REC

Reduce our Carbon Footprint!

SEPTEMBER 2024

A French collective initiative to measure and reduce the carbon footprint of recorded music

Centre national de la musique

snep Syndicat National de l'Edition Phonographique

upfi

SMA Syndicat des Musiques Actuelles

ekodev

carbone4

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PART 01

Forward

Context

The REC project was born out of the desire of French phonogram producers and distributors to take action in the face of the climate emergency and tackle the issues linked to their activities' carbon footprint.

This new and necessary transition is destabilising an industry that is in the process of reinventing its business model in the wake of a number of disruptions to the physical market: firstly, the CD crisis, from which the industry is gradually recovering; and secondly, the consequences of the Covid-19 pandemic, which led to a shortage of raw materials affecting vinyl production and to a halt in sales in retail outlets during periods of confinement. At the same time, while more resilient streaming is now driving growth in the recorded music market, it is still a fragile young model that has not yet reached maturity in comparison to other major markets. For all these reasons, industry professionals of all sizes have launched the REC project. The ambition is clear: to anticipate a chosen decarbonisation of activities here and now, in order to avoid suffering more abrupt consequences in the future, but also to participate in the general effort that must currently be undertaken and deployed by all sectors and ecosystems. Cultural sectors also have an impact that far exceeds their weight in the overall carbon footprint: that of their role in shaping new imaginations and new practices. And music, the French's number one cultural practice, has a key role to play. For the past year, the CNM and its partners, the trade unions representing professionals in French phonogram production and distribution – the Syndicat national de l'édition phonographique (SNEP), the Union des producteurs phonographiques français indépendants (UPFI) and the Syndicat des musiques actuelles (SMA) - have been working directly with all the players in the recorded music industry's value chain on the REC project (Réduisons notre Empreinte Carbone ! / "Reduce our Carbon Footprint!"), which aims to measure and reduce the industry's carbon footprint.

This initiative, which benefits from the support of the ekodev and Carbone 4 agencies, is supported by the "Alternatives vertes" call for projects, launched in 2021 by the ministère de la Culture and the Secrétariat général pour l'investissement, and steered by the Banque des Territoires as part of France 2030.

The Project Partners

— About the Centre national de la musique (CNM)

The Centre national de la musique is a public industrial and commercial establishment (EPIC). The CNM is the first public establishment to serve music and variety shows in their entirety. Music in all its aesthetic forms and in the great diversity of its professions, as well as variety shows, historically defined as including visual shows, cabarets, musicals and comedy shows, are thus in a “common home”.

— About the Syndicat national de l’édition phonographique (SNEP)

Founded in 1922, the SNEP, Syndicat national de l’édition phonographique, is the main employers’ organisation for producers, publishers and distributors of recorded music, and partners of music artists. It represents the interests of French record labels of all sizes and from all musical backgrounds in dealings with public authorities, other professional organisations and the media. SNEP is a member of the International Federation of the Phonographic Industry (IFPI), the Mouvement des entreprises de France (MEDEF) and the Fédération des entreprises du spectacle vivant, de la musique, de l’audiovisuel et du cinéma (FESAC).

— About the Union des producteurs phonographiques français indépendants (UPFI)

UPFI is the leading union of independent phonogram producers and distributors in France. Founded in 1993, it brings together around a hundred labels, VSEs, SMEs and ETIs, and represents their views to the music industry, public authorities and the media. As a promoter of musical diversity, UPFI is committed to raising the profile of French creation and encouraging its funding.

— About the Syndicat des musiques actuelles (SMA)

Created in 2005, the SMA is the trade union for the contemporary music industry, currently bringing together more than six hundred companies. It represents record producers (labels), festivals, concert halls (including state-approved SMAC venues), show producers, training centres and radio stations, as well as federations and networks. The common denominator of these independent companies, most of which are associations, is that they work in the general interest and to promote diversity, in particular by supporting the expression of artists and access to culture for the general public. They claim a limited profitability.

— About ekodev and Carbone 4

Founded in 2009, ekodev brings together a bold team and an ecosystem of experts mobilised to (re)awaken organisations to stimulate commitment and bring about change. Its members help organisations to develop and implement ambitious sustainable development strategies.

The Carbone 4 group supports the world’s transformation towards decarbonisation and adaptation to climate change. As a link between scientific excellence and the business world, Carbone 4 helps its employees to understand the world that is taking shape.

— About France 2030

- **A twofold ambition:** to bring about lasting change in key sectors of our economy (health, energy, automotive, aeronautics and space) through technological innovation and to position France not just as a player, but as a leader in the world of tomorrow. From fundamental research to the emergence of an idea to the production of a new product or service, France 2030 supports the entire life cycle of innovation right through to its industrialisation.
- **An unprecedented scale**: €54 billion will be invested to help our businesses, universities and research bodies make the transition in these strategic sectors a success. The aim is to enable them to respond competitively to the ecological and attractiveness challenges of the world to come, and to develop the future leaders of our sectors of excellence. France 2030 is defined by two cross-cutting objectives: to devote 50% of its spending to decarbonising the economy, and 50% to emerging players who are driving innovation, without any expenses that are detrimental to the environment (as defined by the Do No Significant Harm principle).
- **A collective implementation**: designed and deployed in consultation with economic, academic, local and European players to determine strategic orientations and flagship actions. Project leaders are invited to submit their applications via open, demanding and selective procedures in order to benefit from government support.
- **Steered by the Secrétariat Général pour l’Investissement** on behalf of the Premier ministre and implemented by the Agence de la Transition Ecologique (Ademe), the Agence Nationale de la Recherche (ANR), Bpifrance and the Banque des Territoires.

— About the Banque des Territoires

Created in 2018, the Banque des Territoires is one of the Caisse des Dépôts five business lines. In a single structure, it brings together in-house expertise aimed at local and regional authorities. As a single point of entry for customers, it offers tailor-made advisory and financing solutions for loans and investments to meet the needs of local authorities, social housing bodies, local public companies and legal professions. It is aimed at all regions, from rural areas to metropolitan areas, with the ambition of fighting social inequalities and territorial divides. The Banque des Territoires is deployed in France’s sixteen regional divisions and thirty-seven local offices of Caisse des Dépôts in order to be better identified and closer to its customers.

Acknowledgements

The project partners wish to acknowledge and thank the organisations and people who have come together for over a year in order that this initiative come into existence.

Sample group of organisations who have supplied data for the REC project

Twenty labels, producers and distributors of all sizes, three recording studios, one pressing plant, one streaming platform: Accords Croisés, Another Who, Baco distribution, Baco records, Believe, Born Bad Records, Chinese Man Records, Deezer, Eclosion13, Estampe, Grand Bonheur, Greenpiste records, Hey Music, Idol, Jarring Effects, Microqlima, MPO, Murailles Music, Sony Music France, Tricatel, Universal Music France, VeryCords, Wagram, Warner Music France, Z production, (Spotify: public data).

Organisations and artists participating in the roadmap’s focus groups

Twelve distributing labels of all sizes, three artists, two streaming platforms, two expert organisations in environmentally friendly audiovisual practices, two departments from the ministère de la Culture, an independent public authority, a business specialised in merchandising, one pressing plant, one media, one recording studio: 75e session, Accords Croisés, Arcom, Baco distribution, Barcella, Because, Believe, Best of Both Worlds, Born Bad Records, Chinese Man Records, Deezer, DGMIC ministère de la Culture, Ecoprod, Frànçois and the Atlas Mountains, Hey Music, Idol, Jarring Effect, MPO, Pioche !, Point de Mir, Qobuz, Silly Boy Blue, SNUM ministère de la Culture, Sony Music France, Universal Music France, Warner Music France.

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As well as everyone who will rally with us in the future for this project to grow and become a reality!

Summary

In recent years, awareness of carbon impact and the need to integrate this issue into their strategies has accelerated among professionals in the recorded music industry. The Centre national de la musique and the trade unions representing phonogram producers and distributors, the Syndicat national de l’édition phonographique, the Union des producteurs phonographiques français indépendants and the Syndicat des musiques actuelles, have decided to collectively lead the REC project (“Reduce our carbon footprint!”) as part of the “Alternatives vertes” call for projects, launched in 2021 by the ministère de la Culture and the Secrétariat général pour l'investissement, and steered by the Banque des Territoires as part of France 2030.

As winner of the first version of this call for projects, the REC project aims to measure the recorded music industry’s carbon footprint in order to contribute to reducing it. The project sand out to observe the greenhouse gas emissions of French productions listened to in France and abroad, and of international productions distributed by French players, taking music’s complete life cycle, from production to listening, as its perimeter.

Data was collected from twenty-five volunteer organisations (three large companies, eleven medium to large labels/distributors, six small labels, a streaming platform, a CD and vinyl record manufacturer and three recording studios), and extrapolated to give an **overall estimate of emissions from the recorded music industry of around 2,780 kilo tonnes CO_2e** for 2022, representing more than one million return journeys by plane between Paris and New York.

In addition to this diagnosis, **forward-looking trends** predict a **tripling of emissions between 2022 and 2030**, mainly due to market growth and the increase in audio and video quality.

In order to decarbonise its activities, better understand future regulations and make its contribution to fighting the climate crisis, **the French recorded music production and distribution industry has decided to formalise a low-carbon strategy based on the underlying data and issues highlighted in the first diagnostic phase.** Thirty-five professionals from all walks of life were mobilised to put forward ideas and recommendations for the roadmap, which was then co-drafted by the trade unions and the CNM.

Manufacturing and end-of-life terminals needed to listen to music played a major role in the recorded music industry’s overall footprint in 2022, **accounting for 51% of emissions**. The levers for reducing this item are shared with other stakeholders who will have to be questioned, whether they are within the music industry or other dependent sectors and industries. With this in mind, the roadmap sands out recommendations to be addressed to the partners of music industry professionals, in a spirit of collective, multi-industry and global responsibility.

Accounting for 22% of emissions, the digital distribution of recorded music should also be examined, especially as projections tend to show that the climate impact of this activity is likely to increase sharply. To this end, it is planned to refine the diagnostics to enable the identification of sustainable reduction actions. This could be done at two levels: micro, with the development of self-diagnosis tools; macro, by specifying certain aspects of the REC project, in particular by creating common evaluation guidelines.

Because 23% of the industry’s emissions concern uses, active public awareness-raising will have to be undertaken. This can only be done by mobilising all the stakeholders in the music ecosystem, and more specifically in the recorded music industry, with artists at the forefront, and with the support of the media, physical distributors and online music distribution platforms (both primary and secondary).

"The REC project is a preliminary but essential step towards raising awareness about the issues involved and decarbonising the recorded industry"

Lastly, the industry’s professionals will not be able to get involved without aligning their skills and making a commitment to act on their emissive positions (this will involve raising awareness and adapting training courses). **A major part of the roadmap is therefore devoted to the training of artists and their professional entourage, from their initial training and throughout their careers.**

The REC project is a preliminary but essential step towards raising awareness about the issues involved and decarbonising the recorded music industry. Its collective nature has made it possible to lay the foundations for concrete and viable actions to curb the industry’s emissions curve. But the range of levers to be activated is much broader than those in the hands of recorded music producers and distributors alone.

