Corporate Sustainability Lessons Learned

The carbon impact of our technology

June 2023

pwc

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Introduction

Our lessons learned publications[1] are designed to share our experience of implementing our sustainability strategy, in order to allow others to learn from our successes – and our challenges.

To date, our net zero focus has been primarily on business travel and our offices, however the way we use technology will play a significant part in reaching net zero.

This target is central to The New Equation, our global strategy to address the breadth and complexity of challenges facing businesses and society, including developing robust ESG reporting frameworks and standards.

A key part of delivering The New Equation is through a human-led, tech-powered approach. We have around 25,000 staff in the UK all using technology on a day-to-day basis.

And as we develop a deeper, more tech-enabled way of delivering results for our clients, many of our people will rely on more physical hardware and a greater range of sophisticated software and tools, such as generative AI and the metaverse.

Unchecked, this could lead to an increase in our energy consumption and associated Greenhouse Gas (GHG) emissions from both the 'use phase' and embodied carbon impact of the physical assets themselves.

As a first step to supporting PwC UK to meet its climate goals, this report provides a detailed analysis of the GHG impact of our current technology usage, which we will use as a baseline, and shares insights on how we will be managing this going forward. This will inform a strategy and roadmap for how we approach our digital carbon footprint in FY24.

Our approach was informed by subject matter expert input, the availability of data and the specific insights sought. We have summarised our data approach and outlined our methodology on page 6.

The main challenges we identified during this digital footprint assessment were in obtaining complete data from manufacturers and suppliers, meaning we developed a set of reliable proxies and assumptions to overcome these.

In September 2020 PwC announced a global commitment to reach Net Zero Greenhouse Gas emissions by 2030, with clear targets covering our operations and supply chain.

To achieve this ambitious target, we are decarbonising the way we operate and decoupling our business growth from our emissions.

> "As technology is increasingly embedded in how we work and collaborate, with each other and with our clients, we need to be conscious of how our technology decisions and behaviours impact the environment.
>
> Adopting a responsible technology approach which maximises positive impacts whilst minimising negative ones is aligned with our purpose; to build trust in society and solve important problems.
>
> **Marissa Thomas**
> Managing Partner & Chief Operating Officer, PwC UK

1 Our previous publications include "Acting on carbon: Our 10 year journey" and "Going circular: Our 10 year journey"

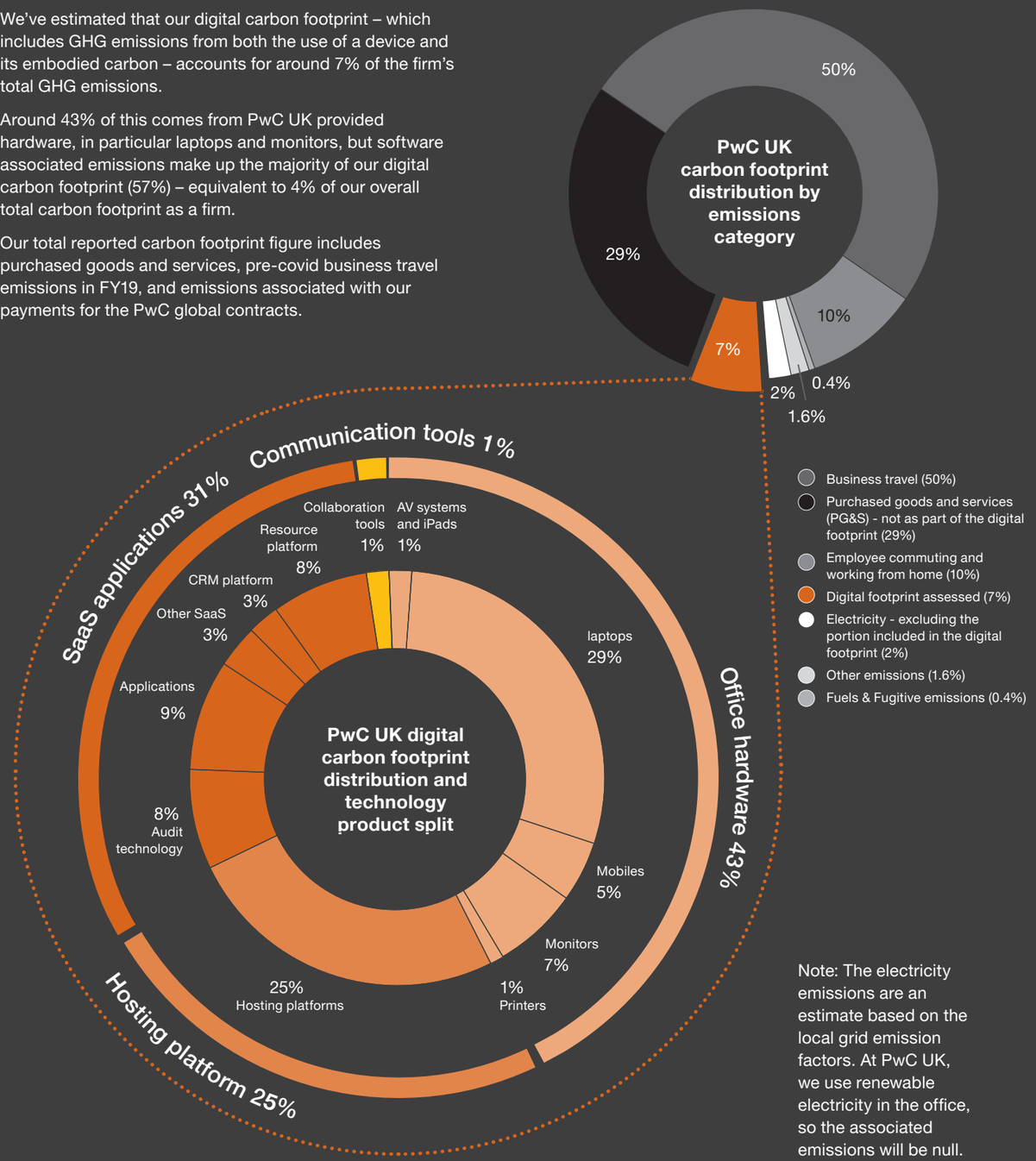
PwC UK digital footprint: Our carbon context

