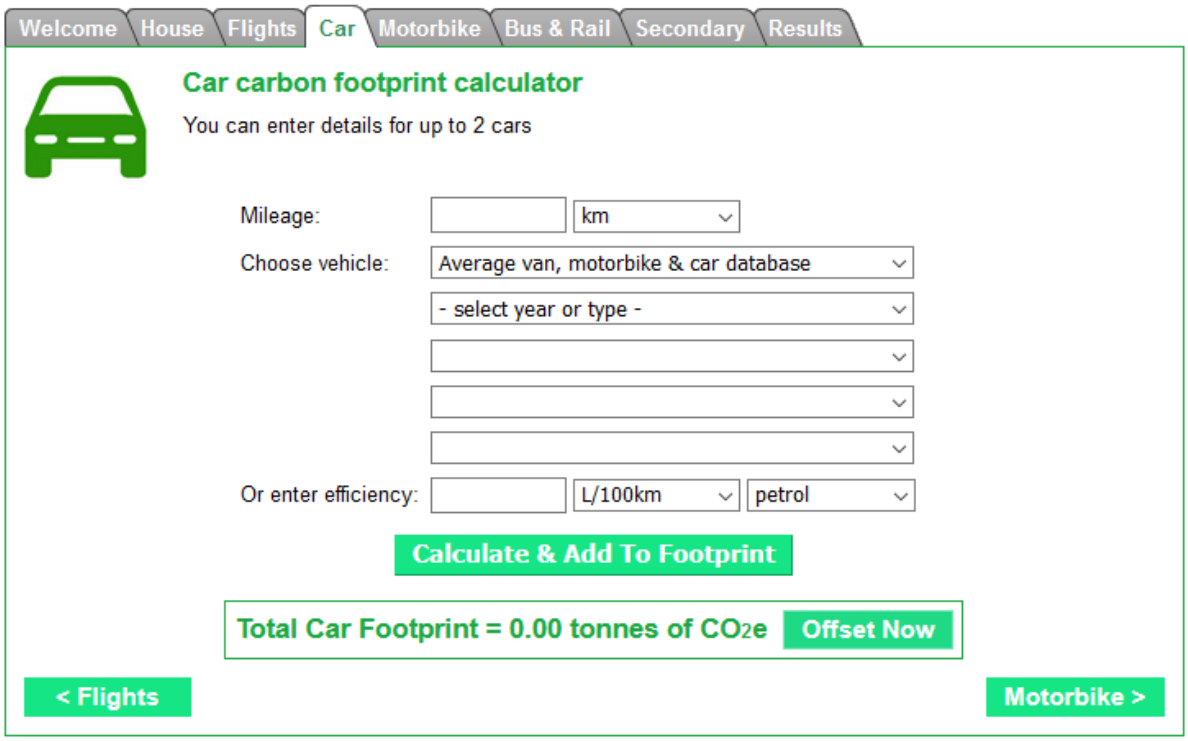

Image 3 The "Car" tab as seen by a visitor. As input the user enters the vehicle's type or its efficiency and its mileage.

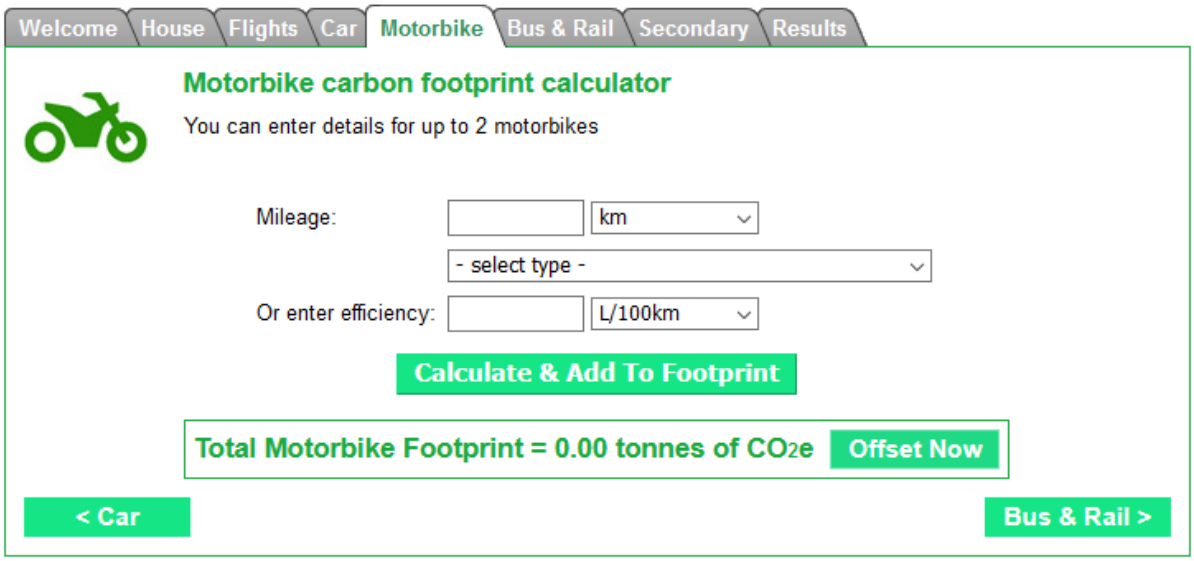

Image 4 Similar to the "Car" tab, the "Motorbike" tab allows users to enter the mileage of their motorbike, its type or its efficiency.

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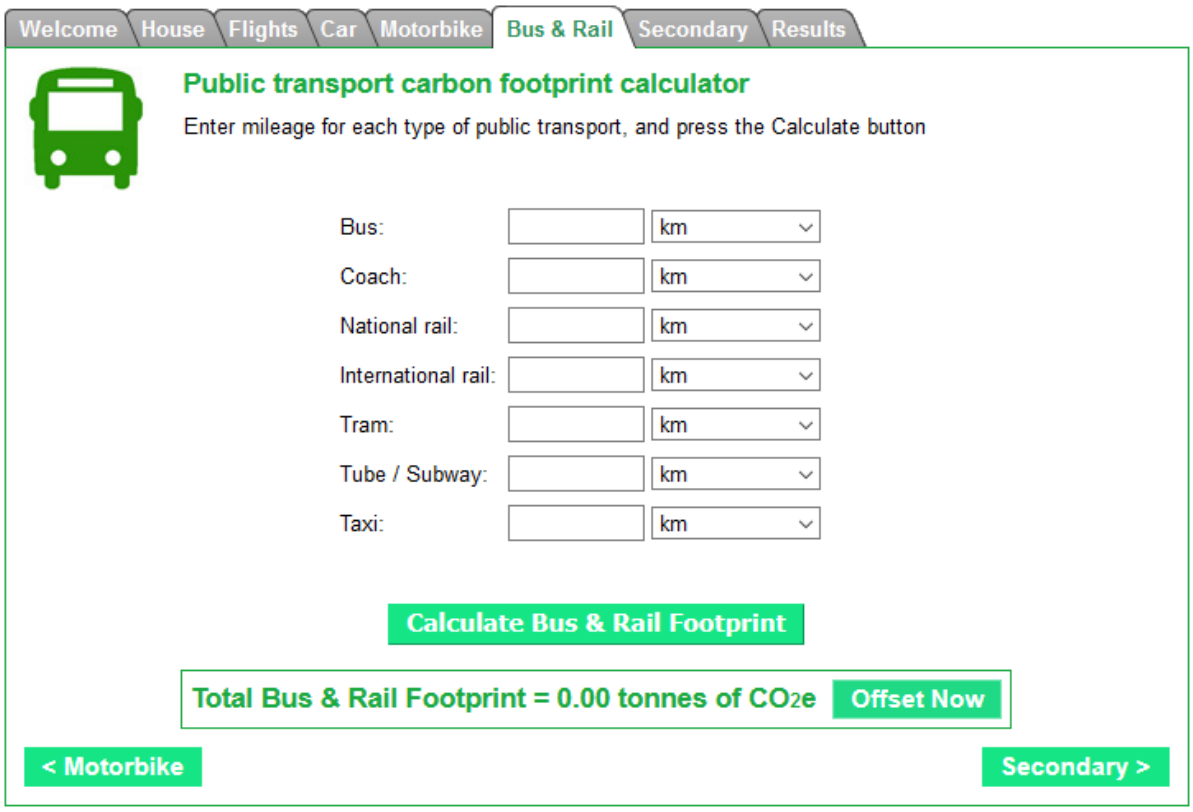

Image 5 The "Bus & Rail" tab prompts the user to enter the distance covered by various public means of transport, such as bus, coach and tram.

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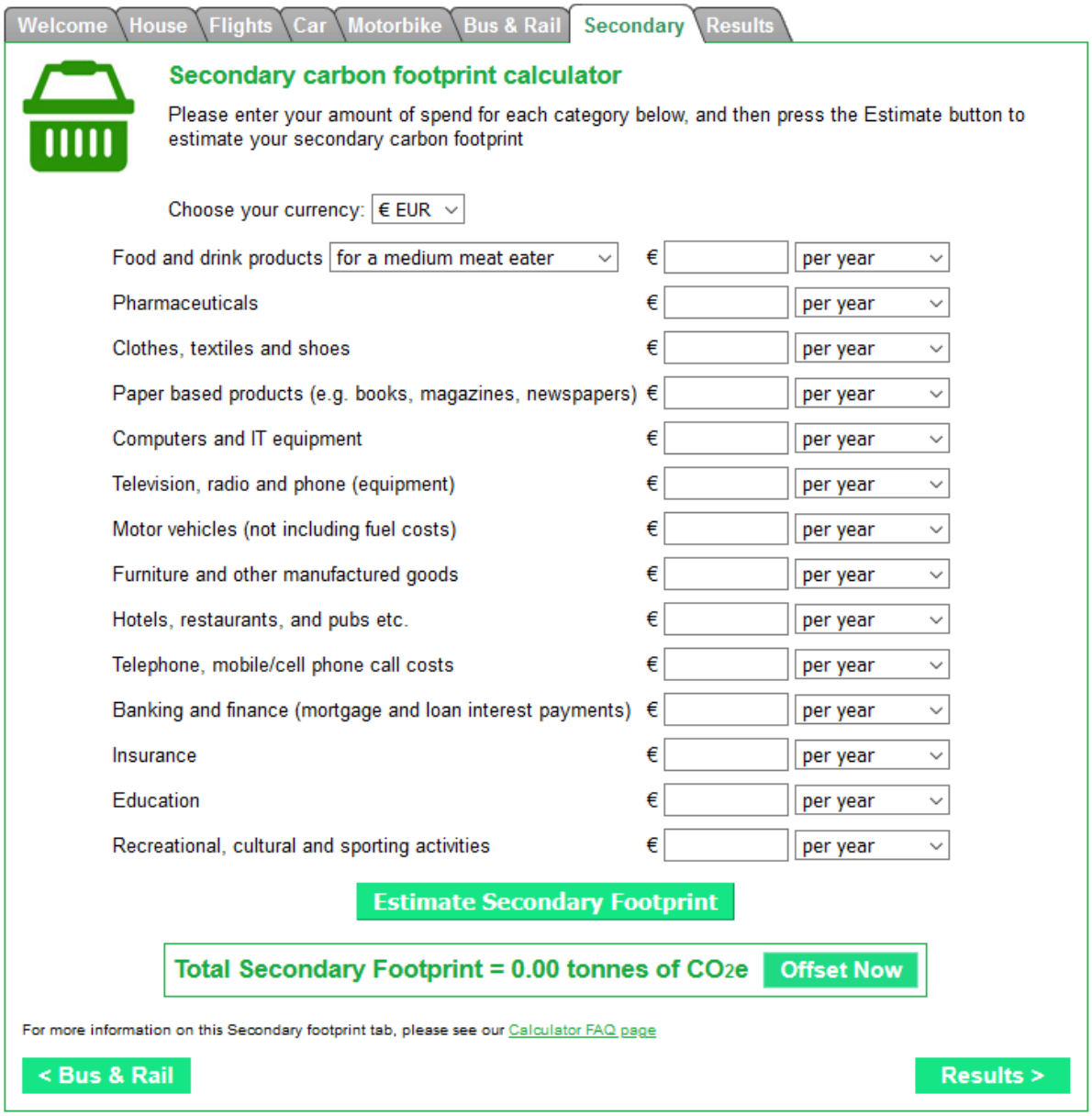

Image 6 In the "Secondary" tab, the user enters information regarding various purchases they make, such as Food and drink products, computers and IT equipment etc.

