

CARBON FOOTPRINT EMISSION CALCULATOR

Author 1: Swati Dhabarde, **Author 2:** 'Arpita Sonawane', **Author 3:** 'Prachal Shahakar',

Author 4: 'Rohan Zanjali' **Author 5:** 'Prajwal Chafekar', **Author 6:** 'Deepak Gupta'.

Priyadarshini College Of Engineering

ABSTRACT: Carbon Footprint has historically been defined as the total set of greenhouse gas emissions caused by an organization, vehicle, or website. Carbon emissions affect the planet significantly, as they are the greenhouse gas with the highest levels of emissions in the atmosphere. This, of course, causes global warming and ultimately, climate change. It is well-known that CO₂ emissions contribute to global warming and climate change, which can significantly cause severe impacts and consequences for humans and the environment. Carbon Footprint measures how much carbon dioxide (CO₂) we produce in our daily lives. It calculates the emission of CO₂ from vehicles and various websites. [5][6]

A **carbon footprint** is the total greenhouse gas (GHG) emissions caused by an individual, event, organization, service, place or product, expressed as carbon dioxide equivalent (CO₂e). [1] Greenhouse gases, including the carbon-containing gases carbon dioxide and methane, can be emitted through the burning of fossil fuels, land clearance, and the production and consumption of food, manufactured goods, materials, wood, roads, buildings, transportation and other services. [2]

In most cases, the total carbon footprint cannot be calculated exactly because of inadequate knowledge of data about the complex interactions between contributing processes, including the influence of natural processes that store or release carbon dioxide. For this reason, Wright, Kemp, and Williams proposed the following definition of a carbon footprint:

KEYWORDS: Carbon emissions; Carbon calculator; Calculator comparison; Footprint; Online.

The Greenhouse Gas Protocol has extended the range of gases.

The standard covers the accounting and reporting of seven greenhouse gases covered by the Kyoto Protocol – carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PCFs), sulphur hexafluoride (SF₆) and nitrogen trifluoride (NF₃). [4]

INTRODUCTION

Carbon dioxide (CO₂) is used as the basis for the carbon footprint because it is by far the main contributor to the enhanced greenhouse effect from human activity (mainly burning fossil fuels, clearing forests, and making cement). So, often only carbon dioxide is counted in the carbon footprint.

However, for a more complete measure of the carbon footprint, the other human-generated greenhouse gases are converted into a carbon dioxide () equivalent (in kilograms or tons) in terms of their global warming effect and added to the footprint. [5]

The two main non-carbon dioxide greenhouse gases associated with human activity are methane CH₄

mainly from cattle belching, manure spreading, wet rice growing, and decomposing waste) and nitrous oxide (N₂O) mainly from nitrogen fertilizers and industrial processes). One ton of methane has the equivalent global warming potential of 21 tons of carbon dioxide (CO₂), while one ton of nitrous oxide is equivalent to 310 tons of carbon dioxide (CO₂).

Because the amounts of methane and nitrous oxide released are much smaller, their emissions together add about 25% globally, to enhanced greenhouse effects. This means that other greenhouse gases should not be ignored when assessing a carbon footprint, at least of individuals or households, although to simplify calculations. [3]

The calculation of individual and household carbon footprints is a powerful tool enabling individuals to quantify their carbon dioxide emissions and link these to activities and behavior. Such models play an important role in educating the public about the management and reduction of carbon dioxide (CO₂) emissions through self-assessment and determination. Carbon emissions models may be used in the future as a tool for carbon taxes, the allocation of carbon units, and the basis for personal carbon trading.^[2]

The calculation of carbon footprint will show you which activities (energy use, travel, etc.) make large and small contributions to your carbon load. The calculation of carbon footprint is a model of reality. But it can give you only an approximate measure of your carbon footprint and its components. In this case, the calculation is a model based on a set of mathematical equations that enables a computer to convert the information of your carbon emissions per person per year.^[2]

This study is based on the calculation of individual carbon footprint through a simple program and from this aspect is different from others. It is discussed what we can do to the reduction of carbon footprint.