Our digital carbon footprint

We've estimated that our digital carbon footprint – which includes GHG emissions from both the use of a device and its embodied carbon – accounts for around 7% of the firm's total GHG emissions.

Around 43% of this comes from PwC UK provided hardware, in particular laptops and monitors, but software associated emissions make up the majority of our digital carbon footprint (57%) – equivalent to 4% of our overall total carbon footprint as a firm.

Our total reported carbon footprint figure includes purchased goods and services, pre-covid business travel emissions in FY19, and emissions associated with our payments for the PwC global contracts.



Note: The electricity emissions are an estimate based on the local grid emission factors. At PwC UK, we use renewable electricity in the office, so the associated emissions will be null.

A closer look at our digital footprint

Our technology and digital infrastructure is made up of a combination of services and products. To initiate our assessment and set a baseline, our scope was focused on areas where we:

1. Have the greatest daily utilisation or most material spend.
2. Have the largest carbon impact.
3. Can collect the data efficiently.
4. Can define forward looking activities and measure changes.

These items have been categorised as either office hardware, hosting platforms, a SaaS application or a communication tool.

PwC UK's calculated digital footprint at a glance

0.42 tCO2e

of digital emissions is generated by each FTE.

It would take just over 20 trees to absorb these emissions

24,201

Mobile Phones

Replaced every 3 years.

435

Printers

Replaced every 5 years.

715

iPads

Replaced every 3 years.

553

large video conferencing screens.

100

video calls ppp/year

Default sleep setting when the meeting room is unoccupied.

26,810

Windows laptops

Replaced every 3 years.

782

MacBook laptops

Replaced every 3 years.

Default sleep setting of 15 mins for laptops.

Chat platform used for instant messaging.

9,373

Monitors

Replaced every 3/5 years

This number increased by 33% since 2021.

This is predominantly due to behavioural changes from working from home during the Covid19 lockdown.

Cloud

Entire tech stack hosted on Cloud Platforms

SaaS

Overall spend on SaaS platforms per year quantified, covering:

- Digital workflow
- Audit technology
- Spend management
- CRM
- Resource management
- HC management
- Applications
- Collaborations tools

How we dealt with the data

Our approach was informed by subject matter expert input, the availability of data and the specific insights sought.

For the baseline calculations, we utilised a hybrid approach depending on the level of accurate data available for each emissions source.

Our objectives

Through this assessment, we aimed to:

1. Understand the materiality of emissions of different elements of PwC UK's tech estate, including carbon intensity factors across:
   - Office hardwares.
   - Hosting platforms.
   - Applications / SaaS.
   - Communication tools.
2. Determine gaps where we could improve the data accuracy and granularity, to help us identify the most carbon intensive area and activities more accurately.
3. Identify initiatives that can reduce associated emissions to inform our future 'green tech' strategy. These will consider operational, behavioural and supply chain impact drivers.
4. Develop a roadmap that can be used to drive change and be measured against on a regular basis.
5. Deepen our understanding of the current challenges and opportunities within this topic so that we can share our insights.

