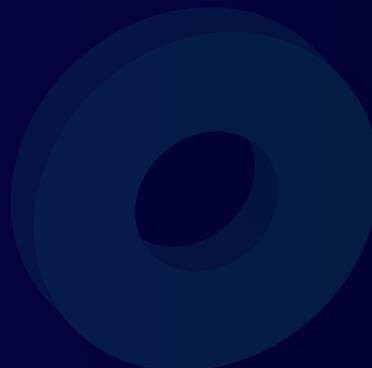


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What Tech Companies can do to **Measure and Reduce Emissions**



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01 Introduction



20%

increase in internet traffic

Life became tremendously more digital in 2020, with the consumption of online, streaming and entertainment services booming more than ever. Since March 2020, several countries have recorded an increase in internet traffic of at least 20%. 167 million people now have a Netflix subscription, a rise of 20% since 2019. At the same time, Netflix's energy consumption rose by 84%. Video streaming via mobile networks has also increased significantly, with a whopping 70% of daily hours on YouTube being streamed via mobile phones or tablets.



84%

increase of Netflix's energy consumption

But things have also changed in the way we work. With both free and paid users, Zoom reports 300 million daily meeting attendees (last update: March 2021). The platform currently has 467,100 business customers who spend 3.3 trillion minutes per year in meetings on Zoom. A trend that will most probably stay to some extent in the future.



70%

increase of daily hours on YouTube

A minute on the Internet in 2020



404,444 hours of video streamed by users



500 hours of video uploaded by users



2,704 app installations



347,222 stories



6,659 packages shipped



52,083 users connected



208,333 participants in meetings



41,7m messages shared



319 users gained



28 new tracks added to library

Source: Visual Capitalist



**34.3 million
t CO2e**

possible growth of
the global carbon
footprint overall

While this digital lifestyle has significant environmental benefits on the one hand (reduction of travel-related carbon emissions, to name one example), the increased internet usage also comes with its downsides for the environment.

Assuming this trend holds up until the end of 2021, the global carbon footprint overall could grow by 34.3 million tonnes of CO2e. It would take 2.8 billion trees to fully sequester all the CO2e emitted in a year. This would require a forest twice the size of Portugal.

Evidently, tech companies are challenged to find solutions to reduce their environmental impact. At the same time, it provides them with an opportunity to become pioneers in making streaming, gaming, and software services more sustainable.



**2.8 billion
trees**

to fully sequester all
the CO2e emitted in
a year

But where should you start? What are typical emission hotspots for tech companies? And how can you reduce those emissions? We will explore the climate-related effects of streaming, gaming, and software platforms and present you with a set of actions tech companies can take to address them and become more climate-friendly.

02 All You Need to Know about Carbon Footprint Calculations

First things first - What is a carbon footprint?

While you have most probably heard and seen the term carbon footprint before, it can be hard to grasp what it actually entails - let's walk you through.

A carbon footprint is the amount of greenhouse gas (GHG) emissions emitted by private or corporate activities during a given period - such as driving to work or producing and shipping a product. It includes carbon dioxide - the gas most commonly emitted by humans - and other climate-relevant gases such as methane, nitrous oxide, and fluorinated gases. For consistent scorekeeping, these gases are converted into tonnes of carbon dioxide equivalent (in short: tCO₂e). So when you see a carbon footprint measured in tonnes of CO₂e, this means that other climate-relevant gases have also been accounted for.