PROJECT DESCRIPTION

Design of propose of work

Our first section contains a description of Carbon emissions from Various fields like vehicles (cars, bikes, buses, trucks), Food (meat egg vegetables), and household things like fans, lights, fridges, etc. It calculates the Carbon Dioxide emission by using a CO₂ calculator. The CO₂ calculator tells the user about daily CO₂ emissions. Our app contains Commute which includes vehicles' Carbon emission calculator. Second, it contains household parts like fans, tv, lights carbon emissions, etc ^[1].

The next part contains the food consumption part in which they asked consumption about the food like how much amount of Meat, Fish, Fruits, vegetables, and eggs did you consume. It asked about the consumption of grains, dairy products, and baked goods. This section shows the food carbon footprint.^[9]

In Commute after clicking on the commute, the app asked questions like

What is the distance travelled by car?

What is the distance travelled by car?

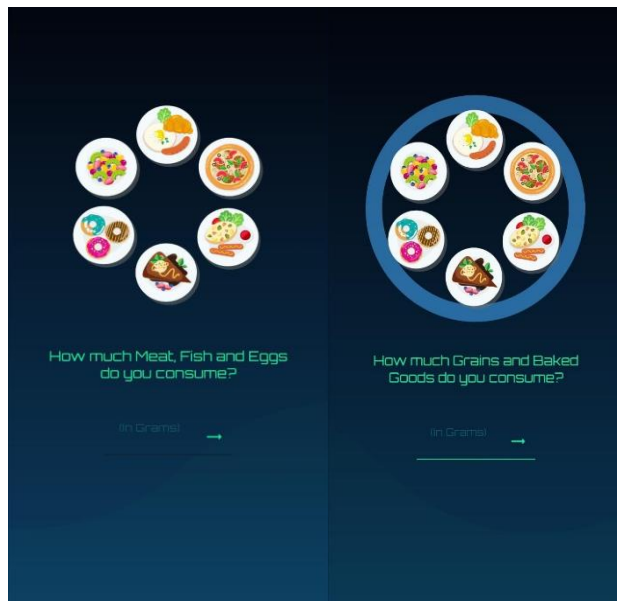
What is the distance travelled by a Bicycle?

By adding the values of this question in miles our app calculates the carbon emission of the given distance in miles.

It tells the consumption compared with the average person's daily activities consumption.

Home energy consumption is a major contributor, as energy-inefficient homes waste significant amounts of energy through poor insulation, energy-inefficient appliances, drafts due to improper sealing, and excessive water use.





CONCLUSION

Until now we have completed the calculator part. It includes the calculation of CO₂ from food items, vehicles, and household work CO₂. In commute, it gives information about how to reduce emissions due to commute like:

Lower the amount of energy used to pump, treat, and heat water by washing your car less often, and using climate-appropriate plants in the garden. Don't set the thermostat too high or low. Install a programmable model to turn off the heat or air conditioning when you are not at home.

Do not unnecessarily speed up or accelerate, it increases the mileage by up to 33%, waste gas, and money, and increases carbon emissions.

When possible, walk or ride your bike to avoid carbon emissions completely.

Don't buy a minivan or SUV if you don't need 4WD and/or will occasionally need extra space.

How to reduce emissions due to household activities:

Don't forget to switch off the lights or unplug your electronic devices when they are not in use.

How to Reduce emission due to food activities:

Stop Wasting Food!

Eat low on the food chain.

Don't eat excess calories!



There are many ways that a carbon footprint can be reduced that require fairly simple changes that can be implemented over time.

Using sustainable transport whenever possible. Walking or riding a bike can completely avoid carbon emissions from driving (although the production of shoes and a bicycle contributes to carbon emissions). Using public transportation can drastically reduce carbon dioxide emissions. Moreover, low-carbon vehicles are an option available that allows driving but reduces carbon emissions overall. Electric cars emit no carbon dioxide if the electricity they're charged with has no associated carbon emissions.

