PLAYING FOR THE PLANET

Untangling the carbon complexities of the video gaming industry

A practical guide to climate action and carbon emissions in the video gaming industry alongside guidance for video game businesses on scope 3 greenhouse gas accounting.

October 2023

Acknowledgements

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Thanks to the Carbon Trust team and Playing for the Planet members.

The Carbon Trust
Matt Anderson, Senior Consultant
Luisa Diaz Flores, Corporate Sustainability Manager
Mari Karla Medina, Analyst

Participating Playing for the Planet members
Microsoft Xbox
Neogames
Pixel Federation
Rovio
Sony Interactive Entertainment
Sumo Group
Ubisoft
Ukie*
Ustwo Games
Unity
Video Games Europe*

Special thanks to non-Playing for the Planet members who contributed to the report
Team17

* Associate Members participation is limited to their respective secretariat and cannot be read as an implicit endorsement of the paper by their individual members

About Playing for the Planet

The Playing For The Planet Alliance was launched in 2019 during the Climate Summit at UN Headquarters in New York. In total, the members of the Alliance have the ability to reach more than 1 billion video game players. In joining the Alliance, members have made commitments ranging from integrating green activations in games, reducing their emissions and supporting the global environmental agenda through initiatives ranging from planting millions of trees to reducing plastic in their products.

The initiative is facilitated by the UN Environment Programme.

About the Carbon Trust

The Carbon Trust is a global climate consultancy driven by the mission to accelerate the move to a decarbonised future. Climate pioneers for over 20 years, it partners with businesses, governments and financial institutions to drive positive climate action.

From strategic planning and target setting to implementation and communication, the Carbon Trust turns ambition into impact. To date, its 400 experts have helped set over 200 science-based targets and guided more than 3,000 organisations and cities across five continents on their route to Net Zero.

Report disclaimer

This is a Playing for the Planet Alliance report whose aim is to address the uncertainty in the application of the Greenhouse Gas Protocol (GHG Protocol) accounting and reporting standards to organisations in the video gaming sector. There is currently a lack of clarity on how the video gaming sector applies aspects of the accounting frameworks. This is creating significant barriers for businesses wanting to increase the ambition of their climate action, as measurement and tracking of carbon emissions is a fundamental pillar of carbon reduction strategies. This report seeks to gather approaches currently used by Playing for the Planet Alliance members to measure scope 3 emissions. The report consolidates learnings and experiences of industry organisations and provides valuable guidance for video game businesses that seek clarity on applying GHG accounting standards. The aspiration of the report is to generate consensus within the Alliance around accounting approaches in relation to the GHG Protocol. Please note that at this stage the intention is not to define or require an industry standard GHG accounting approach.

About this report

Why do we need this report?

- As part of its mission and in line with its core focus areas for 2023[1], the Playing for the Planet Alliance (P4P) seeks to accelerate climate action and decarbonisation in the video gaming industry.
- In recent years, video game businesses across the industry have worked to measure, report, and understand their carbon footprints, set carbon reduction targets, and develop carbon reduction strategies.
- Through P4P's work in this area and engagement with video game businesses across the industry, foundational challenges to accelerating climate action have become clear. This report seeks to address these challenges, namely: a lack of clarity on how video game businesses should interpret and apply existing carbon accounting frameworks and engagement with the broader video gaming community on climate action.
- Frameworks – such as the Greenhouse Gas (GHG) Protocol and, the related, Science Based Targets initiative (SBTi) – already exist. Businesses can follow these frameworks to measure, report and therefore reduce their carbon emissions.
- Currently there is ambiguity on how the video gaming sector applies and interprets these frameworks, particularly around scope 3 emissions. Members of the video gaming industry that measure their emissions are having to evaluate and interpret how they apply these frameworks individually, resulting in reports that are not always comparable and can vary significantly between companies.
- This causes uncertainty as to whether the frameworks are being correctly interpreted and inconsistency in how the sector measures and reports its carbon emissions. In turn, businesses face a significant barrier when they start to measure and reduce their emissions, consequently slowing down the speed of climate action.
- Establishing new understanding on this agenda was seen as the priority project for P4P to take forward together in 2023. Discussions were held to confirm this approach in a series of meetings through a period of six months in 2022 and this approach has also been informed by other initiatives such as Carbon Call which was founded with the support of Microsoft, with UNEP's support in 2022.
- Building a connection between video game players, the video gaming community and video game businesses also forms an important part in accelerating climate action. Players should have access to clear and useful information on this topic, which this report seeks to provide.

[1] https://www.playing4theplanet.org/project/annual-impact-reporting

Who is this report for and how is it structured?

- This report has been created with a broad audience in mind: the general public, the video gaming community and video game businesses.
- Content tailored to these audiences is included in the report and the structure is shown below for clarity:

Chapter 1 summarises the known state of climate action in the video gaming industry and is meant to inform all interested readers on progress, barriers and the path forward for the video gaming industry to accelerate impact.

Chapter 2 is intended for the video gaming community and interested members of the general public. This chapter is meant to grow a connection with the video gaming community on climate action in a reader friendly way, by explaining the connection between climate change and video games, sharing useful information on carbon emissions and video games, so that the video gaming community can be informed on this topic, and providing helpful tips and tricks for players that are interested in participating in taking climate action.

Chapter 3 is primarily intended for video game businesses and provides technical guidance aimed at addressing challenges of interpreting and applying carbon emissions accounting and reporting frameworks. This chapter also includes commentary and recommendations on areas of further study to continue building positive momentum in this area.

Chapter 4 is intended for all audiences and includes frequently asked questions relevant to the content of this report.

Contents

1

Climate action in the video gaming industry: Progress, barriers and the path forward

So where does the video gaming industry stand on climate action? The next pages will review the current known state of the industry on climate change, the barriers to taking accelerated action and the next steps on the climate action journey.

1.1. State of the industry on climate action

If you are a video game player reading this report, odds are that you are familiar with the Big 3 – Nintendo, Microsoft Xbox and Sony PlayStation – and have played one of their games, whether on a video game console, PC or mobile video gaming device. For many players, these organisations represent the video gaming industry; think Mario, Master Chief and Kratos. However, given its creative nature, the video gaming industry is made up of many other video game companies, including listed publishers and many small- and medium-sized video game developers and studios, as well as businesses in the PC and mobile video gaming ecosystem that produce hardware and distribute video games. How all these companies are tackling climate change can tell us a lot about the state of the industry on climate action.

Across the Big 3, carbon emissions are reported publicly on an annual basis, which is generally understood as the first step in a comprehensive climate action strategy. Microsoft Xbox and Sony PlayStation regularly communicate their progress on sustainability and climate initiatives through their communication platforms[2] and both of their parent companies have set science-based targets through the Science-Based Targets initiative (SBTi).[3] These carbon reduction commitments should be applauded and signal the importance of taking and embedding climate action in their business operations. Yet, due to the nature of these companies as large multinational technology companies, their science-based targets do not specifically address emissions within video gaming businesses. Nintendo has not set a science-based target, but has identified 'environment' as one its four corporate social responsibility (CSR) priority areas.[4]

2. https://www.xbox.com/en-GB/community/sustainability, https://www.playstation.com/en-gb/corporate/playstation-and-the-environment/
3. https://sciencebasedtargets.org/companies-taking-action, see FAQs for more information about SBTs and the SBTi
4. https://www.nintendo.co.jp/csr/en/report/creation/index.html

Elsewhere in the video gaming industry there is progress on climate action – Ubisoft has set its own science-based targets and both Rovio and Unity have committed to submitting science-based targets for validation through the SBTi.

While some of the large organisations at the top of the industry have made good initial progress on climate action, there is still a long way to go to decarbonise these businesses and the video gaming industry as a whole. The complex nature of the video gaming sector supply chain means that many video game companies may have the ambition to reduce emissions, but face challenges to achieve these, such as a lack of resources and technical know-how.

This industry-wide reality is reflected in the small number of video game businesses that have set science-based targets. Currently, only 12[5] out of 222 businesses analysed have either set, or committed to setting, a science-based target.[6] This is not for a lack of will, but rather a lack of certainty and solutions on how to measure carbon emissions and navigate the landscape of carbon emissions reduction targets.

Since the early days of the industry, video game companies and video gaming journalism have built a strong connection with players through magazines like Electronic Gaming Monthly (EGM) and conferences like E3 and gamescom. And while video game companies communicate often with their audience, the conversation around climate change has been relatively quiet.

Perhaps unique to the video gaming industry as an entertainment medium, is its ability to blend artistic expression, compelling storytelling and technological advancements to engage and connect with its audience – players. Initiatives such as Playing for the Planet's (P4P) 'Green Game Jam' and games like 'Alba: A Wildlife Adventure' show that great games and engagement with players on environmental topics can go hand in hand. The opportunity to connect and talk with players about climate action is an enormous opportunity to grow impact across the industry; so let's start talking.

For the video gaming industry, taking climate action does not mean degrading the video gaming experience of players in order to reduce carbon emissions. Instead, developing creative solutions to reducing carbon impact while maintaining player experience, sharing carbon and energy information with players to inform their decision making, giving players more options in how they play and using video games to inspire players to take action, will all form part of the solution.

The industry has come a long way in a relatively short time and there is recognition of the ambition and need to do more on climate action. In 2019, the Playing for the Planet Alliance was launched with the mission to inspire the video gaming industry and community to take environmental action to 'Promote, Protect and Play for the Planet'. In 2023, P4P has grown to include 42 members and has targeted decarbonisation of the gaming industry as a core focus area – and while decarbonisation of the video gaming industry is happening – it's time to speed things up[7].

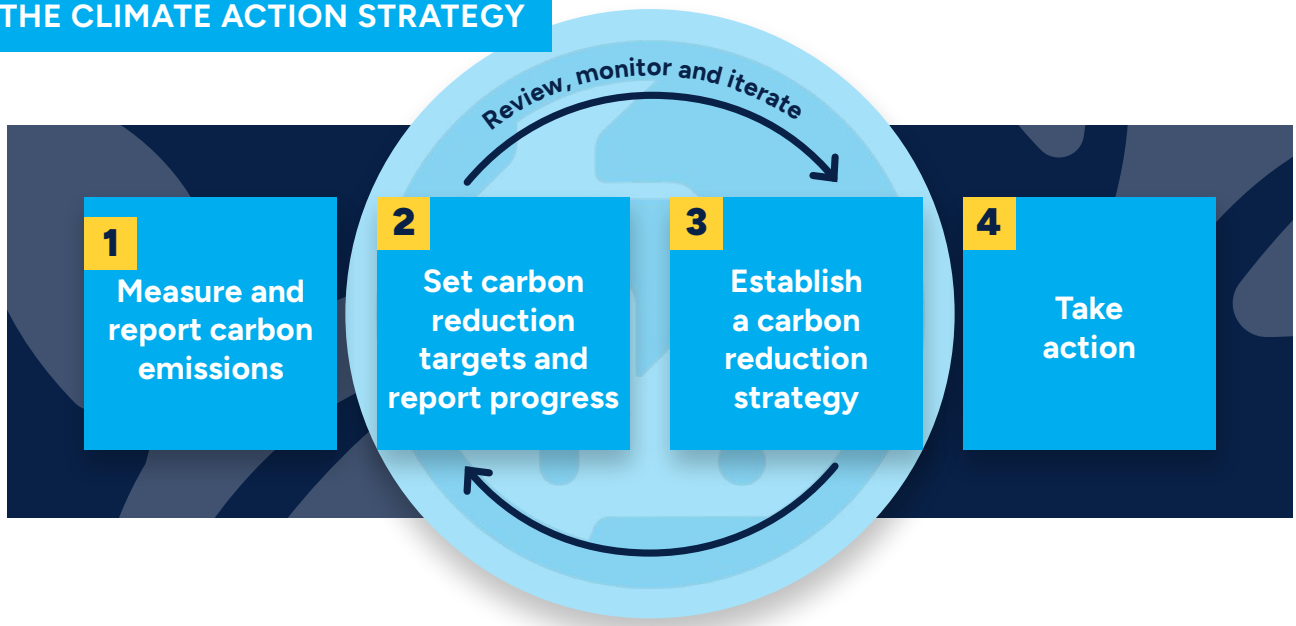
'Promote, Protect and Play for the Planet'

5. Microsoft, Tencent, Sony, Aristocrat, Embracer Group, Ubisoft, Unity Software, Stillfront Group, Rovio Entertainment, COLOPL, Klab and Voltage.
6. Based on analysis of SBTi's companies taking action data on 28th March 2023.
7. United Nations Environment Programme (2023). Playing for the Planet Annual Impact Report. Nairobi., https://www.unep.org/resources/report/playing-planet-alliances-2022-annual-impact-report

1.2. Barriers to accelerating impact

Fundamental to taking and accelerating climate action, is the ability to measure and estimate carbon emissions consistently and accurately. This is important for several reasons, but primarily boils down to this: you can't manage what you don't measure. Reliable measurement and estimation of carbon emissions helps businesses to understand where their emissions are coming from, focus efforts and resources to achieve the best outcomes in reducing emissions and establish a consistent and meaningful baseline to set carbon reduction targets, which ultimately guide the business' climate action strategy.

THE CLIMATE ACTION STRATEGY



Through its engagement with video game businesses across the industry, Playing for the Planet and its members have identified barriers which limit the speed at which video game companies can take action and deliver impact. Addressing these barriers is necessary to move the Alliance forward on climate action.

BARRIERS TO ACCELERATING IMPACT

Sustainability resources

Many video game businesses are small- and medium-sized organisations. They often don't have dedicated sustainability resources and need support and guidance on the best way to take action.

Complexities of carbon accounting and target-setting

While video game businesses want to take climate action, the complexities of carbon accounting, reporting and target-setting are difficult to navigate. As a consequence, many organisations struggle to measure and estimate certain aspects of their emissions and set carbon reduction targets accordingly.

Connecting and communicating with players about climate action

Similarly, many players are increasingly concerned about climate change and interested in the role they can play (56% of players say that the video gaming industry has a responsibility to act on global warming, while 45% of players think the industry should be doing more[8]). However, players lack information and the video gaming industry still has a way to go to connect and communicate with players about climate action.

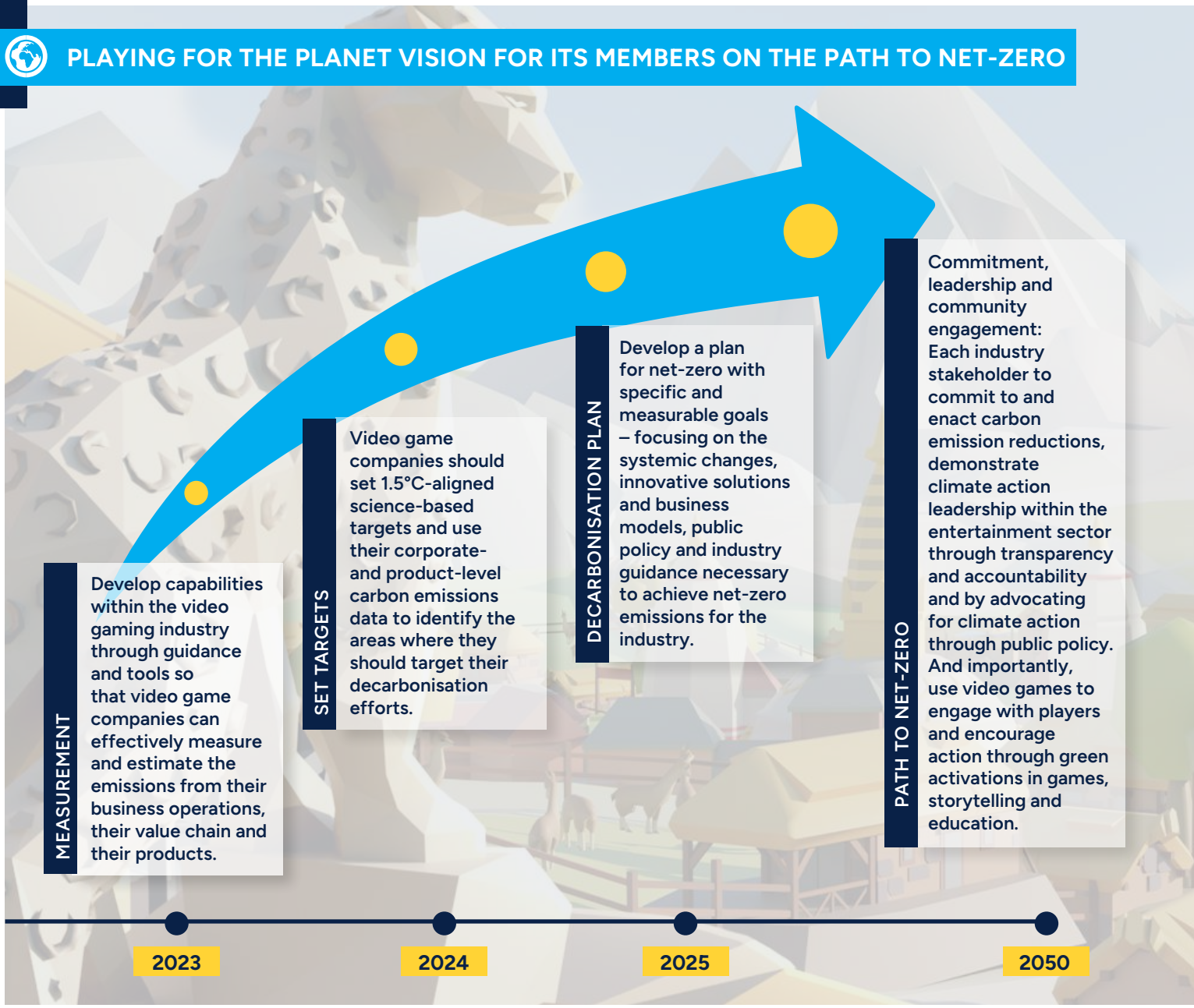
8. Leiserowitz, A., Carman, J., Psaros, M., Neyens, L., Rosenthal, S., Marlon, J., & Srivastava, M. (2022). What Do Video Gamers Think About Global Warming? New Haven, CT: Yale Program on Climate Change Communication, https://climatecommunication.yale.edu/publications/what-do-video-gamers-think-about-global-warming/toc/2/

1.3. Path forward on climate action in the video gaming industry

Achieving net-zero carbon emissions in the video gaming industry is the ultimate goal of climate action and the path forward is going to take an industry-wide effort. By beginning to address the barriers in carbon accounting and community engagement, a solid foundation can be built that supports and scales climate action at an accelerated pace. Video game businesses can then move forward quickly with establish their own carbon reduction targets aligned with the latest climate science and use carbon emissions inventories as a useful tool to guide their climate action strategies and efforts.

The video gaming industry has a great opportunity to inspire action, create innovative solutions and mobilise a generation of players who are as invested in protecting the environment as they are in the video games they play and love. There is a lot of work to be done and getting off to a good start is important, so the industry must focus on the fundamentals and support video game businesses and the video gaming community on these first steps.

PLAYING FOR THE PLANET VISION FOR ITS MEMBERS ON THE PATH TO NET-ZERO



Playing for the Planet has identified five core areas to focus its efforts in 2023:

1. Continue to build out green activations in play with a focus on real-world impact
2. Accelerate progress on decarbonisation in the industry
3. Research and insight
4. Community and communications
5. New areas for exploration

For more information, see Playing for the Planet's Annual Impact Report 2022

2

Calling all players: Connecting with players on climate action

Hi players.

There's something important we've been meaning to discuss – the latest slate of blockbuster video games for this holiday season...wait, not that. There's something else equally important to talk about – climate change.

I know we haven't had a chance to talk about this often. Lately, we've been thinking a lot about climate change and wanted to share what we've learned, to keep you informed and maybe even spark some inspiration around how you, as a video game player, can stay educated and get involved.

Whether through direct action or more passively through awareness, there are lots of ways to contribute.

As citizens, parents, siblings, and yes, even as players, climate change affects us all. So please join us as we get the conversation going.

2.1. Press Start: What does climate change have to do with video games anyways?

Climate change – that's a big concept.

Put simply, climate change is a shift in temperature and weather patterns, which since the industrial revolution in the 1800s has accelerated because of human activities and greenhouse gases emitted (i.e. carbon emissions, but also including other gases like methane and nitrous oxide – see FAQs for more information) through the burning of fossil fuels.[9] Rising sea levels, increasing numbers of natural disasters like droughts and wildfires, famines and millions of people displaced from their homes. These are just some of the effects of climate change.

It's likely you already have some awareness and knowledge on the topic, whether through the media and journalism, your own interest and research, or even through entertainment and video games. So rather than share much more detail about climate change generally, here are two key concepts[10] to be aware of:

We're at a critical point in time to turn back the clock on climate change. The latest science shows that we've reached an average global surface temperature increase of 1.1°C since the mid- to late-19th century. Based on current levels of carbon reduction commitments made by governments via Nationally Determined Contributions (NDCs), it is likely that warming will exceed 1.5°C this century and even limiting global warming to 2°C will still be a challenge. Every small increase in global warming will intensify the effects of climate change that we are already experiencing. Climate change poses a real threat to human well-being, the health of our planet and diversity of animal and plant life. It's important we get this right and act quickly.

Limiting global warming and battling climate change requires net-zero CO_2 emissions globally and the level of carbon emission reductions achieved this decade will decide whether warming is limited to 1.5°C or 2°C.