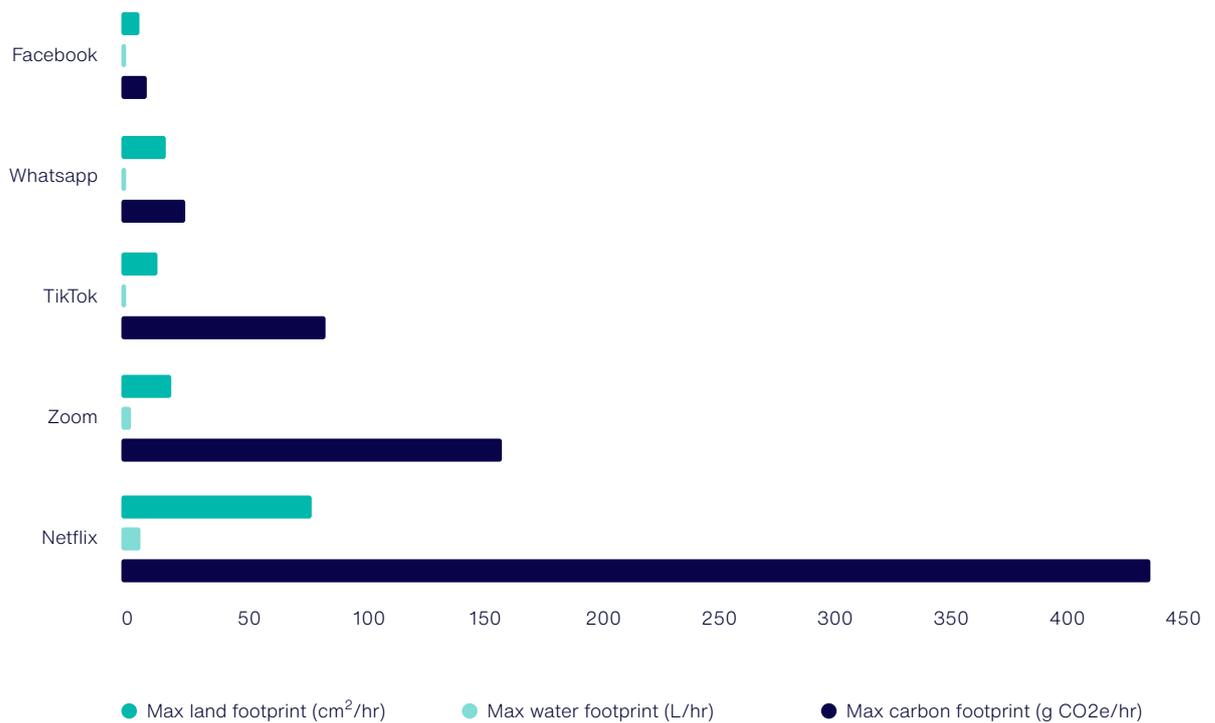
To make carbon footprints more tangible, let's look at a few examples. A return flight from London to Hong Kong produces approximately 5 tonnes of CO₂e. Charging 1,275,322 smartphones produces approximately 10 tonnes of CO₂e. And the average carbon footprint per person in Germany is about 10 tonnes CO₂ per year.



Source: How bad are bananas?

What does that mean in terms of our digital behaviour? A 2020 study recently published interesting estimates of the approximate carbon, water and land footprints associated with each hour of data spent in popular internet apps, among others Netflix and Zoom.

How big is your app's environmental footprint?



Source: Purdue University/Kayla Wiles

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Corporate Carbon Footprint vs Product Carbon Footprint

Companies looking to understand their environmental impact have two options: the Corporate Carbon Footprint (CCF) and the Product Carbon Footprint (PCF). A CCF includes emissions from all corporate activities for a certain period. On the other hand, a PCF looks at emissions from production, delivery, use, and disposal of a product over its entire life cycle. If you would like to learn more about these two approaches, make sure to [head over to our article](#).

02 The Most Important Standards for a Corporate Carbon Footprint Calculation

Various standards have been developed over the last 20 years to ensure the comparability of carbon footprints with ISO 14064 and the GHG Protocol Standard being the most commonly used and accepted ones. We generally recommend the GHG Protocol Standard as it improves comparability between companies, enables better benchmarking and, therefore, more targeted carbon management and reduction strategies. However, should you require an ISO 14064 compliant report, Planetly can certainly provide this as well.

The Greenhouse Gas Protocol not only defines how you count carbon but also defines so-called scopes outlining what you count - Here, the GHG Protocol differentiates between three different scopes, or categories, of emissions.

