How can the Portuguese Publishing Market achieve net zero?

2024 Book 2.0 Carbon Footprint Whitepaper

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1. Foreword

Embracing sustainability to nurture the next generation of readers

Sustainability is no longer an option, it is imperative that all sectors, including our own must urgently address. The global climate crisis and loss of biodiversity poses significant challenges that demand urgent and collective action. APEL and its members have a unique responsibility to lead by example and ensure that the books we produce are aligned and amplify the principles of environmental sustainability.

I am pleased to see that APEL have embraced this responsibility through Book 2.0 and proactively placed sustainability alongside other critical issues such as reading literacy and digitalization that will share the future of our sector. Our sustainability efforts must not just be about compliance, but around our ethical duty to form a sustainable future for our industry that will ensure books will nourish the next generation of readers and protect our environment.

Pedro Sobral

President APEL

We want books you love to love the planet as well

Last year at the inaugural Book 2.0 conference, we shared the stage to discuss climate action and sustainability within the international and Portuguese publishing industry. After our session, we realized the need to move our discussion from just talking to concrete action. But where do you start?

The idea was simple. For books to be truly sustainable we need the full supply chain to be working together to rapidly decarbonize and reach our respective climate targets. But it is difficult to see how actions being taken across the supply chain were making tangible carbon reductions.

A carbon footprint study is a crucial tool in this endeavour and helps to estimate an initial overall carbon impact of the publishing sector. Such a study can lay the foundation for a roadmap for the collective action that will achieve greater carbon reductions. Our hope is that these insights will spark further ideas, collaboration and action that will continue the conversation in subsequent editions of Book 2.0.

Rachel Martin   António Redondo

Global Director of Sustainability, Elsevier   CEO, Navigator Company

2. Executive Summary

2.1 Key insights:

1. **Calculating carbon emissions is a collective challenge**

In a perfect world, all companies would be able to report on their direct emissions (Scope 1 and Scope 2), enabling supply chain partners to accurately calculate upstream and downstream emissions and break this down at a product level to drive business decisions. In reality, carbon reporting across all sectors and industries is still at an early stage. It requires resources, technical expertise and industry standards and methodologies.

Aligned with other sectors and countries, this study also found each supply chain partner in the Portuguese general publishing market are at different stages of their net zero journey. For some parts of the supply chain, it was difficult to extract reliable data, either at a company level or in aggregate. In cases where tools were available to help calculate emissions, they were not being fully utilized due to a range of issues such as lack of resources, awareness/demand or priority.

2. **Building the business case to act now**

Given the limitations of available and reliable carbon data, it suggests the need to increase awareness and understanding of the business case for acting on climate change.

The study found that while the ethical/moral considerations to be environmentally responsible are well understood, sustainability is often associated with added costs and potential restrictions. Given the dynamics of the Portuguese publishing market (with many micro, small and medium sized organizations) there are concerns around how climate action may translate into the need for additional resources, potential costs and risks in sharing and disclosing data.

There is also now a sense of urgency given emerging EU regulations around ESG disclosures and supply chain reporting such as the EU Deforestation regulation. As such, compliance will be a key part of the initial business case for climate action as regulations will impact on how books are produced, marketed and their ability to be sold in the Portuguese market.

3. **Small but mighty: the power of being agile**

Within the context of the international publishing market, Portugal is a relatively small market, selling around 13.1 million books in 2023. The market dynamics show that in many cases the supply chain is comprised of a few large organizations, which in some instances are vertically integrated, owning two or more steps in the supply chain process. This makes the Portuguese publishing market a perfect case study for other

international markets in terms of testing methodological approaches around carbon reporting, disclosures and labels.

As such, this study showed the ability to generate an initial estimation for the overall carbon impact of the general Portuguese publishing market. In 2023, it is estimated the market produced 9,874 tonnes of carbon dioxide equivalent (CO_2e), representing approximately 0.017% of Portugal's total emissions. This translates into around an average of 555g CO_2e[i] per book sold in Portugal in 2023. To put this into broader context, the carbon impact of a book would be equivalent to driving 5.13 kilometres in a new passenger car or spending 15.4 hours streaming video content.

Additionally, the printed book is also a source of storage of carbon while the book is kept or further recycled. This is due to the carbon that is absorbed by trees while they are growing, something referred to as biogenic carbon. It is estimated that 391gCO_2e per book represents that biogenic carbon.

