

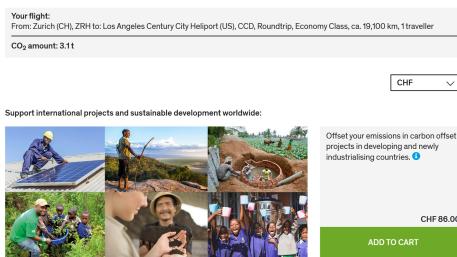
Desk Research PDF [Group 16]

MyClimate

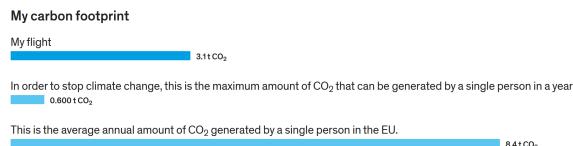
https://co2.myclimate.org/en/offset_further_emissions

Myclimate let's you calculate your CO₂-emission from a trip or your personal footprint and then lets you choose between different compensation projects to offset this amount.

Calculate and offset your CO₂ emissions!



Additionally, some basic information is shown at the bottom, like comparing the average yearly CO₂ emission of a European and the maximal sustainable emissions to your flight.



The user interface is quite well made and graphically pleasing. It's very easy to get your CO₂ emission estimated, just put in your starting point and destination and it spits out an estimate and all the options they provide to compensate for this amount.

Another option provided by myclimate is the personal footprint calculator. It's formulated in eight simple questions, which are not too hard to answer. It's not too time consuming to fill out, which is important for such kinds of things, as the average user might not be willing to invest a couple hours into this. On the other hand, this might also be the downside to this calculator. In my opinion, it's not possible to calculate a good estimation of your CO₂-footprint with only eight questions and vague answers.

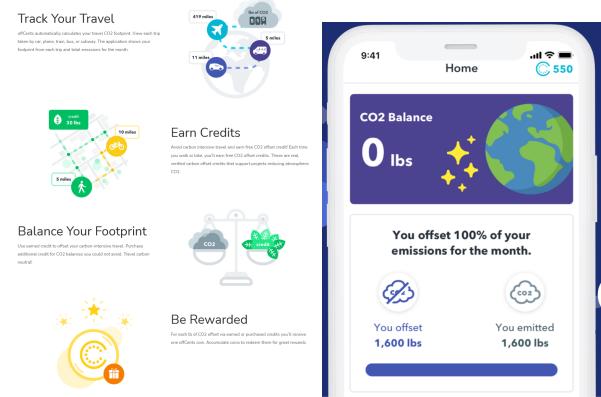
Another disadvantage of the myclimate design is the limited user satisfaction and experience after payment. You don't get to see your actual impact on the project or any information about your position compared to others. So no real engagement in the matter. "Just pay and be happy". This might lead to a once and only once experience and does not encourage the users to come back.

But all in all, myclimate is still far better, compared to the "checkbox only" options out there, for visualizing your compensation.

Offcents

<https://offcents.com>

offCents is an app that automatically calculates your CO2-emissions when travelling. It gives you options to compensate your emissions via CO2-credits, which you can spend on different projects.



The Idea is simple: track your travel, earn credits, balance your footprint, be rewarded

The app calculates the amount of CO2 emitted by the travelled time and distance, as well as the mode of transport. It illustrates the travelled distances and the related emissions for each mode of transport to give you statistical feedback about your travel habits.

You can earn credits for travelling carbon neutral like biking or walking. These credits can also be bought to offset the emissive travel options. Offcents then spends the money correlating to these carbon credits on projects, which remove CO2 from the atmosphere, like reforestation efforts.

A two sided sword is found in the automatic travelling mode detection. Some users report that the app sometimes falsely detects bike rides as car rides and thus “charges” you with emitted carbon instead of rewarding you for the savings. And there is no way to correct these false detections.

Another issue is the usability of the travelling planner, as it does not really offer an easy to use interface and does not let you do things like plan a return trip or a roundtrip, only single trips.