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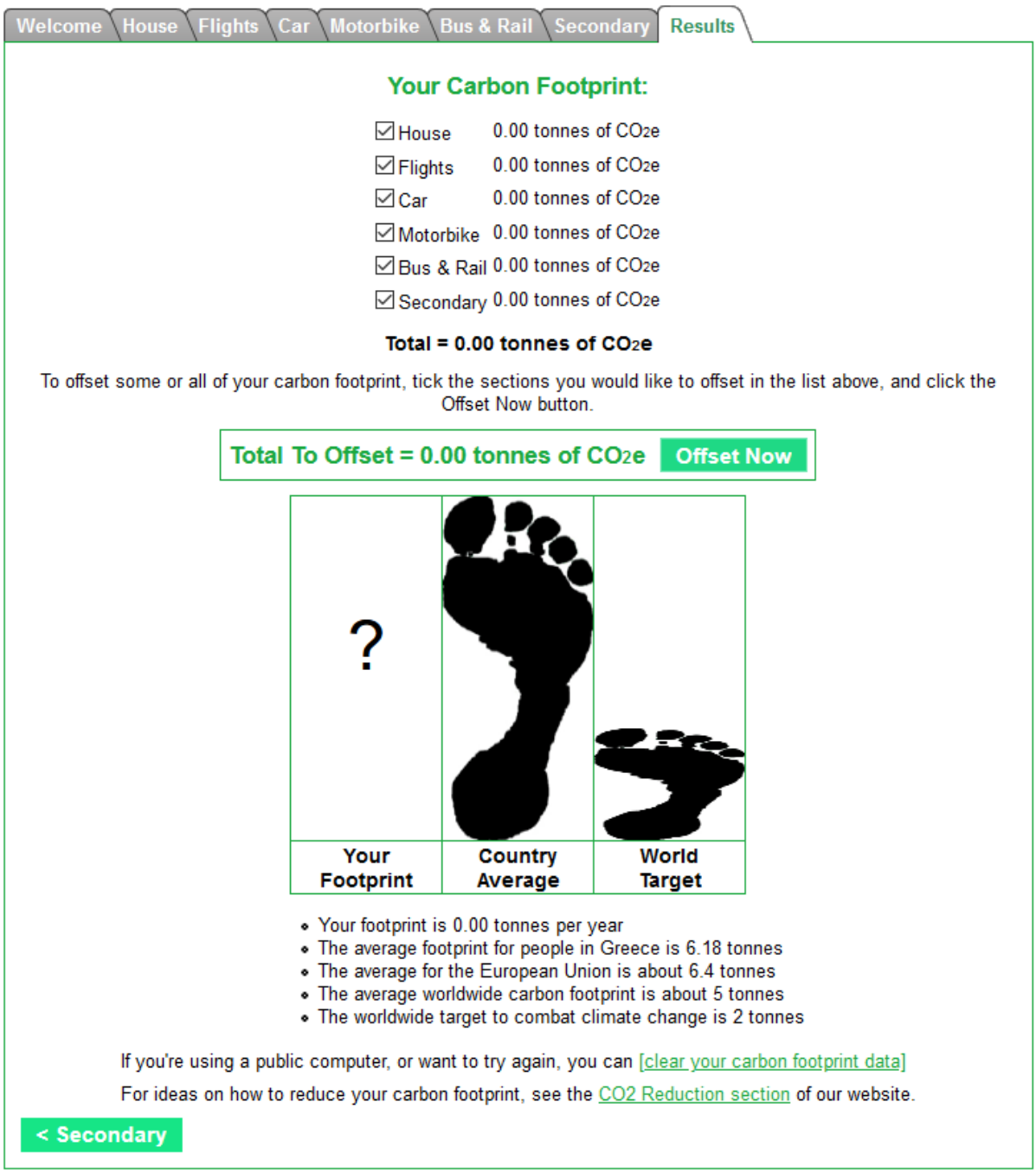

Image 7 In the final tab of the Carbon Footprint calculators, results are presented in a way that the user can easily review how much does each aspect of their choices (House, Flights, Car, Motorbike, Bus & Rail, Secondary) contributes to the user's total carbon footprint and how their results compare to their country's average and the world target.

In conclusion, the Carbon Footprint calculator is characterized as an easy-to-use calculator that allows users to understand comprehensively how their habits contribute to their carbon footprint. The calculator can be found by visiting the following link: https://www.carbonfootprint.com/calculator.aspx. The calculator can be added to a website as it is promoted by the Carbon Footprint Ltd, developer of the calculator.

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2.2 WWF Footprint Calculator

WWF UK has developed an easy-to-use calculator that allows its user to calculate their footprint and to compare it to the score of the average UK citizen. The calculator is designed as a simple questionnaire, in which the user chooses in each question one of the given answers.

The questionnaire is divided into four (4) main sections-categories: Food, Vehicle, House, and Stuff. The questions and answers are descriptive, minimizing the need for manually entering data and simplifying the procedure (from the user's perspective). Example of questions and answers are:

- **How would you best describe your diet?** (Meat in every meal, Meat in some meals, Meat very rarely, No beef, Vegeterian, Vegan)
- **What kind of vehicle do you travel in most often as a driver or passenger? (if any)** (Car, Motorbike, Neither – I walk, cycle or use public transport for all my journeys)
- **What kind of house do you live in?** (Detached, Semi-detached, Terrace, Flat)
- **In a typical month, how much do you spend on clothes and footwear?** (£0, £1-£50, £50-£150, £150+)

In the end the user sees the calculated result and has access to an analytical report for each of the four (4) main categories mentioned above. Moreover, they have access to tips on how they can reduce their overall impact in every category.

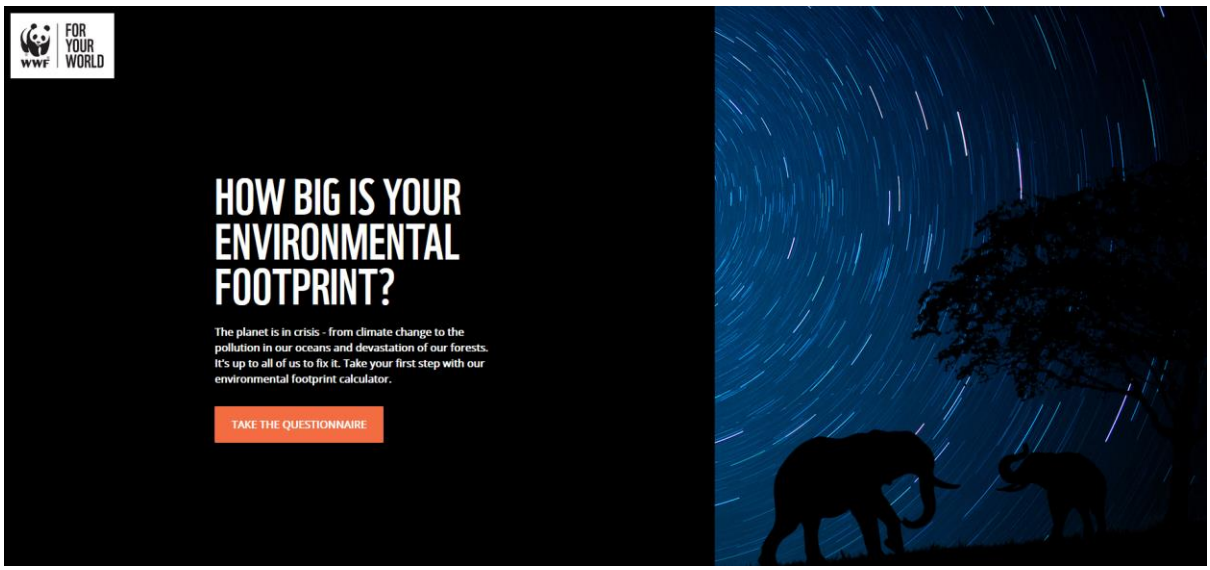

Image 8 Calculator's welcoming page.

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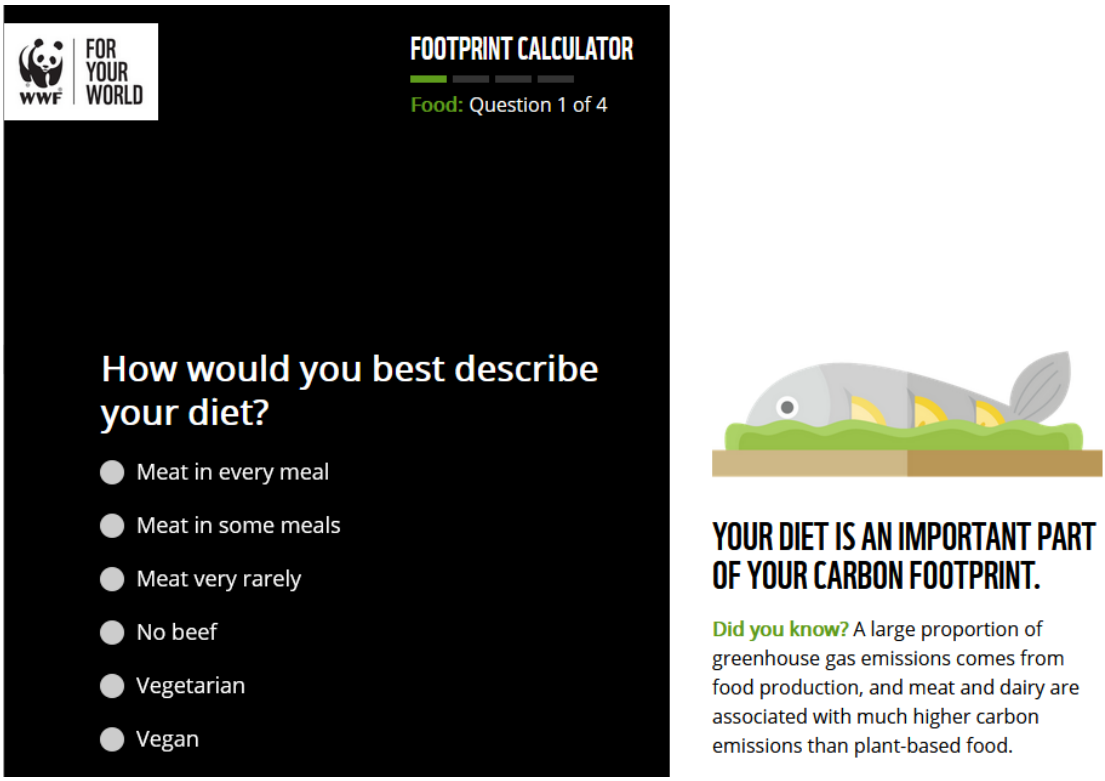

Image 9 The first question of the section "Food".