For this reason, the project partners propose that the steering committee involved in this project be made permanent and extended, in order to ensure that the present roadmap is properly followed up and consider extensions to it, whilst ensuring that the issues of all the stakeholders are properly taken into account. SNEP, UPFI and SMA are committed to this, as is the CNM, which has coordinated this collective initiative. We are all convinced that it is urgent to take action both on decarbonisation – which is only one facet – and, more broadly, on the environmental, social and societal sustainability of our activities.

PART 02

Detailed report, REC: “Reduce our Carbon Footprint!”

Introduction

— Context and objectives

In recent years, the awareness of companies in the recorded music industry and the organisations that represent them, SNEP, UPFI and SMA, of the urgent need to integrate the challenges of ecological transition into their economic strategy has accelerated.

The Centre national de la musique’s working groups on ecological transition and the commitment shown by a number of leading figures in the industry (artists, label managers, record company executives) led the CNM and the unions representing the industry to sand up a partnership and launch this project, supported as part of the call for “Alternatives vertes” projects run by the Banque des territoires (Caisse des Dépôts group) in conjunction with the ministère de la Culture, ministère de la Transition écologique and the Secrétariat général pour l'investissement.

REC, which stands for “Réduisons notre empreinte carbone!” (Reduce our carbon footprint!), aims to assess the carbon footprint of the production and distribution of recorded music in France and to define a low-carbon strategy for the industry.

The project has a number of objectives:

- → Measure: to draw up a baseline report to monitor changes in the industry’s emissions over time;
- → Analyse: to understand the issues inherent in the industry;
- → Raise awareness and provide training: to give companies in the industry an overview of their main emission sources;
- → Recommend certain actions to companies in the industry so that they can incorporate them into their development strategy;
- → Planning: to serve as a basis for building an industry strategy that meets the challenges, and if possible helps to achieve the objectives of the Paris Climate Agreement.

— Governance

The REC project was implemented by the Centre national de la musique with methodological support from ekodev and Carbone 4 and the support of two steering committees:

- A restricted steering committee, the operational core of the project, made up of the winning partners of France 2030’s “Alternatives vertes” 1 call for projects (SNEP, UPFI, SMA and CNM), acting in particular as a link with professionals;
- An extended steering committee, a validation and guidance body involving other stakeholders (Sony Music France, Universal Music France, Warner Music France, Believe, Idol, Accords Croisés, Baco Music and Deezer).

— Perimeter of the Carbon Diagnosis

The functional unit observed is as follows: “Direct or indirect impact on climate change of recorded music from the catalogue distributed by French players”.

This therefore includes the impacts of music from the catalogue distributed by French players internationally, but excludes the impacts of music from the catalogues distributed by international players in France.

The time perimeter was defined following the 2022 calendar year.

Illustration 1: Observed functional unit

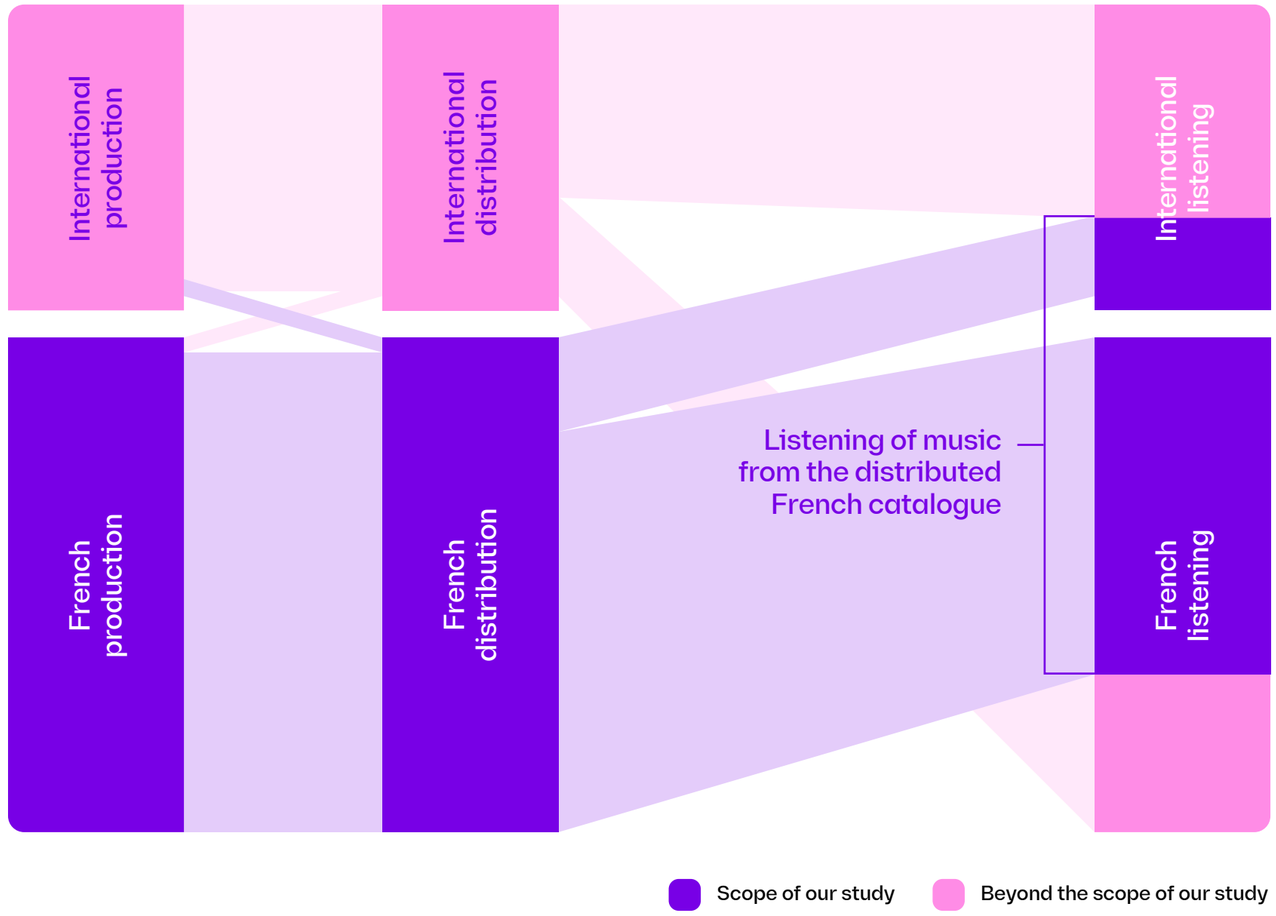
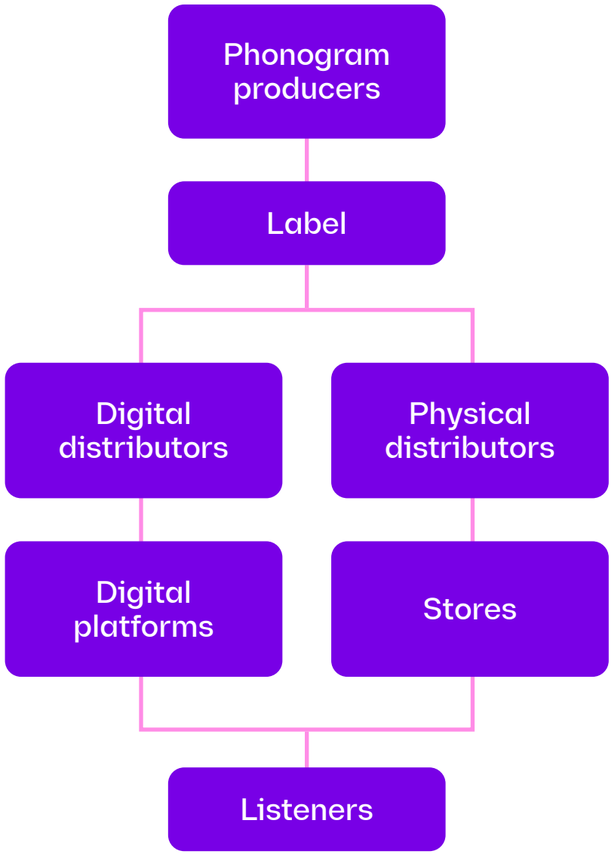


Illustration 2: Mapping the organisations and organisational scope of recorded music



For the organisational scope, all entities outside the recorded music industry have been excluded.

The following are therefore included
- Recording studios;
- Phonogram producers;
- Phonogram publishers;
- Distributors (physical or digital);
- Physical platforms (shops, e-commerce, etc.) or digital platforms (audio or video streaming exclusive to music or “User Generated Content” [UGC]), radio, television, etc.
- Listeners for their listening.

The following are excluded, since they are not strictly speaking part of the scope of recorded music:
- Rights management activities
- Activities prior to recording (composition, creation);
- Live performance activities;
- Certain “synchronised” listening activities where the recorded music is part of a wider project, such as:
  - Music integrated into cinematographic and audiovisual works;
  - Music integrated into advertising films;
  - Music incorporated into video games.

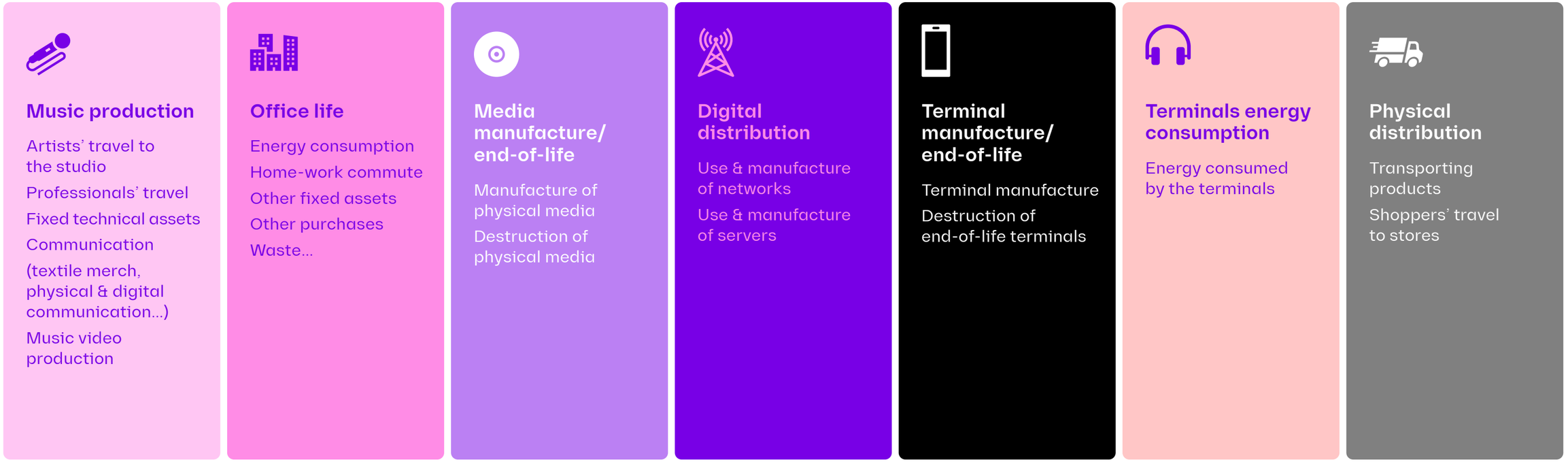


Illustration 3: The seven categories

The various elements of impact have been divided into seven categories.