Finally the last issue is the information about the offset projects, which is quite limited. And, as in most similar applications, there is no way of seeing the actual progress on these and your actual contribution other than the financial side.

All in all, offcents is still one of the best apps for carbon compensation and it's one of the few, offering free rewards for your personal saving efforts.

Quartz

<https://qz.com/1267709/every-google-search-results-in-co2-emissions-this-real-time-dataviz-shows-how-much/>

This article on QUARTZ shows off two simple websites that try to illustrate the CO2-emission caused by Google. One of the two simply shows you the number of kilograms emitted by google since clicking the link and the other one shows how many trees would need to be planted to offset these emissions by literally “planting” trees on your screen. This is because Google's data centers create so much CO2 that every query causes 0.2 grams of CO2 emissions and Google.com alone creates an “estimated amount of 500kg of CO2 emissions per second.” In the tree visualization, called “DEFOOOOOOOOOOOOOOOOOOOOREST,” this signifies every second spent on Google, there needs to be 23 trees taking in CO2 to maintain some equilibrium.

GOOGLE.COM EMITTED **1531.47** KG OF CO2 SINCE YOU OPENED THIS PAGE



These websites seek to visualize or continually show the increase of CO2 emission caused by Google. The article also highlights how it isn't just Google that has data centers which are extremely potent for the environment, but also how Facebook and other tech giants create extreme amounts of CO2 emissions. This really shows how while it might be useful for people to cut down their daily CO2 emissions, the vast majority is created by companies that have no limitations on what they can do and how much CO2 they can emit. In my opinion, as useful as it would be to create a CO2 visualizer for the daily things we purchase and use, it seems to be more important to visualize these tech giants and show their consumption instead. Maybe this will one day encourage companies to reduce their carbon footprint if it is so obviously being visualized and displayed for their users.

Emerge

<https://www.emergeinteractive.com/insights/detail/does-irresponsible-web-development-contribute-to-global-warming/>

After discovering that Google and other companies create so much CO2 from just their web services, I wondered what the output was for other companies that rely on websites and consumers who frequently access these. What this article talks about is the finding that just transferring 1GB of data produces 3kg of CO2. This means that every hour we watch netflix, we also can produce 10kg of CO2. This was extremely eye opening as I don't think many people see their internet usage as something that can potentially contribute more CO2 than what they purchase. This also means that websites and internet services have the responsibility of delivering in the smallest, most optimized packages to reduce their internet CO2 emissions. For example, the article talks about how CNN's website is not built responsibly and creates over 532 metric tons of extra CO2, but with just a simple optimization, they were able to bring down the website's data payload and decrease the emissions. This example is important because the inefficient data usage leads to about 175 terabytes of additional data transferred each month.

Moving forward, it is important for website designers and programmers to reduce their CO2 impact by limiting the complexity of unnecessary web designs as well as always caring about optimizing their web pages. The article also found that a simple Ad blocker can reduce the amount of bandwidth by 25% which means that this responsibility is also for Ad producers to create optimized ads for their users.

South Pole

South Pole is a company dedicated to climate change solutions. They do this by funding and planning compensation projects via investment and capital management, as well as hosting public events for other companies and private investors to create awareness and facilitate “green” investment.

The big goal of South Pole is to make climate change financially attractive and allow investors to actually turn a profit by saving on emissions and protecting the planet. They want to shift capital away from non-sustainable options to sustainable ones and thus accelerate climate action and defund old, pollutive technologies. This should accelerate the current rate of transition, as we will miss the temperature increase goal of 1.5 degrees otherwise.

In comparison to other compensation project funders, south pole offer quite a lot of options, that are not focussing on reforestation or saving patches of natural ground. They start projects like carbon negative shipping, carbon negative homing, carbon neutral clothing, ... They achieve this by offering support to clients, who want to start such projects.

Additionally they write a blog on their webpage about current actions and events regarding climate change, as well as project updates. This is a big advantage compared to other services, which provide near zero feedback on your supported projects.