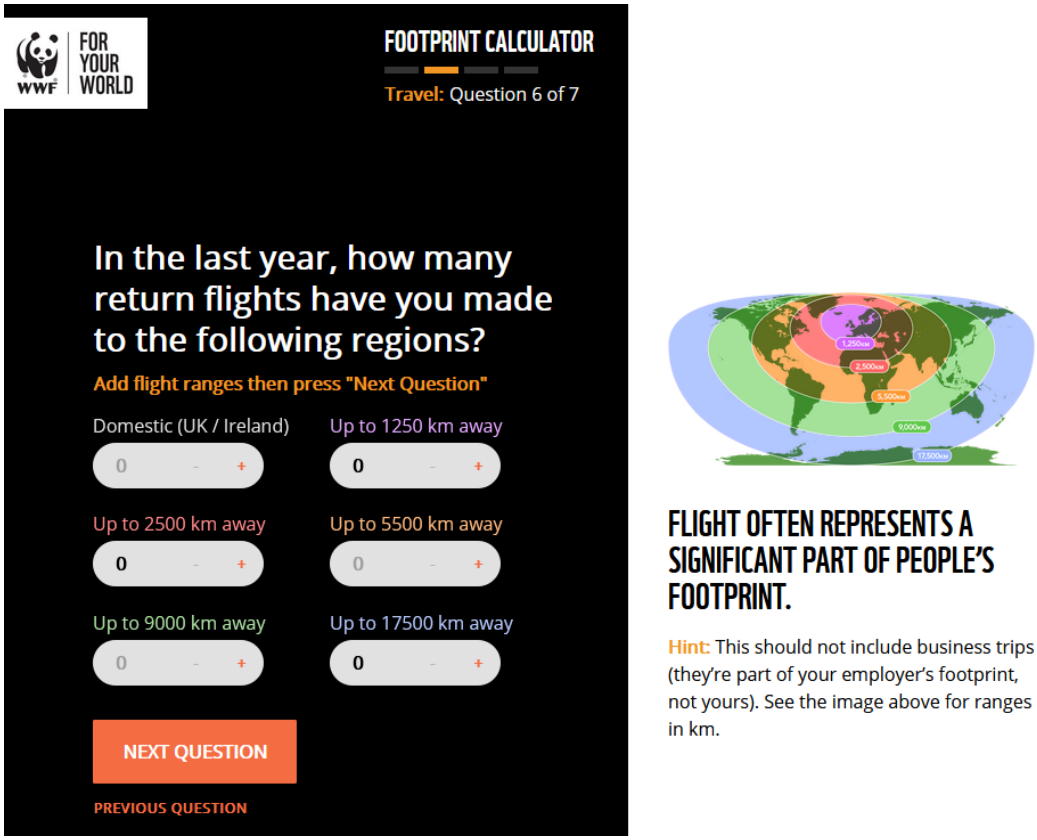

Image 10 Example question of the "Travel" section. Users add the number of flights they make in each range by clicking on the "+" or "-" signs of each range.

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Image 11 Question from the "Home" section.

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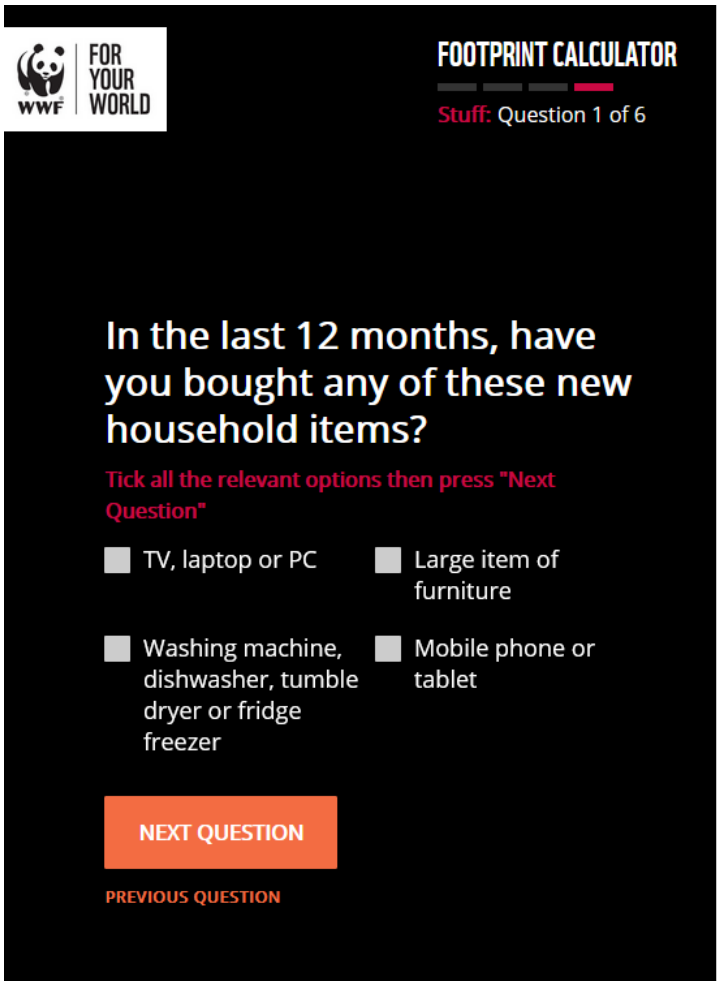

Image 12 Question about the purchases made last year in the "Stuff" section.

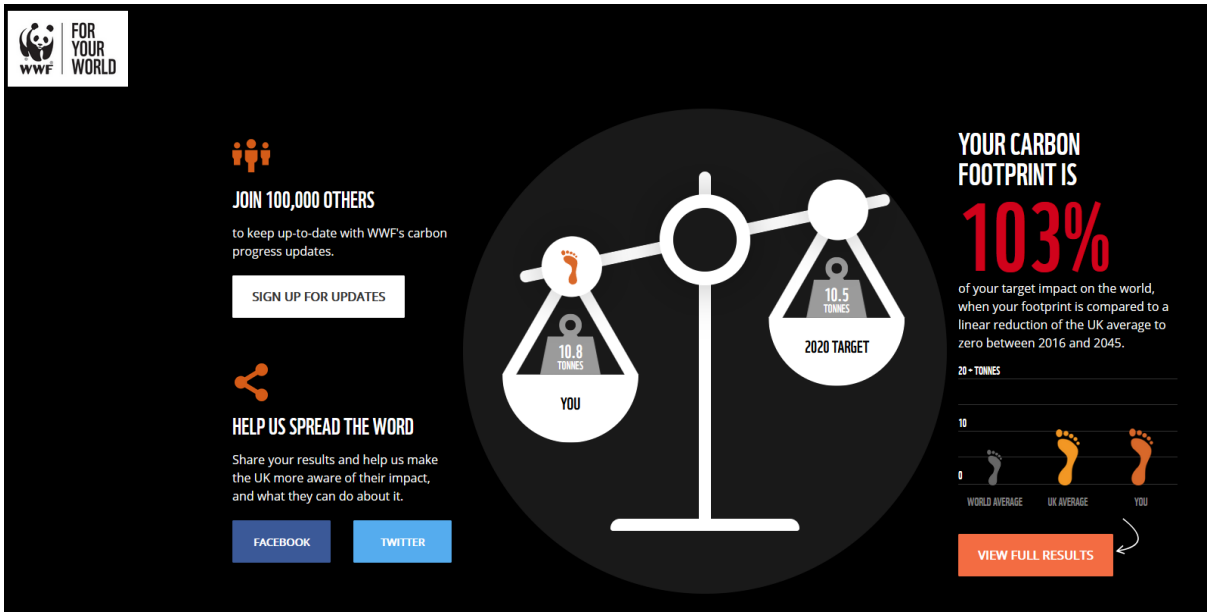

Image 13 By completing the questionnaire the user can view their results compared to the global 2020 target and the UK average and has the choice to view their full results and how they can alter their lifestyles to reduce their footprint.

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As it can be seen from the above images, the calculator has a modern and elegant interface that is user-friendly and provides useful information in each question that connect the question asked to the carbon footprint. Although, one can understand how their lifestyle contribute to their carbon footprint, they cannot get direct information about how their travel and mobility choices are linked to their footprint. Furthermore, the calculator is focused on the United Kingdom and cannot easily be implemented in a broader area.
The calculator can be accessed by visiting this link: https://footprint.wwf.org.uk/.

2.3 Footprint Calculator by Henkel AG & Company KGaA

Henkel AG&Company KGaA has developed a Footprint Calculator in cooperation with the Wuppertal Institute. The user has to answer a questionnaire divided into four (4) main categories: "Housing", "Nutrition", "Mobility" and "Holiday & Leisure", which can be characterized as an extensive but simply to answer one. Questions include:

- **How big is the house or apartment in which you live?**
- **How do you wash your dishes?**
- **What is your diet usually like?**
- **How many cups or glasses (0.25l) of each beverage do you drink per day?**
- **What kind of car do you own?**
- **How often do you engage in the following sports?** (list of sport activities given)
- **Use of online streaming services for music.**

In the end, the user can view their annual calculated footprint and compare it with the global target, the global average and the European average. Furthermore, the calculator provides the equivalent of the user's footprint to "times travelled around the world by car", while it helps the user understand their impact by providing the "amount of soccer fields covered with trees needed" to store their CO_2 annual emissions.