4. Maximizing the potential of every printed book

As a durable consumer good, books last a long time. The study also identified that most of the carbon emissions of the sector are concentrated in the production of books through paper production (41%) and printing (28%) with other inputs such as inks, varnishes, glues and binding materials contributing approximately 20%. This means choices being made today on book design, alongside contractual obligations with authors, distributors and booksellers may indirectly affect the sector's ability to reach its net zero targets and ambitions in the future.

In Portugal, it is estimated around 35% of books on average will be returned unsold from the retailers to the warehouse. According to interviews in this study, over a period of between 7-10 years, unsold books will re-enter the market and be returned on average 5 times before unsold stock is finally disposed of either through recycling, donations or pulping. The dynamics behind moving stock in and out of the warehouse will be publisher specific but reflect broader Portuguese book buying trends which show a strong demand for seasonal book buying (i.e. gifts), pricing discounts, bestsellers and new releases. This also means the books produced in 2025 may still be in a publisher's warehouses in 2032 and beyond.

Established industry practices and contracts can make it difficult for publishers, especially smaller publishers, to move individually in some supply chain processes related to design, waste and returns. As such these areas may be a useful starting point for collective action. For example, in the UK a materiality matrix provides publishers with the environmental breakdown of various product choices to better optimize product design and potential recyclability. Additionally, industry studies such as the Industry Returns study from RISE bookselling have shown different best practices and ideas to drive down return rates from booksellers.

5. **We need reading and culture to support Portugal's net zero ambitions**

Given the estimated overall climate impact of the book sector being only 0.017% of Portugal's overall emissions, it could be argued that the biggest impact books can have on climate action in Portugal is through the content that is published and read. Continued support for a cultural sector that prioritizes books and reading will be critical for Portugal's overarching net zero ambitions. Additionally, the sector will also rely on factors beyond the control of individual supply chain members, such as technology innovation, emerging regulations, and the pace of the energy transition that will indirectly affect the pace at which the sector can reach net zero. Recognizing the government as a key stakeholder in the overall dialogue around supply chain action may be helpful in pursuing the net zero goals of the sector.

2.2 Recommendations:

1. **Setting a 2050 vision:**

The Portuguese book sector already recognize the importance of taking action to address climate change and wider sustainability issues. Each part of the supply chain is currently at different points in their journey to disclose carbon data and reduce emissions. Having a joint commitment, aligned with science, provides a platform to create momentum, awareness and accelerate actions across the supply chain. Such a commitment would ideally be underscored by a formation of a supply chain forum of industry associations that meets to discuss shared challenges, data reporting and opportunities for joint action.

2. **Accelerate aggregating reporting and sharing of carbon data**

The carbon estimate provides an initial baseline to understand the climate impact of the sector. It also highlights the current data gaps and potential role for associations, particularly APEL, to help aggregate this data, improve the accuracy of the initial model and track progress. For larger organizations, who will represent most of the current market, generating industry averages in the first instance, can also help smaller members fill their own data gaps as they expand their capacity for carbon reporting.

3. **Move from awareness to compliance**

Emerging climate related regulation will impact the Portuguese book sector and it is important that the book supply chain is aware of new regulations and are working towards compliance. Exploring possible educational and accelerator programs to help better support supply chain members will help ensure the business case for sustainability is well understood and embraced throughout the supply chain.

4. **Bring in the authors and readers**

Two parts of the wider supply chain that are not represented in the overall emissions across the supply chain are the authors and readers. Both of which also have an indirect impact on the book's environmental impact.

For authors, there has been a growing sense of awareness and concern over the environmental impact of books over several years. Back in 2018, Author Martin Dorey criticised his US distributor for wrapping his book, *No More Plastic*, in a single use plastic wrap. Additionally, authors are interested in the carbon impact of their books. During an initial carbon label prototype project, as part of the Publishing 2030 Accelerator, the most enthusiastic stakeholder where the authors who welcomed greater transparency and information about the impact of the book production.

Additionally, consumers, and in particular younger generations, are also interested in the sustainability of the goods and services they purchase. Results from the European Investment Bank (EIB)'s Climate Survey indicate that 84% of young people in Portugal would be in favour of stricter government measures to impose a change in personal behaviour and 68% would be in favour of a carbon budget system to set a cap on the most climate damaging consumption. Additionally, 90% of Portuguese respondents are in favour of labelling on food to help limit the impact on climate and the environment. These examples give a good indication there is a growing awareness and desire for greater transparency about the climate impact of consumer choices and consumption.