Penguin Perspectives Blog

This is where we cherry pick the latest news and views on climate change and how its effects are already making waves in our economies, societies and daily lives. Tune into the fresh perspectives and opinions from both our own experts and other great movers and shakers on the climate scene and read uplifting stories from our climate protection projects across the world. Have an idea or topic you'd like to learn more about? Get in touch - our experts will have it covered!

On the user interaction site one has to say that southpole offers a quite well designed website. How the interaction between a client company would work cannot be seen.

All in all, South Pole focuses more on the “bigger game” than the individual compensation by setting their aim on investment and companies as clients.

Grow My Tree

<https://growmytree.com/>

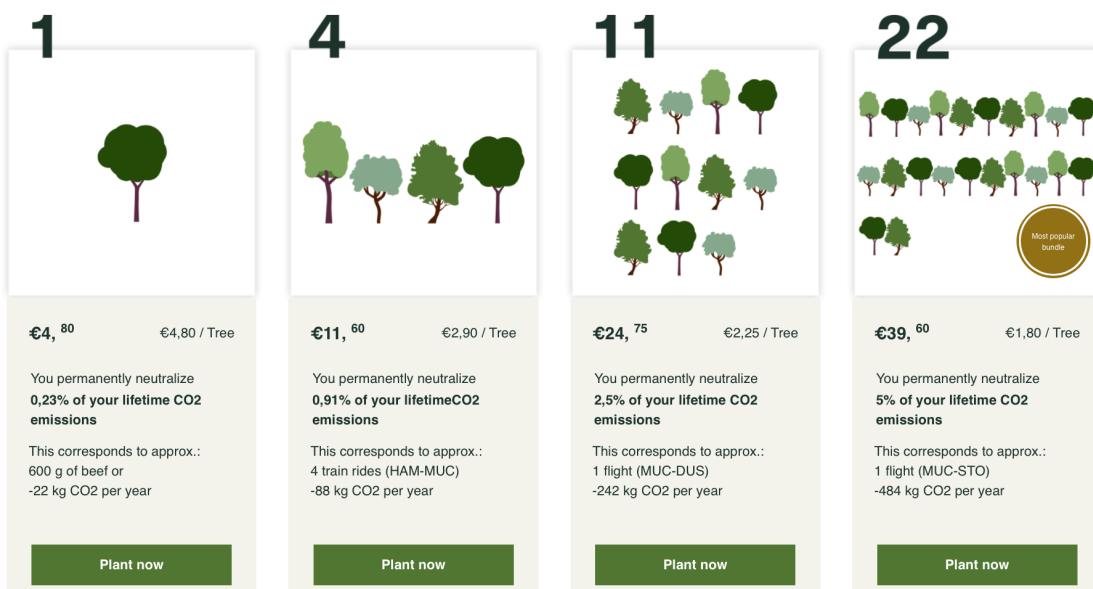
Grow My Tree is a service that grows trees for people to compensate for their CO2 emissions. It is also possible to "gift" trees to friends. Prices vary in the number of trees to be planted and in return, the customer/user receives personalized tree certificates that acknowledge their contribution to CO2 compensation. The "tree bundles" are given names like "tree friend" (one tree), "climate hero" (22 trees), "forest hero" (220 trees) and many more. The amount of CO2 compensated is shown as a fraction (%) of a common user's average CO2 emission per annum and is also given in kilograms of CO2 per year.

The service further allows you to keep track of your personal "tree account" where you can see how many trees you have planted or gifted so far. Furthermore, the "tree tracker" tells you how many trees you still have to plant in order to compensate for all your CO2 emissions and become CO2-neutral.

Grow My Tree includes a description and enlightenment of greenhouse gas emission per capita and of the effect of re-forestation on CO2 emission compensation in the form of a text. There is also a FAQ and further questions can be posed via email. The website also maintains a blog that covers topics about being green when shopping, the updates to trees planted around the world through their service, etc.

In addition, Grow My Tree offers collaborations with companies. For example, companies can not only pay for planting trees, but include links to Grow My Tree at the bottom of their emails or during the check-out process. This opportunity can be lucrative to businesses for marketing reasons. By working with Grow My Tree, they can use the Grow My Tree partner logo and sell themselves as sustainable companies.