The Three Scopes of Carbon Emissions

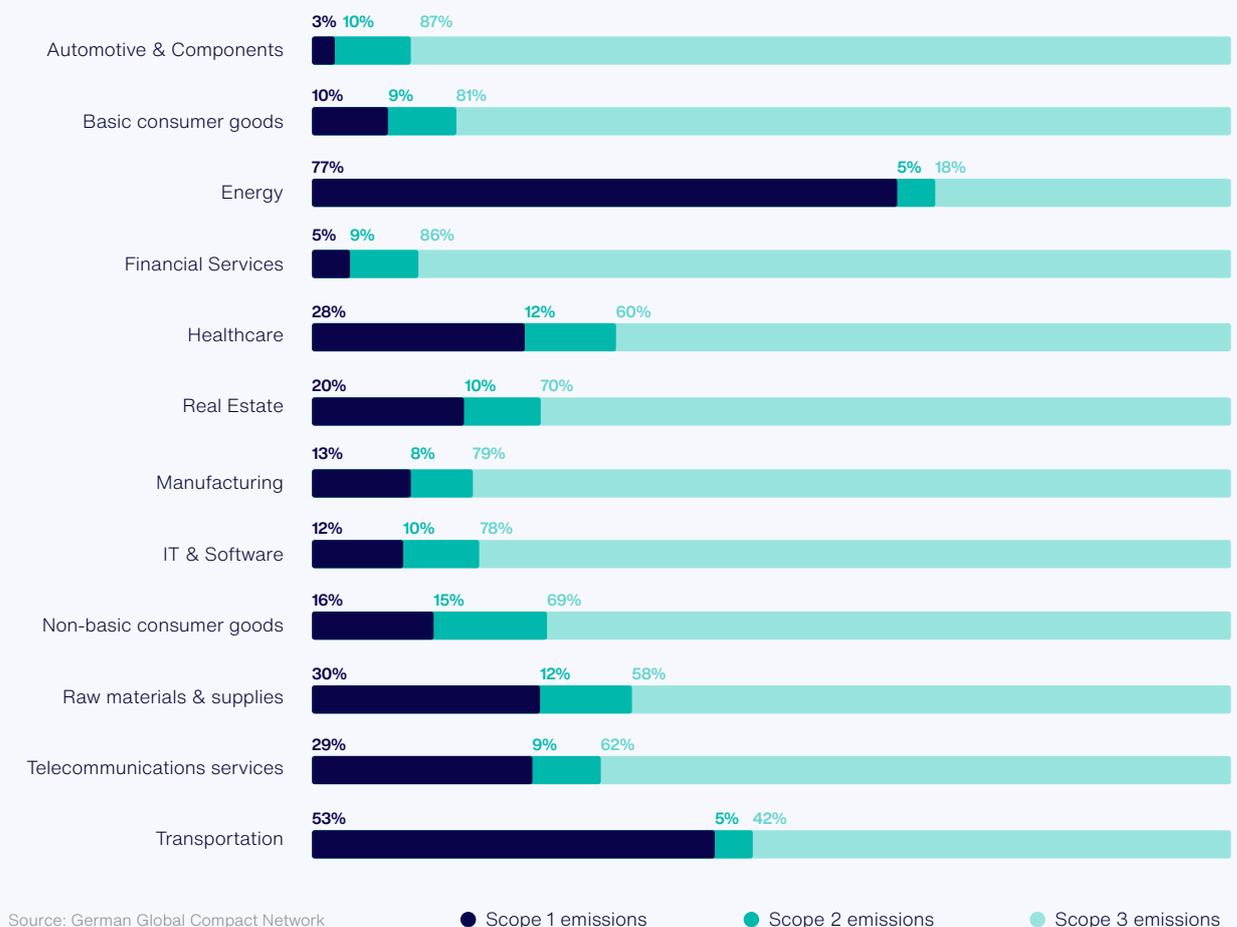


Scope 1 covers any direct GHG emissions that arise from the combustion of fuels owned or controlled by the reporting organisation or institution. Scope 2 emissions include indirect GHG emissions that result from the consumption of purchased or acquired energy such as electricity and heating. Scope 3 emissions include the remainder of indirect GHG emissions, which cannot be categorised as energy-related emissions in Scope 2. They occur outside of the organisation, e.g. in the supply chain or during production.

If you would like to learn more about the different scopes and how a carbon analysis works, check out [this article](#) from our carbon fundamentals.

Why is it important to look at all three scopes when assessing a company’s carbon footprint?