- **Music production**, which includes travel by performers to the studio, the immobilisation of technical equipment needed for recording, travel by studio staff and all emissions linked to efforts to market the music: merchandising, production of music videos, physical and digital communication.
- **Office life**, which includes all emissions linked to the operation of recording, production, publishing and phonographic distribution structures (energy consumption at sites, fixed assets, operating purchases, waste, home-work travel, other business travel).
- **The manufacture and end-of-life** of physical media (CDs, records).
- **Physical distribution**, including the transport of physical media to sales sites or to the customer in the case of e-commerce, as well as the travel of listeners to buy media in shops.
- **Digital distribution**, which includes all the programmes for the manufacture and use of the networks and data centres needed to distribute music for radio, television, audio streaming platforms (such as Spotify or Deezer), ‘long’ video streaming platforms (such as YouTube or Dailymotion) or ‘short’ video streaming platforms (such as TikTok or Instagram): mobile networks, fixed-line networks, IPTV networks, FM, etc.
- **The manufacture and end-of-life of the devices** needed to listen to music – whether they are used to play tracks (smartphones, computers, car radios) or to produce sound (headphones, earphones, etc.), taken into account to the extent that they are used to listen to or view music.
- **The energy consumption of the terminals** needed to listen to music (idem).

— Methodology

In order to estimate the impacts of each of these categories, we relied on ‘micro’ data from questionnaires sent to a representative sample of the industry, as well as ‘macro’ data from pre-existing studies, hypotheses or scenarios constructed for the study and validated by the industry. We have therefore used a mixed accounting approach between a bottom-up (or micro) approach and a top-down (or macro) approach.

Generally speaking, activity data (number of streams listened to, number of clips produced, total digital communication budget for the industry, etc.) were estimated from the questionnaires and extrapolated to the industry as a whole using macro data to estimate industry sales.

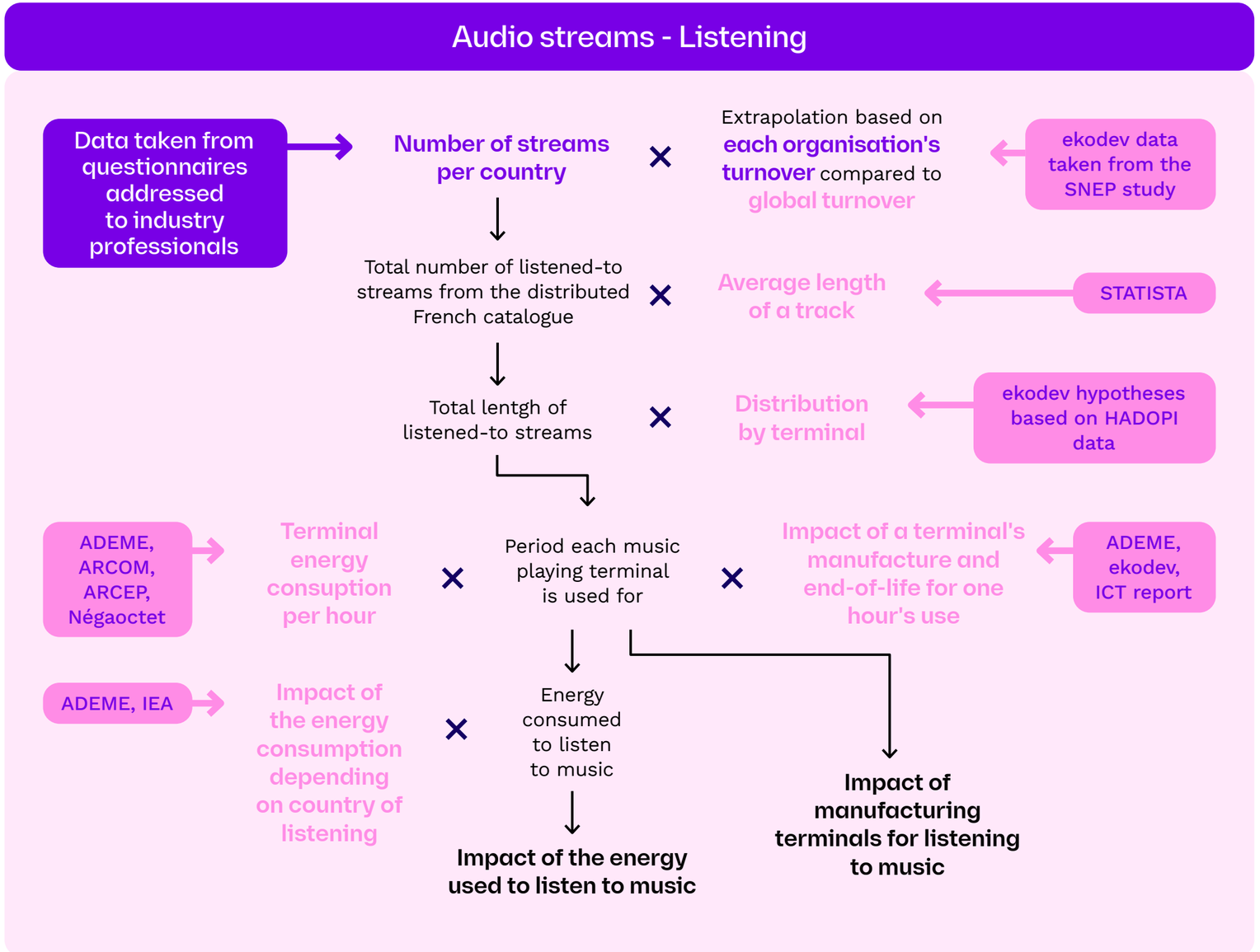


Illustration 4: Example of an extract from the method for calculating emissions for listening to audio streams

The scenarios and emissions factors used to transform this activity data into emissions (impact of the energy consumption required by the terminals to listen to a stream, carbon impact of the production of a music clip, indirect impact of a thousand euros invested in digital communication, etc.) were constructed by cross-referencing internal and external reports from the industry.

The detailed method, item by item, and the elements used for the calculations (scenarios and emission factors) are presented in the appendix to this study.

Special case of radio and television listening:

- The industry’s structures (labels, distributors, publishers) do not have listening data for their catalogue distributed on radio and television. It is assumed that international listening via these media is very low, but there is no reliable way of estimating these figures.
- International radio and TV listening has therefore been excluded, due to a lack of data.
- Radio and TV listening in France has been estimated on the basis of Médiamétrie data and data from the CNM’s Observatoire de la diversité de la production et de la diffusion de la musique enregistrée, which estimates the volume of radio and TV listening in France to music produced by French players.

Key figures emerging from industry analyses and taken into account in the 2022 estimates[1]

28 million
physical units
distributed by French players (CDs and vinyl, all combined)[2]

6,78 billion
hours of music listening
on radio in France [3]

380 million
hours of music videos watched
on television in France[4]

163 billion
streams
on audio streaming platforms (Deezer, Spotify, etc.)[5]

46 billion
views
on ‘long’ video platforms (YouTube, Dailymotion, etc.)[6]

466 billion
views
on ‘short’ video platforms (TikTok, Reels, Shorts, etc.)[7]

261 billion
views
on video platforms that could not be categorised (a weighted average value was therefore taken into account)[8]

1. These figures are the result of an extrapolation realised thanks to data gathered through the questionnaires answered by the organisations included in the panel.
2. Result of extrapolation by sales of data collected from the panel of the number of media distributed by French players (SNEP Study – La production musicale française).
3. Data taken from the Médiamétrie 2022 report.
4. *Idem.*
5. Result of extrapolating the number of streams and catalogue views distributed by French players using sales data collected from the panel. (SNEP Study – La production musicale française).
6. *Idem.*
7. *Idem.*
8. *Idem.*

Recorded music: diagnosing the main emission sources

— Current state of emissions in the recorded music industry

Total emissions from the recorded music industry amount to around **2780 ktCO2e** in 2022.

We can thus see that the manufacturing of user terminals (telephones, computers, speakers, etc.) and the energy consumption of the terminals required to listen to music from the French distributed catalogue are by far the biggest sources of emissions in the industry, accounting for 74% of emissions.

The digital distribution of music in audio or video format accounts for 22% of emissions, the majority of which are caused by videos.

Producers’ production activities (music videos, communication, recording, etc.) account for only 2% of the industry’s emissions.