Your GROW MY TREE tree bundles



Climeworks

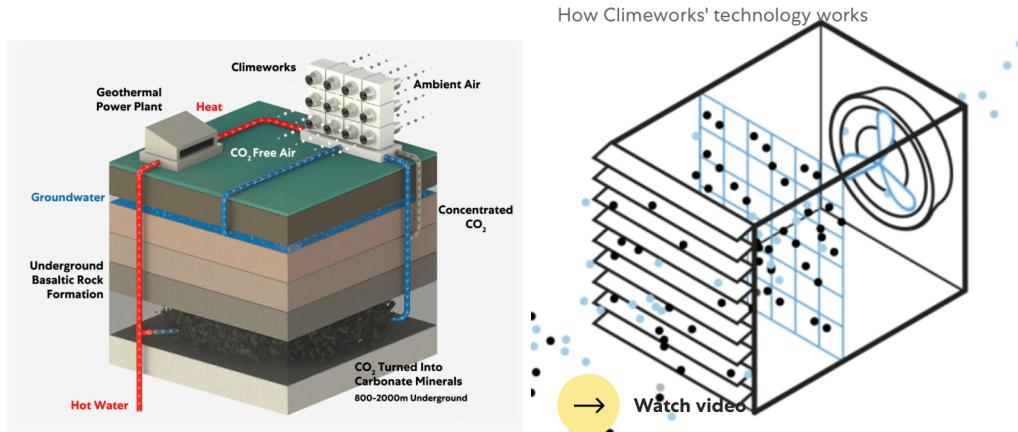
<https://climeworks.com/>

The goal of Climeworks is not only to assist customers reduce their carbon footprint, but rather help them remove their carbon footprint. The service offers to remove CO₂ from the atmosphere using an air capture technology against monthly payment. When choosing the plan, the customer is told how many kilograms of CO₂ can be removed throughout a year. CO₂ removal can also be gifted to friends, where they receive a digital card that confirms the present.

The website includes a carbon footprint “calculator” based on the country one lives in. More precisely, the calculator shows the average carbon footprint of an average citizen of a given country. Climeworks emphasizes their technology of removing CO₂ from the air and permanently storing it in the ground and tries to explain it to the potential customer by using various diagrams and videos (see figures below). Specifically, Climeworks works with a partner called Carbfix to store the extracted carbon-dioxide. More importantly, the technology is scalable.

Climeworks tries to motivate the user to contribute to CO₂ emission compensation through their service by using action phrases and slogans such as “act now”, “let’s reverse climate change”, “climate-positive”, etc.

The service is also offered to businesses. Especially for companies with a net zero target, Climeworks could be very interesting because it has a measure for the CO₂ compensated and is a very direct method. For instance, planting a tree from a seedling needs years until it reaches its full potential of CO₂ compensation.



Carbon Pricing Calculator

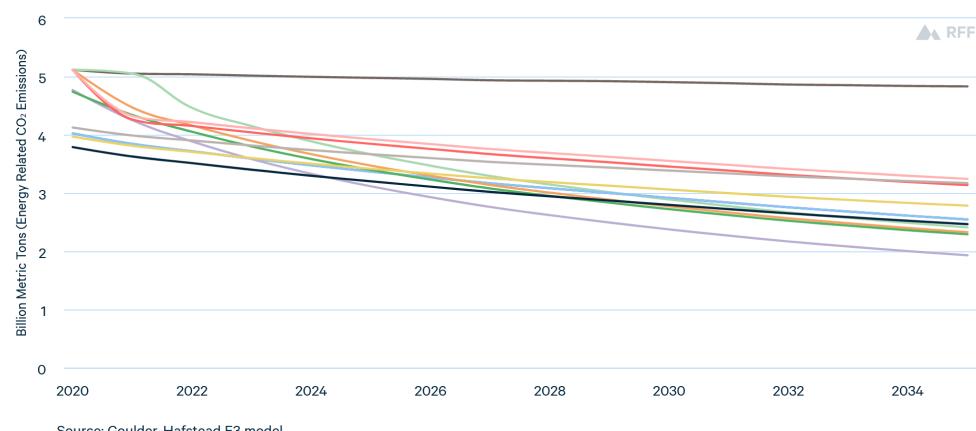
<https://www.rff.org/publications/data-tools/carbon-pricing-calculator/>

Carbon Pricing Calculator is an interactive tool that is used to visualize the effects of different policies on carbon emissions and their economic and environmental effects.