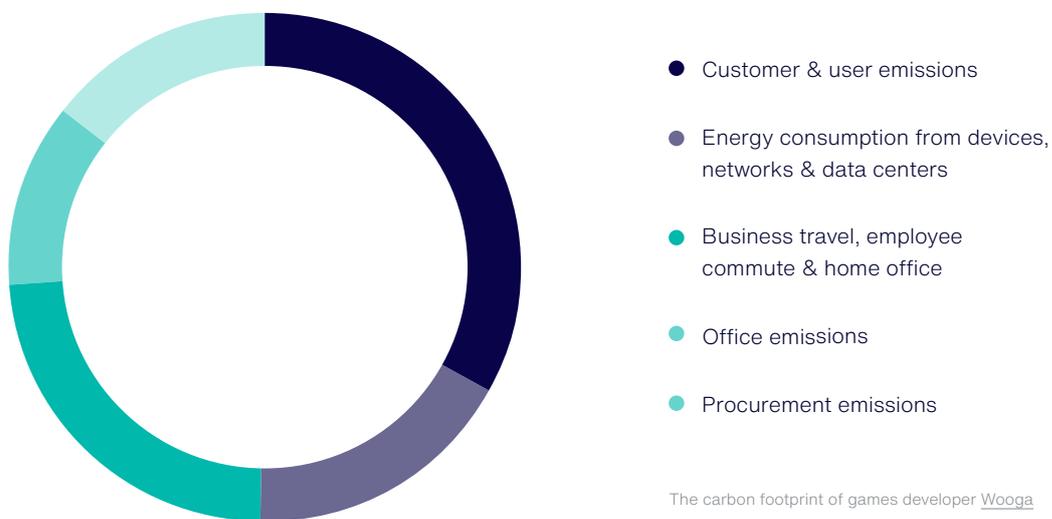
For most companies, including technology companies, the main drivers of carbon emissions lie primarily in scope 3 - calculating their carbon footprint without accounting for scope 3 emissions would not cover the full picture.



Now that we have clarified the fundamentals of carbon footprinting, we will make this more tangible. Let’s start with typical emission sources of technology companies.

03 Typical Emission Sources of Technology Companies

The daily actions of streaming, gaming and software companies cause emissions. Let's look at these a bit more in detail.



Energy consumption from devices, networks and data centres

A significant amount of emissions for streaming services, software and gaming come from devices, network infrastructure and data centres.

Due to the complexity and dynamic nature of this area, finding reliable data is extremely difficult. Some studies will already be outdated by the time they are published.

Estimates for the annual energy consumption of data centres currently range from 350 to 400 TWh. The energy consumption for networks is estimated to be around 400 to 500 TWh per year. Calculating the energy consumption of end devices is even more difficult - after all, devices are very diverse, and so is their energy consumption.

At Planetly, we want to make it easy for you. For any data not available to you, e.g. for server emissions data, we can use industry benchmarks and secondary data from our database that are based on the specific server providers.



Customer and user emissions

Besides server and data processing emissions, the emissions from customers and users often make up a substantial part of digital companies' carbon footprints.

Case in point: player interactions with games from mobile game developer Wooga were up to 705 t CO2e in 2019, accounting for 33% of the company's total carbon footprint. While these emissions were based on estimates about battery capacities and local electricity mixes, it paints a pretty clear picture. Therefore, technology, streaming, and gaming companies should not stop at their office doorstep when assessing their carbon footprint.



Business travel, employee commute and home office

What does business travel, employee commute and working from home have to do with streaming, gaming and co.? At first sight, not a lot. But when we look at a company's carbon footprint, employee emissions are not to be underestimated in their share of overall carbon emissions. Business travel is actually a very prominent emission driver, especially for international companies.

Due to the pandemic in 2020, this pattern changed significantly for many companies, with business travel decreasing tremendously and many of us working from home for several months. Home office emissions would also fall into this category - as well as your company vehicle fleet if you have one.

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Did you know?

Even with CO2 emissions resulting from video calling, in many cases working from home would still result in fewer emissions than commuting, as the following example shows.

Carbon comparison

 <p style="font-size: 1.2em; font-weight: bold; color: #00c853;">5.08 kg CO2e</p> <p style="font-size: 0.9em; color: #ccc;">Two employees commuting via car to the office (10km)</p>	 <p style="font-size: 1.2em; font-weight: bold; color: #00c853;">1.2 kg CO2e</p> <p style="font-size: 0.9em; color: #ccc;">Having 8 hours of video calls per day</p>
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Office emissions

Despite many companies moving to a remote setup in 2020, the majority still operate offices and will continue to do so in the future.