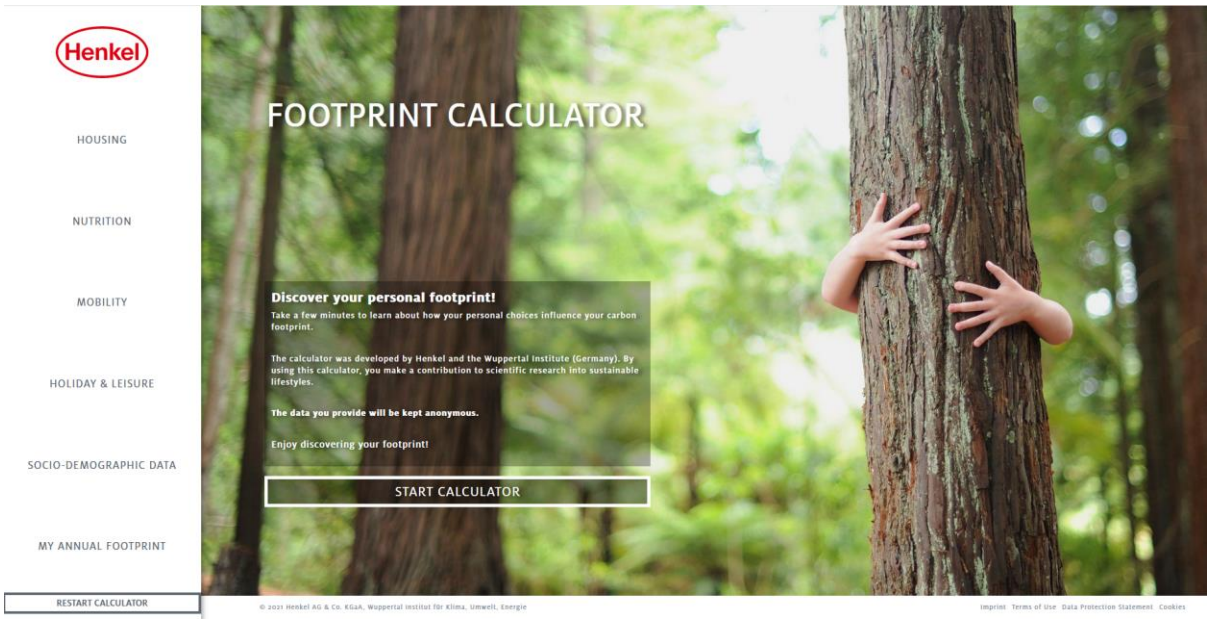

Image 14 The calculator's introductory page. On the right side of the webpage, one can select one of the four (4) main categories to begin with.

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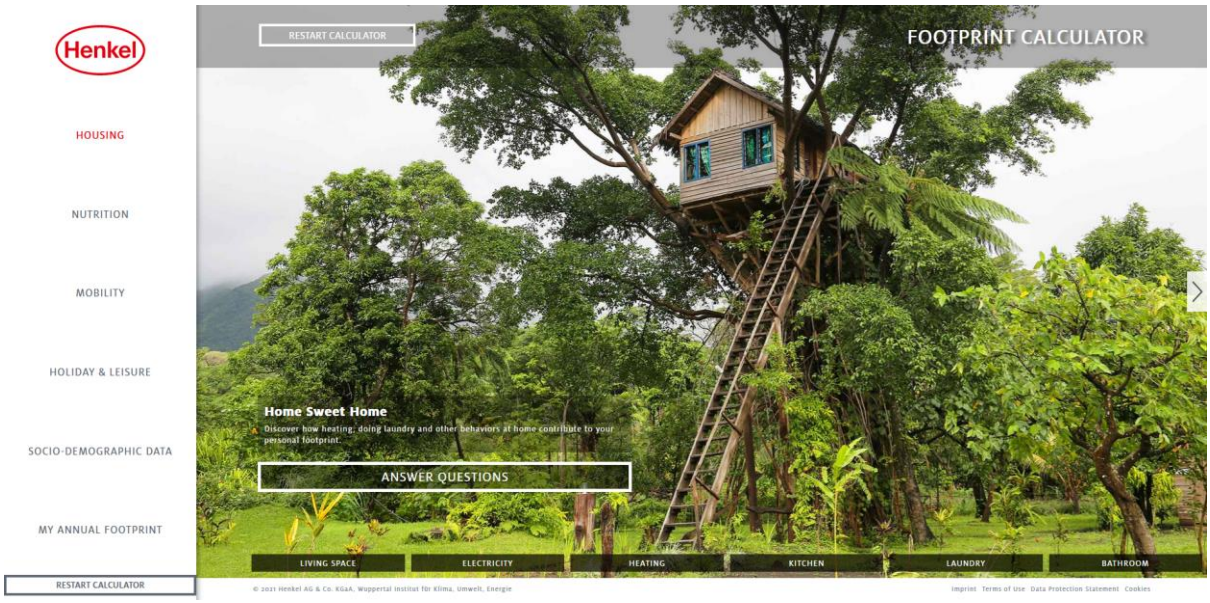

Image 15 The introductory page of the "Housing" category.

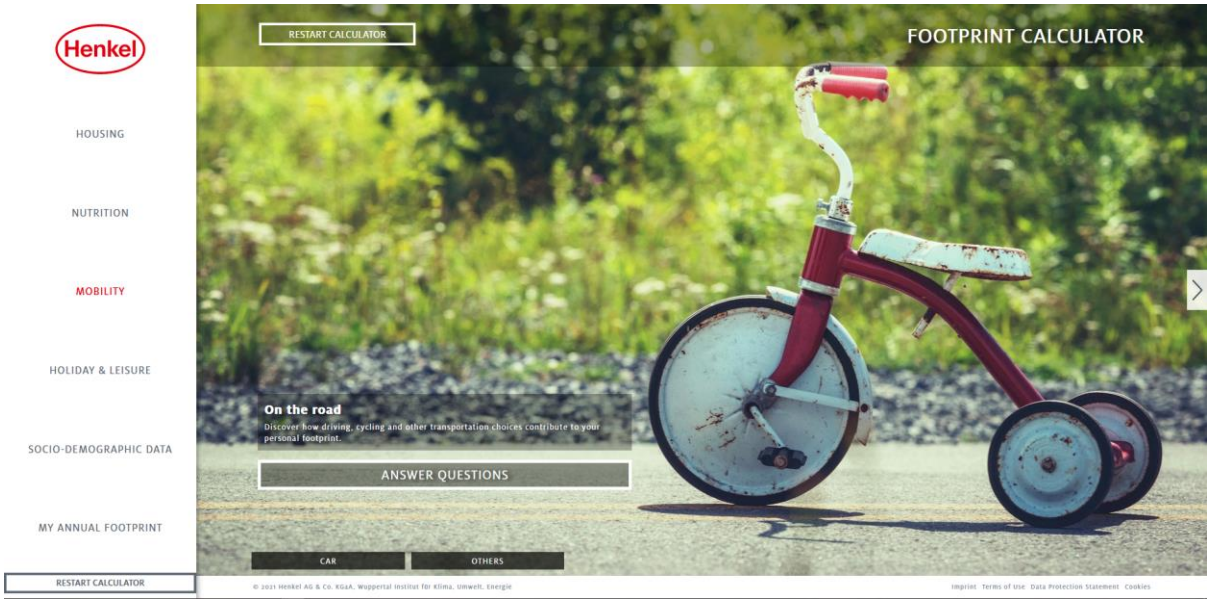

Image 16 The introductory page of the "Mobility" category. The user can directly select the tab "Answer Questions" or the tabs "Car", "Others" found at the bottom of the page.

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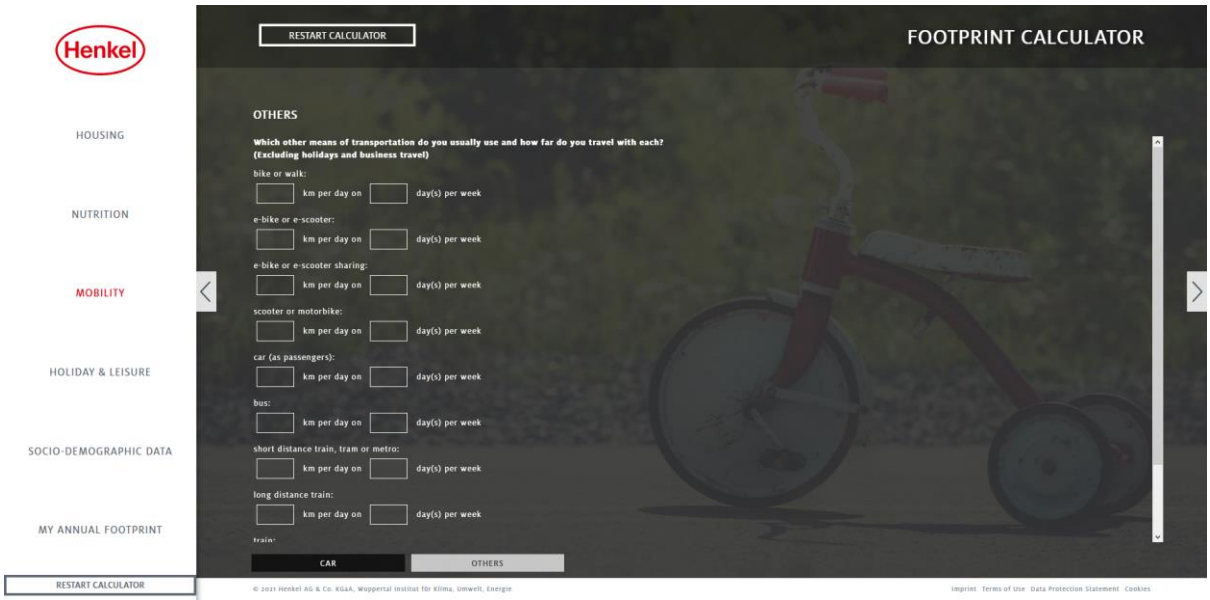

Image 17 For instance, by selecting "Others", users must enter km per day or km per week made by a list of vehicles given below the question.