9. For more information about climate change, see this informative article from the United Nations https://www.un.org/en/climatechange/what-is-climate-change
10. Adapted from the IPCC, 2023: Summary for Policymakers. In: Climate Change 2023: Synthesis Report. A Report of the Intergovernmental Panel on Climate Change. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland, (in press). https://www.ipcc.ch/report/ar6/syr/resources/spm-headline-statements

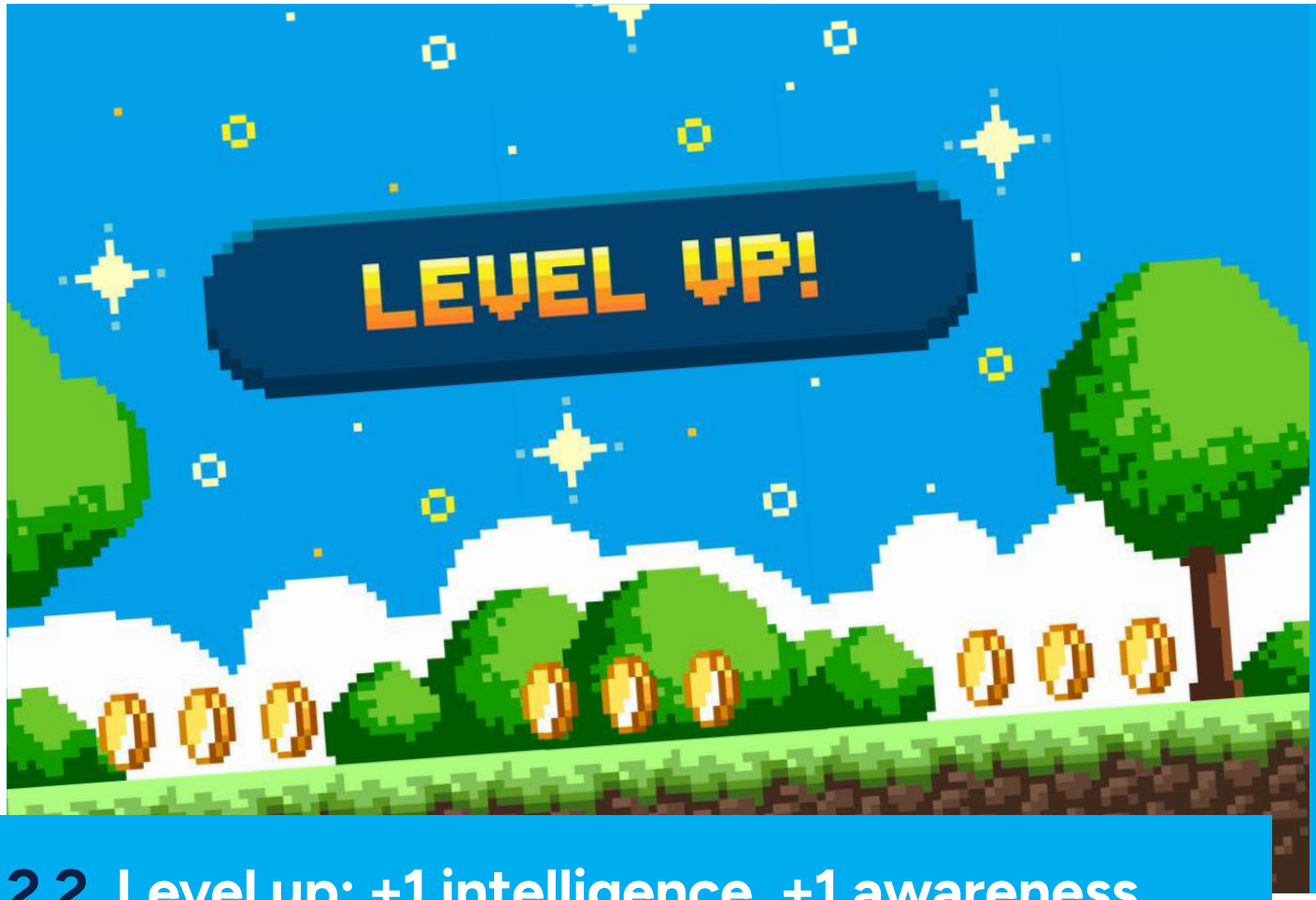
Achieving net-zero emissions is going to take a global effort, and everyone has a role to play. Governments around the world must establish policies and frameworks to enable effective climate action and facilitate the transition to renewable electricity grids. The private sector must cooperate to accelerate climate action through finance and technology, while global citizens should stay informed and engaged. Behavioural and lifestyle changes have an important role to play too. Vulnerable communities are in many ways receiving the brunt of the impacts of climate change, even though they've historically emitted next to no carbon emissions. Climate justice, social justice and inclusion are all necessary aspects of a just transition towards a net-zero carbon future.

So where do video games fit into all of this? In two main ways:

Video games are part of the largest entertainment industry today. Producing video games relies on a complex supply chain of artists, programmers, producers, engineers and many more. And playing video games requires technology – computers, video game consoles, mobile gaming devices like smartphones and tablets, TVs, sound systems, data centres and the internet. All of these parts require energy to do their job and generating energy means some amount of carbon emissions are produced. On top of the energy used to run video gaming devices, there are carbon emissions from the production and manufacturing of these devices as well.

Video games are a uniquely interactive form of art and entertainment and have great potential to reach more than three billion players[11] and counting through storytelling, raising awareness and community action. After all, we love video games for the sense of wonder and promise of new experiences, the challenge and achievement of taking down a final boss and probably above all else, the video gaming community and connectedness that is at the heart of video game culture. These qualities are exactly what can make video games so powerful in the fight against climate change.

11. https://www.gamesindustry.biz/dfc-global-game-audience-reaches-37-billion



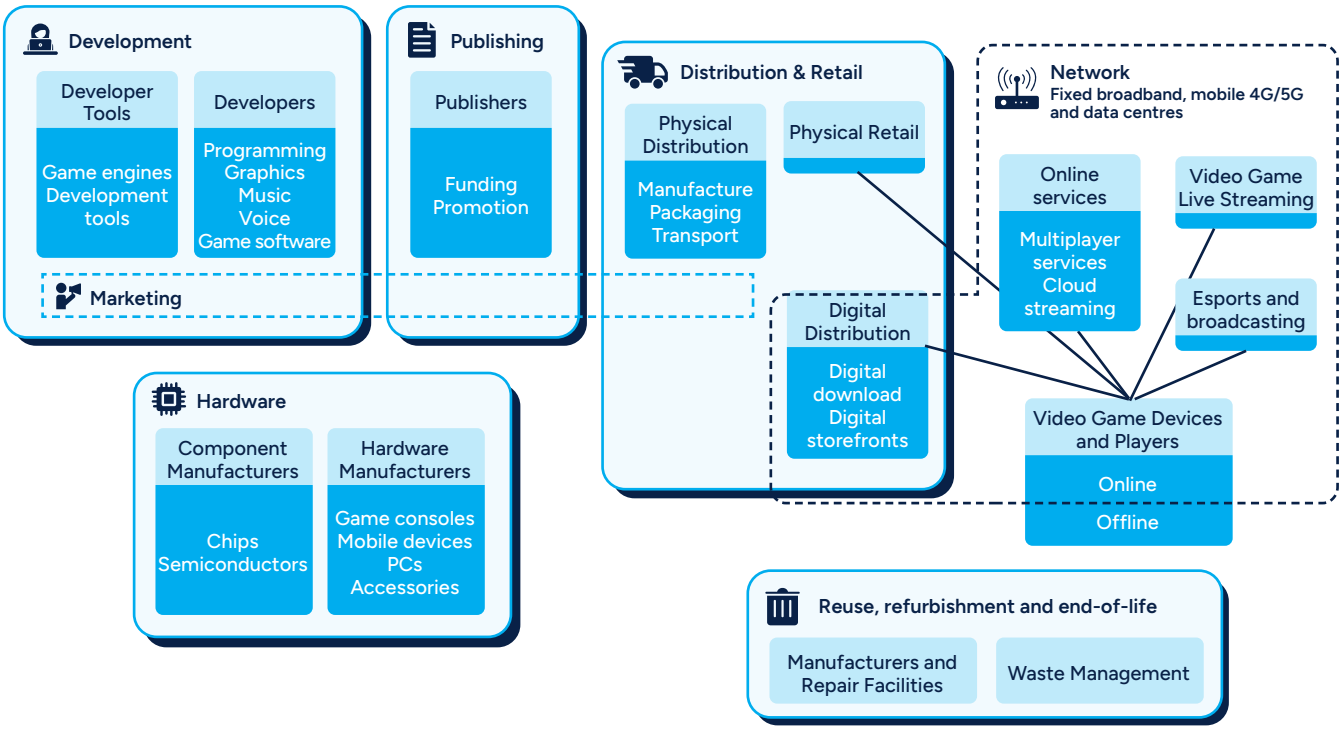
2.2. Level up: +1 intelligence, +1 awareness, +1 faith. Sharing information on video games and carbon emissions with the video gaming community

Tutorial down, some solid XP in the bank and we've made it to the next save point. Let's level up. Finding clear, useful information about carbon emissions and carbon footprints hasn't always been easy, particularly in the video gaming industry, but it's getting better. There's some important information to cover to make sure you're equipped for the fight ahead. Below, we cover:

- How the video gaming industry works and the elements of the supply chain
- How video games are made and the associated life cycle carbon emissions
- Power, energy and carbon information for video game consoles, mobile devices, PCs and related electronics, like displays
- Electricity and carbon emissions
- Factors affecting the carbon emissions of video games
- Solutions being implemented by the video gaming industry to tackle climate change

2.2.1. How the video gaming industry works and the elements of the supply chain

Today's video gaming industry has become complex and is made up of many different types of businesses across the value chain. At the heart of the industry are three types of companies: developers and studios — who create video games, publishers — who finance, distribute and market video games, and hardware manufacturers – who produce the consoles, computers and mobile devices that run video games. Retailers also play an important role in the value chain by getting video games into players' hands. Some video game businesses focus on one aspect of the supply chain, while others fulfil two or more roles. Nintendo, Microsoft and Sony, for example, all design hardware, publish games and develop games and may be considered platform providers.

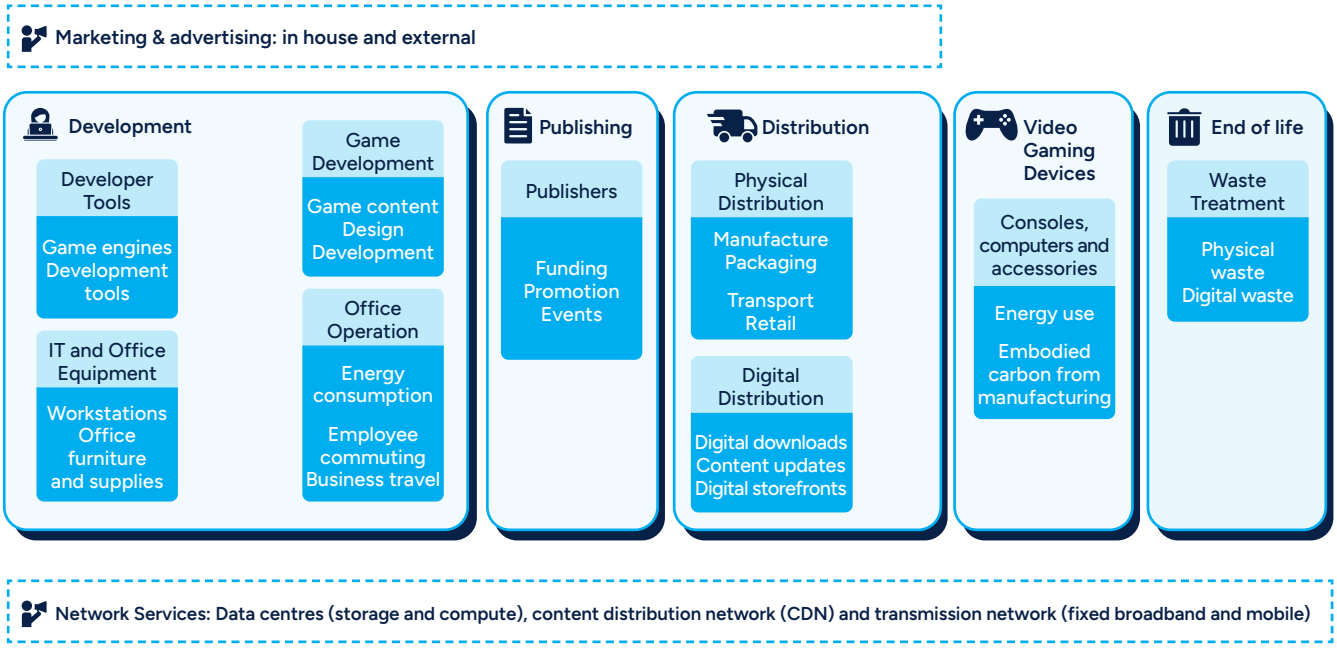


As the video gaming industry has grown and matured, so has the complexity of the supply chain. Developers rely on both in-house and third-party game engines and tools to build their games. Distribution of video games has evolved too, from primarily moving physical media on cartridges and discs to store shelves and then into player's video game devices, to now also relying on digital means of distribution games like downloads and cloud streaming over the internet.

Increasingly, network and online services are used by video games to provide multiplayer connectivity, save game data, and even stream in-game assets in real-time as you play. Video streaming and esports has grown in popularity as well, thanks to the access offered by network connectivity.

2.2.2. How video games are made and the associated life cycle carbon emissions

The actual process of making video games is well-documented.[12] But what's not so obvious, is the carbon footprint of a video game's full life cycle – from its development through to it being played on a video gaming device and to its end of life.



This next part gets a bit technical, but bear with us, as we try to clearly present some information to get you up to speed. And because we don't all speak the language of carbon emissions, here's a reference point: 100 grams of CO_2e is equivalent to driving a quarter of a mile (0.4 km) in an average American gasoline-powered car.[13] You can find more information in the FAQs section to answer some other questions, like, 'What does CO_2e mean?'.

Let's dig into some studies that have assessed the carbon impact of playing a video game. While we do this, just bear in mind that the objectives, boundaries and methods of analysis used across studies vary and for good reason, there is no one-size-fits-all approach to video gaming.

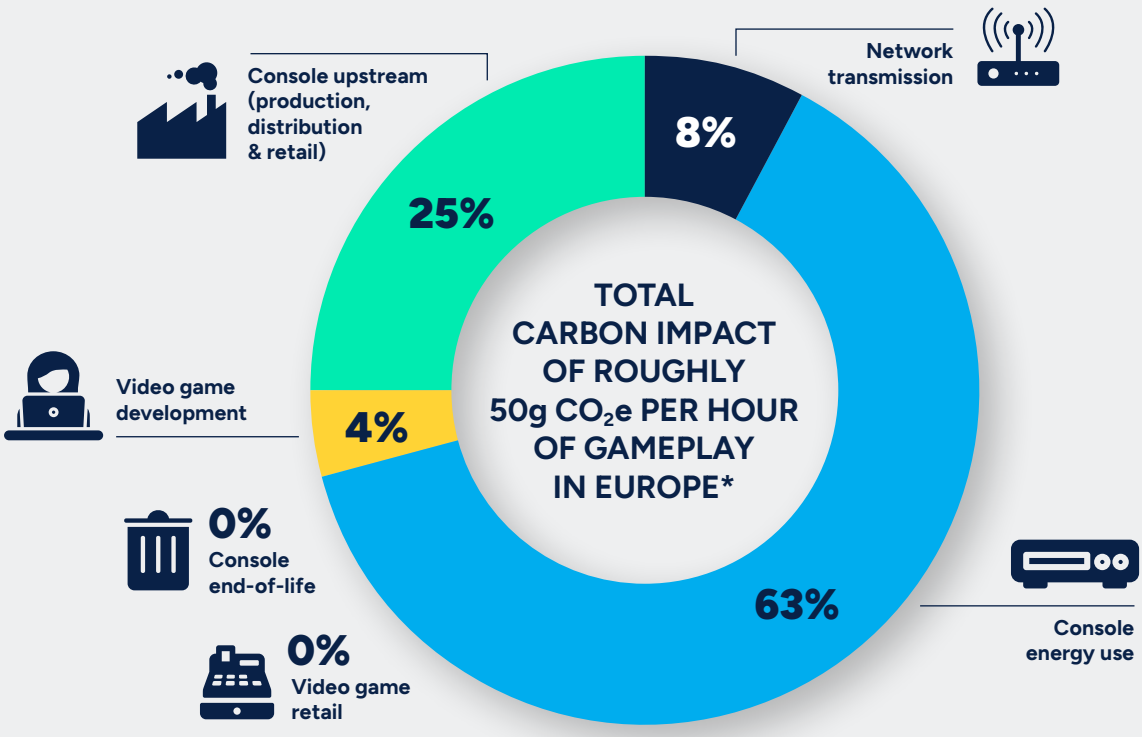
Many players in 2023 are likely to play a digitally downloaded game on a video game console, so let's look at the results for this scenario and review some key takeaways.

Research sponsored by Sony Interactive Entertainment Europe in 2020 took a comprehensive approach to estimating the life cycle carbon impact of playing a video game on a PlayStation 4 console in Europe and is useful to illustrate some key concepts. Within the research, analysis was performed to compare life cycle carbon emissions from three different means of gaming: console with a physical disc, console with a digital download and cloud gaming. The result of this analysis for the digital download scenario is presented in the figure below.

12. For additional information on how video games are made see these sources: https://medium.com/@microclub_usthb/how-video-games-are-made-608cacced8f, https://www.cgspectrum.com/blog/game-development-process
13 https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

Since the life cycle emissions are being estimated, for each category the emissions from manufacturing, transport, use and end of life are considered. For clarity, the life cycle emissions associated with the TV are not considered in the boundary of this figure, as they were considered to be equivalent between the three gaming scenarios. *Bear in mind, this type of analysis is dependent on many different parameters and assumptions and this is only one reference point.*

CARBON IMPACT OF PLAYING A VIDEO GAME ON A PLAYSTATION 4 CONSOLE IN EUROPE (SIE SPONSORED RESEARCH IN 2020)



Source: Adapted from J. Aslan's EngD thesis, Climate Change Implications of Gaming Products and Services.[14]

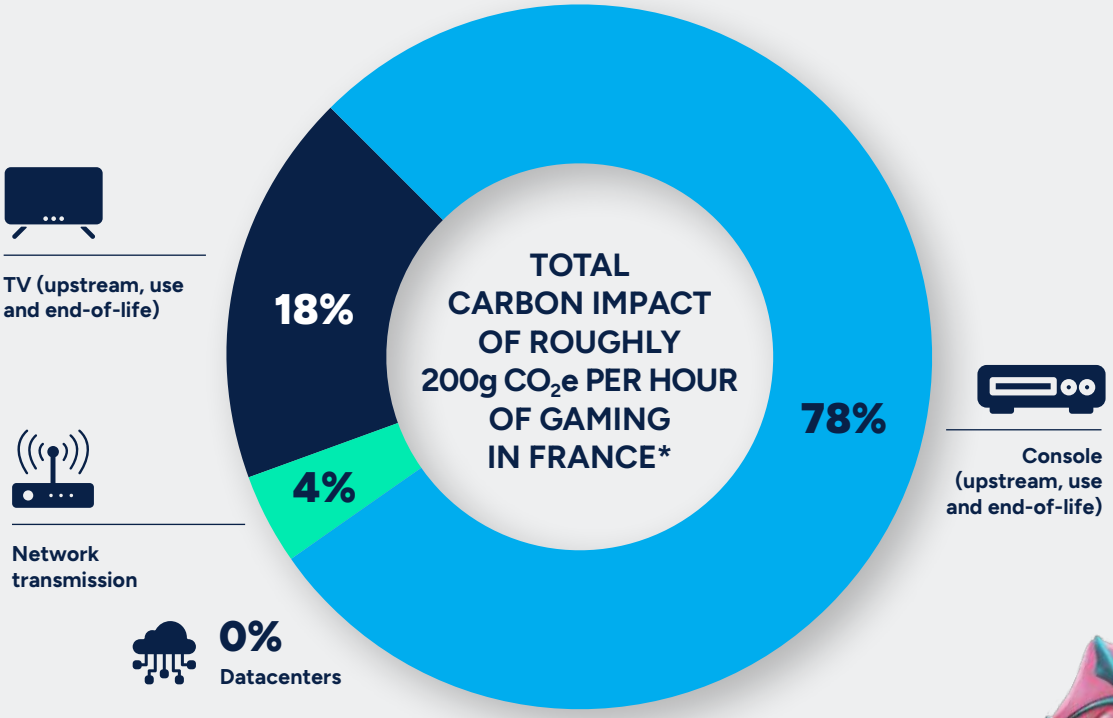
*The emissions associated with production and use of the TV are not included in this figure. This figure is only representative of one gaming scenario. Other studies have estimated the hourly impact of video gaming in the range of 50 gCO_2e to 600 gCO_2e per hour depending on what is included in the boundary of analysis, the scenario studied and the region of study. Results are sensitive to assumptions, such as the estimated console lifetime, assumed to be 5 years in this case.

A more recent study by the French Agency for Ecological Transition (ADEME) to estimate the carbon impact of 1 hour of playing a video game in France provides another useful data point.[15] There are some important distinctions in the boundary of analysis used for the ADEME figure presented below – namely that it evaluates emissions in France specifically (rather than Europe). It also includes the life cycle emissions associated with the TV and does not include the emissions from developing the game.

[14] Aslan, J. (2020). Climate Change Implications of Gaming Products and Services. Doctoral dissertation. University of Surrey. (figure adapted from table 42), https://openresearch.surrey.ac.uk/esploro/outputs/doctoral/Climate-change-implications-of-gaming-products-and-services/99512335802346#details

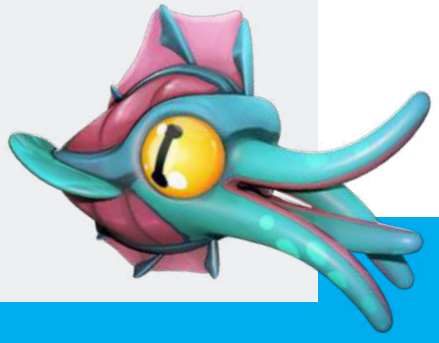
[15] MEYER Julia (ADEME), NICO Tom (I Care), BURGUBURU Alexis (I Care), RIGAL Margot (I Care), LIZON Benjamin (I Care), GENIN Léo (I Care), CATALAN Caroline (I Care), ADAM Isaure (I Care). 2022. Evaluation of the environmental impact of the digitalization of cultural services., https://librairie.ademe.fr/dechets-economie-circulaire/5961-environmental-impact-assessment-of-the-digitalization-of-cultural-services.html

CARBON IMPACT OF 1 HOUR OF PLAYING A VIDEO GAME IN FRANCE (ADEME ANALYSIS IN 2022)



Source: Adapted from ADEME report, Environmental Impact Assessment of the Digitalization of Cultural Services, Table 45.16

*The emissions associated with developing and publishing the game are excluded from this study. Results are sensitive to modelling parameters and assumptions, such as regional emissions intensity of electricity and estimated console lifetime, assumed to be 6.5 years in this case.