Emissions from offices first and foremost come from heating, cooling and electricity of the office space. On top of that comes furniture, IT equipment, stationery and other office supplies. If you offer an employee canteen, this would also fall into this category.



Procurement emissions

Procurement emissions are basically all emissions from goods and services your company purchases from external suppliers.

Remember the server emissions we already touched upon? If you use external server providers, the respective emissions from such servers and data centres would be listed here.

If you also use consulting services such as tax and accounting consultants, law services or a marketing and PR agency, these would all fall into this category.

04 What Tech Companies Can Do to Reduce and Avoid Emissions

Many technology companies are increasingly focused on living up to their responsibilities, looking for affordable and sustainable solutions to reduce their emissions.



Use renewable energy sources

Despite all efforts to reduce the amount of energy required, streaming of videos and music, playing online games and using software will always be coupled with energy consumption. However, by using electricity from renewable energy sources, technology companies can significantly reduce emissions here.

A first and very effective step for any technology company would be to run offices and buildings on green electricity - just like HR tech company [Personio](#) does already - and move your servers to green cloud providers. Streaming provider [Zattoo](#) even takes this to the next level with their first pilot project of streaming directly from a wind turbine. The servers in the wind turbine are powered by the energy generated on-site.



Increase energy efficiency

Next to using renewable energy, companies can also take other effective measures to maximise the energy efficiency of their offering.

Today, digital technologies such as 5G and optical transmission techniques can transmit much larger amounts of data with less energy input, leading to fewer CO2 emissions.

And there are more ways to tackle this. A great example comes from [PlayStation](#): To make playing games more energy-efficient, the company equipped their PS4 with energy-efficient power supplies, rest modes and system on a chip architecture. As a result, an estimated 17.5 million tonnes carbon equivalent emissions were avoided for PS4 to date. PlayStation's PS5 is equipped with additional energy efficiency features.



Minimise data amounts wherever possible

While streaming, software and online games will always produce inevitable emissions, providers can minimise data amounts as much as possible.

One effective way of doing so is optimising the necessary bit rates for the desired, highest possible quality. You wonder how? Let's look at one example: With title-specific bitrates for video content, for example, you can use much lower bit rates for titles with less rapid frame changes while maintaining the same display quality. This will significantly reduce the amount of data transmitted compared to standard bit rates.

A more tangible example comes from YouTube: Many users listen to music on YouTube in the background, so they are not actively watching the respective videos. Experts estimate that YouTube's annual carbon footprint could be significantly reduced if the platform sent sound only to such users instead of streaming the entire video.



Reduce your corporate carbon footprint

Corporate emissions such as business travel, external services and office emissions are often underestimated despite having a considerable impact on the carbon footprint of technology companies.

The good news: There are many low-hanging fruits to quickly reduce your corporate carbon footprint, such as:

- Switching to a renewable energy provider;
- Using smart meters to lower heat-based emissions;
- Avoid unnecessary business trips and replace them with online meetings;
- Use the train for necessary business trips and corporate events;
- Switch to green(er) suppliers and encourage your suppliers also to analyse and reduce their carbon footprint.

Microsoft, for example, released a detailed code of conduct that requires all suppliers to disclose their carbon emissions. The tech company wants to continuously reduce not only its own carbon footprint but also that of other players in the industry.

On top of that, you can compensate for any emissions that cannot yet be avoided today by supporting highly certified climate action projects. Such projects help to reduce emissions or absorb them from the atmosphere.



Join green initiatives

In the tech industry, many great initiatives evolved over the years that help companies take effective climate action and motivate others to join them in their mission.

One of these initiatives is the [UN Playing for the Planet Alliance](#). This is a group of companies in the video games industry, including Sony Interactive Entertainment, Microsoft, Twitch and GameDuell, who make voluntary, time-based commitments for people and the planet. Such obligations include integrating green activations in games, reducing carbon emissions and supporting various green initiatives such as planting trees or reducing plastic in their products.

Another recent and relevant example is the [Green Software Foundation](#), founded by a group of companies including Microsoft and Accenture. As a non-profit organisation, the Foundation's primary mission is to build a reliable ecosystem of people, standards, tools and best practices for green software development. Your company can join the Foundation to keep the field of green software development growing, create standards for the entire industry and work together to reduce carbon emissions from software.