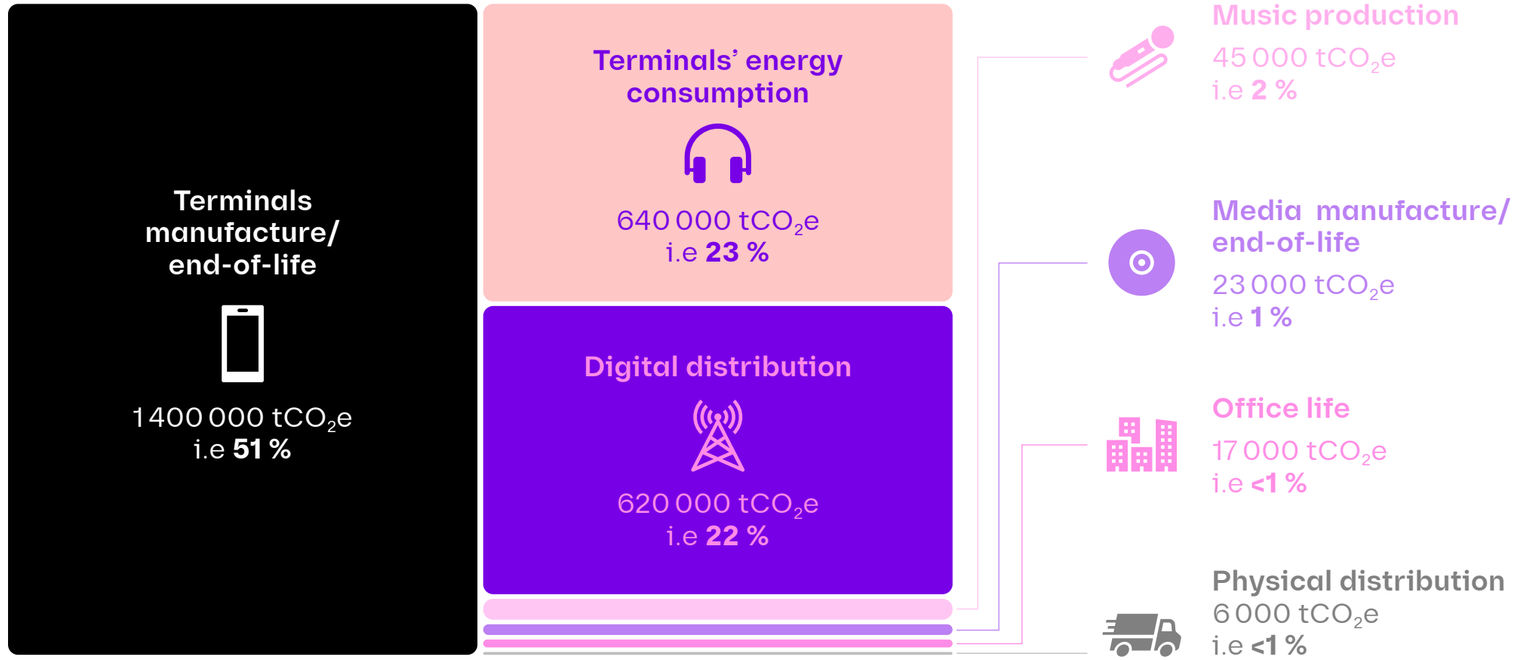


Illustration 5: Division of the recorded music industry’s carbon impacts

— Overview of the industry’s emissions by country of audience

An overview of the catalogue of music distributed by French players shows that international listening is not negligible, as shown in Chart 1 hereafter.

60% of listening time takes place in France, and generates 47% of broadcasts. Conversely, 30% of listening time takes place internationally, but generates 34% of broadcasts

The difference in emissions between France and the rest of the world can be explained by the diversity of the electricity mix in the listening countries. Electricity generated from fossil fuels will be more carbon-intensive than electricity generated from renewable or nuclear sources. The more the listening mode depends on high electricity consumption (particularly on networks), the greater the difference. This is particularly the case for digital listening on video and audio platforms. Emissions from digital distribution and the energy consumption of the terminals used to listen to music account for 45% of the industry’s emissions.

Yet the French electricity mix is particularly low-emission compared with most other countries (11 times lower than the global electricity mix[9]). As a result, listening to music in digital format in France is less emissive than in most other countries in the world.

Some emissions could not be characterised and are shared between France and other countries (mixed). Emissions linked to office life and production are not included in the breakdown.

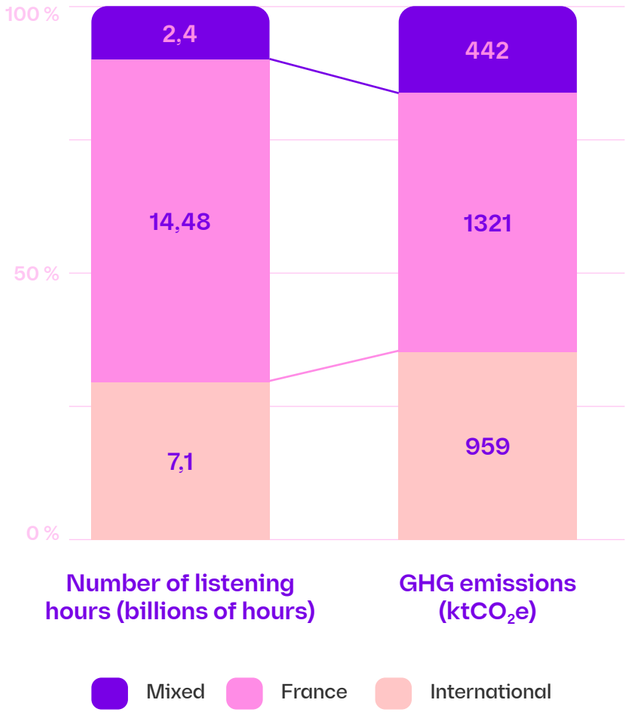


Chart 1: Distribution of the volume of listening and associated emissions depending on listening locality

— Overview of emissions by listening mode

The listening mode has a major influence on average emissions per listener per hour. This has an impact on the industry’s overall emissions, as shown in the graph below.

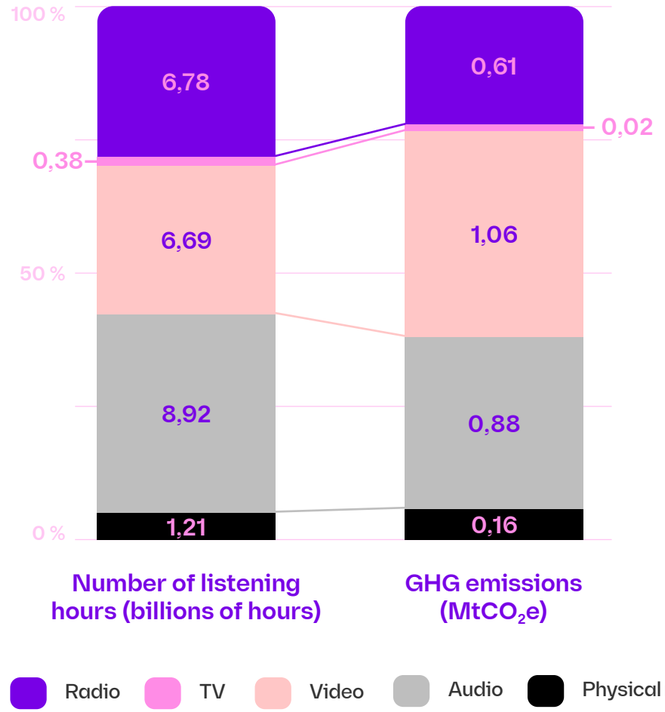


Chart 2: Distribution of listening volume and associated emissions by listening mode (in %)

9. Emission factors (EF) from the Base Empreinte

Most music is listened to in digital format (audio and video), accounting for 65% of listening volume. These two modes of listening account for 71% of greenhouse gas emissions. Video viewing is particularly emissive, as it requires the distribution of a large amount of data.

Radio is the second most emissive listening mode, because it is the second most used listening mode. Unlike other listening modes, where the manufacture of terminals is the main source of emissions, most radio emissions come from the energy consumed by the terminals. This is because radio is most often listened to in a vehicle, the operation of which depends on the fuel used.

Listening to music on physical media is also an intensive mode of listening in terms of emissions, as it requires the use of more specific terminals (CD player, vinyl turntable, etc.), but these emissions are lower, as the volume of listening is lower than in the other modes.

The graph above allows us to compare broadcasts by mode of listening for one hour of listening for an average listener, whatever their country of listening, whatever their means of listening.

This analysis is not restricted to a usage scenario with a given terminal, a given network and a given country.

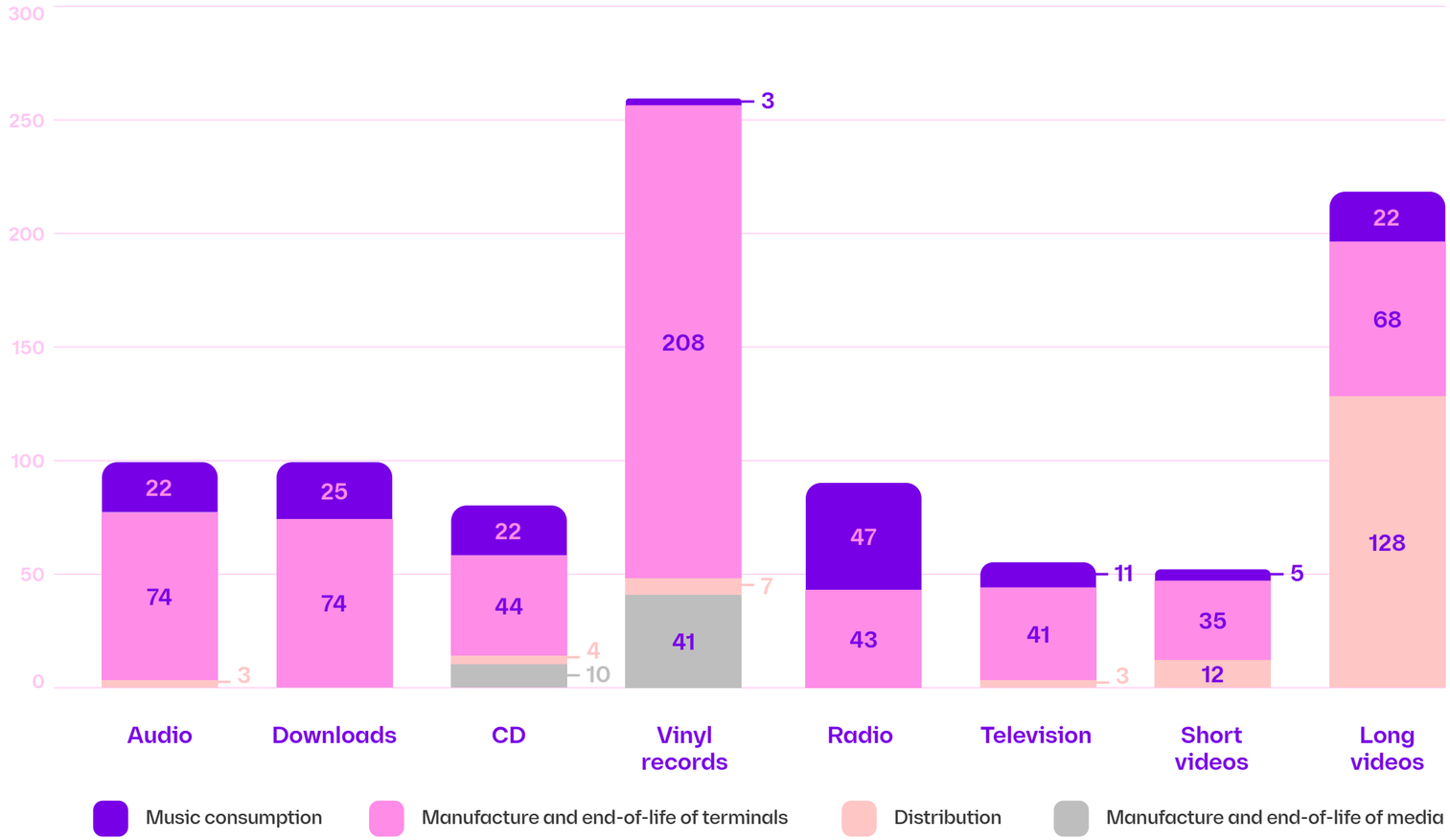


Chart 3: Distribution of emissions for one hour of listening per listening mode

So, behind the figures for the impact of audio, for one hour of listening, lie, among other things, scenarios for average use of terminals. This is why, since audio streams require more terminals (Tablets, computers, speakers, etc.) than the viewing of short videos (mostly only on smartphones), the emissions for audio streaming are higher, which may seem counter-intuitive.