Staying up to speed on carbon information will allow more informed decision-making when considering the environmental impacts of your preferred video gaming style.

- **The video gaming device normally makes up most of the carbon impact of video gaming, but TVs and displays are significant too.**
- **The emissions from both production of the video gaming hardware and energy used during gameplay make up a large part of the carbon impact of video gaming.**
- The indication is that **the carbon impact of video game development is small (estimated as 1.6 gCO_2e per hour of gameplay[17]), but not trivial**, compared to the console and TV.
- **How your local electricity is generated matters**. Whether your electricity is generated through renewable sources or fossil fuels will have an effect on carbon emissions and generation sources vary from region to region. See Section 2.2.4 for more information.

This data should give you a sense of how carbon emissions relate to the video game life cycle and next, we'll dive a bit deeper into the details, focusing on the parts of the life cycle with the biggest impact and also the greatest opportunity for positive change.

16. MEYER (ADEME) et. al. 2022. Evaluation of the environmental impact of the digitalization of cultural services.
17. Aslan, Climate Change Implications of Gaming Products and Services, 2020, based on data from 3 European developers and 214 hours total gameplay per game

2.2.3. Power, energy and carbon information for video gaming hardware and related electronics, like displays

There is some good information out there on the power and energy consumption of video gaming hardware and some of that will be summarised here with a focus on current generation consoles, PCs and mobile devices, alongside resources for more information.

Power consumption of current generation video game consoles varies depending on the function and state of the device. For example, a console in rest mode will consume less power than when sitting idle on the console's home screen. Sony, Microsoft and Nintendo all publish energy efficiency data as part of the games console voluntary agreement[18] and this data is verified by an independent inspector as part of compliance with the voluntary agreement. The nature of video gaming hardware is that consoles receive software updates and hardware revisions over time, so these figures can change over the life of the console.

POWER INFORMATION FOR VIDEO GAME CONSOLES

Console state	PlayStation 5[19]	Xbox Series X[20]	Xbox Series S[21]	Nintendo Switch[22]
Off (PS5 – Rest mode with low power use, XSX/XSS – Energy Saver)	0.3-0.38 W	0.32 W	0.32 W	0.3-0.5 W
Rest mode internet connected (PS5), Standby (XSX/XSS), Sleep (Switch)	0.9-1.2 W	11.8 W	11 W	0.3-0.5 W
Home menu	44-46 W	48 W	28 W	3 W
Streaming media	54.1 W	47-48 W	28-31 W	6 W
Active gaming [last gen game]	199-201 W [90-109 W]	157.7 W	81.5 W	7 W

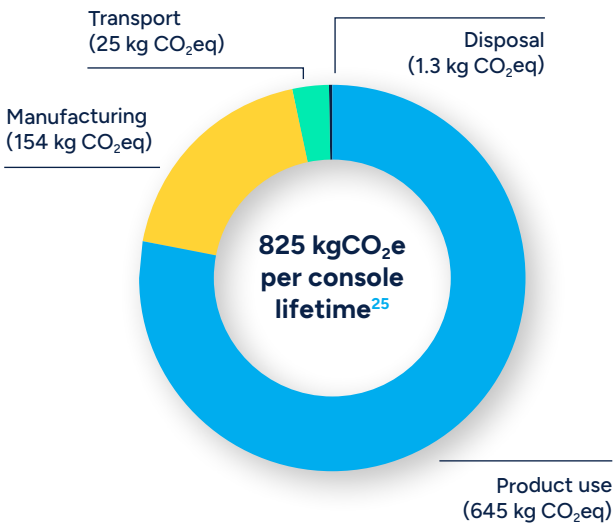
[18] https://efficientgaming.info/about
[19] Based on PlayStation published data https://www.playstation.com/en-gb/legal/ecodesign/
[20] Based on data published in Xbox Series X Ecoprofile. (Home menu and streaming media values from https://support.xbox.com/en-GB/help/hardware-network/power/learn-about-power-modes,)
[21] Based on data published in Xbox Series S Ecoprofile. (Home menu and streaming media values from https://support.xbox.com/en-GB/help/hardware-network/power/learn-about-power-modes,)
[22] Based on Nintendo Switch Model HAC-001(-01) in TV mode https://www.nintendo.co.uk/Corporate/Consumer-Information/Eco-design/Information-about-energy-efficiency-and-eco-design-of-Nintendo-Switch-family-consoles-2026830.html

In the PC space, power consumption data isn't as clear cut and the hardware options are much more varied. In general, video gaming laptops can consume 100-300 W during gameplay and video gaming desktops usually consume even more power. Nvidia's RTX 3060 mid-range graphics card is rated at 170 W with a required system power of 550 W[23]. Top-end graphics cards like Nvidia's RTX 4090 average 315 W while gaming for the graphics card alone with a required system power of 850 W.[24]

From a carbon perspective, on average the energy used to play games makes up most of the lifetime impact. Manufacturing the console has an impact too, accounting for 15-20% of the lifetime carbon impact. We can see this in the ecoprofiles for Xbox Series X and Xbox Series S, as published by Microsoft.

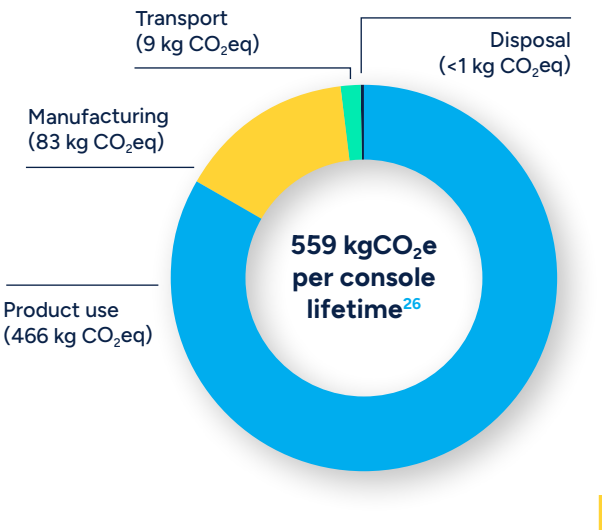
ECOPROFILE

Xbox Series X



ECOPROFILE

Xbox Series S



[23] See specs section of product page https://www.nvidia.com/en-gb/geforce/graphics-cards/30-series/rtx-3060-3060ti/
[24] See specs section of product page https://www.nvidia.com/en-gb/geforce/graphics-cards/40-series/rtx-4090/
[25] https://download.microsoft.com/download/4/8/D/48D50344-33CD-4D9A-BA11-0C7DCA1A3948/Ecoprofile_XboxSeriesX.pdf
[26] https://download.microsoft.com/download/4/8/D/48D50344-33CD-4D9A-BA11-0C7DCA1A3948/Ecoprofile_XboxSeriesS.pdf

With more than three billion players using mobile devices to play video games,[27] let's also review some energy data for playing video games on smartphones. In general, smartphones are efficient devices and during gameplay consume between 2-5 W based on testing from Xbox and their certification team.

POWER INFORMATION FOR A SELECTION OF SMARTPHONES

Phone model	Baseline power*	Power during gameplay**
iPhone XR	0.3 W	2.3-4.4 W
iPhone 11	0.3 W	2.7-3.5 W
Galaxy S9	0.4 W	1.9-4.3 W
Galaxy S21	0.4 W	2.2-3.1 W

*All test results were measured with a Yokogawa WT210 digital power meter during 30 minutes of use. For baseline results, devices were idle with screen on and no apps running. Settings such as bluetooth, NFC and notifications were also turned off. Consistent volume, brightness and vibration settings were used across all tests and devices. Power setting used was 'optimised for battery life'. Results presented here have adapted energy figures in Wh from test results into average power figures in W.

** Gameplay results are from tests across four games (Beatstar, Angry Birds: Dream Blast, Clash Royale and Minecraft). For each game and device, two gameplay tests were run.

To round things out, lets take a quick look at power requirements of displays. Most console players are likely to use a TV, though some may use monitors, so we can look at both.

POWER INFORMATION FOR A SELECTION OF TVS AND DISPLAYS

Mid-range 43" 4K Smart TV[28]	High-end 55" 4K Smart TV[29]	High-end 65" 4K smart TV[30]	High-end 65" 8K smart TV[31]	Entry-level 27" Full HD monitor[32]	Ultra-wide 37.5" QHD gaming monitor[33]
53 W (99 W HDR)	83 W (147 W HDR)	100 W (179 W HDR)	112 W (389 W HDR)	19 W	37 W (106 W HDR)

[27] https://www.pocketgamer.biz/news/81293/92-of-gamers-are-exclusively-using-phones/
[28] Average of https://www.lg.com/uk/tvs/lg-43ur91006la and https://www.samsung.com/uk/tvs/uhd-4k-tv/cu8500-43-inch-ue43cu8500kxxu/
[29] Average of https://www.lg.com/uk/tvs/lg-oled55c34la and https://www.samsung.com/uk/tvs/oled-tv/s95c-55-inch-oled-4k-smart-tv-qe55s95catxxu/
[30] Average of https://www.lg.com/uk/tvs/lg-oled65c36lc and https://www.samsung.com/uk/tvs/oled-tv/s95c-65-inch-oled-4k-smart-tv-qe65s95catxxu/
[31] https://www.samsung.com/uk/tvs/qled-tv/qn900c-65-inch-neo-qled-8k-smart-tv-qe65qn900ctxxu/
[32] Average of https://www.lg.com/uk/monitors/lg-27bl650c and https://www.samsung.com/uk/monitors/flat/t35f-27-inch-ips-fhd-1080p-freesync-lf27t350fhrxxu/
[33] https://www.lg.com/uk/monitors/lg-38gn950p-b

Key takeaways about power, energy and carbon information for video gaming hardware and electronics

- **Know where to find energy and carbon data**. For consoles and displays, manufacturers normally publish energy efficiency data within the specifications on the product page. Sometimes they are found separately on the product sheet. In regions like the US, EU and UK, energy data can also be found on energy efficiency labels when shopping in store and online.
- **When selecting or building a video gaming system to suit your gaming preferences, it pays to check the power and energy specifications from the manufacturer**. When you have determined the type of video gaming experience you're after, you can save energy and money on your electricity bills by shopping smart and selecting efficient components. For console players, make sure to check the energy labels when purchasing a display. For PC players, it can be more challenging to navigate the energy data available, so check the specifications of components provided by CPU and GPU manufacturers.
- **Displays have a wide range of energy consumption depending on the specifications and features**. A high-end 4K TV can consume nearly as much energy as a current gen console when displaying HDR content. Selecting the right size display with the right features to match your gaming setup can reduce energy consumption.
- **Manufacturing of video gaming hardware and peripherals has a carbon impact too**. Keep your devices as long as they suit your needs and when you're ready to move on, trade them in to be refurbished, recycled or properly disposed of. In some cases, new hardware may have a large energy efficiency improvement, so keep an eye on how your older devices are performing over time. Manufacturers have trade-in and take-back programs for the electronics that you no longer use so they can receive a second life or be treated properly at end of their useful life.
- **Before buying new, take a look at used and refurbished from reliable vendors**. Good deals can be found on used and refurbished electronics, so it can pay to take a look and is an easy way to reduce carbon impact. Reputable vendors will also back up their products through warranty so you can be confident that they'll work like new or be covered under warranty in case something goes wrong. The same recommendations above apply when shopping for used and refurbished goods, so make sure to check available energy data.

2.2.4. Understanding electricity and carbon emissions

We've talked a lot about energy, so we should also talk about how energy, electricity and carbon emissions are related. There are two key concepts to be aware of:

- How electricity is generated in your region will affect the carbon emissions from video gaming
- Your electricity supplier may offer an electricity product that is 100% renewable, what this really means may not be obvious

As far as video gaming is concerned, when you consume energy, you are consuming electricity which is normally generated at a power plant and distributed through the electrical grid to your home. Different ways of generating electricity emit varying amounts of carbon. Now here's the kicker: depending on where you live, the generation mix of your electricity will be lower- or higher-carbon. For example, France has historically generated low-carbon electricity compared to global averages because of its adoption of nuclear power.[34] On average one hour of gaming in France, will emit less carbon than one hour of gaming in the UK, which in turn emits less carbon than one hour of gaming in the US. How much less, depends on the grid emissions intensity.

Carbon emissions from 200 Wh of electricity (200 W for one hour)[35]

13 gCO_2e	42 gCO_2e	81 gCO_2e

Depending on where you live and your options for electricity suppliers, you may have access to a green tariff electricity product and they may be marketed as 100% renewable electricity.

Green tariffs can be a great option for consumers looking to further reduce their environmental impact by purchasing cleaner electricity. They typically come with a price premium, though it's worth shopping around because you may find a good deal to fit your budget.

For more information on electricity generation and carbon emissions, here is a quick primer

For more information on green tariffs: UK, US

[34] https://ourworldindata.org/low-carbon-electricity-by-country

[35] Based on emissions from electricity generation only for grid year 2019. France: 63 gCO_2e/kWh (https://www.eea.europa.eu/ims/greenhouse-gas-emission-intensity-of-1), UK: 212 gCO_2e/kWh (https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2021), USA: 403 gCO_2e/kWh (https://www.epa.gov/system/files/documents/2023-04/emission-factors_sept2021.pdf)

In markets with green tariffs, like the US, EU and UK, there is an accounting mechanism to track the generation of renewable electricity. So for each amount of renewable electricity generated, a matching Energy Attribute Certificate (EAC) is created. Green tariffs normally mean that all of the electricity supplied to your home is backed by EACs, verifying that the amount of electricity you consumed was uniquely matched by an equivalent amount of renewable electricity. It does not mean that all the electricity used in your home is through a direct supply of renewable energy; you are still using electricity from the grid from a mix of generation sources. These certificates are intended to serve as a market signal: the more demand for EACs and green tariffs, the more renewable generation will be built to meet demand.

Another important concept to understand is **additionality**.

In simple terms, **additionality** refers to renewable energy generation that is truly new and helps to reduce emissions from electricity across the grid. As a consumer, when you enter a green tariff with an electricity supplier, the EACs used to back your electricity supply may be generated from renewable electricity that already exists. In this case, the grid average emissions are not necessarily directly improved.

In the corporate space, this concept is particularly important. Large organisations may consume a lot of electricity and have an opportunity — through their electricity contracts, such as corporate PPAs — to introduce significant amounts of new (or additional) renewable electricity generation.

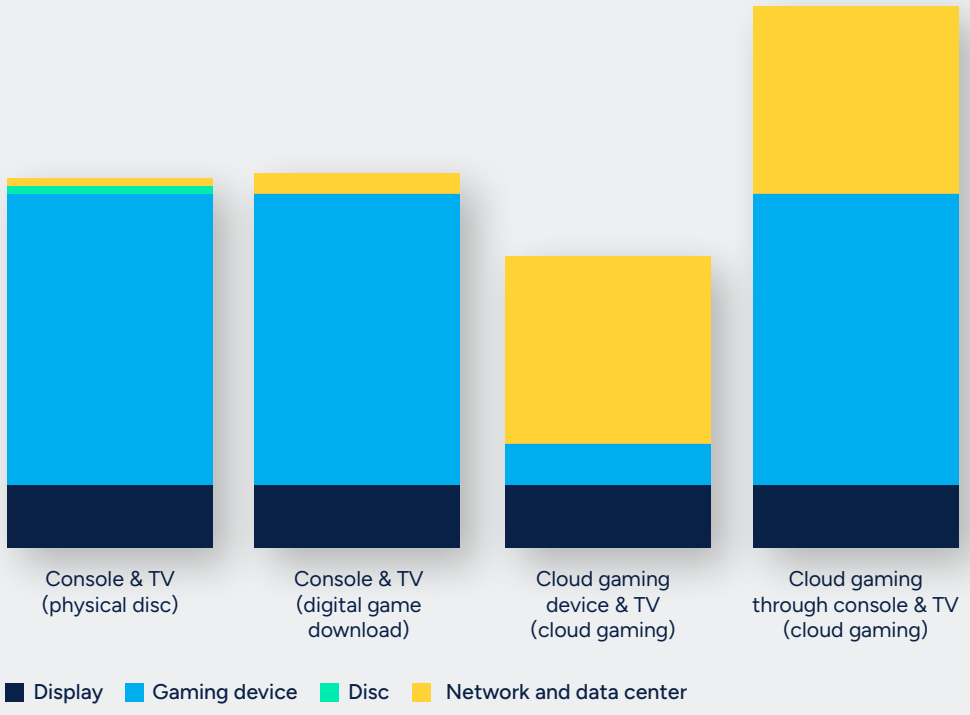
For more information on PPAs, the UK Climate Change Committee has published a primer.

2.2.5. Factors affecting the carbon emissions of video gaming

Here is one last important piece of information about carbon emissions and video gaming: there are many factors involved, including the video gaming hardware used, type of display, how the game is distributed, whether the game is played locally or through cloud streaming services and as we saw previously, how the electricity is generated in your region. The figures below, adapted from ADEME analysis, demonstrate the potential for variation in carbon impact from different video gaming scenarios.

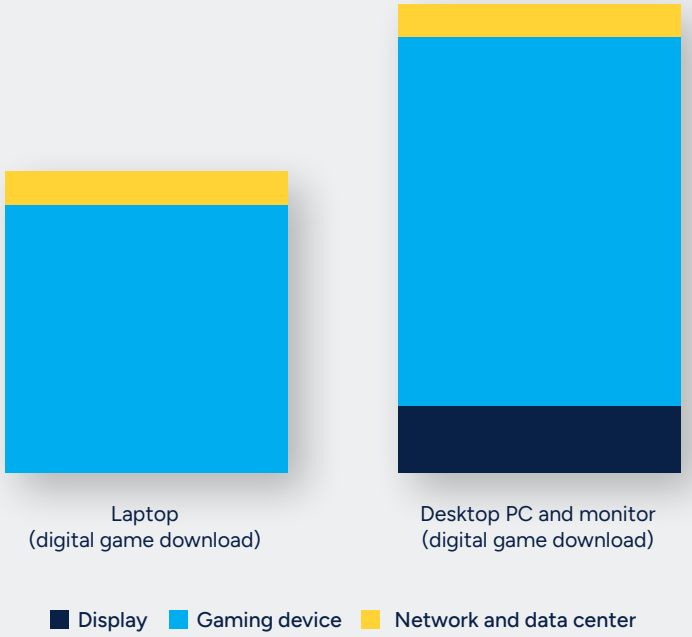
Note that figures presented throughout this section are meant to illustrate the potential for variation between different video gaming scenarios based on a number of different parameters, rather than present one scenario as better than another through direct comparison. The carbon impact values have been intentionally omitted; see take-away box at the end of this section for more discussion on the sensitivity of carbon impact analysis to assumptions and data used in studies.

ESTIMATED VARIATION IN CARBON IMPACT ACROSS DIFFERENT VIDEO GAMING SCENARIOS IN FRANCE: MANY FACTORS ARE AT PLAY



Source: Figures are adapted from ADEME report, Evaluation of the environmental impact of the digitalisation of cultural services, 2022, Figure 49.

ESTIMATED VARIATION IN CARBON IMPACT ACROSS DIFFERENT PC VIDEO GAMING SCENARIOS IN FRANCE: MANY FACTORS ARE AT PLAY



Source: Figures are adapted from ADEME report, Evaluation of the environmental impact of the digitalisation of cultural services, 2022, Figure 49.

How video games are developed is important to consider as well. Decisions on how the game software is designed to run on the hardware can affect carbon emissions too.

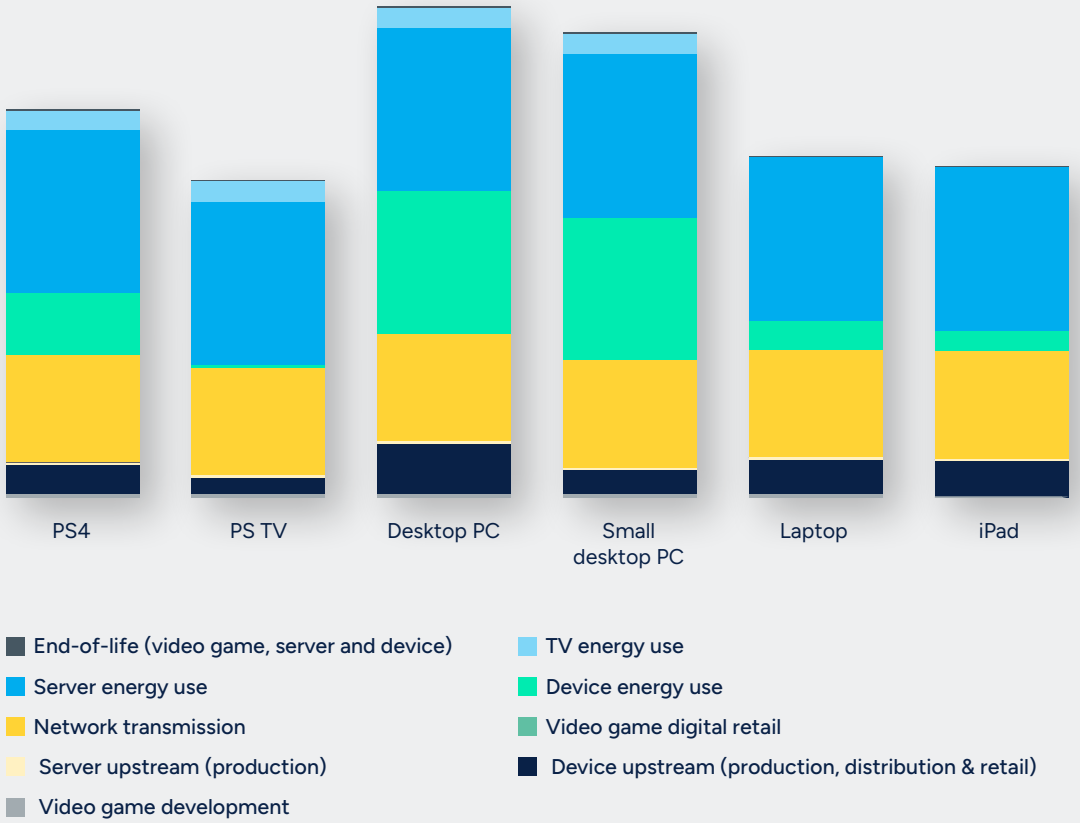
A recent case study from 343 Industries – the team behind Halo Infinite – drives this point home. The team was able to find ways to reduce power consumption in their menus without negatively impacting gameplay fidelity and user experience.