It has a plethora of different metrics to choose from. For example, one can see the impact of GDP, annual revenues, carbon pricing or the change in average household income on CO₂ emissions. It can also visualize the results in different kinds of graphs such as a chart or a table view.

The computation of the relevant impact is done using the Goulder-Hafstead Energy-Environment-Economy E3 CGE model, which models the US economy. It divides the economy into different industries, placing an emphasis on energy such as coal mining etc. It also takes into account the interaction of existing environmental policies with taxes, not limited to a carbon tax but also including the current taxes on labor and capital.

It is a useful tool that can be employed in order to compute projections of CO₂ emissions, as it allows for a better approximation of the effects of different factors on CO₂ emissions compared to simpler models.



Data Series i

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| <input checked="" type="checkbox"/> Business as Usual | <input checked="" type="checkbox"/> America Wins Act (Larson) |
| <input checked="" type="checkbox"/> America's Clean Future Fund Act (Durbin) | <input checked="" type="checkbox"/> American Opportunity Carbon Fee Act (Whitehouse-Schatz) |
| <input checked="" type="checkbox"/> Climate Action Rebate Act (Coons-Feinstein) | <input checked="" type="checkbox"/> Consumers REBATE Act (McNerney) |
| <input checked="" type="checkbox"/> Energy Innovation and Carbon Dividend Act (Deutch et al.) | <input checked="" type="checkbox"/> Healthy Climate and Family Security Act (Van Hollen-Beyer) |
| <input checked="" type="checkbox"/> MARKET CHOICE Act (Fitzpatrick) | <input checked="" type="checkbox"/> Raise Wages, Cut Carbon Act (Lipinski) |
| <input checked="" type="checkbox"/> Stemming Warming and Augmenting Pay Act (Rooney) | <input checked="" type="checkbox"/> Custom Policy 1 (\$70, 5% growth, Corporate Income Tax Cuts) |

Machine Learning CO2 Impact Calculator

<https://mlco2.github.io/impact/>

<https://www.climatechange.ai/events/neurips2019.html>

Machine Learning Emissions Calculator is a tool that helps compute the carbon footprint of the machine learning training processes depending on the GPU used. As we know that training is a power hungry process, most of the training is done via cloud computing. However, since those clouds host quite powerful GPUs which run for hours at end, their contribution to carbon emissions is quite significant.

Using this tool, one can choose the used hardware, runtime, cloud provider and computing region using a drop down menu to calculate an estimate of the carbon impact of their research. This way, it aims to get researchers to be mindful about their cloud providers and their regions regarding their carbon impact. It also aims to get researchers to abandon “wasteful” algorithms such as grid search for hyperparameter tuning as it takes up too much resource.

Lastly, the webpage explains the concept of Renewable Energy Credits (RECs) and urges users to buy carbon offsets to minimize the environmental impact of their research.

CO2 Fit

<https://techcrunch.com/2015/01/05/why-im-excited-by-the-new-co2-fit-app-an-app-to-get-the-planet-fit/>

CO2 Fit is a mobile app that motivates the user to lessen their carbon footprint. The main idea behind the functioning of the app is that the user enters the journey they are about to make and their method of travel, such as driving, cycling, taking a train etc. Depending on the type of the journey and the total length/speed of the journey, the app approximates how much CO2 you emitted. Then, the user is rewarded with Recoins which represents the amount of CO2 the user “saved” by choosing a greener method of travel.

The Recoins are then used to offset your CO2 emissions by the less “green” methods of travel such as driving a car. If the user took a train or cycled before, they can “cash-in” their coins as a means to counter their CO2 emissions. There is also a leaderboard that is implemented mainly to motivate users.