Drive more efficiently by not speeding and accelerating unnecessarily, as these driving styles can reduce mileage by 33%. Also, avoiding traffic whenever possible is important as idling contributes to CO₂ emissions.

Improving home energy efficiency by insulating and sealing it properly. Utilize weather stripping and caulking to ensure windows, doors, and skylights do

not have air leaks. In addition, using energy-efficient appliances—especially furnaces, air conditioners, and refrigerators, can reduce emissions that contribute to a carbon footprint. Upgrading incandescent light bulbs to fluorescents or LEDs is also a way to reduce emissions, along with setting thermostats to an appropriate level (using a programmable model also helps).

Recycling and composting help to reduce carbon emissions associated with the "provision of goods", or the extraction of resources, transport, manufacturing, and disposal of goods.

Think about "food miles" by eating locally grown foods. A significant amount of greenhouse gas emissions are produced as a result of producing and transporting food, so the emissions can be reduced by eating food grown close to home.

Reduce beef and dairy intake, especially if it is not locally produced. The production of beef and dairy on large farms produces a large number of greenhouse gases. ^[12]



FUTURE SCOPE

The carbon footprint calculator helps people be more aware of their contribution to the current environmental problem and what they can do to lessen their impact on the environment. It makes our internet green internet which gets lower CO2 emissions. People get aware of CO2 emissions. Whether at home, work, school, or while you travel, small changes can add up. In brief, to reduce your carbon footprint, you'll want to do things like reduce the amount of energy you use, eat fewer animal products, shop locally, travel smart, and reduce your waste. ^{[2][6]}

Then it shows the carbon footprint in tonnes. It gives information about the average carbon footprint for travel which is 10.0 tonnes of CO2. It tells us that we are emitting less emission than average or more emission than average.

Carbon calculators have been put forth as a tool to motivate sustainable behavior change in people. However, the approach of "just" presenting numbers to communicate climate footprints is not an effective strategy. In this paper, we investigate the use of an application that combines carbon footprint calculations with game-like features to address the gap between awareness and behavior. Our results are based on an interview study and show that while respondents appreciate the idea, several problem areas have implications for the design of carbon calculators, including issues with targeting the "right users", the use of gamification, and the absence of a social context. Furthermore, the results point towards general barriers and opportunities for design when the aim is to design for sustainable behavior change. This includes a need to be adaptive to the transitioning process towards a low-carbon lifestyle.

Most research studies on carbon footprint calculators have focused on the design and methodology of specific calculators and in particular, there has been a focus on how calculations of carbon footprint are made and the lack of consistency and transparency between different calculators. Additionally, there also exists a challenge in getting people to adopt and use carbon calculators more than once. In a study by Line which focused on understanding what factors would

make individuals continue to use a carbon footprint calculator, the authors found that an already positive low-carbon attitude and knowledge are key factors influencing user retention. However, with a few exceptions, there is limited work focusing on the actual use and experience of interacting with carbon calculators. Most research on this kind of application which aims to understand and propose ways to increase engagement is usually not grounded in empirical work, but rather based on the authors' intuition. In other words, more attention needs to be paid to understanding how people use and experience carbon footprint calculators as a tool to support a change in their behavior, to firmly ground the design in the everyday reality of people. According to basic principles of HCI and user-centered design (UCD), encouraging the adoption of new kinds of applications is not something that may be done without an early focus on design for relevant target groups. Nor is it possible to disregard the physical and social contexts of the use of climate calculators. The traditional user-centered design postulates that the design needs to consider goals for using an application. There is a multitude of different approaches to user-centered design, but they all share similar basic principles: early focus on users and their context, goals of the application, iterative design, and evaluation of the application. Evaluations may be carried out in various ways and one is through user studies.

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