However, we can see here that the most emissive listening mode on average is vinyl, because it is necessary to immobilise more terminals than for other listening modes (vinyl turntable, amplifier and speakers). It should be noted that in the absence of a specific lifecycle analysis for these terminals, the assumption of a five-year lifespan has been used by default. This lifespan would have to be twenty years for the impacts of vinyl listening to be comparable with those of other listening modes.

Listening to music on a video platform has around twice the impact of listening to it on an audio platform, mainly because of the clear difference in the amount of data to be distributed.

An hour of short video (TikTok, Shorts…) is less emissive than an hour of long video (YouTube, Dailymotion…), because the video quality is much lower. Also, watching short videos requires far fewer devices on average (almost exclusively smartphones).

— Conclusions

There is a very strong correlation between the recorded music industry and the digital sectors. Indeed, the main impacts are on music listening (23% for the energy consumption of terminals and 51% for the manufacture and end-of-life of terminals) and digital distribution (manufacture and end-of-life of networks and energy consumption of networks representing 22% of the total footprint).

By way of comparison, the breakdown of the digital industry’s carbon footprint[10] is as follows:

→ 20% for terminal energy consumption;
→ 45% for the manufacture of terminals;
→ 35% for networks and data centres.

The carbon profile of recorded music is therefore first and foremost the profile of an eminently digital activity.

As with the digital industry, major technological developments in favour of more sustained consumption of content are creating risk for the industry: technical obsolescence, higher quality content and therefore greater quantities of data exchanged…

"The carbon profile of recorded music is therefore first and foremost the profile of an eminently digital activity."

10. TSP – The Shift Project, Lean ICT, 2018: https://theshiftproject.org/wp-content/uploads/2020/10/Deployer-la-sobriande-numerique_Resume_ShiftProject.pdf

Focus by life cycle

— Music production: 2%

The emissions directly attributable to the actions of music producers represent almost 2% of the industry’s total emissions. While this may seem like a small item, it includes the reduction levers that are easiest for professionals to take action on.

The production and creation of music videos is the most emissive activity. This is mainly due to the immobilisation of heavy equipment (technical and artistic) and the use of filming locations that are often far from the production teams’ bases.

The essential use of digital tools for digital communication makes this item quite emissive. The quality, and therefore the data weight of the content broadcast is an important adjustment variable.

As far as music recording is concerned, the travel of artistic and technical teams to the studio is the most emissive item.

It should be noted that professional home production activities could not be included, as the boundary between the creative process (excluded from the scope) and recording as such is becoming finer. Furthermore, the volume of 100% home produced masters is difficult to quantify.

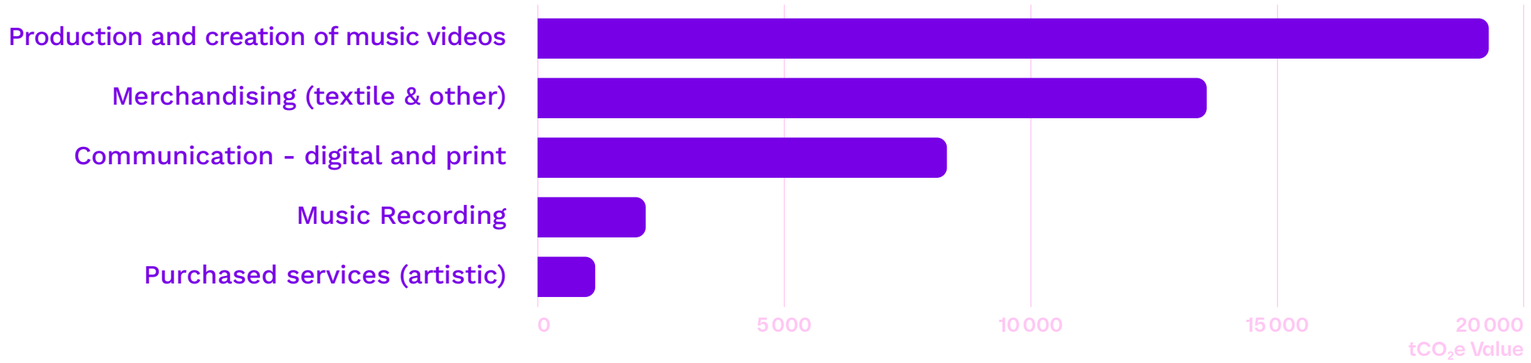


Chart 4: Summary of emissions linked to music production activities

— Office life: 1%

As the office activities of music producers are similar to those of other tertiary sectors, we find the classic emissions items and breakdowns. An average of around 4 tCO_2e is emitted per full-time equivalent position[11], given that an average tertiary company emits between 2 and 10 tCO_2e/FTE[12].

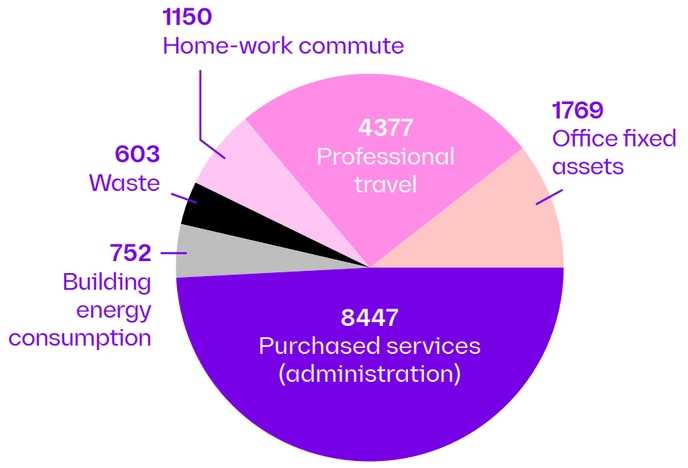


Chart 5: Distribution of emissions linked to office life

11. Revised Xerfi study
12. Ekodev observations

— Media manufacture and end-of-life: 1%

The manufacture and end-of-life of CDs and records account for less than 1% of the industry’s emissions. Even if the emissions linked to these media are mainly attributable to their use and to the terminals needed to listen to them, the raw materials required for their manufacture remain an important issue in terms of preserving resources and using water, which does not fall within our study’s perimeter. It should also be noted that the a manufacturing plant’s location has an influence on the emissions associated with the energy used to manufacture the media, due to the different energy mixes.

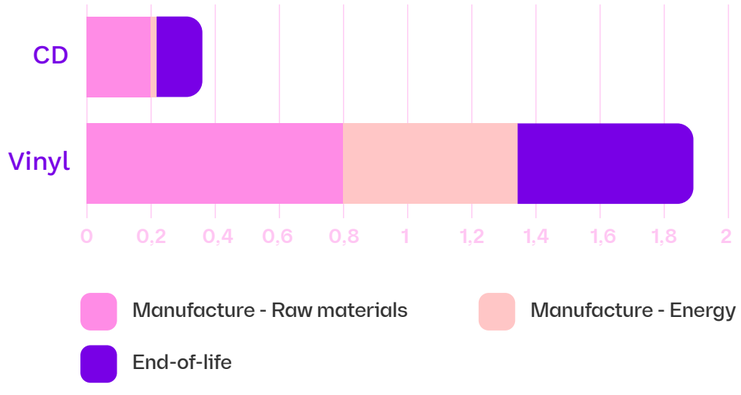


Chart 6: Comparison of emissions linked to CD and record manufacture and end-of-life

— Physical distribution: <1%

Emissions from physical distribution are obviously closely linked to the means of transport and the distance between the places where the media (CDs and records) are manufactured, stored and sold. Consumer trips to outlet points are also included in this category of emissions.

On a local level, two thirds of the media were sold in shops (large food or specialist outlands, or specific sales outlands), and only one third via e-commerce. Nevertheless, e-commerce accounts for more than half of the emissions from physical distribution. The number of intermediaries between the manufacturing plant and the end user is an important factor in the development of emissions, which partly explains the difference in emissions between the e-commerce network and that of physical sales outlands. This difference can also be explained by ordering habits: wholesale for points of sale, retail for e-commerce sales. In-store distribution is “efficient” in the sense that consumers make one trip to buy several products, with their journey divided up according to the number of products in a given basket.

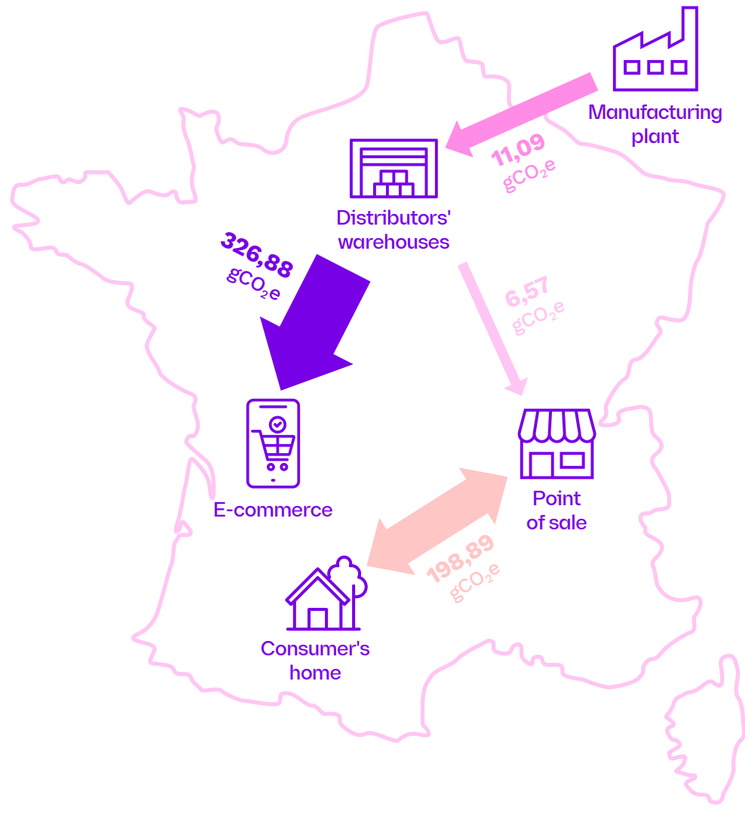


Illustration 6: Comparing emissions from e-commerce circuits and outlets

— Digital distribution: 22%

Digital distribution is a fairly high emitter, accounting for more than a fifth of the industry’s emissions.

The difference in impact between audio, short videos and long videos can be explained firstly by the very different volume of data: 72 MB/h on average on an audio platform, 250 MB/h on a short video platform and 3 GB/h on average on a long video platform. While the networks are different, fixed networks are not efficient enough to limit the difference in impact.