While the game is paused, the in-game world continues to be rendered, but is blurred behind the pause menu interface. This presented an opportunity to carefully focus efforts on reducing power consumption without impacting the player experience. A Graphics Engineer was able to reduce power consumption in the pause menu from 185 W to 165 W by reducing the rendering resolution from 4K to 1080p, a change that is invisible to the player.

For more information, see the case study here: https://learn.microsoft.com/en-us/gaming/sustainability/case-studies/case-studies-halo

Finally, with cloud gaming offering another way for players to access video games, it's helpful to revisit Sony Interactive Entertainment's 2020 research to get a better understanding of the potential variation in carbon impact from cloud gaming using different edge devices, such as a video game console, desktop PCs, laptop and iPad.

ESTIMATED VARIATION IN CARBON IMPACT ACROSS DIFFERENT CLOUD VIDEO GAMING DEVICES IN EUROPE



Source: Adapted from Aslan, Climate Change Implications of Gaming Products and Services, 2020, Figure 64

Understanding the sensitivity of carbon impact results to assumptions and data used in the study

So that you are better equipped to understand and interpret the results of carbon impact studies, below are some key assumptions and decisions that can have a significant effect on carbon impact results for video gaming:

Results are extremely sensitive to assumed lifetime of devices, consoles and TVs – primarily for two reasons: 1) lifetime energy use is linked to the assumed lifetime duration, so a longer assumed lifetime means a bigger portion of the lifetime carbon impact is due to energy use and 2) upstream emissions from production do not typically vary with lifetime, so when results are presented per hour of gameplay, production related emissions vary depending on the assumed lifetime. In other words, the fixed production emissions are spread across more or less hours depending on assumed lifetime.

The region of use will also have a significant effect on carbon impact results due to the variation in carbon emissions intensity of electricity from region to region.

Estimation approaches and data quality will vary between studies. There will always be limitations in the availability of high-quality data. For example the data used to determine the carbon footprint of the production of video gaming hardware and displays will ultimately affect the uncertainty of the results.

The boundary defined for each study will have a significant effect on the results. Make sure you understand the goal of the study and associated boundary of analysis used in carbon impact figures – in particular whether a study includes emissions from the full life cycle (including manufacturing and end-of-life) and inclusion of displays and network transmission in the boundary of study.

Interpret and use results with caution: When comparing carbon impact per hour of video gaming for different scenarios and devices, do so carefully. The assumed lifetime of the devices will affect the results and relative performance of different playstyles, as will boundary definition, availability of high-quality data and assumptions for region of use.

2.2.6. Solutions being implemented by the video gaming industry to tackle climate change

The video gaming industry is a creative industry at heart and this is reflected in solutions the industry has implemented on its journey towards tackling climate change. Innovation and community connection, nurturing collaboration and a focus on technology are all central themes. Below are some examples of solutions being implemented in the industry today:

INNOVATION IN RAISING AWARENESS IN THE VIDEO GAMING COMMUNITY AND ENCOURAGING CLIMATE ACTION

As a cultural medium, video games can raise awareness and encourage players to act for the environment by incorporating content on climate change. The **Green Game Jam** brings together over 50 studios[36] who commit to release game content that focuses on environmental and sustainability issues. During the event, participants collaborate to develop games that increase awareness and provide solutions. In 2022, the content created during the Green Game Jam engaged 214 million players worldwide.

For the 2021 Green Game Jam, Ubisoft was inspired to create Riders Republic Rebirth, an in-game activation featuring a virtual climate protest and a reforestation activity. They also plan to simulate a forest fire in the game to show the severe consequences of climate change in real life. These types of in-game content are called **green activations,** which aim to inspire players towards taking climate action through video game experiences.

Some companies create video games that **make environmental topics a central theme**. Alba: A Wildlife Adventure, developed by ustwo Games, follows the story of a young girl who visits her grandparents on a Mediterranean island and becomes determined to protect the local wildlife from harm. The game's focus on conservation and environmental activism offers a fun and engaging way to raise awareness about the importance of protecting wildlife and preserving natural habitats.

37

[36] https://www.playing4theplanet.org/projects
[37] Image source: Playing for the Planet Alliance

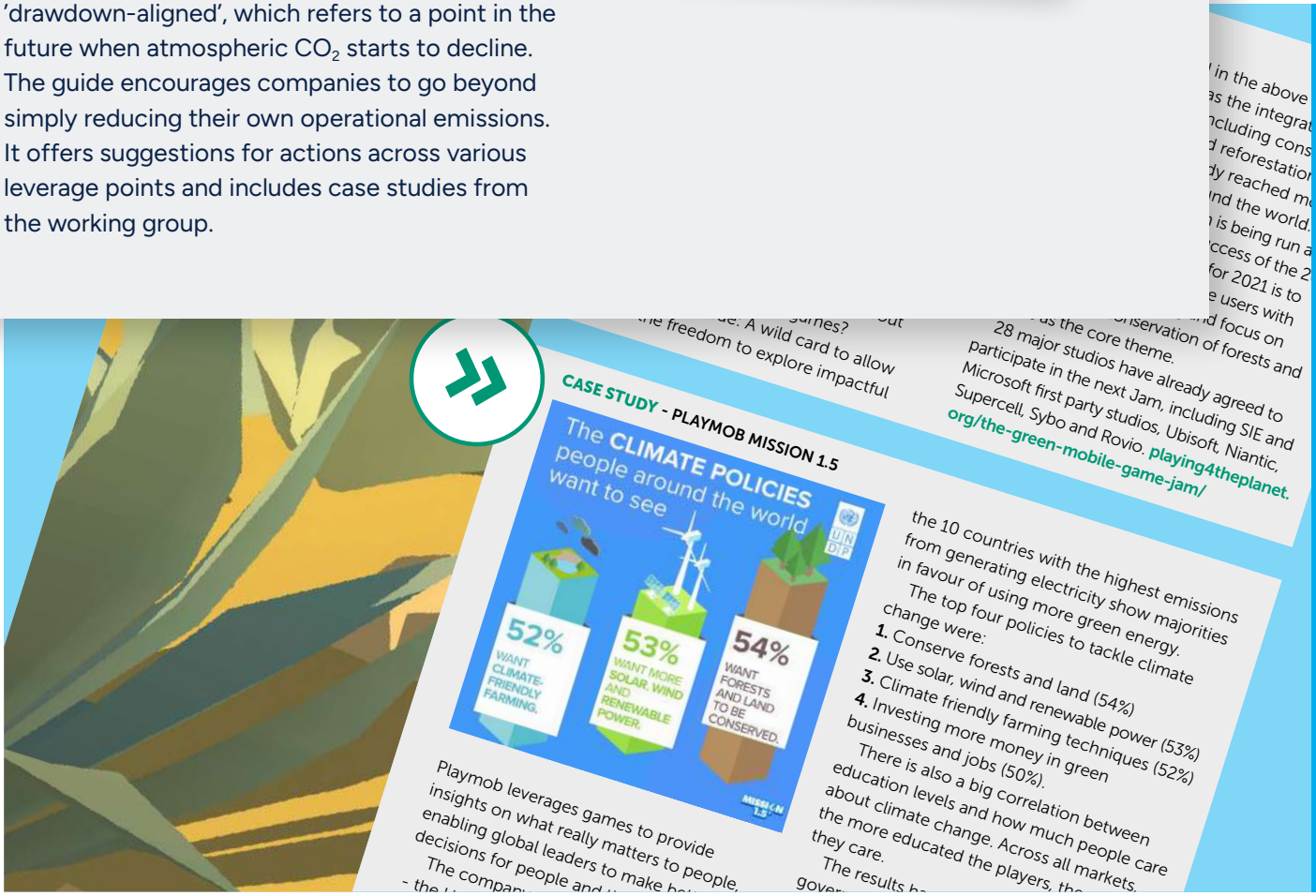
NURTURING COLLABORATION: SHARING BEST PRACTICE TO GUIDE STUDIOS TO REDUCE THEIR ENVIRONMENTAL IMPACT COLLECTIVELY AND INDIVIDUALLY.

Many companies have demonstrated leadership by making public commitments to reduce their environmental impact. **Several companies have even developed their own internal training materials**. Ubisoft released an e-learning program, Climate School, available to all its employees, for example.[38]

Collaborative regional initiatives such as the **PlayCreateGreen.org or the Green Games Guide** allow studios of all sizes to learn more about the actions they can take to measure and reduce their environmental impact, drawing on inspiration from other studios.

The **Drawdown-Aligned Business Framework**,[39] provides an outline of how video game software companies can take steps to become 'drawdown-aligned', which refers to a point in the future when atmospheric CO_2 starts to decline. The guide encourages companies to go beyond simply reducing their own operational emissions. It offers suggestions for actions across various leverage points and includes case studies from the working group.

[40]



[38] https://news.ubisoft.com/en-us/article/2xcruKK2rZJ22OSeyWzkKO/ubisofts-environmental-commitment-2022-update
[39] Project Drawdown (2023). A Drawdown-Aligned Framework for the Gaming Industry, https://drawdown.org/publications/a-drawdown-aligned-framework-for-the-gaming-industry
[40] Ukie (2021). Green Games Guide, https://ukie.org.uk/download/44dwrszqf32xq0atp1bh8ck5ct/0

CONTINUOUSLY STRIVING FOR INCREASED ENERGY EFFICIENCY OF VIDEO GAME DEVICES.

In 2015, the **Games Consoles Voluntary Agreement** was introduced leading to a total energy saving of 54 TWh over the lifetime of the previous generation of consoles (PS4 and Xbox One). This is equivalent to the amount of electricity used by Greece in 2021. For the current generation of consoles, manufacturers anticipate additional energy savings of 46 TWh over their lifetimes, given new requirements.[41]

All consoles have dedicated **energy-saving modes** that users can activate. During the first launch, players are asked to choose whether they want to enable this feature.

Xbox has recently introduced a new 'carbon-aware' update, which will enable users to download console and game updates during times when renewable energy is being utilised the most on the grid.[42]

[41] Interactive Software Federation of Europe (2022). Key points on the added value of the Games Consoles Voluntary Agreement to the Ecodesign framework, https://www.isfe.eu/wp-content/uploads/2022/04/ISFE-Key-points-on-the-added-value-of-the-GCVA-to-the-Ecodesign-framework.pdf

[42] https://news.xbox.com/en-us/2023/01/11/xbox-carbon-aware-console-sustainability/

PRACTICAL TIPS AND TRICKS FOR PLAYERS THAT WANT TO MASTER CLIMATE ACTION

1 Keep playing.

Video games bring us joy, offer hope and build communities. Keep playing and engaging with video games on environmental topics.

2 Check your system settings.

Know how to find and enable energy saving modes. Platform providers make this information easy to find online, so reducing energy and carbon can be as simple as changing a setting.

3 Use your video gaming devices as long as they suit your needs.

Trade them in when you're done with them so they can have a second life or be treated properly at the end of their useful life.

4 Right size your hardware and display for your setup and video gaming style.

Going too big can lead to unnecessary energy consumption and higher energy costs and going too small can affect your video gaming experience – make an informed choice and get it just right.

5 Get involved.

Make your local government representatives aware that climate action matters to you. Advocate for credible government plans for net-zero, a rapid transition to clean, renewable energy and for access to low-carbon transport. Stay informed and engage with social media on environmental topics in a focused and fact-checked way, supported by good data.

6 Consider using your smart TV or streaming stick

for your non-video gaming entertainment instead of using your video gaming device; they are a more energy efficient way to stream video content.

7 Physical vs. digital.

Make an informed choice.[43] As a rule of thumb, it's worth downloading directly to your video gaming hardware or getting a physical copy if you expect to play a game for a long time. If you just want to try out a game, cloud streaming can offer a good alternative. Streaming from an app directly to your TV or mobile video gaming device is more efficient than streaming through a console.

8 Consider used and refurbished devices

from reliable vendors when making a new purchase. They can offer good value and have a reduced carbon impact. Just make sure to check available energy data on used devices and that they are competitive on energy efficiency.

9 Check your electricity contract and supplier's carbon credentials.

Consider switching to a 100% renewable electricity service.

10 Tell your friends and community.

Start conversations and share information about climate action within your community. Engage directly with studios and platform providers to share what you care about on environmental topics.

[43] For more detailed information on this topic, see Chapter 5 of Aslan's Climate Change Implications of Gaming Products and Services, 2020.

3

Addressing existing corporate GHG accounting and reporting barriers to climate action

The next sections aim to address barriers to accelerating climate action. It focuses on the complexities of greenhouse gas (GHG) accounting and reporting frameworks, primarily the GHG Protocol Value Chain (Scope 3) Standard. GHG is the technical term used by accounting frameworks, however throughout this section, you can think of the terms GHG and carbon as interchangeable.

The guidance presented in this section was developed through a collaborative exercise between a group of Playing for the Planet members with the objective to:

- Gather approaches currently used by members to measure scope 3 emissions and consolidate learnings and experiences to provide valuable guidance for video game businesses who are seeking clarity on the application of GHG accounting standards.

The intention is not to define or require an industry standard GHG accounting approach, thus the approach taken towards generating this guidance is:

- Help video game companies understand how to apply the GHG Protocol Value Chain Standard by sharing best practices and examples specific to the industry
- Where possible, generate a reasonable level of alignment within membership of the Playing for the Planet Alliance around:
  - GHG accounting approaches for the video gaming industry as it relates to the meeting the existing requirements of the GHG Protocol today and;
  - What is needed in future updates to the GHG Protocol to help create a more efficient foundation between entities in the value chain.
- Where alignment does not exist, these areas are highlighted and a path forward for building alignment is suggested.

The content of this section is structured as follows:

- Section 3.1 briefly reviews the current landscape of carbon accounting and reporting in the gaming industry to identify trends.
- Section 3.2 provides specific scope 3 carbon accounting and reporting guidance for gaming companies.
- Section 3.3 highlights existing carbon accounting and reporting challenges that require further study and discussion amongst industry members to reach a consensus.

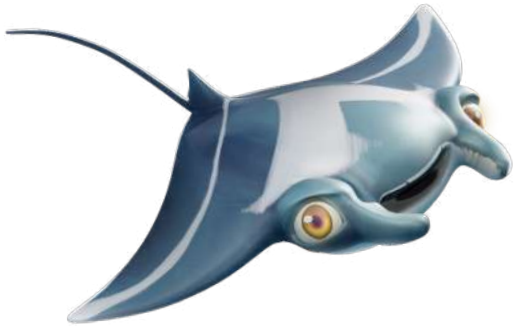
Due to the broad nature of value chain (i.e. scope 3) GHG accounting, this guidance will focus primarily on the categories understood to be most relevant to gaming businesses (for more information about scope 3 categories, see Section 3.2.2):

- Categories 1 and 2 – Purchased goods and services; and capital goods
- Categories 6 and 7 – Business travel and employee commuting (including working from home)
- Category 11 – Use of sold products
- Category 12 – End of life treatment of sold products

3.1. State of GHG accounting and reporting in the video gaming industry

We reviewed the landscape of carbon accounting and reporting in the video gaming industry to identify trends and through analysis of 9 video game companies'[44] public reports, we have observed the following:

- **Categories 1 and 11 are the most significant** for video game companies assessed, including hardware manufacturers, publishers and developers, followed by category 2. (See Section 3.2.2. for more information on the scope 3 categories).
- **Estimation methods are broad**, including the use of supplier-specific emissions data generated from corporate-level data, spend-based estimates and average data.

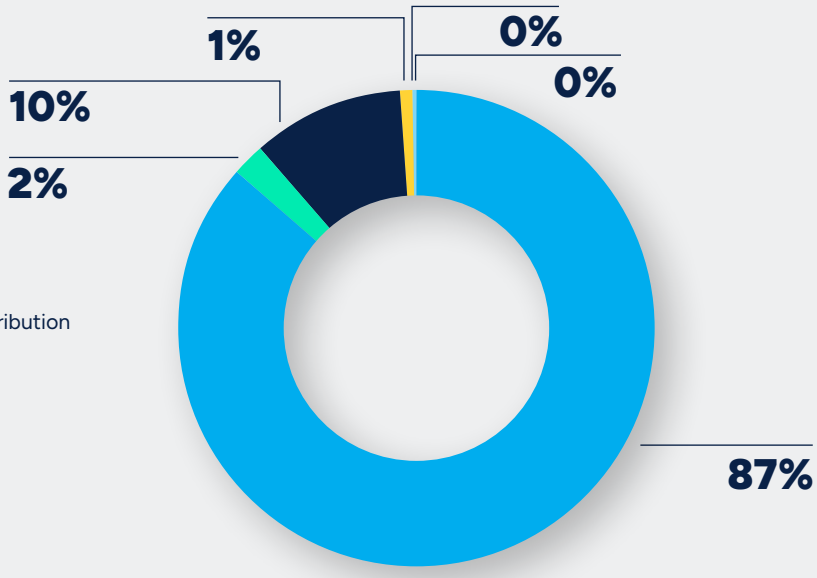


- **Some categories are not reported**. It is unclear if this is due to non-applicability, challenges in collecting good quality data, lack of confidence in estimation approaches or level of materiality. Categories 8-10 and 12-15 are normally not reported by publishers and developers considered in this analysis. Manufacturers typically do not report on categories 8 and 14.
- **Category 11 lacks consistency between companies**. This is because reporting methodologies vary greatly in aspects such as devices and platforms included and calculating emissions based on measured energy use or using average data paired with estimates of time played. Generally, assumptions made in estimations are not clearly disclosed and substantiated.

[44] Microsoft*, Sony*, Nintendo, Ubisoft, Mag Interactive, 37 Interactive Entertainment, Space Ape, Rovio and Sega Sammy. *Xbox and Sony Interactive Entertainment emissions are aggregated into group level emissions reporting.

EXAMPLE CARBON FOOTPRINTS OF VIDEO GAME COMPANIES

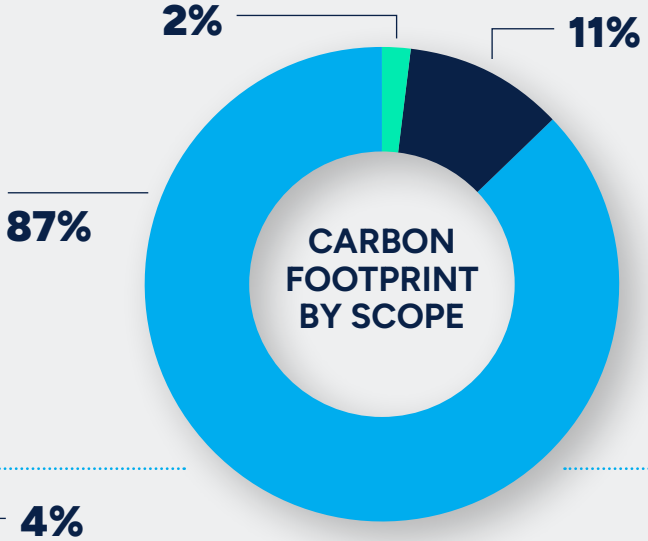
NINTENDO'S REPORTED 2021 CARBON FOOTPRINT



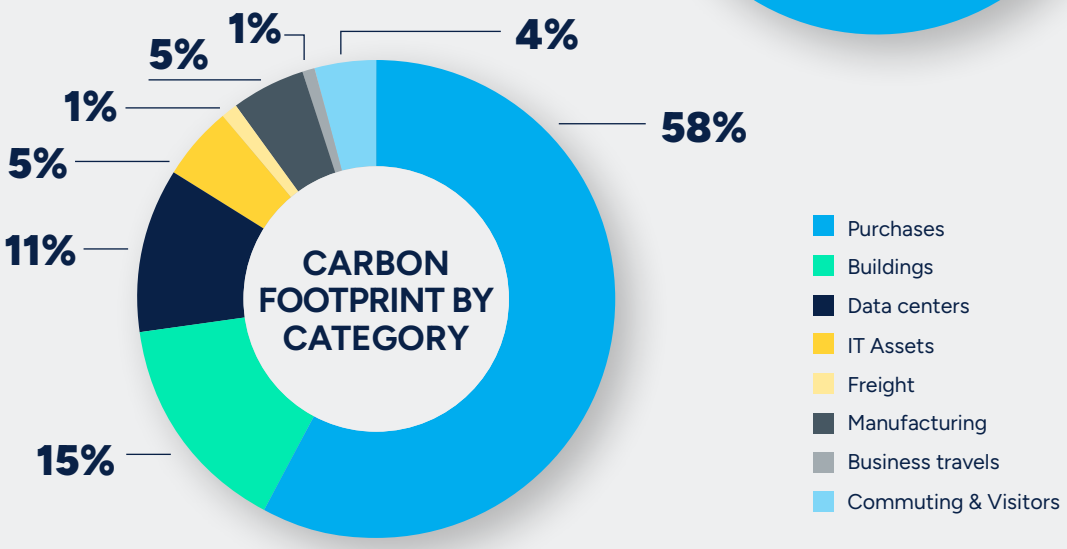
- Scope 1
- Scope 2
- Other scope 3 categories*
- Catagory 11 – Use of Sold Products
- Catagory 4 – Upstream Transportation and Distribution
- Catagory 1 – Purchased Goods & Services

*Other scope 3 catagories reported include:
– Cat. 2 – Capital Goods
– Cat. 3 – Fuel & Energy Related Activites
– Cat 5. – Waste Generated in Operations
– Cat 6. – Business Travel
– Cat. 7 – Employee Commuting
– Cat. 9 – Downstream Transportation and Distribution
– Cat. 12 – End-of-life Treatment of Sold Products