Whilst there has been no conclusive study conducted that would indicate specific labelling for books would influence purchasing behaviour or an author's choice of a publisher, having reliable reported carbon data at a product level will make the climate impact of print books tangible for both key stakeholders.

At an international level, an agreed methodology was published back in 2023, and the International Publishers Association have supported a free tool to calculate the carbon impact of an individual book that could be piloted and tested in the Portuguese market. In 2023, LeYa participated in an initial pilot of possible carbon labels with four different titles. It is recommended that larger publishers, who have capacity, might initiate pilots and feedback in subsequent book 2.0 sessions on product level reporting and labelling.

3. Introduction

What is climate action and why should we care about net zero?

The Paris Agreement is an international treaty on climate change that was adopted by all 196 members of the United Nations back in 2015. Since then, it has become an international standard for climate action providing a long- term climate goal and a mechanism to strengthen the global response to the threats posed by climate change. In basic terms, the Paris Agreement aims to limit the rise in global temperatures to

below 2 degrees Celsius, and ideally under 1.5 degrees Celsius by 2050. Yet action to address climate change has remained slow. Recent reports from the UN climate scientists already indicate that temperatures have risen to close to the 1.5-degree tipping point and are on track for a 2.7 – 3-degree Celsius increase in global warming by 2050. Such a rise in temperature would have a devasting effect on our planet, our health, and our economies. The United Nations have called for rapid action "on all fronts – everything, everywhere, all at once".

3.1 What is net zero?

Net zero as a scientific concept, refers to a state where global greenhouse gas emissions would be "balanced" by removing the same amount from the atmosphere through either carbon removal technology or natural carbon sinks (for example, forests or oceans). To achieve a net zero globally, there is a need to limit the rise of global temperatures, which implies a finite budget of carbon dioxide, alongside other greenhouse gases, that can be emitted into the atmosphere. Staying within this carbon budget, according to the UN Climate Change Committee (called the IPCC), requires CO2 emissions to peak before 2030 and fall to net zero by 2050.

Net zero has since been translated for use in corporate contexts by the Science Based Targets initiative (SBTi). The components of the Corporate net zero standard is defined as setting a long-term target to cut all possible emissions (defined as more than 90%) before 2050 and neutralize residual emissions through permanent carbon removal and storage projects.

3.2 Net zero as a mechanism for action

Net zero, as a concept has provided governments and the private sector around the world to align on a common goal of rapid decarbonisation that will help achieve the Paris Agreement's climate targets, often under wider Environmental, Social and Governance (ESG) framework.

At a government level, international climate policy has focused on setting a goal to achieve net zero emissions by a specific date. For example, the European Union aims to be net zero by 2050, making this a legally binding target as part of the European Climate Law and outlining their roadmap for action in the European Green Deal. Each EU member state, including Portugal, is required to both monitor their emissions and report on progress. Despite a 2% reduction in EU greenhouse gas emissions in 2022, further rapid reductions are needed to achieve the EU climate commitments.

A key tool in helping the European Union achieve its climate policy is the EU Emissions Trading System (EU ETS). This regulation covers specific sectors such as maritime transport and aviation and sets a cap to limit the total amount of greenhouse gas emissions that can be emitted by sectors that fall under its scope. Each year, the cap is reduced, and companies must monitor and report on their emissions. Additionally, EU

ETS is also a carbon market where organizations pay for their greenhouse gas emissions helping to raise revenue that will finance the green transition. Specifically for the publishing sector, the pulp and paper sector is part of this regulation and to date has reduced its carbon emissions by 21.4% from 2020- 2023.

It is widely acknowledged that in addition to government led action, the private sector can support their government and wider sector in bridging the emissions gap between current policies and the goals of the Paris Agreement. Primarily this accomplished by companies setting voluntary net zero targets and reducing their own emissions. Disclosure around the progress made against targets by companies help to increase the government's confidence in achieving their climate commitments. As such, increasing regulation for companies, such as the European Union's Corporate Sustainability Reporting Directive, is now mandating climate discloses for larger publicly listed organizations with a view to extend this for smaller organizations in the near future.

3.3 Supply chain approach

Net zero is a collective goal that requires rapid transformation across all sectors of society from government, businesses and individuals. As such no single organization can achieve net zero emissions alone. Take for example the publishing sector, there are broader dependencies in other industries such as forestry, paper production, transportation and ICT that require progress to be made across the supply chain, if publishers are to achieve their net zero targets.