The graph opposite shows the specific emissions of audio data distribution, which represent 3% of total emissions for an hour of listening on an audio platform.

A reduction in quality to standard quality saves around 10,000 tCO_2e, or 1.2% of listening emissions.

On the other hand, an increase in average quality to 320 kb/s makes the impact of the networks significant on the full impact of audio, and an increase beyond the high quality offered by the platforms could dangerously increase emissions linked to digital audio listening[13].

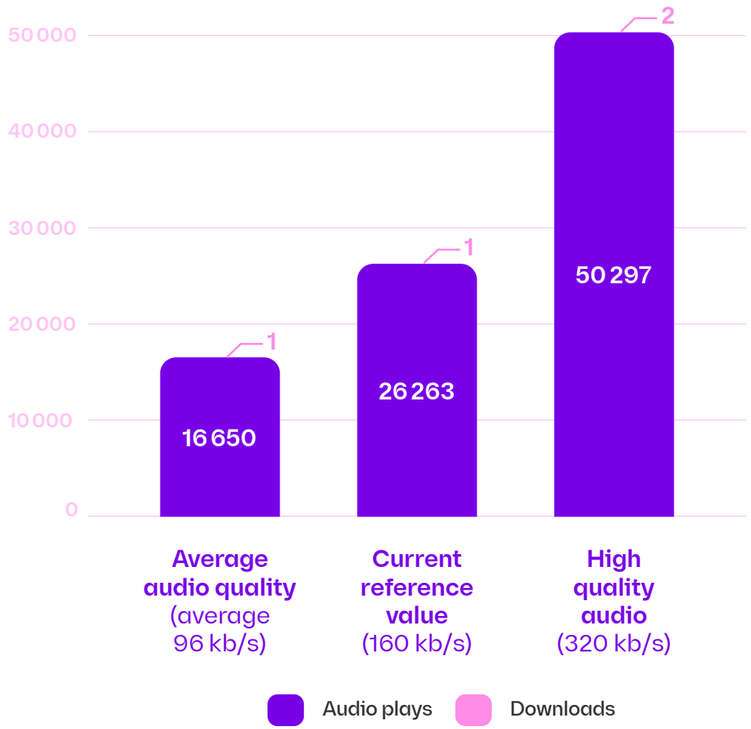


Chart 7: Impacts on networks (digital distribution - audio)

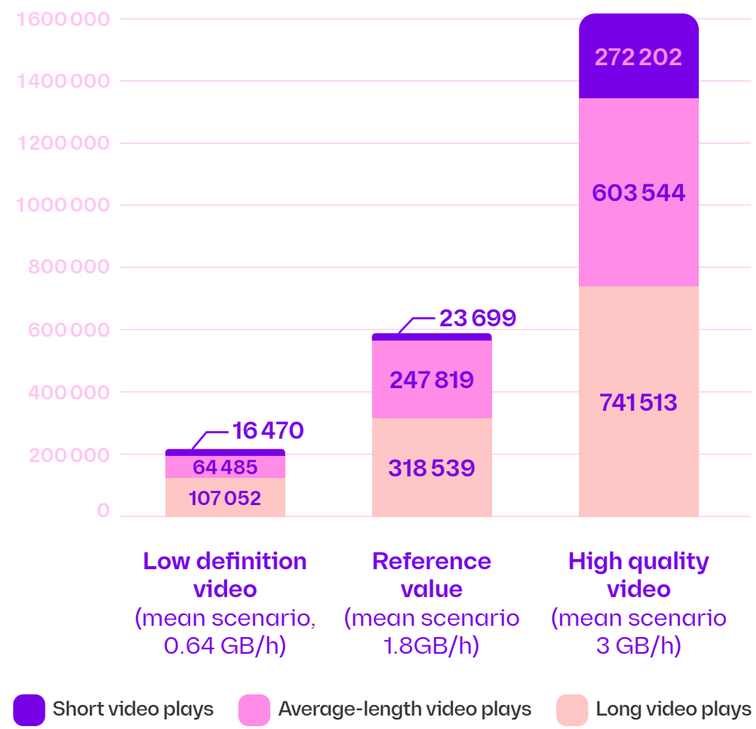


Chart 8: Impacts on networks (digital distribution – videos)

Unlike listening on a digital audio platform, the distribution of video data takes up a much larger share of emissions linked to viewing.

It accounts for 57% of video platform listening emissions. Variations in quality therefore have a major impact on viewing on video platforms, with a threefold reduction in viewing between a 1080p video (3 GB/h) and a 720p video[14]. The drop in quality would lead to a sharp reduction in emissions.

Emissions linked to digital distribution are at high risk of significant growth given the increase in the quality and number of formats offered by technological innovations in formats[15].

13. These projections do not take into account new formats such as Dolby Atmos.
14. Current mean scenario at 1,8 Go/h.
15. See following chapter: Foresight exercise: what industry in 2030?

— Manufacture, use and end-of-life of terminals: 75%

With 52% of emissions, the manufacture and end-of-life of terminals is the industry’s biggest source of emissions. The use of terminals also accounts for 23% of emissions. However important they may be, the levers for reducing emissions represented by these two areas are the furthest from music producers’ and distributors’ control.

Impacts regarding terminals are mainly due to:

→ User consumption habits: choice of eco-friendly products, renewal rate of terminals.

→ The activities of these terminals’ manufacturers: technical, software or marketing obsolescence, choice of materials, etc.

The particularly high impact of tablets is explained by their low usage rate and limited lifespan. The impact of turntables, hi-fi systems and all screen-equipped terminals is essentially based on their size and weight, and therefore on the number of materials needed to manufacture them. It is also interesting to note the significant impact of using car radios and their speakers. These figures can be explained by the energy required to operate them: the petrol used by the cars they equip.

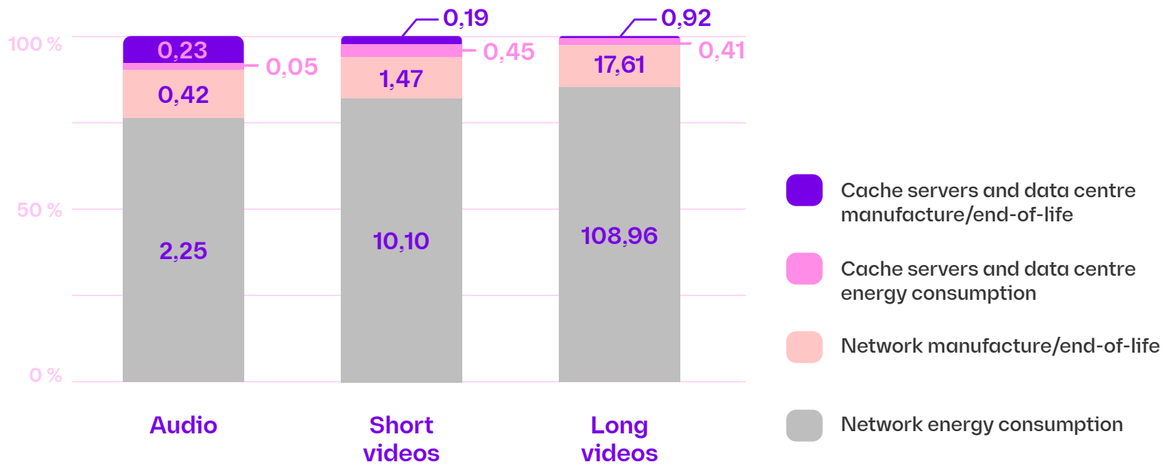


Chart 9: Impacts linked to digital distribution by listening mode (gCO_2e/hour)

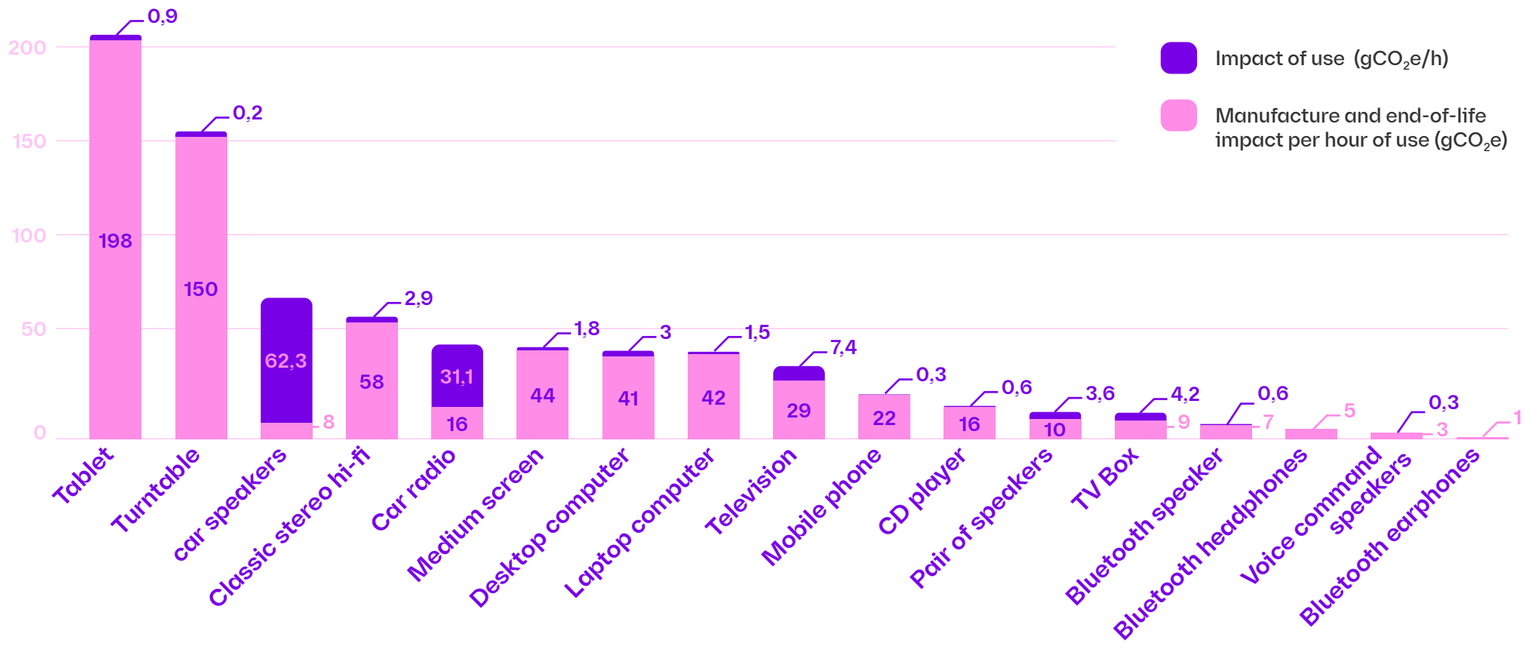


Chart 10: Impact of manufacture, use and end-of-life of terminals per hour of use

Foresight exercise: what industry in 2030?