If the users save a certain amount of Recoins, they can also purchase a certificate which are confirmed by several intergovernmental organizations such as World Wildlife Fund (WWF), similar to buying virtual goods in online games.

CARBONALYSER

<https://theshiftproject.org/en/carbonalyser-browser-extension/>

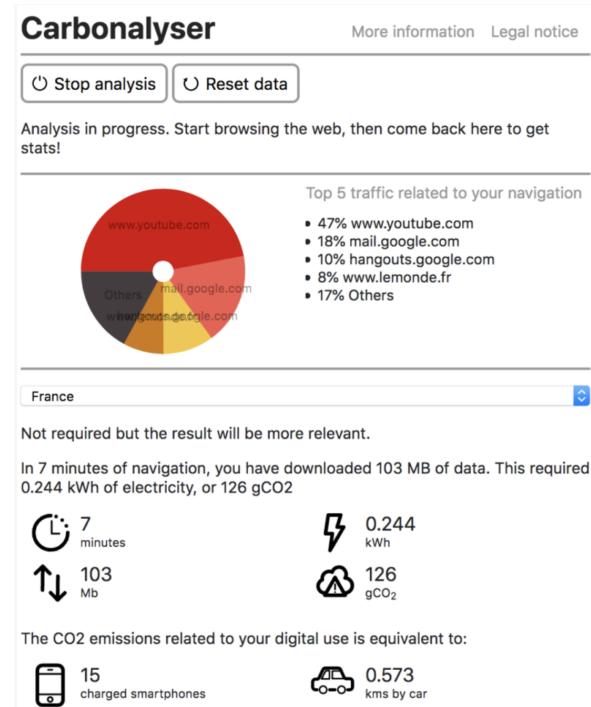
Carbonalyser is a web extension (also a mobile app). When the user installs it on their device, they can run an analysis where the extension starts tracking their usage of the web. It tracks data transfer between the device and the servers it is connected to. The extension uses a model called the 1byte model, which calculates electricity consumption from data transfer by modelling the energetic footprint of data transfer through data centers(servers, networks, terminals), networks infrastructures(for example the electricity a WiFi connection uses) and the device used to browse the Internet(smartphone or laptop).

Carbonalyser presents the analysis in many forms, It presents a pie chart of the websites where you emitted the most CO₂, it presents the estimated amount of electricity you used and the quantity of CO₂ emitted.

To help users put those values more in perspective, the extension offers equivalences or comparisons : for example an equivalence to driving a car or how many charged smartphones equal your web surfing impact.

To make their calculations more accurate, the app lets users define their location, so they can more accurately relate electricity consumption to greenhouse gas emissions(how much Co₂/Kw of electricity), else the extension uses a global average.

For privacy and safety concerns, they have made the source code of their web extension public to show the users that their info is analysed directly on their phone and remains private and not shared with any third parties.



Zalando/flixbus

As most other online shopping platforms, those two websites use a very simple checkbox to present a financial equivalent to the CO2 emission caused by this transaction. The calculations behind this remains very unclear. For example for Zalando.ch which is an online clothing retailer, when clicking on the I want to know more, they redirect you to a webpage with a paragraph, explains what work is done.

The compensation money for Zalando goes to help the reforestation of the natural forests in the south of Ethiopia. They also mention that the projects they fund are Gold Standard certified. Upon further research, we found that Gold Standard is a foundation that studies and analyses acts of climate and environment to quantify, certify and maximise their impact. In short, this foundation sets standard that projects have to attain, for them to be certified by them.

However there are no links from the Zalando page to the Gold Standard Foundation page, this was done personally. For Flixbus, they delegate their CO2 compensation to a partner called atmosfair. Atmosfair's work for flixbus can be divided in two parts : the first for which they take 75% of the carbon compensation fees are used to finance fuel efficient foodstoves in Rwanda. The remaining 25% are allocated to the Future of Mobility Fund, which aims to make the transport of the future 100% carbon neutral.

The flixbus website offers much more information and numerical support than Zalando. For example on the Atmosfair page linked from flixbus, users can see the quantity of CO2 saved per year through their projects.