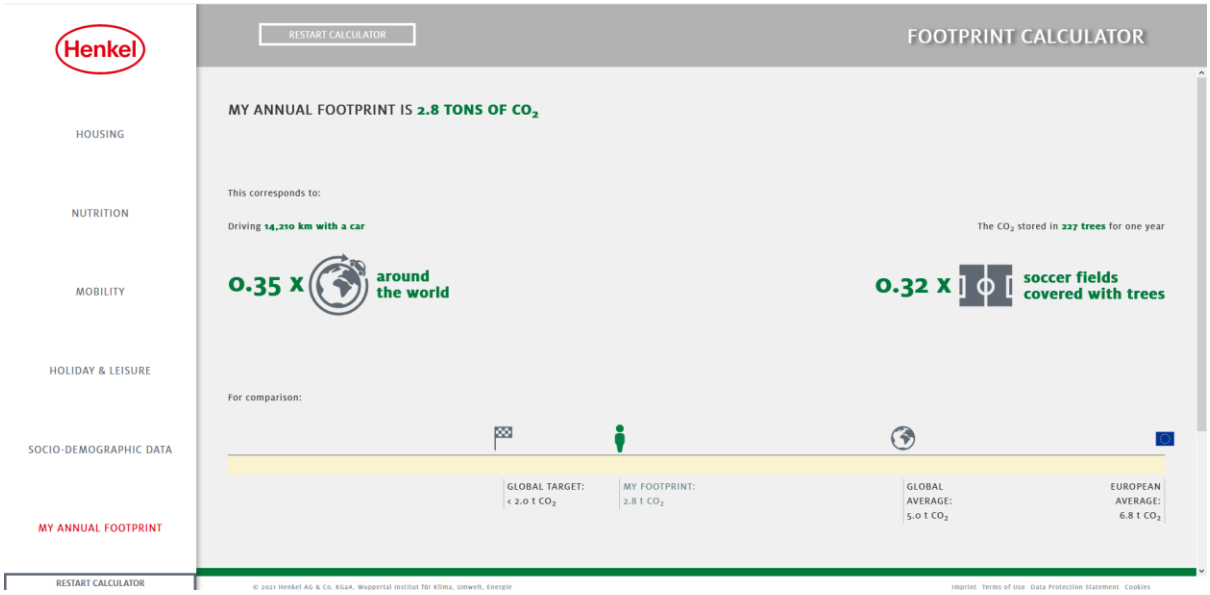

Image 18 After filling all the questions of each section, the results page presents the user's annual footprint and compares it with the global target, the global average and the European average. Furthermore, the calculator provides the equivalent of the user's footprint to "times travelled around the world by car", while it helps the user understand their impact by providing the "amount of soccer fields covered with trees needed" to store their CO2 annual emissions.

Although the calculator is simple and quite analytical regarding the lifestyle of the user, it does not provide detailed information regarding each section. Moreover, one cannot simply fill in the "mobility" section and get results regarding their input. The calculator may be accessed here: https://footprintcalculator.henkel.com/en.

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2.4 ICAO Carbon Emissions Calculator

The International Civil Aviation Organization (ICAO) has developed a methodology to calculate the carbon dioxide emissions form air travel. The simple-to-use ICAO Carbon Emissions Calculator allows passengers to estimate the emissions attributed to their air travel, by filling in the following information about their flight:

- One Way or Round trip
- Cabin Class
- Number of Passengers
- From City/Airport – To City/Airport

By entering the above, the user can view their emissions. The methodology used is freely available.

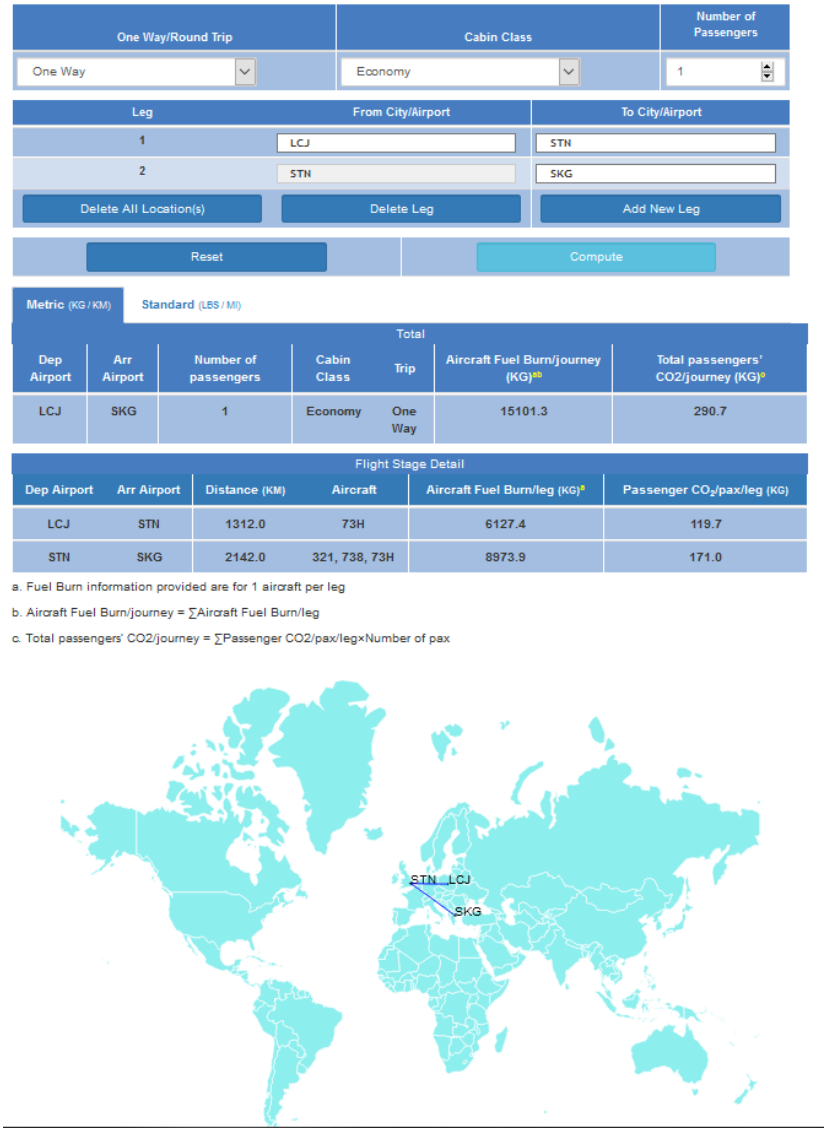

Image 19 The ICAO Carbon Emissions Calculator. The user selects the type of their trip, their cabin class, the number of passengers and their destination details. For instance, in the example presented above, a passenger from Lodz, Poland to Thessaloniki, Greece, with a stop in London, UK produces 290.70kG of CO_2.

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The calculator is simple and easy to use and one can enter only valid information regarding their destination. For instance, in the example presented in the image above, one cannot enter a direct flight from Lodz, Poland to Thessaloniki, Greece, as there is not yet a direct connection. The calculator can be accessed here: https://www.icao.int/environmental-protection/Carbonoffset/Pages/default.aspx

2.5 Ecological Footprint Calculator by GFN

The Ecological Footprint Calculator was created and is managed by the Global Footprint Network, a research organization that responds to climate change that tries to change how the world manages its natural resources. The calculator is based on "National Footprint and Biocapacity Accounts" data for selected nations. Specifically, as it is stated on the Global Footprint Network's site "the national per person Footprint can be allocated to different end-use categories (food, shelter, mobility, goods and services), and land types (forest, cropland, energy, fish, grazing land). This results in a matrix that uses a country's average consumption profile to distribute Ecological Footprint into these different categories.". The personal calculator increases or decreases different parts of the matrix relative to national average behaviour. The calculator is aligned with the international Ecological Footprint Standards, according to which, it is calculated how much biologically productive area is required to produce the resources for the human population and to absorb its carbon dioxide emissions.

The calculator is divided subtly into three (3) main sections: Food, Housing and Transportation, each containing a set of short questions answered by sliding a bar from the worst to the best choice. In some questions, the user can add more details if they wish to improve the accuracy of their calculations, whereas on the bottom right corner there is a "learn more" button that shares useful trivia related to the question asked.

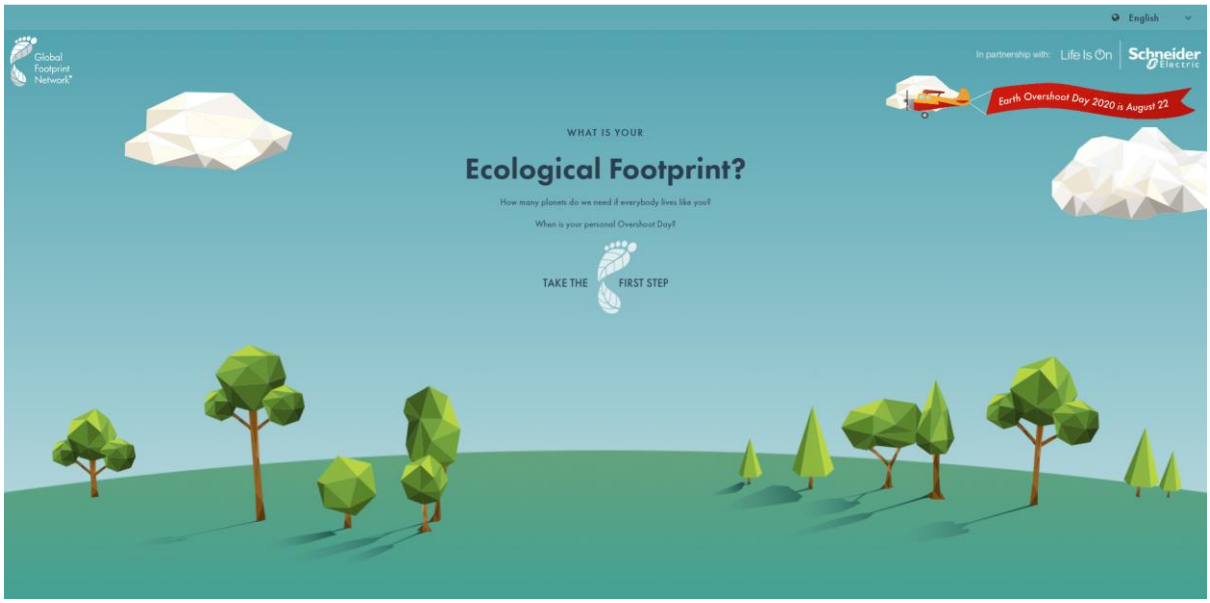

Image 20 The introductory page of the calculator

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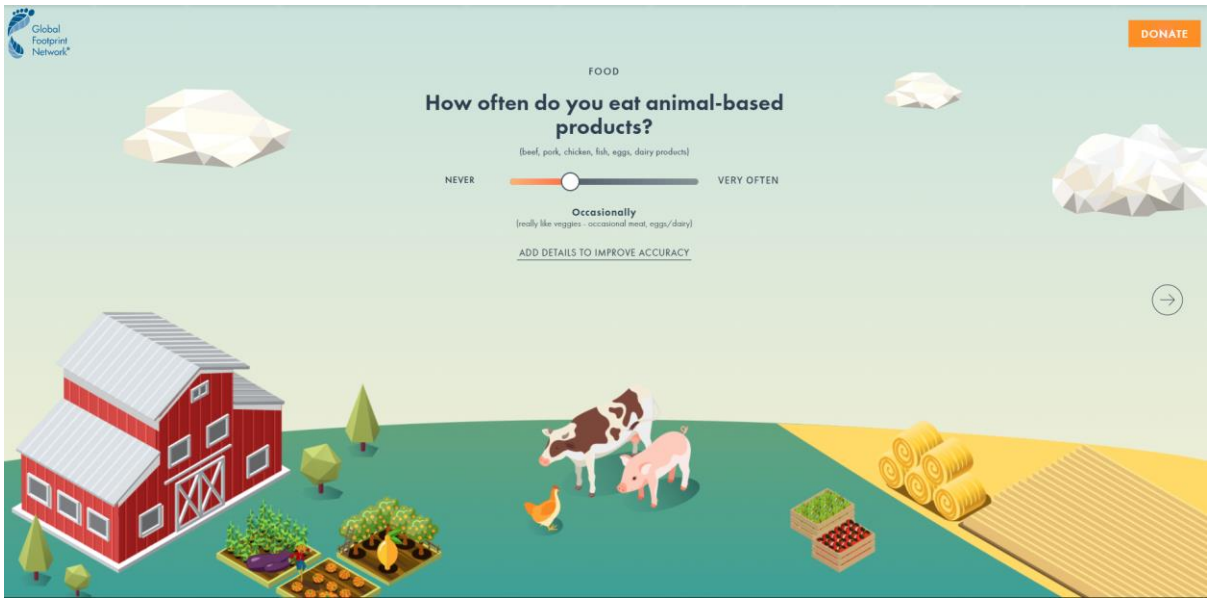