Our approach

Hardware associated emissions

Hardware inventory	Emissions data	Calculation
Collate an inventory of the hardware items in use including: • Model of hardware. • Age of hardware. • Number of items within each category.	• Where available, use a life cycle assessment (LCA) for each specific model. • If not available, estimate using LCA data for a comparable model is available.	• Scale up the emissions data to an annual estimated figure. • LCA data is often broken down into 'use- phase' and 'non-use phase' emissions which needs to be considered during the calculation.

Software and cloud associated emissions

Supplier information	Supplier Data	Calculation
• Determine which suppliers provide each software. • This includes any cloud hosting providers and SaaS / Applications.	• Scope 1, 2 and complete scope 3 emissions collected from supplier reported emissions (e.g. sustainability reports / CDP submissions). • Where scope 3 emissions are not completely disclosed, use input / output modelling (i.e. supply chain emissions based on spend or local grid emissions).	• Where complete emissions data is available, use the reported emissions to determine the organisations share of the suppliers tCO2e. • If complete emissions data is not available, use an estimate.

Key insights about our digital footprint

Hardware

Items identified with high embodied carbon emissions

- Laptops have the highest collective carbon footprint of our technology, driven by the large number we use within the business. 87% of laptop emissions are from embodied carbon.
- iPads and iPhones have the highest percentage of embodied emissions, compared to use phase emissions, for a single unit.
- Printers have the highest single unit emissions, nearly five times more than the next item.

Extending the lifetime of these items by reducing the frequency of upgrades would spread the embodied emissions across more years, consequently reducing the overall carbon impact. It is also important to select products that maximise the use of recycled and low-carbon materials.

Items identified with high use phase carbon emissions

- Screens for the AV systems have a high percentage of use phase emissions compared to their embodied footprint. This finding in particular has helped us to understand the full value of our meeting room tech upgrade, where we transitioned to a system that automatically switches off the monitors when the room is unoccupied.
- Monitors have one of the highest in use phase emissions per unit, approximately three times higher than for laptops.

For this group, selecting items with lower energy usage and increasing efficiency will not only improve the overall user experience, but also reduce energy usage.

Applications / SaaS

- At present, SaaS providers are unable to provide data on the emissions related to cloud-storage and dataflows. This presents a clear challenge when examining potential levers for emissions reduction.
- We are working with our SaaS suppliers to ensure we are able to calculate more accurate and relevant emissions data, based on the actual usage and impact. This will help us to identify the most carbon intensive area, and develop a relevant reduction strategy.
- During this assessment we focused our engagement with key SaaS providers but we will continue to expand our engagement with a wider range of vendors to advocate for greater transparency.

Hosting platforms

- Currently, the individual virtual server emissions data that we can obtain from our hosting providers is often very limited, because the data is not captured or calculated at the granular level. This makes it challenging to understand which services or activities are driving emissions. For major cloud providers, however, it's either already possible or on their roadmap to make this data available.
- Some cloud platforms are already powered by matching 100% of their electricity consumption with renewable energy.
- The grid carbon intensity can vary significantly for different cloud regions and cities, because some countries or regions can generate electricity more sustainably than others. For example, between two European cities, where most of our services are hosted, the carbon intensity can be up to five times higher[1]. While considering the environmental impact, it's important to balance it with data privacy and service resilience standards.
- Within our cloud platform emissions, the largest emissions are created when cloud native code is not being used. This reduces their efficiency, and increases the cost and associated emissions.

Communication tools

- Over three quarters of our online meetings used video calling - and for good reason. Although switching a camera off during a web call can reduce the carbon footprints by 96%[2], the social and business value of doing so, alongside the reduction in business travel as a result of a good virtual face to face experience, outweighs the carbon savings here.
- Using virtual backgrounds or blurring tools during a video call can use up to 18% more electricity under certain circumstances and in most cases at least 2-5% more[3]. This means that using these sparingly will help to reduce energy consumption and carbon.
- The larger the email, the more processing power is required to transfer the data. On average, emails with attachments generate up to 12 times more emissions than ones without. If we halved the number of emails with attachments each year, we could potentially reduce email carbon emissions by 30% annually[4].
- Our people receive eight times more emails than they send and this includes a combination of regular emails, newsletters, spam, and extensive cc'ing lists. By unsubscribing to five unwanted email lists, or by removing five people copied in emails each day, we could save at least 9tCO2e of emissions each year across the firm[5].