Progress towards net zero is measured and tracked through carbon reporting. Industries and organisations report on carbon emissions according to the Greenhouse Gas Protocol (GHG), that defines three categories of emissions called scopes:

- **Scope 1:** Emissions that a company owns or controls. For example, burning fuel in a company vehicle.
- **Scope 2:** Emissions that come from purchase energy. For example, the energy purchased to heat or cool an office building.
- **Scope 3:** Other indirect emissions that occur in the company's value chain. This can cover categories such as business travel, remote working, and staff commuting, but also emissions from purchased goods and services.

For most businesses, more than 70% of their business's carbon footprint will come from their Scope 3 emissions. This represents both an opportunity and challenge. On one hand, gaining a better understanding of Scope 3 emissions can help prioritize action, inform decisions and lead to more efficient use of resources. On the other hand, measuring and sharing data across supply chains can be challenging. Each supply chain partner will be at different stages of their own net zero journey with different abilities to measure and report on emissions. Additionally, each sector will have unique characteristics around how they do business, that will inevitably require a more

substantive understanding of drivers of emissions as well as collective action across the supply chain.

Whilst the publishing sector is not recognized as a high carbon intensive sector, it is still important to understand where efforts should be concentrated, determine priorities and outline a roadmap to support broader net zero targets. Many global publishers such as Harper Collins, Hachette, Penguin Random House, Elsevier/RELX, and SpringerNature have validated science-based targets and are working to reduce emissions with net zero targets that range from 2030 – 2050. In all cases, Scope 3 is where the majority of emissions lie and as such the supply chain presents the opportunities to achieve the desired emission reduction targets.

4. Carbon Footprint Assessment of the Portuguese General Publishing Market

4.1 Methodology

Portugal, whilst representing a relatively small general publishing market (estimated to be 2.5% of the size of the biggest market, the US, based on 2023 revenue) recognizes the growing importance of sustainability for its future success. With just over 13.1 million books sold, the Portuguese sector represents an opportunity to help build societal awareness and desire for climate action through the content that is published. At the same time, the sector also recognizes its role to ensure that the production of those books optimizes the use of resources, supports the Portuguese Government's broader net zero goals, and minimizes its operational impact on the planet.

To accomplish this goal, a first understanding of what the carbon footprint of the sector is required. By enabling a benchmark and baseline for data it is envisaged this whitepaper will provide:

- An initial estimate of the 2023 carbon footprint for the Portuguese general publishing market, adapted from the Publishing Accelerator 2030 industry validated methodology.
- A qualitative understanding of the maturity of the book supply chain in terms of net zero targets, carbon reporting and broader inter-dependencies that will affect the ability of the sector to achieve its net zero goals.
- Input for further dialogue across the supply chain on how to effectively measure, evolve existing methodologies and report on carbon data, as well as initiate discussions around future collaborative actions to enable all parts of the supply chain accelerate their net zero actions.

4.2 Research design

Calculation of the annual carbon impact:

Organizations across the book supply chain recognize the importance of Scope 3 emissions in their overall net zero ambition. However, there are systemic challenges around measuring such emissions, in addition to having the resource, accurate data and methodology to do so.

This study adapted the agreed industry methodology developed as part of the Publishing 2030 Accelerator to provide an initial estimate of the total emissions for the publishing sector, across the supply chain. Where data was incomplete for the Portuguese market, general industry averages were used and assumptions. We note that the carbon footprint can be assessed using various methodological approaches and standards, such as the GHG Protocol Product Standard and the ISO/TS 14067. For sections of the supply chain that have supplied available carbon data, to our knowledge these calculations have been aligned to the GHG protocol.

Qualitative understanding of the book sector: To complement and provide further context to an overall carbon number, a written survey was issued to the industry associations and/or the organizations that represent a large share of the market across the Portuguese book supply chain.

Additional desk research was undertaken as background and context setting, focused on publicly available background material that included supply chain member's annual reports and their corporate responsibility statements and goals, Portuguese governmental reports, and broader industry studies related to Publishing.

Participants in this whitepaper included:

- APEL
- ApiGraf
- CTT
- LeYa
- Penguin Random House Portugal
- The Navigator Company

4.3 Scope

Systems Boundaries: This whitepaper focused on the estimated GHG emissions baseline for the Portuguese general publishing market only considering the books that were domestically produced and distributed to retailers in Portugal. This covers children and young adult, fiction and non-fiction and educational sectors. We did not account for export markets and academic publishing.