Image 21 A question asked in the "Food" section that allows to add more details to improve the accuracy of the calculations

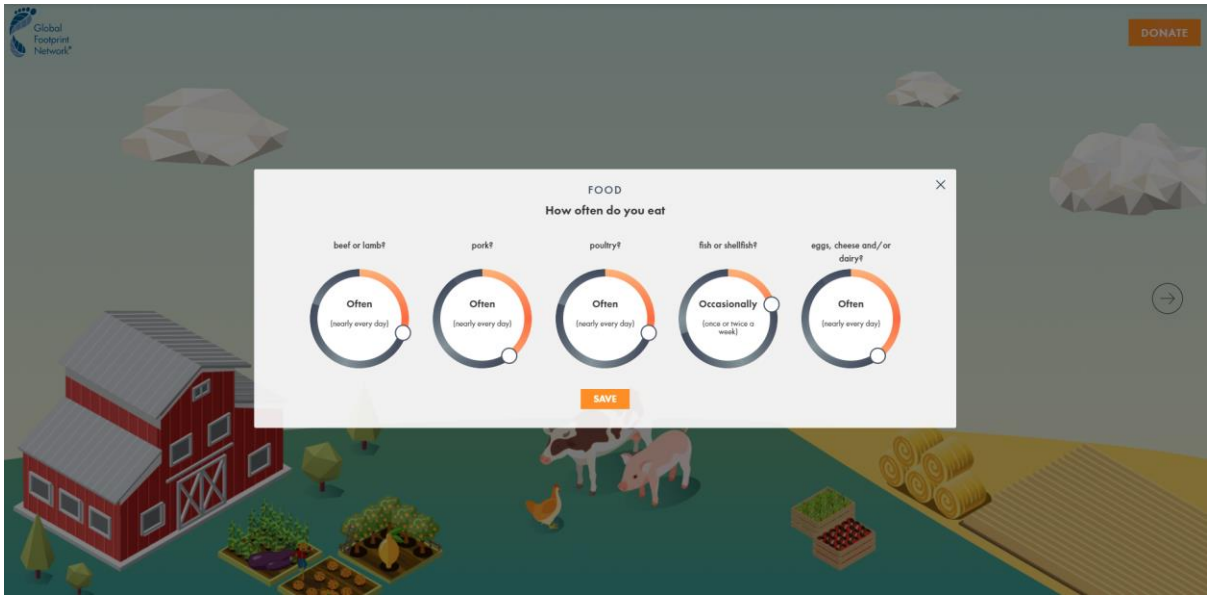

Image 22 By clicking the button "add more details" one can easily add more information regarding the question by sliding the most representing answer

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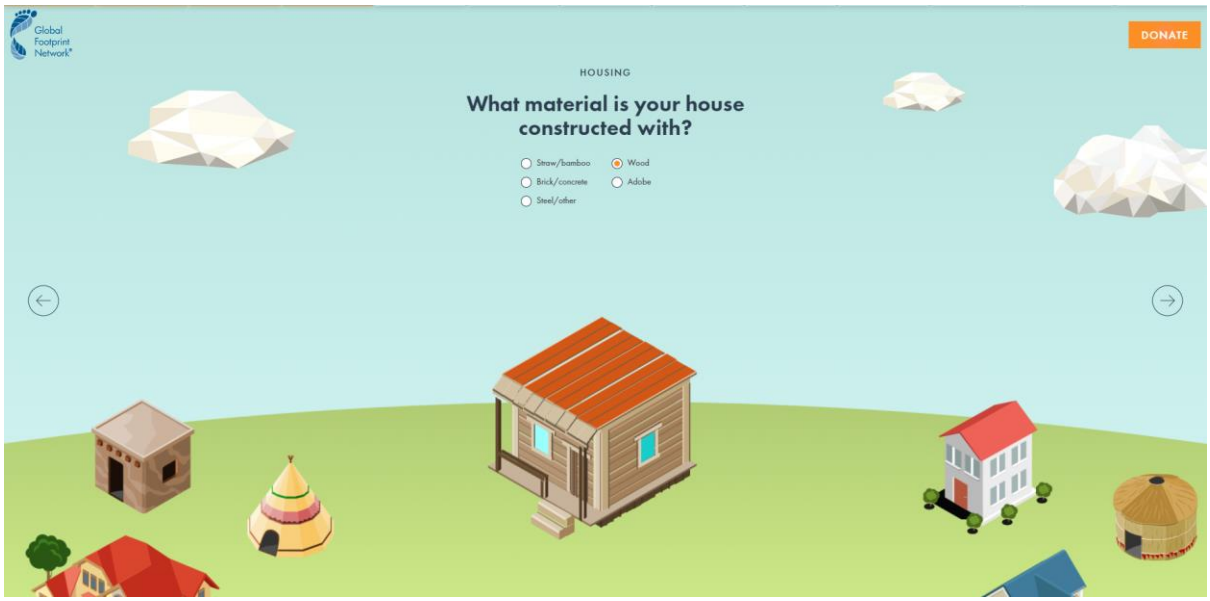

Image 23 Question asked in the "Housing" Section

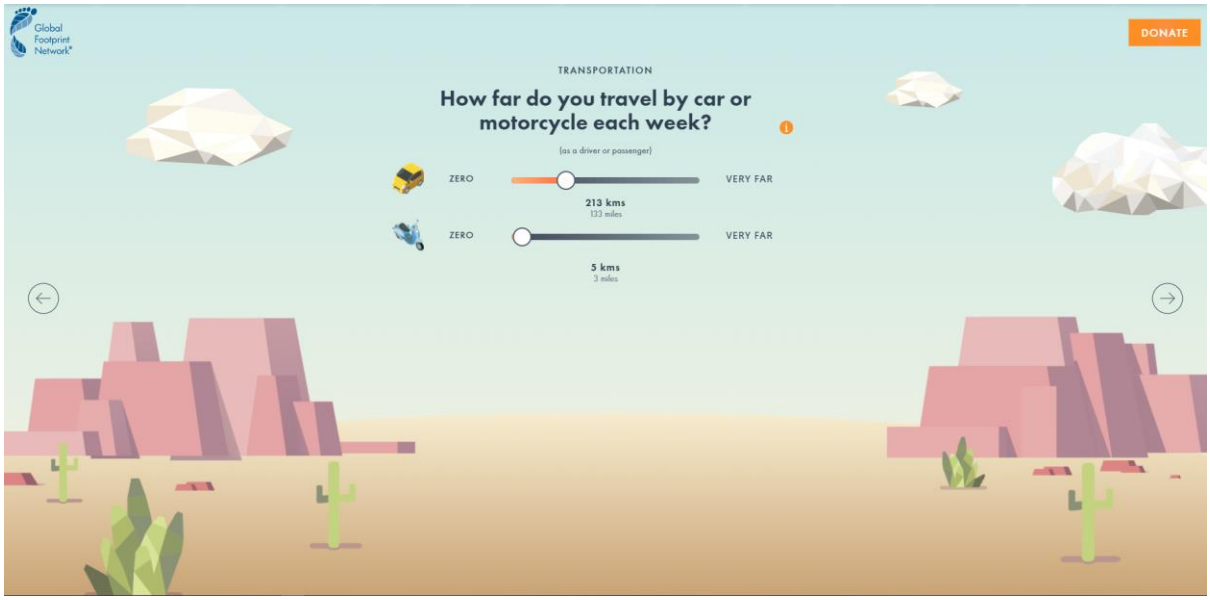

Image 24 Question asked in the "Transportation" section

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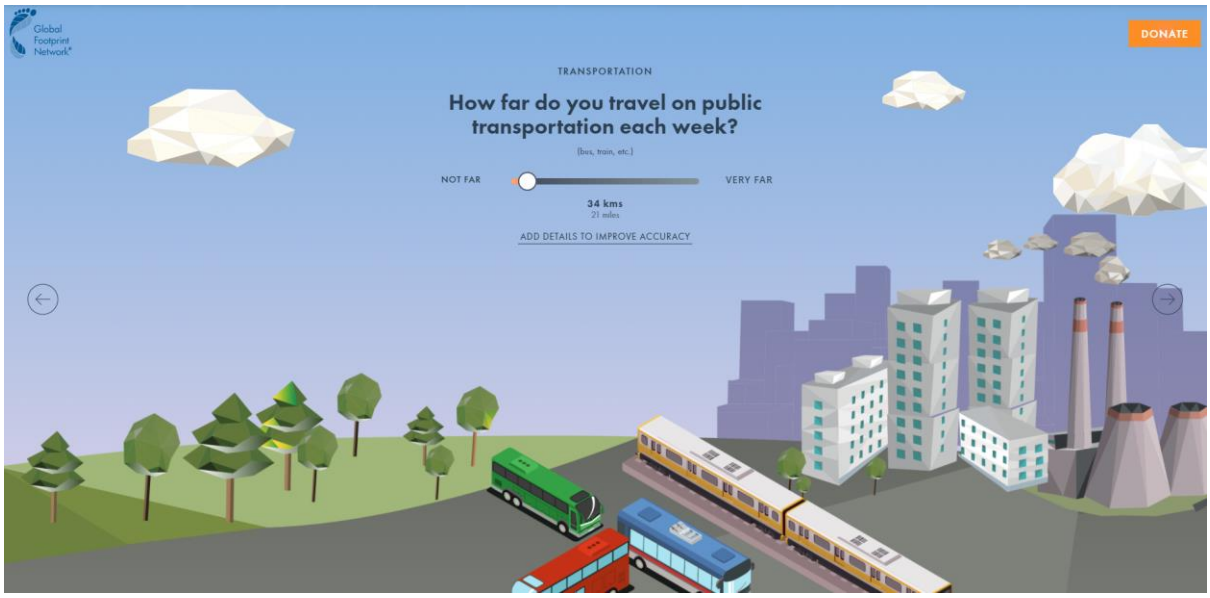

Image 25 Question from the "Transportation" section that refers to the use of public transportation weekly. It does not cover a lot of means of transport besides bus and train.