As you can see, emissions are generated in all sorts of areas in tech companies. However, many of them can already be mitigated through relatively quick and easy measures. Many tech companies are already heavily involved in sustainability initiatives and have already taken several of the aforementioned steps. Let's look at a few examples.

05 Best Practice from Leading Industry Innovators

The logo for Personio, featuring the word "Personio" in a black, cursive script font, underlined.

Personio: One of the First Carbon Neutral Unicorns

Sustainability and climate action have been on Personio's agenda ever since. Co-founder and CEO Hanno Renner and the entire team show great interest and passion for creating sustainable impact. To achieve that, Personio has an internal Sustainability Committee that drives sustainability within the organisation and identifies opportunities to take climate action. As part of this engagement, Personio wanted to gain transparency about their carbon footprint and reduce it as much as possible over time.

Personio is committed to reduce and avoid emissions wherever possible. Therefore, the company already runs offices on green electricity, avoids domestic flights within Germany, and offers sustainable commute options such as public transport tickets for all employees.

While reduction and avoidance are critical for Personio, emissions can currently not be entirely avoided for some areas. Personio, therefore, decided to offset their carbon footprint for 2020 by supporting certified climate action projects - making them one of the first carbon neutral unicorns.

The logo for Zattoo, featuring the word "ZATTOO" in a bold, black, sans-serif font, with a stylized orange and black wind turbine icon above the letter 'O'.

Zattoo: TV Streaming From a Wind Turbine

TV and video on demand platform provider Zattoo has kicked off the age of powering TV streaming more sustainably. While all of Zattoo's data centres already run on green energy, the streaming platform took their efforts up a notch: At the end of 2020, Zattoo joined forces with windCORES, a brand of the WestfalenWIND group, to move part of Zattoo's infrastructure into a wind turbine near Paderborn in Germany. The servers moved to the wind turbine are now powered directly by the energy generated on-site.

Why did Zattoo make this move? Over 80 million hours are streamed via Zattoo every month, creating more than 5 million gigabytes of data every day. Processing and distributing TV content, therefore, make up a significant share of Zattoo's carbon footprint. The company is committed to reduce emissions long-term and make TV streaming more sustainable. Bringing computing capacity closer to power generation was the first important step on this journey.



Wooga: Carbon Neutral Mobile Games Developer

Earlier in this paper, you saw a breakdown of Wooga's carbon emissions. Let's take a look at what they did next.

Whilst reducing emissions long-term is a priority to Wooga, they decided to offset what could not yet be avoided by supporting certified climate action projects. To ensure that playing Wooga games is more sustainable, the company went the extra mile here: they estimated player interactions and then offset all emissions caused by playing Wooga games in 2019. Doing so, Wooga proved their dedication to create exceptional experiences by guaranteeing that playing their games now means no harm to the environment.



SoundCloud: One of The First Carbon Neutral Open Audio Platforms

As the world's largest open audio platform driven by a community of creators, listeners and curators, SoundCloud is committed to being transparent about its carbon footprint, finding measures to reduce it over time and offsetting the remaining emissions.

With offices in Berlin, London, New York and Los Angeles, SoundCloud's office & building emissions account for a large proportion of its carbon footprint. However, their largest emission source are several external providers the company works with, including marketing agencies, legal and consulting services, human resource support and IT services.

Based on this analysis, SoundCloud plans to introduce regular reporting and implement reduction measures, such as using green electricity and supplier engagement for purchased services.

06 The Future of Climate Action for Tech Companies

Many streaming, gaming & software companies are already committed to find and create sustainable solutions to reach the goals of the Paris Agreement and tackle climate change. Due to growing industries and the increasing population, our need to adapt to our changing climate has never been more critical.

There is still a long way to go before we reach a carbon neutral tech industry, but given the increasing engagement of global players in the industry, we have reasons to be optimistic.

Transparency is the key to a more sustainable future in this sector. Companies need to create visibility about their emissions by continuously tracking and analysing their own emissions.

Are you ready to take an essential first step towards carbon neutrality? Planetly can support you on this journey, helping you introduce and automate your carbon management, from data collection to reduction strategies and offsetting measures.

Reach out to us to get started:

hello@planetly.com