UBISOFT'S REPORTED 2021 CARBON FOOTPRINT



- Scope 1
- Scope 2 (Market-based method)*
- Scope 3 – Upstream



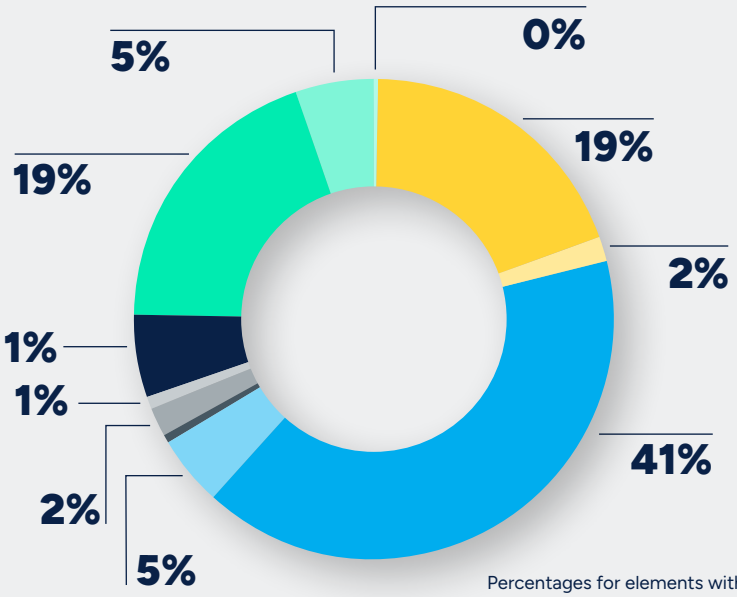
*For reference, using the location-based method of the GHG Protocol, Scope 2 represented 25,507 tCO_2eq in 2021

Figures above have been adapted from reported values: https://www.nintendo.co.jp/csr/en/esg_data/index.html, https://www.ubisoft.com/en-us/company/social-impact/environment

EXAMPLE CARBON FOOTPRINTS OF VIDEO GAME COMPANIES

SPACE APE'S 2018 CARBON FOOTPRINT

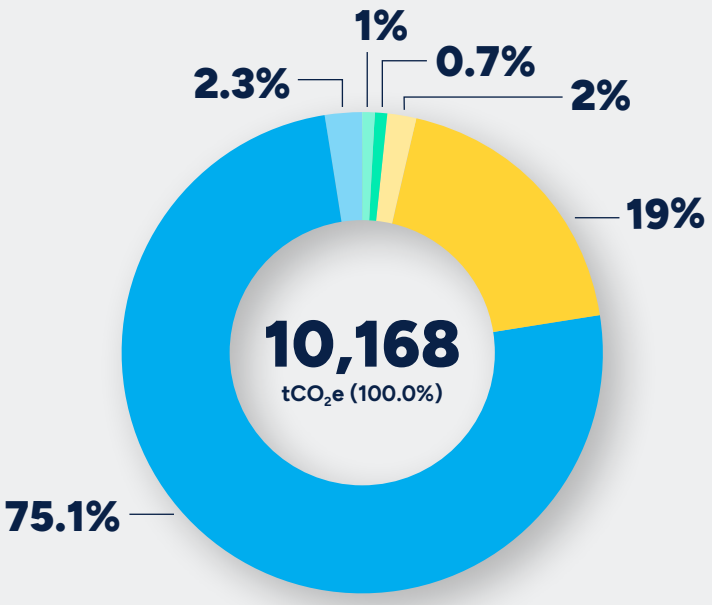
- Flights
- Hotel stays
- Cloud Computing
- Electricity
- Electricity Transmission and Distribution
- Gas (Heating)
- Waste
- Water
- Waste Water
- Deliveries
- Purchases
- Device usage
- Employee commutes
- Remote workers



Percentages for elements with less than 1% are not shown

ROVIO'S 2021 CARBON FOOTPRINT

- Player's devices
- Other
- Offices*
- Business travel**
- Employee commuting
- YouTube viewer's devices



* includes Espoo, Stockholm, Copenhagen, Izmir and Shanghai
** includes air, taxi, hotel

Figures above have been adapted from reported values: https://spaceapegames.com/green#:~:text=Here's%20our%20spreadsheet.,emitted%20a%20further%20180%20tonnes., https://investors.rovio.com/sites/rovio-ir-v2/files/2022-03/Sustainability%20Report%202021.pdf

Areas of improvement for carbon accounting and reporting have been observed, which video game companies may consider implementing into their reporting process in alignment with individual business goals and needs:

Recommendation 1: Consistency

Video game companies should consider reporting results in a consistent manner, such as by GHG Protocol scope 3 category and using consistent methodologies to support tracking performance over time. Companies may choose to report emissions in a way that meets their own reporting, communication and stakeholder needs (e.g., Rovio's 2021 footprint), however also providing the supporting data by scope and category will provide greater clarity and understanding of the reported figures.

Recommendation 2: Granularity

Video game companies may consider also reporting results by business unit (e.g., by studio or department) or by type of product or service (e.g. cloud streaming service). This greater level of granularity will aid the intended users in reporting their own emissions with greater accuracy and enable more accurate benchmarking.

Recommendation 3: Transparency and completeness

Video game companies should clearly document the methodology, data sources, assumptions and boundary for each category. They should also include the rationale for categories that are excluded or not reported.

Understanding, acknowledging and taking responsibility for video gaming's carbon impact

- **Understanding carbon impact:** Video game companies who understand their impact perform carbon footprints annually at the corporate- and product-level, in line with industry standards such as the GHG Protocol.
- **Acknowledging carbon impact:** Video game companies who acknowledge their impact are committed to reporting and disclosing their scope 1, 2 and 3 emissions publicly and through initiatives like the CDP, a not-for-profit charity that runs the global disclosure system for investors, companies, cities, states and regions to manage their environmental impacts.
- **Taking responsibility:** Video game companies who are taking responsibility for their impact have committed to ambitious carbon reduction targets towards net-zero emissions that are aligned with science, such as science-based targets. These companies also have a plan for reducing emissions and are implementing solutions and tracking progress towards their carbon reduction goals.

3.2. Scope 3 GHG accounting and reporting guidance

This section provides guidance to video game companies on interpreting and applying the GHG Protocol Value Chain (Scope 3) Standard for corporate reporting. For reference, you can find the standard publicly available on the GHG Protocol's website: https://ghgprotocol.org/standards/scope-3-standard

3.2.1. Principles of scope 3 GHG accounting and reporting

Naturally, applying the accounting and reporting framework defined in the GHG Protocol Value Chain Standard requires some interpretation. The standard was developed to be applicable to a broad range of industries and companies, so it does not address the specific characteristics of particular industries, such as the video gaming industry, in its requirements.

The standard sets out accounting and reporting principles that shall be adhered to (see Section 4 of the Value Chain Standard for additional information). The primary function of these principles is to guide the application of the standard in situations of ambiguity, so they are important to bear in mind when conducting a carbon accounting and reporting exercise.

Accounting and reporting principles of the GHG Protocol Value Chain Standard	
Relevance	Ensure the GHG inventory appropriately reflects the GHG emissions of the company and serves the decision-making needs of users – both internal and external to the company.
Completeness	Account for and report on all GHG emission sources and activities within the inventory boundary. Disclose and justify any specific exclusions.
Consistency	Use consistent methodologies to allow for meaningful performance tracking of emissions over time. Transparently document any changes to the data, inventory boundary, methods, or any other relevant factors in the time series.
Transparency	Address all relevant issues in a factual and coherent manner, based on a clear audit trail. Disclose any relevant assumptions and make appropriate references to the accounting and calculation methodologies and data sources used.
Accuracy	Ensure that the quantification of GHG emissions is systematically neither over nor under actual emissions, as far as can be judged, and that uncertainties are reduced as far as practicable. Achieve sufficient accuracy to enable users to make decisions with reasonable confidence as to the integrity of the reported information.

3.2.2. Emissions hotspots for video game companies

Determination of emissions hotspots for video game companies is useful to guide accounting and reporting efforts and develop climate action strategies to target the largest emission sources in the business and value chain. Hotspots are presented below based on analysis discussed in Section 3.1.

Scope 3 Category	Publisher	Developer	Manufacturer
1 Purchased goods and services	High	High	High
2 Capital goods	Medium	Medium	Medium
3 Fuel and energy related emissions	Low	Low	Low
4 Upstream transportation and distribution	Low	Low	Low
5 Waste generated in operations	Low	Low	Low
6 Business travel	Low	Medium	Low
7 Employee commuting	Low	Low	Low
8 Upstream leased assets	Not reported	Not reported	Not reported
9 Downstream transportation and distribution	Not reported	Not reported	Low
10 Processing of sold products	Not reported	Not reported	Low
11 Use of sold products	High	High	High
12 End-of-life treatment of sold products	Not reported	Not reported	Low
13 Downstream leased assets	Not reported	Not reported	Low
14 Franchises	Not reported	Not reported	Not reported
15 Investments	Not reported	Not reported	Low

Scope 3 emissions contribution — High (> 10%) — Medium (5-10%) — Low (<5%) — Not reported

A note on scope 3 science-based targets: Companies must set near-term scope 3 targets that cover at least two-thirds (67%) of total scope 3 emissions considering the minimum boundary of each scope 3 according to the SBTi criteria. For long-term scope 3 targets, there is a 90% coverage requirement. For scope 3 emissions that fall outside the minimum boundary, targets are not required, but are encouraged when these emissions are significant, but such targets cannot count towards the two-thirds threshold.

Across the video gaming industry, these scope 3 categories are expected to be the largest and most relevant emission sources:

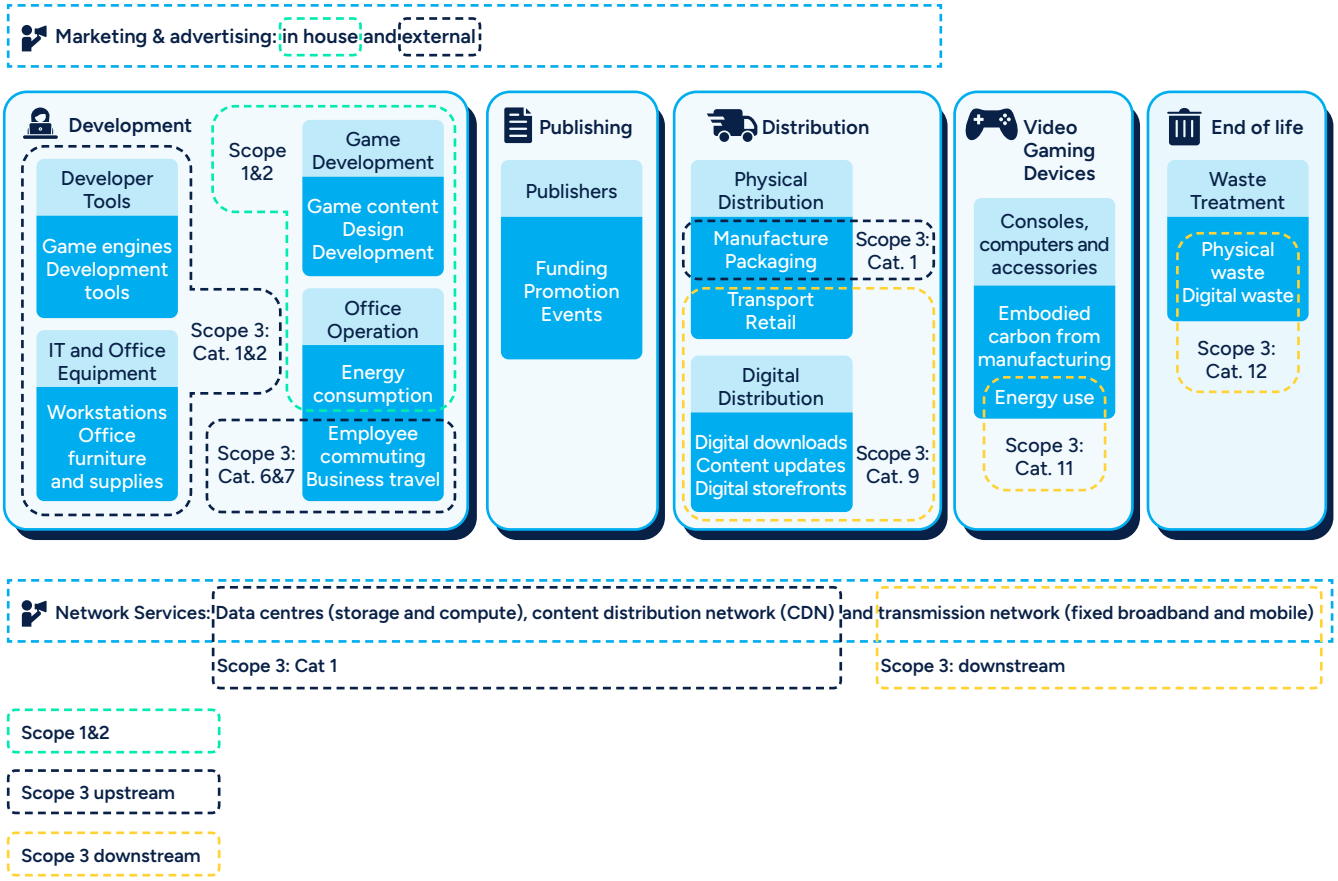
- Category 1 – **Purchased goods and services**. High emissions and high relevance.
- Category 2 – **Capital goods**. Medium emissions and high relevance. Sometimes reported together with category 1.
- Category 6 – **Business travel**. Medium emissions and medium relevance for developers. Typically, low emissions for publishers, manufacturers and platform providers.
- Category 11 – **Use of sold products**. High emissions. Relevance depends on the company and is discussed in more detail in Section 3.2.7.

For more information on the definition of these categories, see the GHG Protocol Value Chain Standard, Chapter 5 – Identifying Scope 3 Emissions.

Other categories of interest were identified as:

- **Category 7 – Employee commuting**. Low emissions expected, however the effect of reporting on working from home emissions is unclear. See Section 3.2.6 for more information on accounting for working from home emissions.
- **Category 9 – Downstream transportation and distribution**. The analysis found that publishers and developers are not reporting this category. However, for publishers and developers who distribute their own games, this category should be assessed for materiality.
- **Category 12 – End of life treatment of sold products**. Low emissions are expected, but many companies do not report on this category or are unclear on its relevance.
- **Category 15 – Investments**. This category is typically not reported on by developers and publishers, however care should be taken to understand the investments within the company, such as joint ventures, because these can be relevant and have medium and high emissions. See 'GHG Protocol Category 15' guidance for more information.

To illustrate these concepts, an example of the applicability of the different aspects of the video game life cycle to carbon reporting for a video game developer is shown below.



3.2.3. Example application of accounting and reporting principles for a video game studio

Video Game Company A began reporting its scope 3 emissions on their sustainability webpage in 2020.

Before completing their 2020 scope 3 footprint, Video Game Company A performed a screening to determine the scope 3 categories relevant to their business operations and value chain. They determined that categories 1 and 2 purchased goods and services and capital goods, category 6 business travel and category 11 use of sold products were most relevant to their business operations and expected to be the largest contribution to their footprint. They also determined that category 8 upstream leased assets, category 10 processing of sold products, category 13 downstream leased assets, category 14 franchises and category 15 investments did not apply to their operations as a video game developer since they have no activities in these areas (relevance principle).

On their sustainability webpage, the company reports their emissions annually as shown below. In a methodology statement, the company includes justification for exclusion of any categories (completeness principle), transparently documents key assumptions, data sources, calculation methodologies and areas of uncertainty (transparency principle). For any categories excluded due to materiality, they include justification based on an estimated percentage of scope 3 emissions. The company also reports progress of their scope 3 emissions over time. They track changes to the scope 3 methodology and have a policy to rebaseline prior years' footprints when methodological changes account for a change of more than 5% in the estimated footprint (consistency and accuracy principles).

Video Game Company A's Scope 3 emissions

Category*	2020 emissions (tCO_2e)	2021 emissions (tCO_2e)	2022 emissions (tCO_2e)
1 – Purchased goods and services†	2,309	2,798	1,976
2 – Capital goods	453	511	478
3 – Fuel and energy related emissions	230	255	248
6 – Business travel	98	158	320
7 – Employee commuting‡	51	65	77
11 – Use of sold products#	1,210	1,192	1,405
Total Scope 3 emissions	**4,351**	**4,979**	**4,504**

Note: figures used in this example are for illustrative purposes

Methodology statement

* Categories 8, 10, 13, 14 and 15 are excluded as they do not apply to our operations as a video game developer and we have no activities in these areas. Categories 4 (0.7%), 5 (0.0%), 9 (0.2%) and 12 (0.3%) have been estimated to be immaterial and are excluded from reported emissions. These categories are monitored annually to determine materiality.

† Category 1 emissions are estimated using a spend-based calculation method with EEIO factors from USEEIO, except for our procured data centre and CDN services which are estimated using an emissions report from the service provider including relevant scope 1, 2 and upstream scope 3 emissions of the service.

‡ Category 7 emissions are estimated using an employee survey. Survey results are extrapolated to the full business based on FTE. Working from home emissions are included in the calculation and estimated using homeworking emission factors within the 'UK Government GHG Conversion Factors for Company Reporting'.

Category 11 emissions of our video game products are considered as indirect use-phase emissions and reported optionally. The estimation methodology includes the use-phase emissions of our video games played on end-user devices (video game consoles, mobile devices and PCs). For each video game we estimate total lifetime gameplay time based on reported user data and we estimate device energy consumption based on energy figures reported by manufacturers and if unavailable, we use energy data from independent studies. Emissions from displays, audio equipment and controllers are excluded. Emissions from network transmission not already included in our category 1 emissions are excluded.

Rebaseline policy – Changes to scope 3 emissions due to methodological changes are tracked over time. When changes amount to greater than a 5% change to the footprint, prior year footprints are rebaselined. If continuous improvements to methodology are expected in consecutive years that would require rebaselining, the target base year footprint is prioritised to ensure consistent performance tracking against targets.

3.2.4. Categories 1 and 2: Purchased goods and services and capital goods

Examples are provided below of the types of goods, services and capital goods that are expected to be most relevant to video game businesses. This is not a complete list, however these examples provide a good starting point on where to focus effort on obtaining high quality data and using best practice estimation methods.

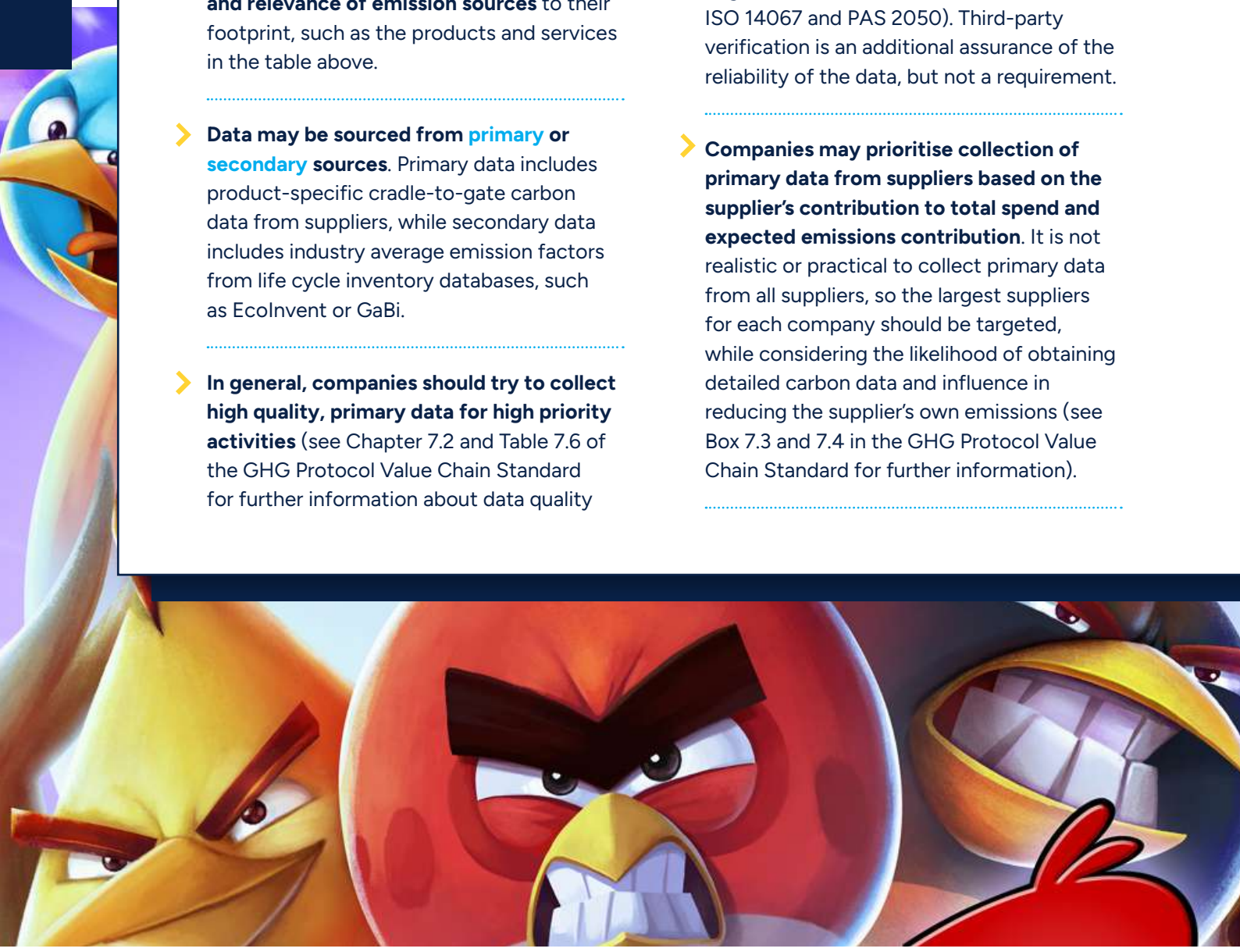
Games Business	Included	Excluded	Not applicable
Publishers and Developers	• IT equipment (office computer equipment, servers, etc.) • Network and data centre services (telecommunication services, cloud services, web hosting, CDNs, etc.) • Advertising services • Subcontracted services (e.g. QA, localisation) • Upstream raw materials and components for physical gaming media such as discs and cartridges (if applicable)		• Upstream raw materials and components for gaming hardware and consoles • Network and data centre services not purchased or acquired by the company
Hardware Manufacturers	• IT equipment* (office computer equipment, servers, etc.) • Network and data centre services (telecommunication services, cloud services, web hosting, CDNs, etc., if applicable) • Procured services* (e.g. finance systems, advertising) • Upstream raw materials and components for gaming hardware and consoles • Assembly (if not already included in scope 1 and 2)	• Manufacturing facility infrastructure and capital equipment (unless purchased by the reporting company)	• Network and data centre services not purchased or acquired by the company

*Include if material to scope 3 footprint. If immaterial, may be excluded with justification.