Reference year: Where possible we used the 2023 as the reference year. Where data was incomplete, best estimates were used where baselines may have differed.

<u>Emission categories:</u> This whitepaper defined six emission categories that cover the book supply chain from raw material to the customer warehouse, that when combined contribute to an estimate of the overall carbon impact of the Portuguese book sector. These were defined as:

1. **Publisher**
2. **Paper**
3. **Other inputs** (ink, cardboard for transport, tape and other materials)
4. **Printing**
5. **Distribution to warehouse**
6. **End of use of unsold stock**

It does not include emissions associated with last mile delivery and customer collection, retail, warehouses, or end of use of sold stock. These aspects are largely outside the control of the publishing supply chain and where data is both hard to collect and/or does not exist.

<u>Emission sources:</u> Given the limitations in collecting data, the model was built with the key principle to keep the calculation simple, aligned to previous studies conducted in the Portuguese book market. As such emissions sources used for the "printing" and "other inputs" section were derived from an initial internal Apigraf carbon footprint study. Additionally, emission factors were used from the Comprehensive Environmental Data Archive (CEDA) in relation to the publisher emission category. The Fisher Solve database, Agencia Portuguesa do Ambiente (APA), CEPI, European Paper Recycling Council (EPRC) were used for calculations in the manufacturing, printing and recycling emission categories.

4.4 Results

The annual carbon impact of the general Portuguese publishing market is estimated to be 9,874 tCO$_2$e [ii] in 2023 for books. If we were to consider Portugal's total emissions to be 56.5 MtCO$_2$e, this mean that the local publishing market accounts for approximately 0.017% of total carbon emissions for Portugal.

Given this overall carbon impact of the publishing market, at an individual book level this translates to approximately 555g CO$_2$e per book sold. To put this into broader context, the carbon impact of a book would be equivalent to driving 5.13 kilometres in a new passenger car. Alternatively, the book also has the same carbon impact as spending 15.4 hours streaming video content, something that the average Portuguese person will do over a period of 6 days.

Additionally, the printed book is also a source of storage of carbon while the book is kept or further recycled. This is due to the carbon that is absorbed by trees while they

are growing, something referred to as biogenic carbon. It is estimated that 391gCO_2e per book represents that [biogenic carbon](#).

In terms of where categories of where emissions are concentrated, most emissions are found in paper (41%) and printing [including trim and waste] (28%) followed by other inputs (20%) that include areas such as inks, varnishes, glues and binding materials. This category breakdowns broadly align with [previous studies](#) assessing the carbon footprint of print books .

Share of emissions

Publisher	6%
Paper	41%
Other inputs	20%
Printing (incl scrap/trim)	28%
Distribution to warehouse	1.6%
End of use of unsold stock	3%

Key assumptions:

The lack of accurate carbon data from across the book supply chain meant to provide an initial estimate, assumptions had to be made. We would recommend that in subsequent calculations, these assumptions would be replaced by actual data from the Portuguese book sector to generate specific industry averages and emissions factors. The assumptions of this model were:

1. Volume:
   - The average weight per book was assumed to be 300g and 200grams for adult and children respectively. Additionally, 40g was added to account for hardback titles.
2. Publisher:
   - Scope 1 and Scope2 publisher emissions used CEDA emission factors and total Portuguese book revenue of €187M
3. Printing and other inputs:
   - Emission factors were taken from the Apigraf study except for the energy use which was applied to the average [grid carbon intensity for Portugal](#) (official 2022 data stating 0.157kg CO_2e per kWh[iii])
   - Assumed trim and scrap to be 10%
4. Distribution:
   - Assumed the distance was 150km and a book would have an average 5 journeys to and from the printer warehouse to retailer warehouse via truck
5. End of use of unsold books

o   Used CEPI average for Portugal on recycled rates (79%) with returns
       assumed to be 35%

5. Drivers of Emissions

Identifying potential drivers of emissions and emission reductions

The overall estimation of the Portuguese general publishing market carbon provides a useful indicator and initial baseline in which to understand the sector's climate impact. It also provides insights into areas across the book supply chain where acceleration of progress and joint action can help prioritize new initiatives and lead to further emission reductions.

The Portuguese book supply chain partners being paper manufacturers, printers, publishers, transport companies and booksellers all recognize the critical importance of climate action. Yet supply chain partners are at different stages of their net zero journey. This section, based on written interviews, outlines the actions already in progress and the various interdependences of each supply chain partner.