1 https://cloud.google.com/sustainability/region-carbon

2 https://www.purdue.edu/newsroom/releases/2021/Q1/turn-off-that-camera-during-virtual-meetings,-environmental-study-says.html

3 https://www.forbes.com/sites/charlesradclyffe/2021/09/02/zoom-vs-teams-heres-who-is-most-sustainable/

4 https://towardsdatascience.com/how-to-decrease-the-carbon-footprint-of-digital-communication-f3186673818c

5 Calculated based on the number of FTE at PwC UK, number of working days per year, & average carbon footprint for a spam email

Lessons learned

This technology carbon impact assessment is our first attempt at quantifying the digital carbon impact at PwC UK, and is a significant step forward at building an evaluation process and understanding our gaps for future improvements.

During this process, we've had to use several proxies and assumptions due to the incomplete data we received from the manufacturers and vendors. In order to develop more impactful reduction strategies going forward, we'll be exploring ways that we can obtain a more accurate and comprehensive data set with the suppliers, as well as advocating at an industry level.

Here are some key lessons learned:

Key lessons learned:

Before you begin

Get your suppliers on board early

Assessing your technology footprint can be a complex topic and data is often not readily available. Get suppliers on board with the approach early to give them time to understand the issues and expectations, as well as to develop innovative solutions.

Understand different life cycle analyses of hardware products

There's a lack of consistency and clarity across the life cycle assessment (LCA) data for different products. Improving your understanding will allow better comparison between different products and between different providers of the same product.

Keep your scope simple

For the initial assessment, it is important to keep the scope simple and straightforward, then expand it over time. For example, although there are a number of custom tech items within our business, as a starting point, we only focused on standard items such as laptops, monitors, mobile phones/iPads, meeting rooms and printers as part of our hardware scope.

During your assessment

Use estimation methods when unable to obtain actual data

Although the spend-based method does not give you enough granularity, if the actual data is not available, estimating emissions based on spend is still a good starting point. You can then work with suppliers to monitor the usage and obtain more accurate emissions data following your initial assessment.

Consider which emission factors you use

Despite using 100% renewable electricity throughout all of our offices, we have chosen to use location-based emissions factors. Although under a market-based approach, some of these emissions would not be attributable to PwC UK, we have opted for this approach in recognition of the importance of using energy responsibly. This also avoids us potentially underestimating emissions while we work on identifying the electricity mix used by our staff and Partners when working from home and client sites. This is a complex area so you will need to choose a methodology that works for your operation and approach.

Work with suppliers to provide dashboards

It's very difficult to calculate the actual emissions for virtual video meetings and emails due to the lack of granular data. This process will be less ambiguous with the imminent launch of dashboards by suppliers. These will provide accurate emissions data which can be extracted for calculations.

Look outside for support

There's a lot to consider when assessing your technology carbon footprint. Don't be afraid to get support from specialist third parties for the areas you feel less confident in.

After the assessment

Re-evaluate technology options regularly

New technology is appearing rapidly so it's important to keep up with change. Cost, payback and environmental impacts may also change frequently so it's worth re-evaluating regularly.

Work closely with internal teams

Work closely with teams that may impact your use of tech so that you can take advantage of any periods of change and plan your reduction initiatives accordingly. Work out where your interdependencies are and keep in touch across your teams (facilities, real estate, IT, communications etc.) so that your successes last. Upskill your people to encourage awareness and promote best practice.

Glossary

Use phase emissions: Any emissions associated with when we use a technology, i.e. energy usage. This is specifically used when measuring hardware emissions.

Embodied emissions: Any emissions associated with the production, manufacturing and end-of-life of a hardware product.

Combined emissions: Use phase emissions plus embodied emissions.

SaaS: Software as a service. Software / applications that we license to use and is hosted by a third party.

PG&S: Purchased goods and services.

tCO2e: Tonnes (t) of carbon dioxide (CO2) equivalent (e); 1 tCO2 is equal to 2,6 economy flights Amsterdam – Rome 1

Scope 1 emissions: This covers the Greenhouse Gas (GHG) emissions that an organisation generates directly — for example while running its boilers and vehicles.

Scope 2 emissions: These are the indirect GHG emissions associated with the purchase of electricity, steam, heat, or cooling.

Scope 3 emissions: All other emissions the organisation is indirectly responsible for, up and down its value chain. For example, emissions associated with purchased good and services.

LCA: Life-Cycle Analysis is a method to quantify and measure the total environmental impact throughout the lifecycle of a product. For an IT hardware, it typically includes material, processing, manufacturing, distribution, use, and end of life.

Location-based emissions factors: Grid-average emissions factor for where the electricity is consumed.

Meet the team

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