Video game businesses both large and small are likely to have purchased many different types of goods and services from a variety of suppliers, which has the potential to create a lot of work to collect data to estimate emissions from categories 1 and 2. Some practical guidance and additional resources are presented below to help video game businesses navigate these challenges.

Data collection (see Chapter 7 of the GHG Protocol Value Chain Standard for more details)

- **Iterative process** with the expectation that data quality will improve over time.
- **Video game businesses may prioritise data collection based on the expected size and relevance of emission sources** to their footprint, such as the products and services in the table above.
- **Data may be sourced from primary or secondary sources**. Primary data includes product-specific cradle-to-gate carbon data from suppliers, while secondary data includes industry average emission factors from life cycle inventory databases, such as EcoInvent or GaBi.
- **In general, companies should try to collect high quality, primary data for high priority activities** (see Chapter 7.2 and Table 7.6 of the GHG Protocol Value Chain Standard for further information about data quality indicators). High quality emissions data will be representative of the technology, time period and geography of the good or service and should be developed with reliable methods that follow footprinting standards (e.g., the GHG Protocol Product Standard, ISO 14067 and PAS 2050). Third-party verification is an additional assurance of the reliability of the data, but not a requirement.
- **Companies may prioritise collection of primary data from suppliers based on the supplier's contribution to total spend and expected emissions contribution**. It is not realistic or practical to collect primary data from all suppliers, so the largest suppliers for each company should be targeted, while considering the likelihood of obtaining detailed carbon data and influence in reducing the supplier's own emissions (see Box 7.3 and 7.4 in the GHG Protocol Value Chain Standard for further information).



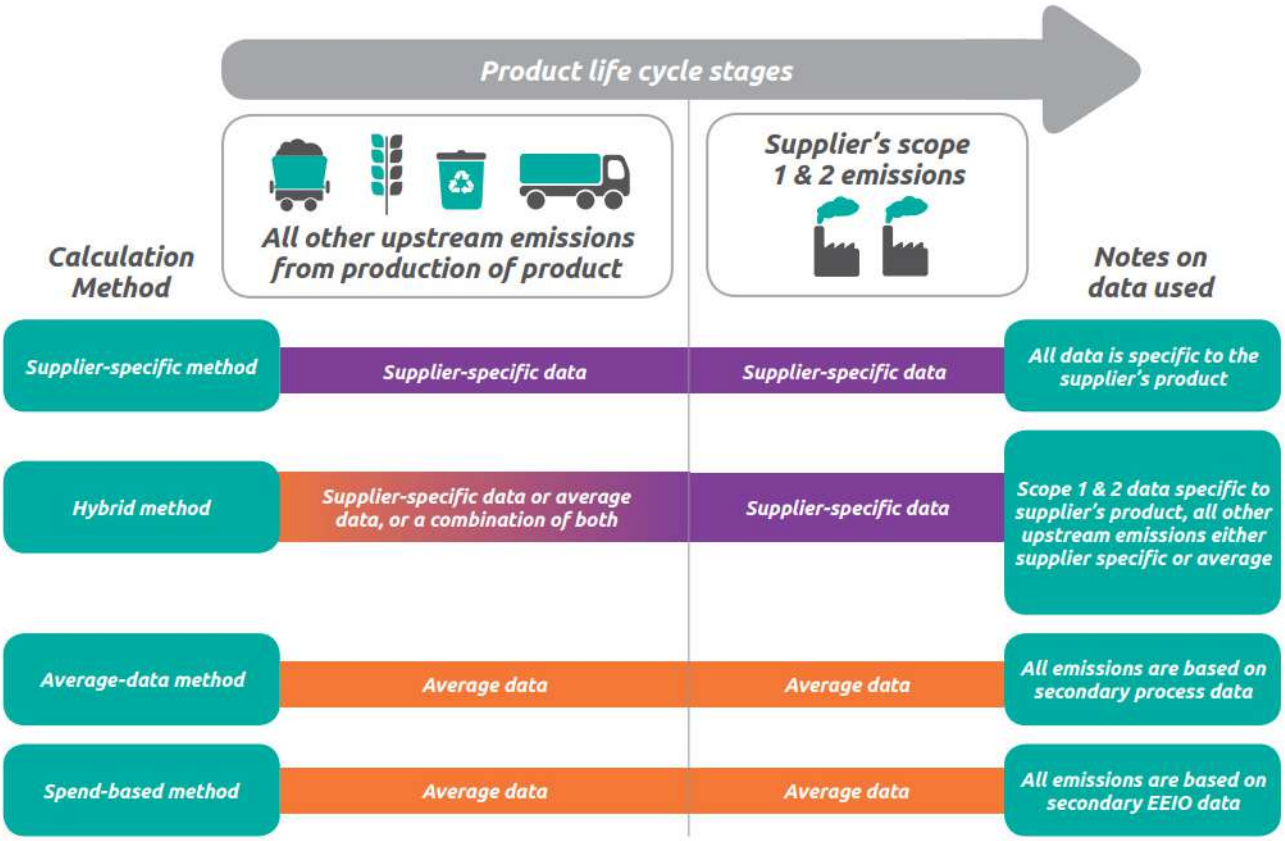


Image source: Greenhouse Gas Protocol, Technical Guidance for Calculating Scope 3 Emissions, page 21

Estimation methods (see Technical Guidance for Calculating Scope 3 Emissions – Category 1: Purchased goods and services for more information)

There are different methods available for estimating emissions for categories 1 and 2:

- **The supplier-specific method** may be used where the purchased good or service is expected to be a significant emissions source, quantity-based data is available for the purchased good or service, product-specific data is available from the supplier and there are engagement opportunities with the supplier to achieve carbon reductions in the good or service.
- **The spend-based method** is a practical approach for estimating the emissions of goods and services identified as lower-priority, or where data from other estimation methods is not available. Many companies use a spend-based approach to estimate emissions from categories 1 and 2 when first estimating their scope 3 footprint and improve over time.

Categories 1 and 2 examples from the video gaming industry

Calculating emissions from IT equipment using the supplier-specific method:

- **Video Game Company A** purchases 100 dell optiplex 7000 Tower Desktops in their latest reporting period.
- They expect this to be a significant portion of their scope 3 emissions and see that Dell publishes product carbon footprints for some of their products on their website, including this particular product. The life cycle cradle-to-grave footprint is estimated as 367 $kgCO_2e$.
- Video Game Company A should only report cradle-to-gate emissions of the purchased good in this category, so they omit the portion of the footprint related to use and end-of-life, resulting in 264 $kgCO_2e$ per desktop. Note: The use-phase of these products is captured in Video Game Company A's scope 2 emissions related to electricity.
- Video Game Company A calculates the emissions from the purchase of these desktops as 100 desktops x 264 $kgCO_2e$ per desktop = 26,400 $kgCO_2e$ (or 26.4 tonnes CO_2e)
- To confirm the product carbon footprint data was used to correctly represent the cradle-to-gate emissions of the product for carbon reporting, Dell is contacted directly.

Calculating emissions from advertising services using the spend-based method:

- **Video Game Company B** purchases $100,000 worth of advertising services from The Advertising Company.
- This represents a significant 5% of Video Game Company B's total annual spend, but when they contact the Advertising Company to obtain supplier-specific data, the supplier indicates they do not currently have this data available.
- Video Game Company B then determines that the spend-based method is the best choice based on the data available.
- Video Game Company B uses a spend-based emission factor from an EEIO database to estimate its emissions from these services.
- $100,000 purchased advertising services x 0.200 $kgCO_2e$/$ of advertising service = 20,000 $kgCO_2e$ (or 20 tonnes CO_2e).

Note: figures used in this example are for illustrative purposes

Recommendations for reporting categories 1 and 2

Recommendation 1:
Data centres

Many data centre providers can provide supplier-specific carbon data to represent the emissions associated with your purchase of their service. The methodologies vary by providers and some providers only include emissions associated with the electricity used in the data centre, which is not consistent with the cradle-to-gate data requirement for the supplier-specific method and likely to underestimate the emissions of the service.

Best practice emissions data for data centres includes scope 1 and 2 emissions of the service provider related to operation of the data centre (including power usage effectiveness (PUE) to capture the emissions associated with overhead energy usage for cooling and lighting) and upstream scope 3 emissions related to the manufacturing and production of the data centre hardware. Scope 2 emissions from electricity should consider the emissions rate of electricity generation in the region of operation.

When available, it is still recommended to use emissions reports from service providers and be aware of the methodology used so it can be transparently disclosed in your company's methodology statement. See Section 3.3 for more discussion on this topic.

Recommendation 2:
Emission factors

Recommended sources of spend-based emission factors include national statistics departments, such as the UK's Office for National Statistics who publish spend-based emission factors by industry for the UK. Other sources of spend-based EEIO emission factors include USEEIO and Exiobase. Industry, global and regional average emissions factors may also be sourced from LCA databases such as EcoInvent or GaBi. These databases are widely used in carbon accounting and normally require a paid-for license to access the data.

3.2.5. Example application of categories 1 and 2 guidance for a video game studio

Video Game Studio Z is a UK-based video game studio. They use the following approach to estimate emissions for categories 1 and 2 related to 2022.

- The company summarises spend for the 2022 reporting period from their central procurement system by supplier and splits these into primary spend categories such as game development, administration, marketing, IT equipment, data centre services and network services.
- For large spend categories, these categories are split into sub-categories (e.g. game development – quality control) to help in analysing the resulting emissions data.
- Before estimating emissions, the company spend is reviewed to determine whether to apply the supplier-specific method, spend-based method or a combination of the two. Suppliers that make up a large portion of spend and where there are engagement opportunities with the supplier to achieve carbon reductions in their goods and services are prioritised for the supplier-specific method. The spend-based method is applied to the remaining spend for estimating categories 1 and 2 emissions.
- Spend-based emission factors from the UK Office for National Statistics are used, specifically the GHG intensity factors (i.e. CO_2e). Note: emissions intensity is published in thousand tonnes CO_2e/million £ which is equivalent to $kgCO_2e$ /£.
- For each spend category using the spend-based method, the company assigns a matching emission factor from the ONS to best represent the good or service.

Example calculations for categories 1 and 2 emissions for a video game studio
Note: this is a simplified example of spend profile for illustrative purposes.

Supplier	Spend category	Spend sub-category	Spend (£)	ONS category name	Emission factor ($kgCO_2e/£$)	Estimation approach	Emissions ($kgCO_2e$)
Supplier A	IT equipment	Desktop PCs	50,000	N/A	N/A	Supplier-specific*	1,000
Supplier B	Advertising	Advertising services	200,000	Advertising and market research services	0.00	Spend-based	0†
Supplier C	Game development	Quality control	250,000	Computer programming, consultancy and related services	0.01	Spend-based	2,500
Supplier C	Game development	External art design	100,000	Computer programming, consultancy and related services	0.01	Spend-based	1,000
Supplier D	Data centre services	Cloud compute	50,000	N/A	N/A	Supplier-specific*	1,000
Supplier E	CDN services	Game distribution	50,000	N/A	N/A	Supplier-specific*	1,000
Supplier F	Telecom services	Office fixed internet	25,000	Telecommunications services	0.01	Spend-based	250

Total categories 1 and 2 emissions = 6,750 $kgCO_2e$ = 6.8 tonnes CO_2e.

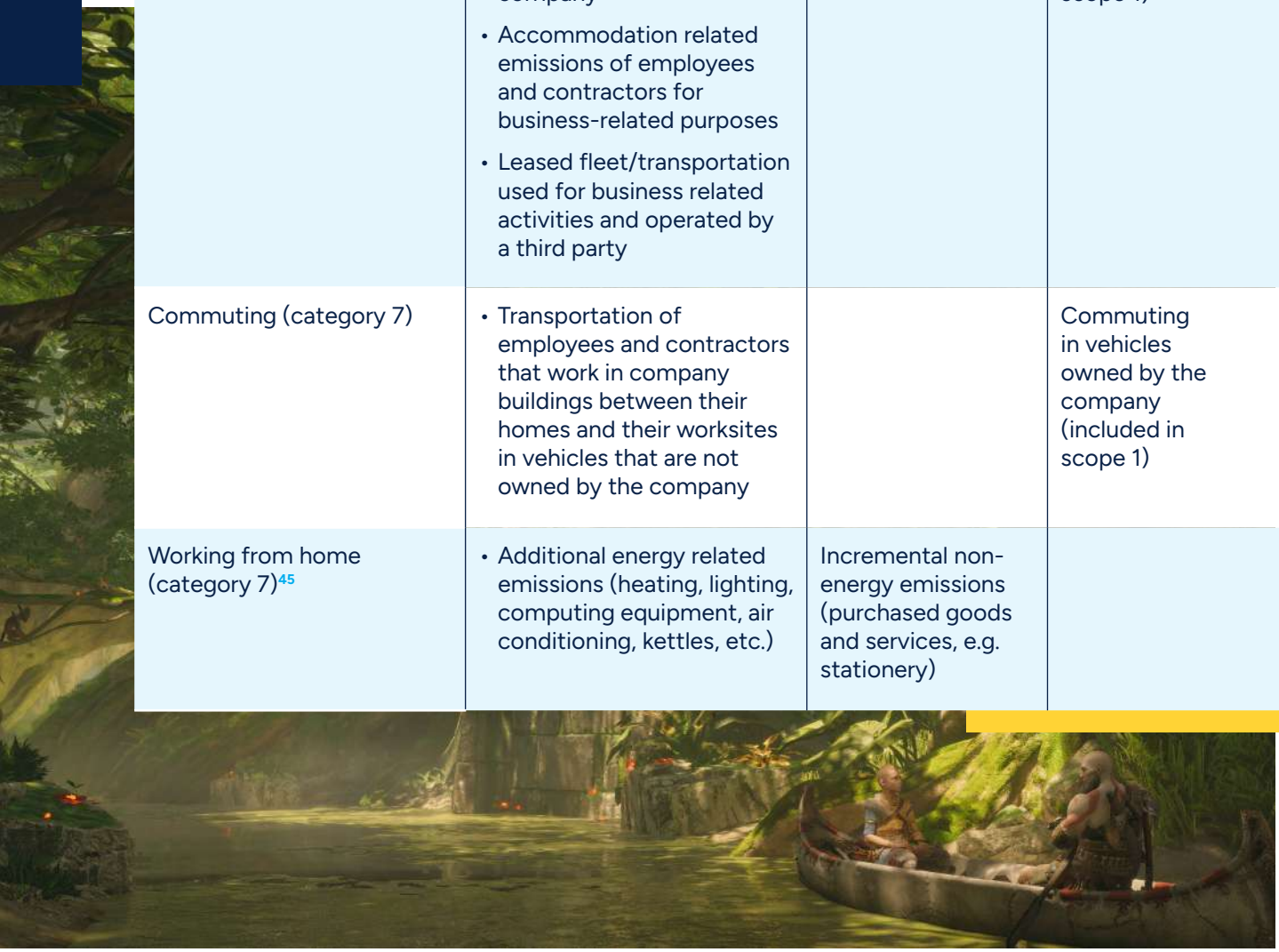
* Supplier-specific emissions are obtained from the supplier and used for reporting

† These emissions are estimated as zero due to the granularity of the emission factor. Due to the high proportion of spend attributed to this supplier and service, this supplier is considered for engagement opportunities in future reporting periods.

3.2.6. Categories 6 and 7: 'Business travel' and 'Employee commuting' (and working from home)

Employee commuting emissions are generally small relative to total scope 3 emissions, while business travel emissions may be material, particularly for developers assessed in Section 3.1. However, both categories are relatively straightforward to estimate and companies have some level of influence over reducing these emissions through employee engagement and company policies.

Scope 3 category	Included	Excluded	Not applicable
Business-related travel (category 6)	• Transportation related emissions of employees for business-related activities in vehicles not owned or operated by the reporting company • Accommodation related emissions of employees and contractors for business-related purposes • Leased fleet/transportation used for business related activities and operated by a third party		Travel in vehicles owned or controlled by the company (included in scope 1)
Commuting (category 7)	• Transportation of employees and contractors that work in company buildings between their homes and their worksites in vehicles that are not owned by the company		Commuting in vehicles owned by the company (included in scope 1)
Working from home (category 7)[45]	• Additional energy related emissions (heating, lighting, computing equipment, air conditioning, kettles, etc.)	Incremental non-energy emissions (purchased goods and services, e.g. stationery)	



[45] Included in category 7 – Employee commuting according to the GHG Protocol's Technical Guidance for Calculating Scope 3 Emissions

Recommendations for reporting categories 6 and 7

Recommendation 1:
When employee commuting emissions are significant (>5%), video game companies should conduct an employee survey to collect a data sample to represent the commuting and working from home patterns of employees.

The results of the survey can then be extrapolated to estimate company-wide patterns for scope 3 emissions estimation. This approach allows for companies to engage with employees on employee commuting patterns and reflect change over time through their scope 3 footprint.

Recommendation 2:
If employee commuting emissions make a low contribution (1-5%) to scope 3 emissions, video game companies may use average data as a proxy to estimate emissions from employee commuting.

National statistics or national transportation departments may publish statistics on average commuting patterns which can be used as proxy data to estimate emissions from employee commuting. For example, the UK Department for Transport publishes transport statistics for Great Britain, including average proportion of commuting trips made by transport mode and region.

For more information on this approach, see the GHG Protocol Technical Guidance for Calculating Scope 3 Emissions – Category 7 Employee Commuting, average-data method.

Recommendation 3:
Emission factors may be sourced from national databases for business travel, commuting and working from home and should include the full life cycle.

For example, in the UK, BEIS publishes average emission factors for passenger vehicles, business travel (including hotel stays) and working from home emissions. These can be found in the government conversion factors for company reporting of greenhouse gas emissions. Well-to-wheel emissions should be captured (e.g., both the emissions from fuel combustion and upstream emissions from extraction and production of the fuel i.e. well-to-tank). Check your national government's website for emission factors specific to your country of operation.

Tools: The US EPA publishes a Simplified GHG Emissions Calculator, which can be used to generate simple estimate of emissions from commuting and business travel to help determine materiality of this category. The calculator does not currently include emissions from working from home.

Example calculations for category 7 – employee commuting emissions for a video game company

Video Game Studio Z has 20 full time employees based in the UK. On average, employees commute a daily distance of 20 miles (32 km) round trip, 3 days per week, equating to 3,000 miles (4,828 km) annually per FTE with the transport modes shown below. Employees work from home (WFH) 2 days per week. For their 2022 scope 3 reporting, the company use the 2022 UK government conversion factors accounting for the full life cycle of the fuel (emissions from fuel combustion or electricity generation plus well-to-tank emissions of the fuel source) to determine employee commuting emissions (see business travel – land and WTT – pass vehs & travel- land sheets of UK govt. conversion factors) and for homeworking (see homeworking sheet of UK govt. conversion factors).

Transport mode	Modal share	FTE equiv.	Annual commute distance per FTE (km)	Emission factor ($kgCO_2e$/km or /passenger-km)	WTT emission factor ($kgCO_2e$/km or /passenger-km)	Total annual commuting emissions ($kgCO_2e$)
Passenger vehicle (medium car – petrol)	25%	5	4,828	0.1847	0.05266	5,730
Passenger vehicle (medium car – battery electric)	25%	5	4,828	0.04878	0.01368	1,508
Train (national rail)	25%	5	4,828	0.03549	0.00892	1,072
Bus (average local bus)	15%	3	4,828	0.0965	0.02494	1,759
Cycling/Walking	10%	2	4,828	N/A	N/A	0
Total commuting						**10,069**

Total annual WFH emissions = 20 FTE x 15 hours per week WFH per FTE x 50 working weeks per year x 0.34075 $kgCO_2e$ /hour WFH = 5,111 $kgCO_2e$

Category 7 employee commuting emissions = 10,069 $kgCO_2e$ commuting + 5,111 $kgCO_2e$ working from home = 15,180 $kgCO_2e$ = 15.2 tonnes CO_2e

3.2.7. Category 11 – Use of sold products

This section will review guidance for reporting category 11 – use of sold product emissions from both a hardware and software perspective, beginning with hardware and reviewing a framework for assessing emissions from software.

Use-phase emissions of video game hardware products

Video game companies that sell video game hardware must report the direct use-phase emissions of the hardware that they sell. This affects console, mobile device and PC hardware manufacturers. The requirements of the GHG Protocol Value Chain Standard specify that the emissions reported should include the lifetime use-phase emissions from products sold in the reporting year.

The activity data and emissions factors needed to calculate these emissions are:

- Quantity of products sold in the reporting year
- Electricity consumption per use of product (e.g. average electricity consumption per hour of gameplay or per year)
- Total expected lifetime of the product
- Life cycle emissions factor for electricity

Recommendations for reporting category 11 for video game hardware

Recommendation 1:
Hardware manufacturers should calculate use of sold product emissions for their hardware using national level emissions factors data at a minimum.

Given the variation in emissions from electricity by region, it is important to consider the regions of use. In some nations, such as the US, there is variability in electricity emissions by region so it may be appropriate to calculate emissions to a higher level of granularity if the variation has a significant impact on calculated emissions and granular sales data is available.

Recommendation 2:
Be transparent about calculation approach used and assumptions made.

Hardware manufacturers should be transparent in their methodology statement about the assumptions made for total expected lifetime and electricity consumption of the products they sell, as well as any adjustments made to emission factors to account for a projection of electrical grid decarbonisation.

A note on science-based targets (SBTs): For hardware manufacturers, the use-phase emissions of the hardware they manufacture must be included in their target boundary, while the use-phase emissions of related hardware they do not manufacture, such as displays, is considered optional. Companies may also optionally include emissions associated with maintenance of sold products during use, but this is not a requirement.