— Projecting the evolution of the industry’s emissions from now to 2030 with no action plan

In the event that no specific action is taken to reduce emissions and that the industry’s economic growth continues unabated (“business as usual” scenario), several factors will increase the industry’s impact on greenhouse gas (GHG) emissions.

First of all, the industry is expected to grow in terms of volume[16], due mainly to the development of streaming services and the sustained growth in the number of subscribers to streaming platforms. Physical sales have been declining since the 2000s, but are expected to stabilise.

Overall, the market would grow, as would music consumption.

In particular, this would imply an increase in the proportion of terminals dedicated to listening to/viewing music, and therefore of the associated energy consumption.

Secondly, the expected increase in the desired quality of video and audio (as observed in the past) and the new uses of music would influence the demand on networks (Dolby Atmos, DAB+ Radio, videos on audio streaming platforms, the emergence of short video applications, etc.). A more indirect influence on the renewal of the installed base of terminals was mentioned, but could not be modelled.

Finally, some emerging activities were identified, but could not be included in the foresight exercise due to a lack of perspectives and studies. This is the case in particular for the increased use of artificial intelligence (AI) at different stages of the value chain, which could imply an increase in the amount of content produced, a rise in distribution rates, new data exchanges, etc.

Certain exogenous effects would have a downward impact on the industry’s GHG emissions. This is specifically the case for expected technical developments in networks (increased efficiency) and data centres. There is also the expected decarbonisation of the French and international electricity mixes. Finally, the power of terminals would tend to fall as components become miniaturised.

16. IFPI Global Music Report 2023, Goldman Sachs research.

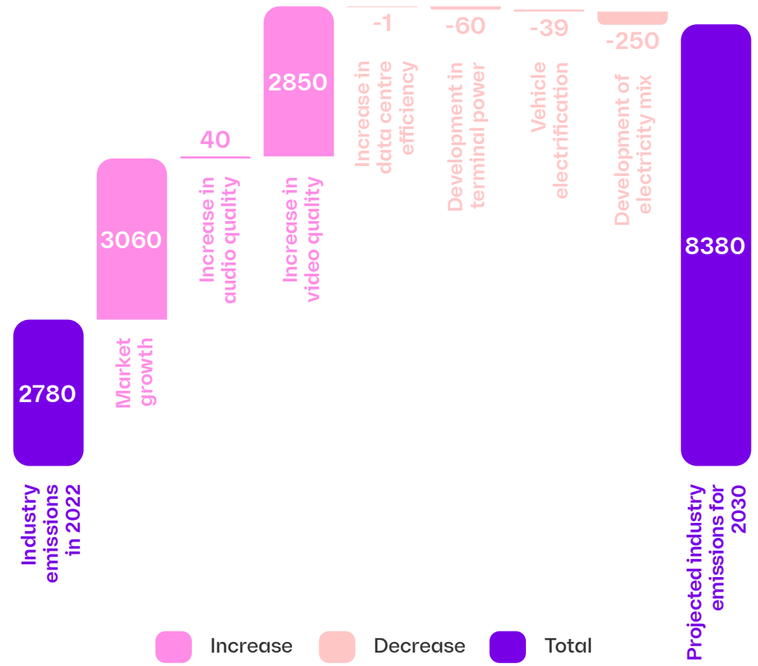


Chart 11: Perspective on the evolution of the industry’s emissions between 2022 and 2030

We could also mention the efforts made by terminal manufacturers and the new market trends that could lead to longer-lasting and more repairable devices, but it has not been possible to model this.

Without any particular influence or disruption in the digital industry, we can expect a sharp rise in emissions from the recorded music industry between 2022 and 2030, reaching more than 8,000 $ktCO_2e$. This represents a threefold increase in GHG emissions in eight years, or 37% per year.

The two biggest influencing factors are market trends and the increase in quality, particularly of videos[17].

While the main issue will be the manufacture and end-of-life of terminals in 2022, it is likely that the core of emissions will be from digital distribution (demand on networks and data centres) in 2030, due to the increase in video viewing and the higher quality of videos. This would account for 55% of the industry’s emissions. Consequently, it would be justified to better control emissions from digital distribution.

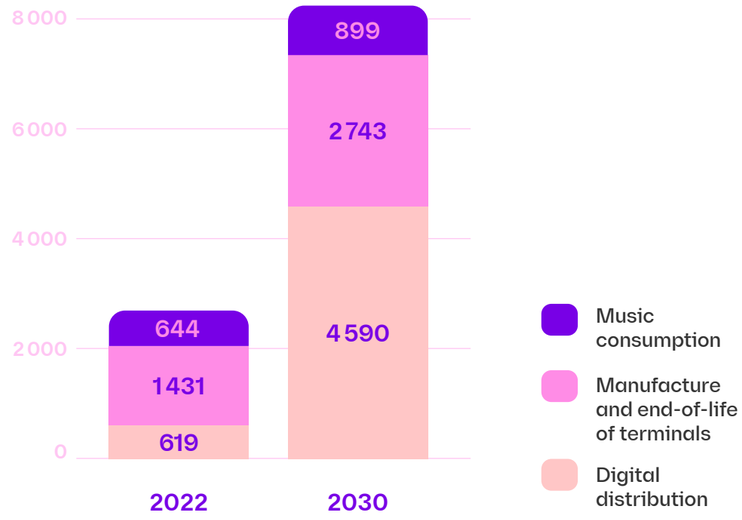


Chart 12: Comparison of 2022 and 2030 emissions over the three main emission items

— What objectives?

When the Paris Agreement was signed in 2015[18], France, along with ninety-five other countries, committed to limiting the average global temperature increase to 2°C above pre-industrial levels. In response to this international commitment, France has drawn up its “National Low Carbon Strategy” (SNBC), which aims to reduce greenhouse gas emissions by 40% by 2030, compared with 1990 levels, in order to achieve a balance between anthropogenic emissions and absorptions in France by 2050.

At European level, since the introduction of the European Green Deal in December 2019, the European Union has sand itself the goal of becoming the first continent to achieve carbon neutrality, by imposing a 55% reduction in greenhouse gas emissions by 2030 compared with 1990.

The industry’s impact includes dependencies beyond the French perimeter, particularly on the manufacture of terminals. Two trajectories can therefore be taken as a basis for meeting the national and supranational commitments made: the trajectory proposed by the Shift Project for the digital industry in France[19] and the trajectories recommended by the SBTi (Science-Based Targets initiative)[20].

In a context of market growth in volume and revenue, the challenge for the industry is not only to avoid increasing GHG emissions at the same rate as market growth (in volume and revenue), but above all to reduce the industry’s emissions by 30% to 42% in 2030 compared with 2022. In order to be in line with the Paris Agreement, the industry’s forthcoming target will have to be as ambitious, if not more so, than this range.

It should also be remembered that the aim is to smooth out the reduction trajectory in order to limit its economic impact, by starting to reduce the footprint as early as possible.

17. In the forecasts of changes in industry emissions between 2022 and 2030, the increase in greenhouse gas emissions linked to the increase in audio quality, such as Dolby Atmos, has not been taken into account. As a result, the impact of this increase in audio quality is probably underestimated.
18. https://unfccc.int/fr/a-propos-des-ndcs/l-accord-de-paris.
19. The Shift Project, report on digital technology.
20. Analysis made using SBTi tools as per their 2022 version (scenario 1.5°C, *absolute contraction approach*).

PART 03

Levers to decarbonise the recorded music industry

Forward

— Introduction

As observed in the first diagnostic phase, emissions from the production and publishing activities of phonogram producers represent less than 5% of the recorded music industry's emissions. However, the very strong interdependence of producers and distributors with other sectors (particularly in the areas of digital distribution and the manufacture, use and end-of-life of terminals) means that digital distribution issues are necessarily at the heart of discussions on the future of a market where three quarters of sales are now digital[21].

Generally speaking, the life cycle of terminals and their energy consumption, servers and data centres, the resources mobilised and the impact of usage (listening, viewing) all need to be examined. With the development of new consumer formats and the growth in vinyl sales, we need to take a broader, more systemic approach, whether to meet future regulatory constraints or simply to define a sustainable production model.

Drafting this roadmap is a response to the stumbling blocks observed throughout the project: since the emitting items are also in the hands of broadcasters and terminal manufacturers, it is necessary to move forward together in order to exert a significant influence on the industry's emissions.

The industry also needs to take ownership of the challenges of decarbonisation, and to be provided with accurate diagnoses and accessible tools to take concrete action, while at the same time influencing the collective narratives conveyed to the general public.

Three areas were therefore considered:
- → Involving all stakeholders in the industry;
- → Creating tools to identify and monitor reduction levers;
- → Raising awareness and training professionals in ecological issues.

21. SNEP Study – La production musicale française.

— Methodology for drafting the roadmap

The aim of the “REC: Reduce our carbon footprint!” project is to estimate the industry’s carbon footprint in order to draw up strategic recommendations for decarbonisation.

The project will therefore take place in several phases:

- → An initial phase to build awareness and take stock of pre-existing data and initiatives;
- → A second phase, to measure the carbon footprint, using:
  - The collection of “micro” data from a panel of structures representative of the industry’s businesses and scales,
  - Taking into account existing ‘macro’ data (Ademe, Arcom, Arcep studies, etc.);
- → And finally, a third phase, to formalise a low-carbon strategy for the industry as a whole.

As part of this strategic formalization, three thematic workshops were organized on subjects defined according to the impacts highlighted during the measurement of the footprint of music in the French distributed catalogue. These three workshops focused on the following issues:

- → Upstream: Recording, formats and distribution;
- → Around: Communication, merchandising and music videos;
- → Downstream: Listening and viewing.

The aim of these working sessions was to feed into, challenge and expand on the strategic directions formulated on the basis of initial estimates of the industry’s emissions, taking into account projected trends in these emissions. The aim was also to identify the potential bottlenecks and rebound effects of the actions envisaged. The discussions that took place during these ideation sessions were therefore used to extract operational actions aimed at responding to the necessary transition in the industry.

The actions extracted from the three thematic workshops were prioritised by the restricted and enlarged steering committees according to the complexity of their implementation, the expected reduction impacts and the consideration of potential rebound effects. They are indicated as avenues to be explored throughout the roadmap in the inserts provided for their presentation.

The roadmap that follows, which initially covers the 2025-2027 period, is therefore the result of a three-stage process: proposal, discussion and prioritisation.

Area 1: Involve all stakeholders in the industry

Given the scale of its partners’ impact in terms of greenhouse gas emissions, the recorded music industry needs to adopt an all-encompassing approach to its decarbonisation. This means including, upstream, studios, press operators, manufacturers of instruments and audio and video equipment needed for creation and production, and, downstream, audio and video streaming platforms, data centre operators and networks...