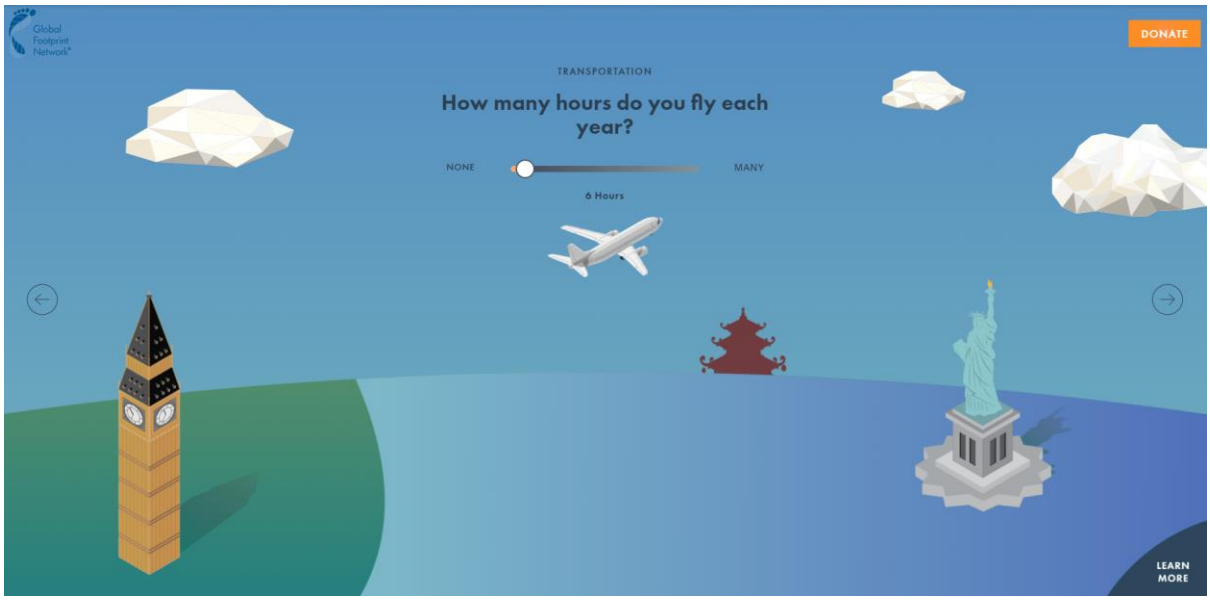

Image 26 Question referred to the number of annual flights. The difference between the previous calculators is that it uses the total flight hour per year rather than the distance between two or more destinations.

In the end, the "Results" section consists of four (4) sub-sections:

- Results Part 1, where the user's personal "Earth Overshoot Day" is presented, and the amount of the "planets" needed to sustain one's lifestyle if everyone lived as they do.
- Results Part 2, where they see how much each sector contributes, to their footprint.
- How do you feel, where the user chooses an emoticon regarding how they feel after they found out their results.

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- How do your results compare to your country, where the user views a global interactive map with each country's results, as they were calculated by using official datasets which comply to the Global Footprint Network quality standards?
- Solution to #Movethedate, where there are simple tips anyone can do to move the earth overshoot day[2].

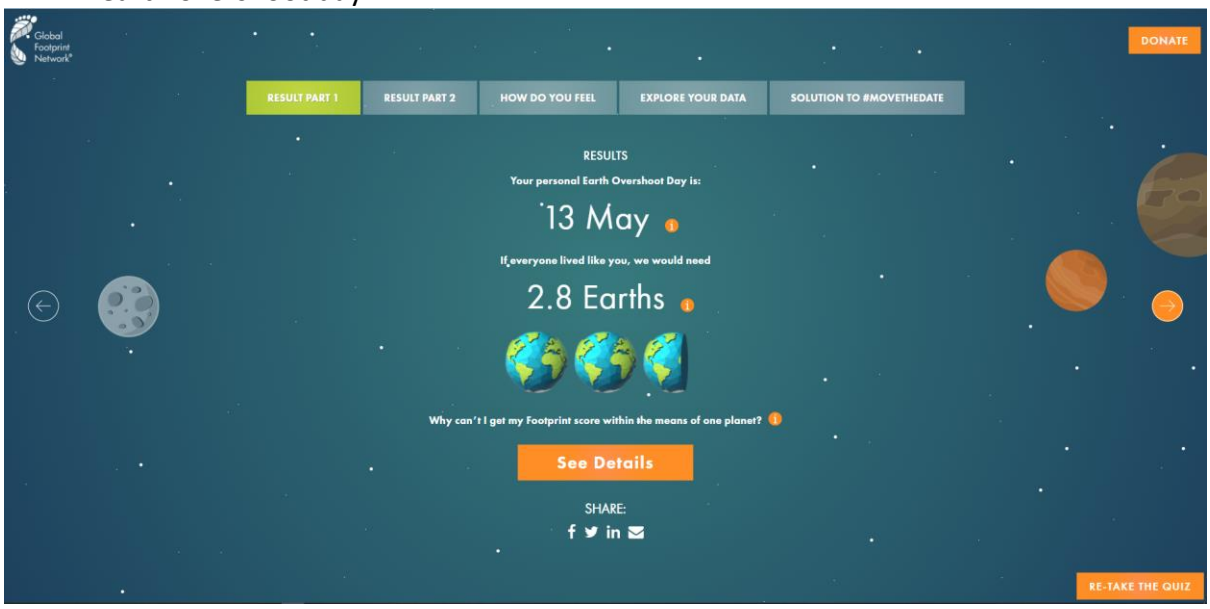

Image 27 "Results Part 1" page

Image 28 "Results Part 2" page

[2] Earth Overshoot Day marks the date when humanity's demand for ecological resources and services in a given year exceeds what Earth can regenerate in that year. (More information can be found here)

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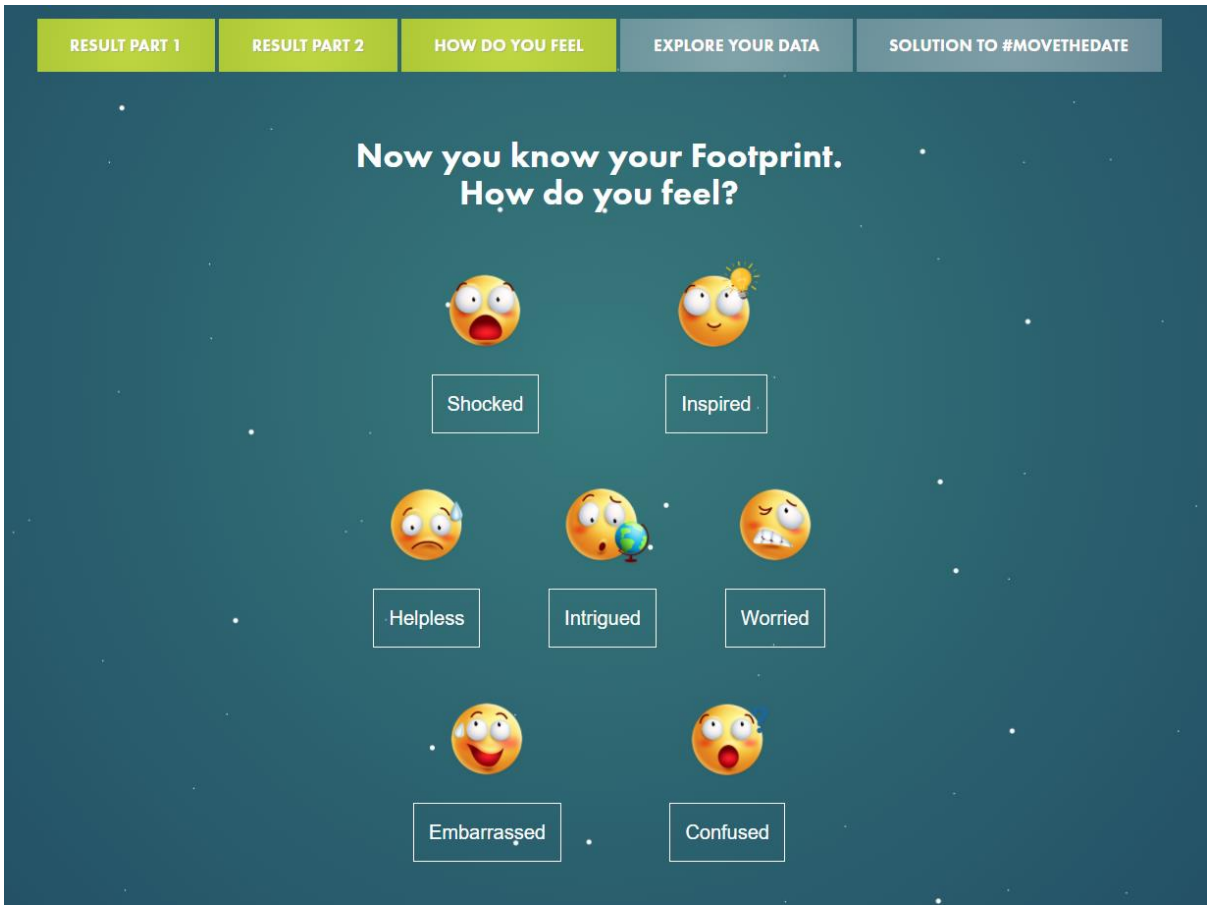

Image 29 The "How do you feel?" page

Image 30 The "Explore your Data" page

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2.6 Other Calculators

Several other calculators exist that can help someone understand their impact on the planet and calculate their carbon/ecological footprint. In this section some of the many flight emissions calculators in existence are presented that can be used as a reference for the purposes of the project.

2.6.1 myclimate Flight Emissions calculator

Foundation myclimate is a foundation based in Zurich, Switzerland that offers advisory services, organizes educational programmes and creates its own projects as a non-profit organization. It offers provides several calculators which allow the users to offset their CO_2 emissions.
Their Flight Emissions Calculator is user-friendly and is similar to the ICAO Carbon Emissions Calculator. It prompts the user to enter the airports of departure and arrival, whether the trip was roundtrip or One way and if they were in the Economy, Business or First Class. The methodology used for the emissions calculation is freely available. The calculator can be accessed here: https://co2.myclimate.org/en/flight_calculators/new.

2.6.2 Offsetters flight emissions calculator and the Offsetters car emissions calculator

The Offsetters flight emissions calculator is a simple tool to calculate the emissions of a flight by entering as input the Point of Departure, Point of Arrival and the Stopovers. Additional information includes the passenger class, the trip type (One way/Return) and the number of travellers. The flight emissions are calculated by using the "2018 Government GHG Conversion Factors for Company Reporting" guide published by the UK Department for Business, Energy & Industrial Strategy (BEIS).
The Offsetters car emissions calculator allows the user to calculate their annual emissions of their car, by selecting the year, the make, the model and the distance (km/year). The data used for the calculator are from the Fuel Consumption Guide of the Minister of Natural Resources Canada, while the emissions factors are sourced from the Environment Canada.
Both calculators allow users to offset their carbon footprint of their flights and car use.