For many products, including video game hardware, meeting the requirements of the GHG Protocol Value Chain Standard means that an assumption must be made to estimate the product's lifetime, which contributes some uncertainty to the resulting emissions calculations. See Section 3.3 for further discussion on the opportunity to improve accuracy and reliability of reporting use-phase emissions using real-word data.

Use-phase emissions of video game software products

Most video game companies are in the business of selling software, including publishers, developers and some hardware manufacturers. It can be difficult to apply the GHG Protocol Value Chain Standard's requirements for estimating the emissions of use of sold products because software is not explicitly addressed nor are specific examples given of how to treat this type of product from a carbon accounting perspective. Within the video gaming industry, companies are interpreting and applying the standard differently, particularly for video game software, which can have a large effect on the estimation of scope 3 emissions.

While there are challenges to meeting the existing requirements of the GHG Protocol Value Chain Standard, standards evolve over time and improvements to approaches for estimating use-phase emissions are being investigated. There is more discussion on the future of accounting for use of sold product emissions in Section 3.3 and meanwhile, it is important for video game companies to stay aware of developments and emerging accounting approaches in this area.

The aim of the guidance presented in this section is to review the requirements of the standard, understand the key accounting concepts which influence how the standard is interpreted, provide recommendations on how to navigate these challenges and highlight where there is need for further study and discussion to build a greater consensus in the industry.

Ultimately, the goal of accounting for scope 3 emissions is to accurately measure emissions with a view towards influencing emission reductions in the value chain. Recognising that video game development is an artistic, creative process, as well as a technical one, it is important to bear in mind that measuring and understanding these emissions is necessary to identify opportunities and develop innovative solutions for real-word emissions reductions, without suggesting that the creative process for game development or the user experience should be noticeably compromised or degraded in the process.

What the GHG Protocol Value Chain Standard says about accounting for use-phase emissions: Understanding the key concepts

Direct vs. indirect use-phase emissions: The Scope 3 Standard divides emissions from the use of sold products into two types: direct use-phase emissions (i.e. emissions from fuels and products that directly consume energy during use, such as cars) and indirect use-phase emissions (e.g. food indirectly consumes energy when refrigerated). In category 11, companies are required to include direct use-phase emissions of sold products (this is a requirement of the standard). Companies may also account for indirect use-phase emissions of sold products, and should do so when indirect use-phase emissions are expected to be significant (this is a recommendation of the standard). For more information on this topic see Chapter 5 of the Standard – Identifying Scope 3 Emissions and Technical Guidance for Calculating Scope 3 Emissions – Category 11.

Lifetime use-phase emissions: Category 11 includes the total expected lifetime emissions from all relevant products sold in the reporting year across the company's portfolio. So if your product has an expected lifetime of 10 years, you would account for all 10 years' worth of use-phase emissions in the reporting year the product is sold.

There are some limitations to this approach when estimating emissions from video game products, which are discussed in greater detail in Section 3.3 alongside opportunities for improved accounting methods in the future.

Relevance of the activity: One of the five core principles of the standard is relevance of emission sources and activities included in the footprint to appropriately reflect the emissions of the company. This is important to bear in mind when determining how to treat emission sources that may be ambiguous, such as use-phase emissions of software products. The standard sets out criteria for identifying relevant scope 3 activities: size, influence, risk, stakeholders, outsourcing, sector guidance and other. For more information on this topic, see Chapter 6 of the Standard – Setting the Scope 3 Boundary.

Should use of software be treated as a direct or indirect emissions for a games company?

Currently, there is no explicit requirement defining how to treat the use-phase emissions of software. Some examples are given in Table 5.8 of the standard, but there is no specific example of 'software' or 'video game software', leaving room for interpretation.

Looking elsewhere, we may see some examples of how the use-phase of software is treated. Within the SBTi's Target Validation Protocol for Near-Term Targets (Version 3.1, Table 5), software is defined as an indirect use-phase emission, implying that for corporate carbon reduction target-setting purposes, it may be included optionally. In adjacent footprinting fields, such as the ICT sector, Life Cycle Assessment (LCA) standards and guidance consider use-phase energy consumption relevant to a software product's footprint.

One of the main reasons this is complicated, is because of the interaction of hardware, firmware and software required to play a video game. Computers operate as a system and the influence of each element of the system on the system's energy use is not well understood. Recent advances in developer tools to measure and understand energy and emissions from video game use show signs of the understanding of this complexity improving in the near future.

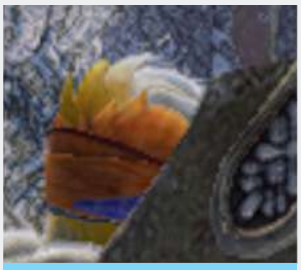
CASE STUDY

Case study: An example of applying the principle of relevance to treatment of use-phase emissions of video game software

A case study is used as an example to demonstrate how a video game company can use the principle of relevance to make a decision on how it will treat the use-phase emissions of the video game software it sells.

Due to the ambiguity associated with classifying software as having direct or indirect emissions, we start from the position that it is indirect and optional to report. The reporting company then uses the principle of relevance to consider inclusion of these emissions in its carbon reporting.

› **Influence:** First, we can assess relevance against the influence criterion. Monster Hunter Rise is used for this example, due to its breadth of in-game graphical options available to the user. Three different graphical options were used and a simple gameplay test was performed on an Xbox Series X over 5 minutes of representative gameplay. A power meter monitor was used to record power and energy usage directly from the console.

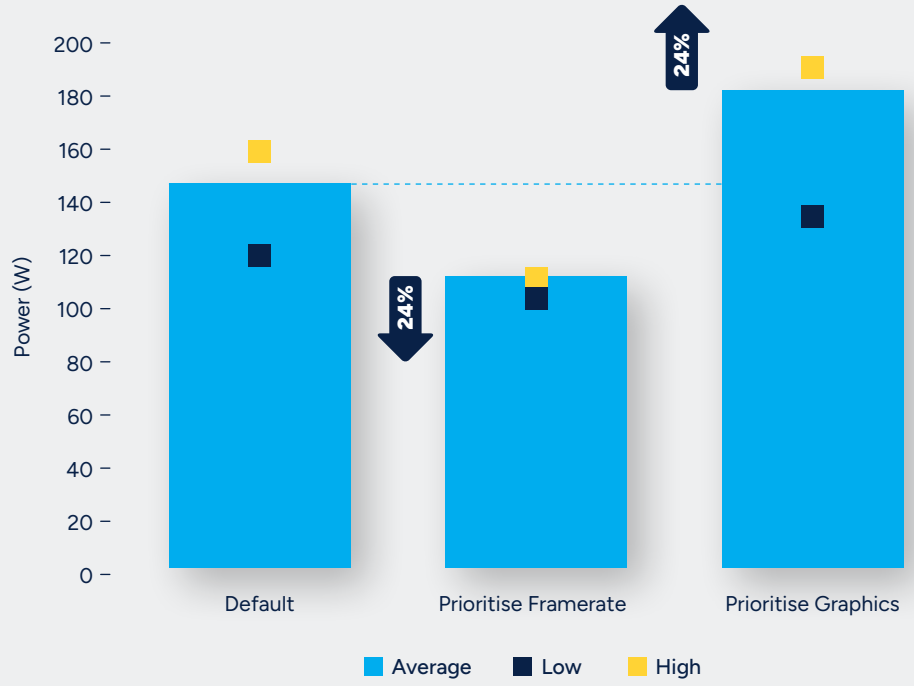
Test Parameters:	DEFAULT	PRIORITISE FRAMERATE*	PRIORITISE GRAPHICS
• 4K display • 60 hz cap • 5 min. gameplay sessions (same mission)	120.7 W LOW · 159.4 W HIGH · Avg. ~145 W	105.2 W LOW · 110.8 W HIGH · Avg. ~110 W	135.6 W LOW · 192.3 W HIGH · Avg. ~180 W
			
	3x zoom	3x zoom	3x zoom

*Note: This mode is primarily inteded for 120 hz, but capped at 60 hz for this test. Would expect more power consumption on a 120 hz display.

A wide range of power draw (~100-190 W) is possible based on selection of graphical settings and performance targets. The influence of software alone is difficult to untangle from the console's power consumption and currently there are no known methods to do so. However, in this specific case, developers were able to influence the graphical options available to users and the user's choice of option does result in a change in power demand of the console during gameplay.

CASE STUDY

EFFECT OF GRAPHICAL SETTING ON IN-GAME CONSOLE POWER DRAW



Size: Next, we can use the size criterion to assess the relevance of the use-phase emissions of video game software. Size can be considered as whether the activity contributes significantly to the expected scope 3 emissions of the games company. A brief example using the following parameters is used to assess size.

Parameter	Value
Game copies sold in reporting year	5 million
Average power draw during gameplay	180 W
Average lifetime gameplay per copy	30 hours
Emission Factor (approx. global life cycle emissions of electricity)	0.5 $kgCO_2e/kWh$
Use of sold product emissions = 5 million x 180W x 30 hours x 0.5 $\frac{kgCO_2e}{kWh}$ =13,500 tonnes CO_2e	

Note: figures used in this example are for illustrative purposes.

For context, large publishers' scope 2 emissions are in the range of 5,000 to 30,000 tonnes CO_2e, so with this example, use-phase should be considered significant. Note: scope 3 emissions were not used as a comparison since gaming companies' boundaries and reported figures are so varied, however with an assumption of 100,000 tCO_2e for scope 3 emissions, the use-phase emissions in this example would represent more than 10% of scope 3 emissions.

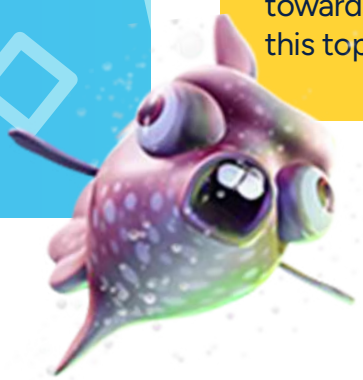
Recommendations for reporting category 11 for video game software

Recommendation 1:
Video game companies should apply the relevancy principle to evaluate their category 11 emissions for video game software and related equipment, like displays and controllers.

Recommendation 2:
Consider the implications and opportunities of accounting and reporting category 11 emissions, including:

- Effect on the footprint boundary used for reporting, target setting (SBTi) and tracking reductions
- Quantity of emissions requiring carbon credits under carbon neutrality may be affected (see FAQs for more information on the definition of carbon neutrality)
- Focuses developer efforts on measuring game performance and energy usage and understanding opportunities for improvement while still delivering an optimal user experience
- Opportunities for collaboration across the value chain by measuring and tracking performance

Accounting and reporting category 11 emissions for video game companies is an evolving space. For more discussion on how the industry can move towards further consensus on this topic, see Section 3.3.



Recommendation 3:
When significant, video game companies should account for the category 11 emissions of their video game software products, in line with GHG Protocol Value Chain Standard recommendations. If not included in your scope 3 footprint boundary used for carbon reduction targets, at a minimum, these emissions should be reported separately.

Recommendation 4:
Be transparent and provide justification. In exceptional circumstances, category 11 emissions may be considered for exclusion due to materiality, lack of influence over the emissions and lack of data necessary to estimate the emissions in a meaningful way. Transparently document justification for exclusion of use-phase emissions of software in a methodology statement alongside reported scope 3 footprint.

Recommendation 5:
Hardware manufacturers who also develop and publish games should be careful to avoid double counting. Hardware manufacturers must report use-phase emissions from the hardware they produce and sell. In some cases, manufacturers also develop and publish video game software. In these cases, they should take care to avoid double counting of software emissions already accounted for in the use of other products sold by the company (e.g., video game consoles)

Treatment of other elements of the video game system, such as displays and controllers

In this example, based on the size and influence criteria used to determine relevant activities in the scope 3 footprint boundary, the game company should consider software use-phase as relevant to their boundary. From the position that use-phase software emissions are an indirect emission, which are optional to report, the company must then make a determination on whether to report this category.

Playing a video game requires a display, input device and in some cases audio equipment and the internet. The relevance of these elements should be considered using the framework shown in the previous example. A brief example is provided on applying this framework from a developer's perspective.

Example: Estimating emissions size of system elements

Element	Copies of game sold	Power draw of element (W)	Activity metric[1]	Emission factor[2] ($kgCO_2e/kWh$)	Total emissions (tCO_2e)	Significant[3]
Display	5 million	92[4]	2.8 kWh	0.5	6,900	Yes
Controller	5 million	~1[5]	0.03 kWh	0.5	75	No
Audio	5 million	30[6]	0.9 kWh	0.5	2,250	Yes
Network	5 million	See note 7	1.8 kWh	0.5	4,500	Yes

1. Based on 30 hours of gameplay.
2. Representative global life cycle emission factor for electricity.
3. Significance cut off of 1,000 tCO_2e i.e. 1% of 100,000 tonnes CO_2e based on range of reported scope 1, 2 & 3 emissions for large publishers (note: there is a large variation in reported scope 3 figures).
4. Based on top selling Amazon UK TV in HDR mode (Toshiba 43" 4K HDR smart TV).
5. Based on max. energy of AA alkaline battery of 3.9 Wh and 2 AA batteries required for 30 hours of gameplay, DualSense battery capacity approx. 4Wh with 5-8 hr charge.
6. Based on top selling Amazon UK speaker (Sony HT-SF150 2ch Single Soundbar), specifications.
7. Assuming 50 GB initial download and 150 MB data usage per hour of gameplay for online connectivity features. Fixed network transmission of 31.5 Wh / GB (inc. router) and data centre usage of 1.3 W. Figures derived from J. Aslan research and sourced from Carbon Trust Carbon Impact of Video Streaming whitepaper.

Example: Justification to include or exclude system element from reported use-phase emissions

Element	Essential for use	Influence	Size	Data availability	Include/ Exclude
Display	Yes (indirect)	✗[1]	✓	Poor	Exclude[2]
Controller	Yes (indirect)	✗	✗	Good	Exclude[3]
Audio	Yes (indirect)	✗	✓	Poor	Exclude[4]
Network	Maybe (indirect)	✓	✓	Medium	Depends[5]

1. Generally low influence over display energy consumption, but use of HDR does have a significant effect on display energy consumption
2. Justification: exclude due to poor data availability and relatively little influence. Displays will inherently be included in all-in-one systems (laptops, mobile devices, handheld gaming consoles)
3. Justification: exclude due to low influence and materiality
4. Justification: exclude due to poor data availability and relatively little influence. Many gamers may use built-in audio from displays or headphones.
5. Justification: depends on online connectivity of the game, proportion of digital distribution and game size

Note: figures used in this example are for illustrative purposes.

3.2.8. Example application of category 11 guidance for a video game studio

Video Game Studio B uses the category 11 guidance to determine the relevance of use of sold product emissions to their business and scope 3 inventory. They primarily operate as a 'work for hire' developer, contracted by video game publishers to develop games for video game consoles and other platforms.

Size: Since the publisher ultimately sells the video game developed by the studio, the studio lacks sales data. They also don't have access to energy data on the performance of their video game. With these limitations in mind, they use a simple estimation approach of use of sold product emissions for the 2022 reporting period, as described below.

- **Video game sales** – use best guess on video game sales based on any publicly stated information from the publisher, or experience with past games developed where there is an understanding of the sales as a proxy
- **Power consumption** – use an approximation as a starting point, such as the reported power figures by console manufacturers through the Game Console Voluntary Agreement
- **Lifetime gameplay** – estimate based on reported gameplay times through a site like howlongtobeat.com or based on experience with past games
- **Emission factor for electricity** – use a global or regional average, based on best knowledge of the markets where the video games developed are ultimately sold.

This simple approach results in an estimated use-phase emissions of 5,000 tonnes CO_2e, which represents a significant portion of their scope 3 emissions.

Influence: The studio then considers their ability to influence these emissions. Within their contract with the publisher, a specification is set out to define the requirements of the game, including performance metrics such as frame rates and graphical quality. The contract requires the studio to discuss and agree on any variations to the specification through contract amendments. Throughout the process, the publisher retains final control and approval over the finished game. To the extent that opportunities are identified to reduce use-phase emissions within a game (and that weren't in the original specification agreed with the publisher), this would have to be discussed and agreed before it could be implemented. The studio therefore determines that they do not have sufficient influence to meet the influence criterion.

Outcome: The studio determines not to report category 11 – use of sold product emissions and justifies this exclusion in their scope 3 emissions report due to their lack of data to estimate these emissions accurately and lack of influence over the video game code within the requirements of their contract. Recognising the significance of these emissions, the studio engages with their publishers to explore opportunities to collaboratively address the use-phase emissions of the games they are contracted to develop and improve data collection to support estimation of category 11 emissions. As their ability to collect data to support the estimation of category 11 emissions and their level of influence over the game code improves, the company re-evaluates the decision to report these emissions in future reporting periods.

Note: figures used in this example are for illustrative purposes.

3.2.9 Category 12 – End of life treatment of sold products

End of life treatment of sold products is expected to be small for games businesses. The activities that should be included in this category are shown in the table below.

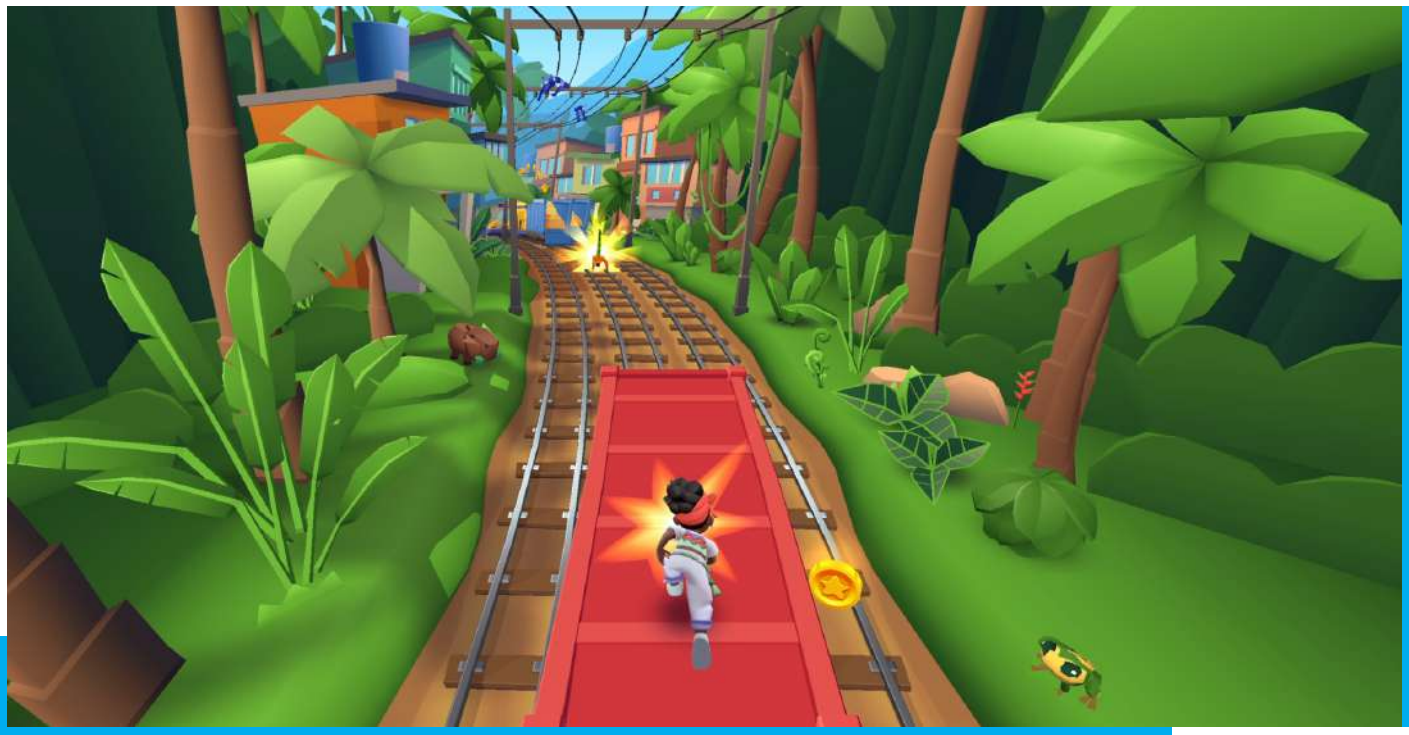
Scope 3 category	Included	Excluded	Not applicable
Publisher/ Developer	• End of life treatment of products sold by the company during the reporting year (e.g. physical gaming media and physical product packaging)	• Emissions coming from end of life of software (game deletion) • Emissions coming from end of life of data centres, servers and hardware	• Waste generated by product advertising events organized by the company (included in cat. 5)
Hardware Manufacturer	• End of life treatment of devices sold by the company during the reporting year (e.g., consoles, keyboards, mice, and other peripherals. Including physical product packaging)	• Emissions coming from end of life of software (game deletion) • Emissions coming from end of life of servers	• Waste generated by product advertising events organized by the company (included in cat. 5)

Recommendations for reporting category 12

Recommendation 1:
Game companies should apply the relevancy principle to decide on whether to report category 12 and include a justification in their methodology statement alongside reported scope 3 footprint.

Recommendation 2:
If primary data is not available, game companies may use proxy data and regional averages to estimate emissions from this category.

This includes emission factors from national databases (e.g. BEIS government conversion factors for waste treatment) and disposal rates (e.g. UK Environment Agency's Waste Electrical and Electronic Equipment (WEEE): Evidence and National Protocols Guidance).



3.3. Existing accounting and reporting challenges and recommendations for further study

The guidance presented in this report is meant to share best practice and recommendations for scope 3 accounting and reporting methods. However, due to the complexity of scope 3 emissions, there are some areas that have been identified where further discussion and study are needed to reach a consensus.

Treatment of use-phase emissions as direct or indirect emissions

Including direct use-phase emissions of sold products is a central requirement for category 11. Yet video game and computer systems rely on a system of hardware, firmware and software which interact to generate a playable video game, leaving the door open for ambiguity in interpreting the definition of direct emissions. The existing examples in the standard are not explicit enough in how to treat video game software, or software in general and currently, industry consensus does not exist on this subject.