In broad terms, the maturity of the supply chain partners was assessed in four areas:

1. **Net zero targets and commitments**
2. **Current reporting on carbon emissions**
3. **Actions taken to date**
4. **Ability to capture granular product level data (i.e. carbon labelling)**

5.1 Publishing

In terms of overall impact, publishing represented around 6% of total emissions for the sector. Arguably the biggest impact from publishers is the indirect impact of decisions made on product design, printing and distribution that ultimately influence other parts of the supply chain emissions and ultimately the lifecycle impact of an individual book.

Context: The Portuguese general publishing market is comprised of four large publishers, representing around 62% of the total market and where two have head offices or parent companies outside of Portugal. The rest of the market is made up and around 250-300 small- medium sized publishing houses, publishing on average around 10-20 books per year.

Net zero targets and commitments: Publishing recognizes the importance of environmental responsibility and increasingly climate action. From the larger Portuguese publishers, they have stated net zero goals and commitments. For example, LeYa have a goal to be carbon neutral in Scope 1 and Scope 2 by 2030. Penguin Random House will reduce emissions by 50% for all emission scopes by 2030. In the case of the Porto Editora Group, they have joined the Porto Climate Act, a collective action from the

Municipality of Porto to be carbon neutral by 2030 as part of the European Commission's [100 climate neutral and smart cities](#).

Current reporting on carbon emissions: In terms of reporting specifically for emissions from Portuguese related publishing activities (i.e. related to Scope 1 and Scope 2) the data was unavailable. In some cases, carbon data is recorded, but aggregated at a parent company level or head office. Sometimes this data is shared internally to inform cross-company working groups, but not yet shared externally. In other cases, some statistics, such as a reduction in energy use, are reported in public statements about climate commitments, but these remain ad hoc and difficult to aggregate. As such any granular level product level carbon reporting was not yet possible.

For scope 3 emissions, publishers reported difficulties in collecting data from suppliers.

Actions to date:

- Focus to date has been on understanding and reducing operational emissions. This includes taking actions to address emissions in office spaces, car fleets and simple actions such as eliminating paper baskets at workstations to reduce paper consumption in the office.
- Parts of Scope 3 were also being addressed for example reducing business air travel and embracing flexible remote working and avoiding emission associated with staff commuting.

Potential Areas of emission savings:

Direct Emission reduction:

- Future working culture: Given the current focus of publishers on reducing their direct emissions, particularly in relation to office space, better understanding and anticipating the environmental impact of future working culture be an area to explore. Scope 1, Scope 2 and parts of Scope 3 emissions savings in areas of office space, cooling and staff commuting could be accelerated as work culture evolves post COVID lockdowns.

Indirect potential impact:

- Product design: Publishers do have an indirect impact on more areas of the total emissions from the book sector. Decisions in product design such as size, format, and materials effect total emissions. Whilst these decisions may not be visible at an organization level as part of scope 1 and 2 emissions, providing granular product information could help bring sustainability into the decision-making process around design and production.

5.2 Paper

As aligned with several other studies assessing the carbon footprint of books, paper generally accounts for around 50% of emissions. In this study, we estimated for Portugal paper contributed around 41% of the sector's total emissions reflecting the efficiency of the national paper producer.

Context: Paper and pulp production is heat-and resource intensive, mainly due to the wood components. Globally the biggest producers of paper are the US and China, and within the EU context Portugal is the 3rd largest European pulp producer and the first in uncoated woodfree printing and writing paper (6th worldwide). The Confederation of European Paper Industries (CEPI) were the first European manufacturing industry sector to develop its own roadmap to support the European Commission's climate policies.

Net zero targets and commitments: Pulp and paper manufactures in EU are regulated to set net zero targets. For example, The Navigator Company has set an internal decarbonisation roadmap to achieve 86% reduction in emissions by 2035 covered by the EU-ETS regulation for their sites in Portugal against a 2018 baseline. In 2023, a 41% reduction has already been achieved.

Also, The Navigator Company has set SBTi net zero emission reduction targets for direct emissions (Scope 1 and Scope 2) aligned to a 1.5-degree pathway as recommended by the United Nations and Paris Agreement. The Navigator Company commits to reduce absolute scope 1 and 2 GHG emissions 63% by 2035 from a 2020 baseline. The Navigator Company also commits to reduce absolute scope 3 GHG emissions 37.5% within the same time frame.