2.6.3 C-level Flight Carbon Calculator

C-level, a B Corp Certified business[3], has developed a Flight Carbon Calculator, that one can use to offset their flight's emissions by supporting reforestation and conservation projects. By providing the necessary information, one can view a flight's carbon footprint and to easily understand their impact by a smooth Graphical User Interface. The calculator can be accessed here.

[3] A B Corp business meets the highest standards of verified social and environmental performance, public transparency, and legal accountability to balance profit and purpose.

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2.6.4 Flight emissions calculators by airlines

Several airlines have developed their own flight emissions calculators, that allow their passengers to calculate their carbon emissions and offset them. For instance, the Scandinavian Airlines System (SAS) allows passengers to easily find out how much CO2 and greenhouse gases their flight generates, by entering their origin airport, their destination airport, the number of passengers and the type of the flight's plane.
Air France offers a similar calculator that can be accessed here. Lufthansa has partnered with Compensaid to develop their flight emissions calculator and offset their carbon emissions. Passengers have two options: either to purchase innovative sustainable aviation fuel or support reforestation projects.

2.6.5 Several open-source projects

Several individuals and organizations have published the codes run from their calculators online, allowing access to anyone interested. For instance, anyone can view the Carbon footprint code developed by the Protea social network or alter this Flight CO_2 calculator developed for iOS and Android software. Finally, one can find some inactive projects, such as the "Air-Guardians" or read the article "Why we cannot decarbonise international conferences without virtual participation" by Milan Klöwer and dive into the code used fo the purposes of the article in Python.

2.6.6 Mobile phone applications

Numerous applications have been developed both in Android and in iOS, that offer carbon footprint calculating and offsetting.

- Capture | Carbon Footprint & CO2 Tracker for Travel and Food by the Capture Club (iOS, Android)
  Capture is a carbon footprint tracker that provides information about the carbon emissions and carbon footprint of the user's daily lifestyle and offers offsetting options such us Tree Planting. To further enhance the user's experience, Capture can use GPS information to predict the produced CO2 emissions and give insights regarding the Carbon footprint. Carbon emissions are estimated by the Capture Club's team of researchers and advisors based on data from the IPCC and UNFCC.
- Klima – Live carbon neutral by the Climate Labs GmbH (iOS,Android)
  Klima mostly targets on carbon neutralization, by allowing the user to calculate their carbon footprint and offset it through several projects. It offers Membership, meaning that the user can contribute on a monthly basis in offsetting projects to neutralize their carbon emissions.
- Earth Hero: Climate Change by Earth Hero (iOS, Android)
  Earth Hero targets in practical action in response to climate change, by suggesting personalized actions in a community of members. It offers a carbon footprint calculator.

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3. Comparative Analysis of the presented calculators

To pick the most suitable calculator for the purposes of the "Erasmus Goes Green" project, the four main calculators presented above (Carbon Footprint, WWF Footprint Calculator, Footprint Calculator by Henkel AG&Co, ICAO Carbon Emissions Calculator and Ecological Footprint Calculator by GFN) were graded according to the following criteria (from high to low importance):

1. Mobility oriented: Can the user easily get information regarding the connection between their means of transportation and their carbon footprint.
2. Methodology presentation: Is the methodology used comprehensively referred and presented?
3. Ease of use: How easy is for a non tech-savvy user to calculate their footprint?
4. Ease of adaptation-implementation: How easy is for the calculator to be adapted to the purposes of the project?

3.1 Mobility oriented

The project aims at reducing the transport-related carbon footprint of higher education students and staff taking part in mobility activities within Europe across the three key actions of the Erasmus programme. Therefore, the most important criterion for grading the aforementioned calculators is if they address CO_2 emissions as a total product of one's lifestyle or by easily providing information regarding the connection of the user's mobility and their CO_2 emissions. To rate each calculator the following sub-criteria were used:

1.1. Means of Transport Included. The more means of transport included within the calculator's framework the best it ranks.

1.2.Ease of use. How easy is for the user to provide information regarding the used means of transport.

Table 1 Calculators ranked according to the "Mobility oriented" Criterion

	Mobility oriented		
Calculator	**1.1 Means of transport included**	**1.2 Ease of use**	**Rank**

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Mobility oriented

Calculator	1.1 Means of transport included	1.2 Ease of use	Rank
Carbon Footprint	The calculator offers separate tabs/calculations regarding: Flights, Cars, Motorbikes and Public Means of Transport.	Flights: The user enters up to 3 flight itineraries, their departure/destination airport and any stop they have. Car/Motorbike: The user can enter the mileage of their car or motorbike and if they are not aware of its efficiency, they can choose the vehicle's type by a long list of available manufacturers.	1
WWF Footprint Calculator	The calculator provides short questions with multiple-choice answers and is mostly time-based. Specifically, it refers in the hours spent per week on a means of transport, except for the flights made which are filled in as the sum of flights made within a domestic / 1250km / 2500km / 5500km / 9000km / 17500 range.	The user simply picks an answer in questions about vehicles and fills the ranges in flights.	2
Footprint Calculator by Henkel AG&Co	The user answers simple questions in two main categories: "Car" (What kind of car do you own?) and "Others", which includes bikes/walks, e-bikes/e-scooters, bus, trains, plane etc. For each of the provided means of transport the user must enter the number of km done per day on how many days per week.	Quite simple to fill in, yet it is quite difficult to provide such a detailed layout of transportation on a weekly basis.	4
ICAO Carbon Emissions Calculator	The calculator refers directly to flights and it does not include other means of transport.	Simple to fill in/Directly linked to the available flights, which is useful for the user not to provide false information.	5
Ecological Footprint Calculator by GFN	The calculator does include a section about transportation but is limited only to car, flight, bus and train as means of transport. The answers are more qualitative than quantitative.	Simple to choose and interact with the calculator.	3

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3.2 Methodology presentation

This criterion refers to the ease of access to the methodology of each calculator. An open and free access to the methodology used builds trust and allows the cross-examination of the results provided.

Methodology presentation

Calculator		Rank
Carbon Footprint	The methodology used for the online calculator is based on the "Greenhouse gas reporting: conversion factors 2020" of the UK Government with a few exceptions. A FAQ page referring to the methodology and other related questions can be found here.	3
WWF Footprint Calculator	The methodology used was developed in cooperation with the Stockholm Environment Institute at the University of York and the University of Leeds. A Q&A page is provided by WWF UK and if there are any questions not answered, someone should e-mail WWF UK directly.	4
Footprint Calculator by Henkel AG&Co	The calculator was developed by Henkel AG&Co in cooperation with the Wuppertal Institute. The Methodology used is not directly provided by the calculator.	5
ICAO Carbon Emissions Calculator	The methodology used is freely accessible by all and is based on a "distance-based approach to estimate an individual's aviation emissions using data currently available on a range of aircraft types".	1
Ecological Footprint Calculator by GFN	The methodology used is freely accessible to all and is given in plain English. A whole webpage is dedicated to the resources used for the calculations.	2

3.3 Ease of Use

Regarding the "Ease of Use" the presented calculators were graded using the following sub-criteria:

3.1. Question and answer type. The questions given must be more straightforward, but descriptive, while multiple-choice answers are easier to be filled in.

3.2. Graphical User Interface. A developed Graphical User Interface is more attractive for the users and is considered user-friendly. Although, this sub-criterion is not as important as the type of questions and answers, as within the project's framework it can be altered.

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3.3.Additional Information provided. If the calculator provides additional information regarding the users' choices, it is easier for them to understand why the questions are being asked and how their answers (hence their lifestyle) affect the size of their carbon footprint.

Table 2 Calculators ranked according to the "Ease of Use" Criterion

Criterion: Ease of Use

Calculator	3.1 Question/Answer Type	3.2 Graphical User Interface	3.3 Additional Information provided	Rank
Carbon Footprint	Short Questions/ User must enter values	Simple	Not directly provided	4
WWF Footprint Calculator	Descriptive Questions/ Mostly multiple-choice answers	Advanced Graphics are used / Eye-triggering sections	Hints and general information provided on the right side of each questions	1
Footprint Calculator by Henkel AG&Co	Short Questions/ User must enter values	Simple but beautiful	Not directly provided	3
ICAO Carbon Emissions Calculator	Short Questions/User must enter values	Too simple	Not directly provided	5
Ecological Footprint Calculator by GFN	Short Questions/Easily filled/User might get confused and in doubt regarding the preciseness of their answers	Advanced Graphics are used/Eye triggering sections	Information is provided by clicking the "Learn More" prompt on the bottom right corner of the site.	2

The most easy-to-use calculator is the WWF Footprint Calculator, as it contains a lot of graphics that attract the user's attention, while the answers are mostly given in a multiple-choice form. Furthermore, it provides useful information, which are easily found, about how each question is linked to carbon emissions.

3.4 Ease of adaptation-implementation

The criterion is used to grade the adaptability of a calculator. It is noted that from the calculators, only the Carbon Footprint prompts the use of its calculator on another webpage. Furthermore, it has to be noted, that the WWF Footprint Calculator is mostly UK-oriented, thus restricting its implementation to a majority of users.

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3.5 Ranking Summary

Table 3 provides the ranking summary of the calculators regarding the criteria used in the analysis:

Table 3 Calculators' Ranking Summary

Ranking Summary

Calculator	Mobility oriented	Methodology presentation	Ease of Use	Ease of adaptation - implementation	Final Rank
Carbon Footprint	1	3	4	1	1
WWF Footprint Calculator	2	4	1	2	3
Footprint Calculator by Henkel AG&Co	4	5	3	2	4
ICAO Carbon Emissions Calculator	5	1	5	2	5
Ecological Footprint Calculator by GFN	3	2	2	2	2

As seen from the above, the Carbon Footprint calculator is ranked as first among the five (5) presented calculators, due to the following factors:

- It allows the user to easily identify the connection between carbon emissions and mobility and it offers a variety of vehicles used for the purposes of the calculation.
- It is based on an approved methodology used by the UK Government.
- It prompts the user to add the calculator to their site easily.

The biggest disadvantage of the Carbon Footprint calculator is its Graphical User Interface, which is very simple and does not easily attract the users' attention.

The Ecological Footprint Calculator is an easy-to-use tool with an interactive Graphical User Interface, which calculates the impact of someone's lifestyle according to the international Ecological Footprint Standards. Thus, it allows the user to easily understand their impact on the planet. Although, the Ecological Footprint Calculator specifically refers to flights, car, bus and train as means of transport, thus not providing enough information about other means, such as tram or coach. Finally, answers are given by "sliding" a bar between two values, which can lead to less accurate and doubtful answers.

WWF Footprint Calculator and the Footprint Calculator by Henkel AG&Co are easy to use calculators with an advanced user interface, which address carbon emissions as a total product of someone's lifestyle and do not easily provide information regarding separate uses.

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Finally, the ICAO Carbon Emissions Calculator, though it provides a comprehensive document of the methodology used, it refers only to flights and does not address other means of transport.

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