While the GHG Protocol Value Chain Standard is not explicit on the treatment of software as direct or indirect, the Science Based Targets initiative (SBTi) has defined use-phase emissions of software as indirect, which has implications on target-setting – specifically that targets covering the use-phase emissions of software are optional and do not count towards the emissions coverage criterion for scope 3 targets (see Section 3.2.7 for more information). And because video games need a system to run, disentangling the energy and emissions specifically attributed to the

software is difficult. Encouragingly and despite this challenge, there has been progress in developing tooling to assist studios in quantifying and reducing their use-phase emissions.[46]

When comparing against other digital entertainment industries, such as video streaming, video game companies are concerned that including use-phase emissions from software may lead to unfair comparisons against entertainment industry peers. Both Netflix[47] and BBC[48] treat use-phase emissions of their video streaming services associated with end-user devices as indirect and exclude them from the footprint boundary (BBC estimates and reports use-phase emissions separately from their scope 3 footprint). Netflix and other digital entertainment companies have engaged with DIMPACT[49] to develop a tool to estimate the carbon footprint of video streaming, including end-user devices. However, this is estimated separate from their corporate scope 3 reporting.

Alongside the accounting principles of transparency and consistency, the level of influence that video game businesses have over the use-phase emissions of their products is an important consideration in how to treat them in carbon accounting. While the extent varies to which studios and publishers can influence use-phase emissions of the video games they make, some video game businesses, such as Embracer, Space Ape and Rovio, are taking accountability for the use of their products by estimating and reporting these emissions. Video game businesses have an opportunity to explore collaborative and innovative solutions to reducing use-phase emissions of their products and despite the challenges, consistent reporting across the industry would help foster a culture of collaboration, transparency and accountability.

Importantly, video game companies have an opportunity to make their intentions on climate action clear: that by acknowledging the energy used by their products and taking accountability and responsibility, they can collectively work towards reducing the real-world emissions associated with their games.

Further discussion in this area among industry businesses is recommended to establish a position on this subject. Playing for the Planet should consider leading this discussion with industry members, building on the relevancy framework used in this report's guidance. Additional research to better understand the influence of each aspect of the computer system (e.g. hardware, firmware, software, etc.) on the resulting power consumption is recommended to support these discussions. Outcomes from these discussions and research should be shared with the SBTi to consider reflection within the SBTi criteria.

[46] https://developer.microsoft.com/en-us/games/articles/2023/03/gdc-2023-xbox-sustainability-toolkit-for-game-creators/
[47] Netflix (2021). Environmental Social Governance Report 2021. https://assets.ctfassets.net/4cd45et68cgf/7B2bKCqkXDfHLadrjrNWD8/e44583e5b288bdf61e8bf3d7f8562884/2021_US_EN_Netflix_EnvironmentalSocialGovernanceReport-2021_Final.pdf
[48] https://www.bbc.co.uk/sustainability/our-plan/
[49] https://dimpact.org/about

Opportunity to improve accuracy and reliability of reporting use-phase emissions using real-word data

Accounting for lifetime use-phase emissions in the year a product is sold is another central requirement for category 11. For video game companies, this approach has some downsides:

- Estimating lifetime emissions in the product's year of sale requires assumptions, including:
  - Expected life of the product
  - Average energy consumption over its life
- Does not capture change over time, including:
  - Improvements to energy efficiency made to the product over the product's life
  - Change in emissions of electricity used by the product
- Resulting emissions estimation has a wide range of uncertainty

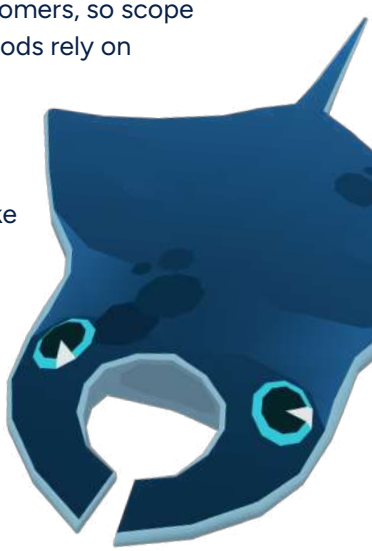
To address these drawbacks, an alternative approach has been discussed among industry members, where use-phase emissions are accounted for as they happen. In other words, video game companies can leverage real-time data available from their products that is available in accordance with applicable legislation and that they can reasonably obtain to account for use-phase emissions from all of their products in the reporting period (including emissions from products sold in previous reporting periods). This approach would allow for more accurate accounting and reporting of use-phase emissions and encourage video game companies to continue to improve energy efficiency of their sold products over time, as these improvements would be reflected in their scope 3 emissions.

To move this topic forward, industry businesses should further refine and document an approach and engage with standards bodies, such as the GHG Protocol, to discuss revision to the standard.

Emissions data for data centres and network services

Most, if not all, video game businesses purchase data centre and network services to operate their video game products and these services may form a sizeable portion of their scope 3 footprint (10% or more in some cases, such as Ubisoft). Emissions data may be available from data centre providers, however it is not always reported consistently, nor in complete alignment with the requirements of the standard. Microsoft includes cradle-to-gate emissions[50] of its data centre services (which includes emissions from production of server blades, disk drives and other componentry), while Google includes some, but not all, upstream emission sources.[51] AWS only includes its own scope 1 and 2 emissions to operate its data centre services and has limited documentation on calculation methods used.[52] Network services are even more difficult to estimate as many network providers do not currently provide this information to their customers, so scope 3 emissions estimation methods rely on outdated analysis from the scientific community.

To move this forward, video game businesses should make a call for transparency and consistency in access to emissions data for data centre services, CDNs and ISPs.



[50] Microsoft (2021). A new approach for Scope 3 emissions transparency. https://go.microsoft.com/fwlink/p/?linkid=2161861&clcid=0x409&culture=en-us&country=us

[51] https://cloud.google.com/carbon-footprint/docs/methodology#:~:text=Google%20calculates%20location%2Dbased%20greenhouse,electricity%20carbon%20emission%20intensity%20factor., Google Cloud 'Carbon Footprinting reporting methodology'

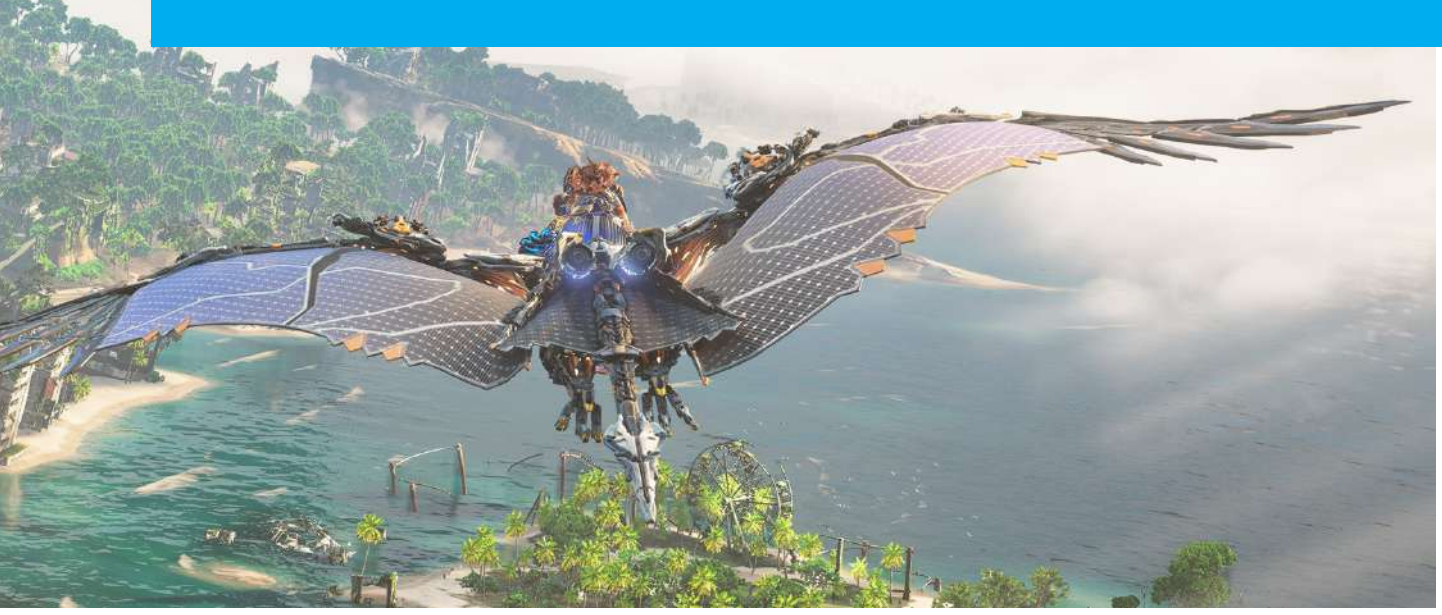
[52] https://aws.amazon.com/blogs/aws/new-customer-carbon-footprint-tool/

Areas for further study to support video gaming industry decarbonisation efforts

Opportunities for further study to support industry decarbonisation efforts are presented below and include emissions related to advertising, next generation console design, the role of engines and emerging technologies.

- **Advertising:** For some publishers, advertising and marketing activities are estimated to make a significant contribution to their scope 3 footprint.[53] Further investigation into the significance of these activities alongside engagement opportunities with advertising and marketing partners to improve data collection and discuss decarbonisation opportunities should be considered.
- **Next generation console design:** Recent console generations last for up to eight years and the most recent console generation began in November 2020 with the launch of PlayStation 5 and Xbox Series X/S. Next generation consoles effectively lock-in power and energy profiles for close to a decade and therefore have an important role to play in achieving industry decarbonisation efforts and carbon reduction targets. Further study is recommended to engage early with industry stakeholders (publishers, developers and manufacturers) on next generation console design and development to ensure environmental performance and industry decarbonisation goals are considered.
- **Role of video game engines:** Video game engines have significant influence over the trajectory of video games and video game development. Further study is recommended to consider the custodial role that video game engines can play in stewarding the mitigation of emissions upstream in the value chain with the communities that build video games using their engines and as innovations in video game technology evolve.
- **Emerging technologies:** Promising new technologies offer innovative ways to develop and play video games. Further study into the carbon impact of these technologies, including cloud gaming, AI, blockchain and 8K, is recommended to understand the role these technologies will play in achieving net-zero emissions in the video gaming industry.

[53] https://ourcommitments.activisionblizzard.com/content/dam/atvi/activisionblizzard/ab-touchui/our-commitments/docs/2022_ESG_Report.pdf



4

FAQs

Frequently asked questions about carbon emissions, carbon footprinting and climate action

What are scope 1, 2 and 3 emissions?

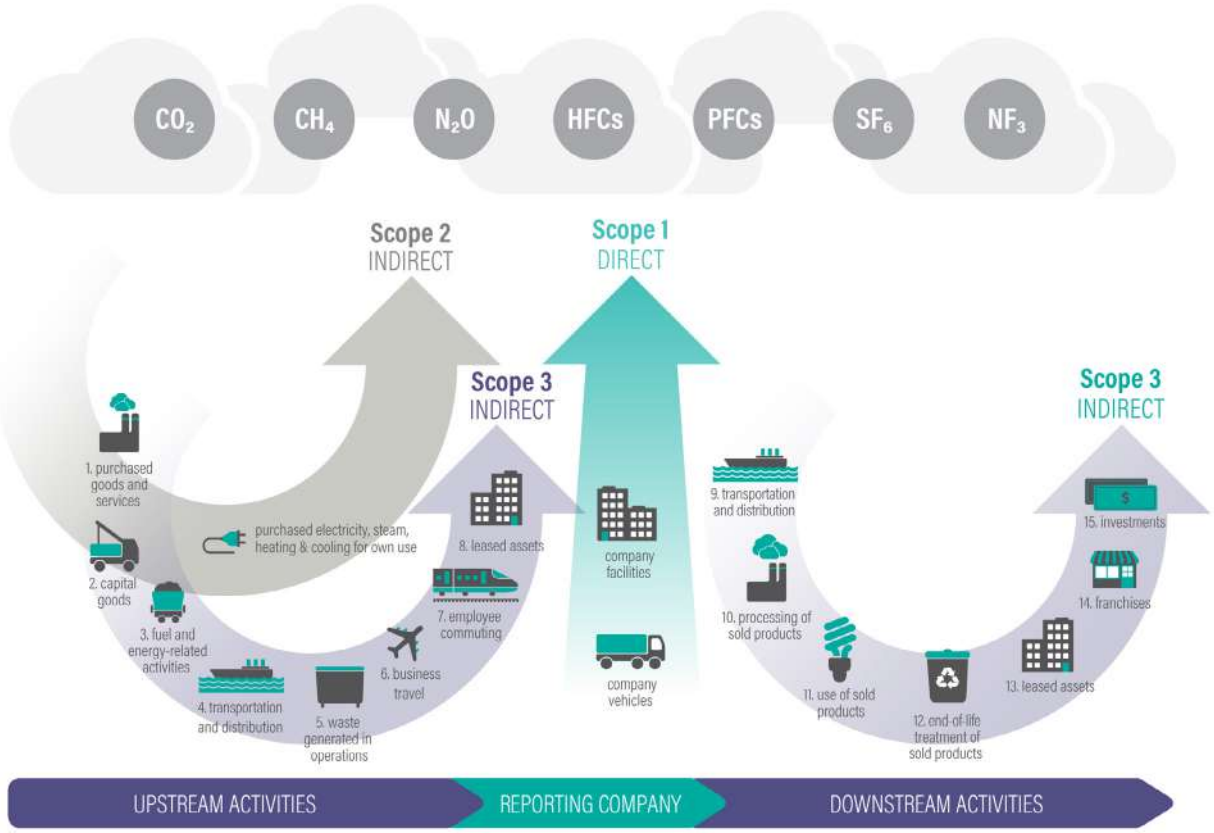


Image source: Greenhouse Gas Protocol, The Corporate Value Chain (Scope 3) Accounting and Reporting Standard, page 5

Scope 1 emissions:

Direct GHG emissions from sources that are owned or controlled by an organisation, such as emissions from combustion of fossil fuels in boilers or vehicles owned by the organisation.

Scope 2 emissions:

Indirect GHG emissions that come from the consumption of purchased electricity, heat, or steam, which are generated by a third party and consumed by the organisation.

Scope 3 emissions:

All other indirect emissions that occur in the organisation's value chain, including emissions from the production of purchased goods and services, employee commuting, and waste disposal.[54]

[54] The Greenhouse Gas Protocol. Corporate Accounting and Reporting Standard.

What is the difference between greenhouse gas (GHG) emissions and carbon emissions?

- Greenhouse gases trap heat in the earth's atmosphere and refer to these six gases: carbon dioxide (CO_2); methane (CH_4); nitrous oxide (N_2O); hydrofluorocarbons (HFCs); perfluorocarbons (PFCs); and sulphur hexafluoride (SF_6). Each of these gases have different capacity to trap heat; methane, for example, has a global warming potential of 27 – 30 times that of carbon dioxide over 100 years.
- Carbon emissions refer specifically to the amount of CO_2 released into the atmosphere. It is the most abundant and has the longest lifespan in the atmosphere, contributing to the majority of total GHG emissions.[55] The term 'carbon emissions' is often used interchangeably with 'GHG emissions' (see 'What about CO_2e?').

What about CO_2e?

- CO_2e means 'CO_2 equivalent' and is a universal metric used to compare the climate impact of different GHGs based on their potential to contribute to global warming over a specific time frame, usually 100 years. It is used to evaluate the emissions of different greenhouse gases against a common basis allowing for easy comparison and tracking of emissions reduction progress.[56]

What is a science-based target (SBT)?

- Science-based targets provide a clearly-defined pathway for companies to reduce greenhouse gas emissions, helping prevent the worst impacts of climate change and future-proof business growth. Targets are considered 'science-based' if they are in line with what the latest climate science deems necessary to meet the goals of the Paris Agreement – limiting global warming to well-below 2°C above pre-industrial levels and pursuing efforts to limit warming to 1.5°C.[57]

What is the GHG Protocol?

- A widely-used international standard for accounting and reporting GHG emissions that provides global standardised frameworks for public and private organisations to quantify and manage the emissions coming from their operations, value chains and mitigation actions.[58]

What is the Science-Based Targets initiative (SBTi)?

- An international partnership between CDP, the UN Global Compact, WRI and WWF that aims to help organisations set and achieve emission reduction targets in line with the latest climate science. The SBTi promotes and defines best practice, develops sector guidance, and validates and tracks progress for SBTs set by organisations.[59]

[55] The Greenhouse Gas Protocol. Corporate Accounting and Reporting Standard.
[56] The Greenhouse Gas Protocol. Corporate Accounting and Reporting Standard.
[57] https://sciencebasedtargets.org/how-it-works
[58] The Greenhouse Gas Protocol. Corporate Accounting and Reporting Standard.
[59] Science Based Targets Initiative (2023). SBTi Corporate Manual.

What does net-zero mean?

- Net-zero refers to a balance between the amount of carbon emissions produced and the amount removed from the atmosphere. Broadly, achieving net-zero emissions is accepted to mean reducing emissions to as close to zero as possible and then removing any remaining emissions through activities such as carbon capture and storage or reforestation.[60]
- However, different definitions exist and within the context of the Science Based Targets initiative Net-Zero Standard, net-zero means: (a) reducing scope 1, 2 and 3 emissions to zero or a residual level consistent with reaching net-zero emissions at the global or sector level in eligible 1.5°C scenarios or sector pathways and (b) neutralising any residual emissions at the net-zero target date – and any GHG emissions released into the atmosphere thereafter.[61]

What is the difference between net-zero and carbon neutral?

Carbon neutrality is similar in concept and sometimes confused with net-zero. However, there are some key distinctions between the two concepts:

- Carbon neutrality may refer specifically to CO_2 emissions or to all GHG emissions – it's not always clear.
- Carbon neutrality claims, such as those aligned to BSI PAS 2060 Carbon Neutrality Standard,[62] allow GHG emissions to be counterbalanced with carbon offsets without having reduced emissions consistent with the amount needed to reach net-zero at the global or sector level.
- The SBTi does not validate carbon neutrality claims[63] and governmental bodies, such as European Parliament,[64] are considering banning the use of carbon neutrality claims due to the risk of misleading consumers.

What are carbon offsets?

- This a complex topic, but at its core, carbon offsets are a mechanism for balancing GHG emissions through projects that either remove GHG emissions from the atmosphere or avoid them being emitted in the first place. Offsetting is typically arranged through a marketplace for carbon credits or other exchange mechanism.
- Not every offset is created equal – the concepts of additionality (i.e. certainty that the offsetting project would have reduced or avoided GHG emissions without the offset buyer's support) and permanence (i.e. whether the project continues to store carbon for a long period of time) are important when understanding the quality of a carbon offsetting project.[65]

What does Life Cycle Assessment (LCA) mean?

LCA is defined as the systematic analysis of the potential environmental impacts of products or services during their entire life cycle, from the extraction of raw materials to its end-of-life disposal or recycling. It aims to identify and quantify potential environmental impacts such as GHG emissions, water consumption, and resource depletion associated with the product, process or service being evaluated. [66] When a study focuses only on climate impact, it is normally referred to as a product carbon footprint.

[60] https://www.climatecouncil.org.au/resources/what-does-net-zero-emissions-mean/
[61] Science Based Targets Initiative (2023). SBTi Corporate Net-Zero Standard.
[62] PAS 2060:2020 Carbon Neutrality. Specification for the demonstration of carbon neutrality. BSI.
[63] https://sciencebasedtargets.org/blog/net-zero-jargon-buster-a-guide-to-common-terms
[64] https://carbonmarketwatch.org/2023/05/11/european-parliament-abandons-neutrality-in-anti-greenwashing-drive/
[65] https://www.greenbiz.com/article/quest-carbon-offsets-almost-anything-goes
[66] https://sphera.com/glossary/what-is-a-life-cycle-assessment-lca/

What is electricity grid emissions intensity?

- The average amount of GHG emissions per the amount of electricity generated by a power grid or utility over a given period of time. It is typically measured in grams of CO_2e per kilowatt-hour (kWh). In other words, it is a measure of the carbon intensity of the electricity supply in a specific region or country or by a particular supplier or electricity product. Power plants that burn fossil fuels such as coal and natural gas for example, will have higher carbon intensity, while renewable energy sources have lower carbon intensity.[67]

What is a green tariff and how do I get one?

- A green tariff is renewable energy product in regulated electricity markets that allows customers to more easily access clean electricity. It is a special tariff rate offered by utilities and approved by state public utility commissions (PUCs) that allows eligible customers to source up to 100% of their electricity from renewable sources, backed by renewable energy certificates to demonstrate the source of the electricity generation.[68]
- To get a green tariff, you will need to contact your electricity supplier and ask them about the green tariff options they offer. Some suppliers may offer a specific green tariff, while others may allow you to choose a renewable energy option as part of your tariff. You may also be able to switch to a new supplier that offers green tariffs.

If I sign up for a green tariff, how does the renewable electricity make its way to my home?

- Green tariffs normally mean that all of the electricity supplied to your home is backed by Energy Attribute Certificates (EACs), verifying that the amount of electricity you consumed was uniquely matched by an equivalent amount of renewable electricity. What it does not mean, is that all of the electricity used in your home is through a direct supply of renewable energy – you are still using electricity from the grid from a mix of generation sources. These certificates are intended to serve as a market signal, the more demand for EACs and green tariffs, the more renewable generation will be built to meet demand.

[67] https://www.nationalgrid.com/stories/energy-explained/what-is-carbon-intensity
[68] https://www.epa.gov/green-power-markets/utility-green-tariffs

CONTACT DETAILS

For further information: www.playing4theplanet.org

To get in touch: info@playing4theplanet.org

The Playing for the Planet Alliance aims to inspire the video gaming industry and community to take environmental action to Promote, Protect and Play for the Planet. Since its inception, the Alliance has expanded to include more than 30 major gaming companies and eight trade associations. UNEP is the co-founder of the Alliance and its role is to facilitate the Alliance's work. The Playing for the Planet Alliance was launched on 23 September 2019 at UN Headquarters in New York during the UN Secretary-General's Climate Action Summit. In joining the Playing for the Alliance, game companies have made commitments ranging from integrating green activations in games and reducing their carbon emissions.

PLAYING FOR THE PLANET