Current reporting on carbon emissions: Using The Navigator Company as the example, corporate carbon numbers for all three scopes are disclosed in the annual report as well as through carbon disclosure databases such as CDP. Additionally, CEPI releases annual aggregated data, such as energy consumption and CO_2 emissions, through a dedicated sustainability platform. Consultants like Fisher-Solve also provide CO2 emissions for different manufacturers by using the same methodology.

The disclosed scope 3 figures (covering indirect emissions) today rely on emission factors from industry databases and are not currently able to be based on carbon data from the supply chain. This is true for most sectors and countries.

Action to date:

- The pulp and paper sector have been working on a steady trajectory to reduce carbon emissions. CEPI estimates that the sector's EU-ETS emissions have decreased by 21.4% between 2020 and 2023. During this same period, The Navigator Company achieved a 35.4% reduction in the same emission categories.

- For paper manufacturers such as The Navigator Company, the focus has been on achieving decarbonization though resource efficiencies that includes incorporating more use of renewable energy into virgin pulp and paper production and improving the efficiencies of the type of machines used.
- Utilizing and in some cases producing their own renewable energy is also a key area of focus that has resulted in emission reductions.
- There is also awareness of broader environmental impacts with an additional focus on water consumption reductions.

Potential Areas of emission savings:

- <u>Innovation:</u> Both in terms of being able to include more renewable energy into the process and the efficient type of machines will help further decarbonize the processes around paper manufacturing

5.3 Printing:

In the carbon estimation, printing is the second biggest emission category that effects overall market carbon emissions estimates. Direct energy use from printer's accounts for around 28% and the carbon impact of other materials accounts for 20% of emissions.

<u>Context:</u> In the broader EU context, while the print market is becoming more international and there are large companies operating across borders, the sector mainly consists of small or micro enterprises. As such it is expected that resources both in terms of time, technology and reporting for carbon emissions will be constrained. The Portuguese printing association [Apigraf](#), confirms most printing organizations in Portugal are small organizations with resource constraints.

<u>Net zero targets and commitments</u>: Currently, given the small size of most printing organizations in Portugal, most will not have structured net zero goals. However, sustainability awareness was reported to be increasing.

<u>Current reporting on carbon emissions:</u> The European association for the graphic industry, [Intergraf](#) has defined the best practice for calculating CO2 emissions from printing activities. Additionally, there is an established industry calculation tool, ClimateCalc, to help small organizations calculate and report on carbon emissions. Currently there is no Portuguese data being entered into the tool, nor being reported formally through annual reports.

As direct emissions are not generally calculated across Portuguese printers, obtaining product level emissions are not possible.

<u>Action to date:</u>

- Apigraf have conducted a study to calculate the carbon footprint of a book and generated standard emission factors for printing and for other inputs, aligned with Integraf recommendations for ink, cardboard for transport, tape and other materials.

Potential Areas of emission savings:

Direct emissions:

- Energy optimization and use of renewables: Printing is energy intensive and better use of machines in terms of optimization combined with the continual adopting of renewable energy will help drive emission reductions.

Indirect impact:

- Optimization in the use of resources (e.g. paper): Printers are following the needs of their customers. For example, some publishers will have different size formats for each imprint or type of content that can affect trim and waste. Potentially wasting more paper than needed. Enabling a dialogue around formats, paper weights and typesetting that help reduce the total number of pages, whilst preserving readability is important.
- Increasing carbon reporting capabilities: To help drive these conversations with publishers, being able to report on carbon data and ideally on individual print runs, will help both supply chain partners reduce their emissions.

5.4 Distribution

Once the book has been produced, it needs to leave the printers and be delivered to the warehouse creating an estimate 2% of the sector's overall emissions. Additionally, the book may make up to 5 trips between the warehouse and retail outlets over the course of its retail life.

Context: The book market is diverse and complex when looking at transportation and return rates between retail outlets and warehouses. APEL reports that the majority of books (80%) are sold through bookstores, with around 20% from supermarkets. Additionally, there are a numerous other outlet that sell a smaller share of books. For example, online shops such as Amazon.es and Worton sell books online, as do individual publishers who sell direct to consumers. CTT represents the primary distributor in Portugal, moving the books full circle from the printer to the warehouse, and then to the retail outlets. Currently CTT has approx. 80% of the market. In 2023, CTT estimated that books were the third biggest category of sent products after fashion and electronics. Additionally, it is estimated that books have a total return rate of around 35%.

Net zero targets and commitments: CTT have set a target to reduce scope 1 and scope 2 by 55% by 2030 with the aim to offset the remaining direct emissions.

<u>Actions to date:</u>

- Current focus is to ensure the last mile is made up of 50% green vehicles by 2025 and 100% by 2030, having grown their EV fleet by approx. 29% from 2022.
- They are also engaging their subcontracted fleet to also convert toward EV
- For office space, they are using 100% renewable energy.

Potential Areas of emission savings:

<u>Direct emissions:</u>

- <u>Further innovation and infrastructure:</u> the current transport infrastructure is very heavily reliant on EVs and EV infrastructure. CTT has shown enormous progress towards converting their car fleet, however, considering having other low carbon options of transport (for example rail or hydrogen) may enhance supply chain resilience.

<u>Indirect impact:</u>

- <u>Purchasing behaviours:</u> How readers want to purchase their books may also influence supply chain dynamics and net zero goals. Whilst most deliveries will be to bookshops or supermarkets, thus enabling shipping optimization, online sales are estimated to be around 15% of overall sales, and 5% of sales going direct from business to consumer.
- <u>Type of content:</u> Each category of book will have a slightly different rate of return. For example, on average a children's book might be moved in and out of the market 7 times, whilst a fiction book on average has a rate of return of 5. Additionally, if it is a new release, chances are that the book will have a low return rate, then a book from the pure back list. Publisher's strategies, in additional to selling conditions such as the fixed book price, and business models will affect the emissions associated with distribution.
- <u>Digitalization:</u> recording, tracking and forecasting book buying data can help optimize stock processes and management and as such impact distribution emissions. Better data can also help implement potential solutions; one such example would be utilization of print on demand especially for backlist titles.

5.5 End use of unsold stock

The final emission category covers the stock that was printed but not sold. In this case, the emissions associated with the waste is estimated to be 3% of total overall emissions. How this stock is disposed of falls under the control of the publisher.

<u>Context:</u> Additional stock that is printed and not sold would be stored in a warehouse. The average obsolesce for an unsold book could range between 7-10 years. As such, publishers have a choice in how they dispose of additional stock, by either pulping the books or sending them to be recycled.

There are restrictions in place, for example contracts that contain clauses around how additional stock needs to be disposed of that can affect decisions around what to do with additional books.

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[i] The assumption of 555g per book is based on the Portuguese Environmental Agency (PEA) data for CO2 emissions per kWh in 2022. Due to increased renewable energy use in Portugal over 2023-2024, we would expect updated PEA CO2 emission data when released to be lower and as such the average emissions per book is expected to decrease using the same methodology.

[ii] For the purposes of this study, we refer to carbon dioxide equivalent (CO_2e) to signify the amount of CO_2 which would have the equivalent global warming impact.

[iii] See endnote 1

Book 2.0 Carbon whitepaper: Summary of Key Messages

Key Numbers:

- o Estimated the Portuguese general publishing market produced 9, 874 tonnes of carbon dioxide equivalent in 2023, representing approx. 0.017% of Portugal's overall emissions
- o On average, each Portuguese book sold in the market in 2023 has an impact of 555g of Co2e, which is the equivalent of driving 5.3km in a new passenger car or watching streaming video for 15.6 hours
- o Most emissions were found to be concentrated in the book production processes of paper production (41%) and printing (28%) with other inputs such as inks, varnishes, glues and bindings contributing 20%.
- o Key areas identified for the sector to address were book design, waste and returns

Key Messages Summary:

- **Publishing recognizes the important and ethical responsibility to act on climate change:** Across the book sector, each supply chain partner already recognizes the ethical responsibility to address climate change and have already initiated actions to raise awareness and reduce carbon impacts. Book 2.0 has provided the platform that has resulted in initiating this first of its kind study as a starting point for ongoing dialogue and action.

- **Need for continual support of the cultural sector and reading:** The biggest impact the publishing sector can have is arguably to continue to support reading and literacy and providing platforms for diverse stories that will inform and inspire climate action within Portuguese society.

- **Established a baseline for action:** The study has achieved two key outcomes. The first is an initial approach to estimate the overall carbon emissions for the sector that provides a baseline and the ability to track progress overtime. Secondly, the study has helped to identify areas where collective action can be taken to start accelerating progress and drive down emissions across the supply chain.

- **Insights and recommendations set the foundation for climate action**: By understanding an initial baseline for the sector's carbon impact, it is envisaged that by upskilling, creating tools and resources carbon data will become more accurate and evolve over time. Additionally, the recommendations of the study provide practical concrete starting steps for the sector to work together to address climate change impacts.