— Action 1: Establish and expand a steering committee

The REC project was steered by two committees:

- A restricted steering committee, the operational core of the project, made up of the winning partners of France 2030’s “Alternatives vertes” call for projects (SNEP, UPFI, SMA and CNM), acting in particular as a link with the industry.
- An enlarged steering committee, a validation and guidance body involving other stakeholders (three major companies, two SMEs, two VSEs and a streaming platform).

In order to ensure that this roadmap is properly followed up and to take advantage of the positive momentum generated by the REC project, the enlarged steering committee will be made permanent and its remit extended.

In order to involve every stakeholder of the value chain of the recorded music industry in the reflections initiated during the project, a proposal for inclusion on the steering committee will be submitted to the Syndicat des Éditeurs de services de Musique en Ligne (ESML). This will enable us to take better account of the challenges faced by the streaming platforms it represents, as well as aligning the decarbonisation strategies of these two sectors.

This proposal will be accompanied by a call for participation in the steering committee by a streaming platform for long videos, a studio, a pressing company and an artist.

Ideas for pressing

- Prefer 140g records to 180g records;
- Lower minimum order thresholds;
- Recycling and new materials.

— Action 2: Coordinate a study on reducing the impact of stakeholders in the physical media market

The recorded music industry is highly interdependent with other sectors. In order to take into account all the impacts of its activity, it will engage in dialogue with the concerned companies.

With the support of the steering committee, the Centre national de la musique, will coordinate working sessions with these sectors, which specifically include pressing companies, in order to study the impacts of their activities and consider ways of sustainably reducing their carbon footprint, while taking into account their economic and social viability. Initial proposals will be developed on the basis of the work carried out during the REC project.

The partners wish to encourage any initiative that reduces the weight and/or ecological footprint of physical media, particularly for the benefit of French production and the French market: reduction at source, recycling, etc.

— Action 3: Discuss new uses in consultation with stakeholders

Recorded music is an industry conducive to innovation, both in terms of creation and use.

However, future transformations could significantly increase the industry’s emissions between now and 2030, particularly with the improvement in video quality, which would lead to an increase in the carbon impact of their digital consumption in streams and, at the same time, a need for users to renew their terminals.

It is therefore necessary to examine the benefits of the emergence of certain new digital formats in the light of the climate emergency. The steering committee will take on the task of opening up this debate, while remaining vigilant to the side-effects it may have on competitive practices.

Ideas for audio and video streaming

- → Encourage better adaptation of formats to terminals;
- → Promote downloading on audio platforms where appropriate;
- → Lower the quality of standard formats;
- → Offer audio playback of video formats wherever possible;
- → Modulate subscriptions according to audio quality and therefore data weight.

— Action 4: Work to raise public awareness of uses

The consumption habits of listeners/viewers (renewal rate of terminals, management of video quality, etc.) represent a significant lever for reduction in an overall low-carbon strategy.

Additionally, the industry, including through the influence of artists, has the means to warn its audiences about the impact of their consumption. The companies in the industry, especially through the steering committee representing them, will have the task of determining the objective and the means of coherently suggesting to audiences that they adopt more responsible modes of consumption and of making the efforts made by the players in the industry visible.

Ideas for audiences

- → Adjust formats to suit the devices used;
- → Give preference to downloading from audio platforms for music that is listened to regularly;
- → Favour audio listening to video formats whenever possible when viewing is not necessary.

— Action 5: Bring people together to start influencing the digital industries

Consumption of music in digital audio and video formats is predominant, accounting for 65% of total listening volume and generating 69% of the industry’s emissions in 2022. In addition, 75% of the industry’s overall emissions come from the manufacture, consumption and end-of-life of the terminals used. The opportunities to reduce these emissions lie mainly in the hands of international companies, over which the companies in the industry have very limited influence.

Other sectors that are also dependent on digital industries (such as audiovisual, advertising and sport) may be involved in this strategy of influence, which could take the form, for example, of communication campaigns on usage, and approaches to digital companies and regulators. The public operators concerned (Arcom, Arcep, CNC, etc.) will be approached by the Centre national de la musique on subjects defined by the steering committee to highlight the common issues linked to the players involved in digital broadcasting.

Area 2: Create tools to identify and monitor reduction levers

In order to facilitate the implementation of actions to reduce carbon impacts, compatible with the development of the recorded music market, it is crucial to develop accurate diagnostics.

These diagnostic efforts will take two main forms:
- → The development of autonomous diagnostic tools;
- → The drafting of benchmarks that will be used to evaluate and present best practices.

These tools and guidelines will enable all those working in the industry to independently seize the resources needed to initiate a low-carbon strategy tailored to their situation.

— Action 1: Support the creation of common assessment guidelines

To refine diagnoses and enable comparisons between different structures, it seems wise to start from a common methodological base.

Common guidelines already exist for estimating emissions from digital companies (particularly data centres). These should be made widely available to companies to help them choose their service providers. As international groups may be subject to contracts signed by their parent companies, labels will do their utmost to ensure that their affiliates pass on the existing benchmarks resulting from a local approach to streaming platforms.

The steering committee will above all study the opportunity and feasibility of producing, with the support of professionals, the State and its public establishment, an Afnor standard for phonogram production and distribution along the lines of the AFNOR SPEC 2308 project – Responsible film, audiovisual and advertising production, published in spring 2024.

Ideas about choosing service providers

- → Include a proper consideration of ecological issues in the specifications submitted to service providers of all kinds.

— Action 2: Create a guide for good practice

In order to make a voluntary and collective commitment, as was the case for the REC project, work will begin on drafting a best practice guide for music production.

This guide should help to involve every professional in the industry in initiating the decarbonisation of their activities by providing a methodological framework and examples of good practice.

The document will aim to standardise decarbonisation approaches The document will aim to standardise approaches to decarbonisation while enabling adaptation to the specific contexts of each activity . A glossary of players, committed service providers and inspiring initiatives will be appended to the document.

Ideas for producer/distributor labels

- → Promote digital links rather than physical mailings;
- → Favour second-hand or European material.

— Action 3: Develop autonomous diagnostic tools to give structures the capacity to monitor their decarbonisation.

The experience of developing autonomous calculators in the audiovisual and performing arts has demonstrated their usefulness in refining diagnoses and involving the profession collectively and voluntarily.

On this basis, the Centre national de la musique will contact the producers of some of these tools to ensure that they are properly adapted to the specific characteristics of music video production, thus enabling a precise and appropriate assessment of the environmental impact of these activities.

Support for the development of autonomous tools dedicated to the activities of the recorded music industry could also be envisaged. It should be possible to support this both through the CNM, which will have a role to play, and through more general measures (such as those of France 2030), the implementation of which the industry cannot, of course, prejudge.

— Action 4: Work to define a carbon reduction trajectory

Based on the proposed trajectories mentioned in the REC project and in line with the objectives set by the National Low Carbon Strategy, the steering committee will define a decreasing trajectory for the industry’s emissions and the sequencing of actions to be undertaken.

This trajectory will make it possible to quantify and objectify the intensity of the measures to be taken in order to comply with it.

— Action 5: Regularly update the steering tool developed as part of the project

The carbon emissions calculation tool, created as part of the REC project to diagnose the industry’s carbon footprint and determine its levers for action, will be regularly updated by the steering committee, to ensure that the findings and decarbonisation measures are in line with each other. It will be produced using the externalities and developments observed in the industry and with the participation of the members of the steering committee.

— Action 6: Adjust the roadmap every three years

The decarbonisation roadmap will be updated every three years based on the results of the tool’s update. The intensity of the measures that will be taken will depend on compliance with the application of these actions and the influence they have had on the downward trend in emissions.

Area 3: Raise awareness and train professionals about ecological issues

The ecological transformation of the industry can only be achieved collectively, requiring general awareness among professionals of the ecological issues at stake and of their urgent and indispensable nature. By increasing the knowledge and skills of professionals in the recording industry, thinking and habits will change.

— Action 1: Give future professionals in the industry the means to do their jobs in the light of ecological constraints

Following on from the proposal made in the *Guide d’orientation et d’inspiration pour la transition écologique de la culture*[22] and inspired by the Action… formation ![23] project run by the Centre national du cinéma, the Centre national de la musique must work to create training and awareness-raising modules within initial study courses that train future professionals in the fields of music to practise their activities responsibly.

The steering committee will work to involve inspirational members of the profession and artists who will give talks on specialized courses to explain their professions and how they are changing in the light of the ecological transition. This will help to convey an effective message to a public that is particularly attentive to what its future peers have to say.

— Action 2: Generalise the inclusion of modules on ecological issues in professional training courses

As a training organisation, the Centre National de la Musique (CNM) has proposed that by 2022 all those providing training within the organisation should have free access to training on ecological issues.

The CNM will make this module compulsory for all its trainers, and will require that at least 10% of the content of each training course given deals specifically with ecological issues.

In order to extend this practice to the entire industry, the steering committee, extended to include the industry’s Joint National Committee for Employment and Training, will consult other training centres on their needs so that this approach can be implemented within their structures.

The steering committee will also cooperate with the AFDAS skills operator to extend the range of training courses on this theme for the benefit of recorded music companies.

— Action 3: Raise awareness among artists

It is important to raise performers’ awareness of the challenges of ecological transition and to make this a natural subject for dialogue with labels.

The steering committee will also initiate exchanges with the schools and conservatoires that train future professional musicians.

In addition, all initiatives aimed at integrating ecological considerations into support programmes for emerging artists will be encouraged.

The implementation of this action is particularly essential to ensure that audiences are aware of their uses.

Ideas for raising artists' awareness

→ Encourage companies to formalise a charter of commitment that they will offer artists to sign.

22. Ministère de la Culture, *Guide d’orientation et d’inspiration pour la transition écologique de la culture*, January 2024
23. Centre national du cinéma, Action… formation !, 2022.

Timetable of objectives

January 2025

→ First meeting of the new steering committee.

2025

→ Coordination by the CNM of working groups with those involved in the manufacture and production of physical media.

→ Online publication of a good practice guide.

Mid-2025

→ Publication of a low-carbon trajectory.

End 2025

→ All CNM trainers to have received training in environmental issues.

2026

→ Adjustment of the self-diagnosis tool for the audiovisual industry to the specificities of music videos.

→ Creation of a self-diagnostic tool devoted to phonogram production activities.

→ Development of an awareness-raising module to be offered to schools training future music professionals.

→ All training courses run by the CNM have at least 10% of their content specifically devoted to ecological issues applied to the subject of the training.

2027

→ All students graduating from music-related training programmes must have received training in ecological issues.

End 2027

→ New roadmap 2028-2030 for the decarbonisation of recorded music.

PART 04

Appendices

Tables of charts and illustrations

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Detailed methodology for calculating the industry’s emissions

— Office life for production, publishing and distribution

The perimeter of this category includes:
- Energy consumption of buildings (including studios);
- Waste management;
- Business travel and commuting;
- Office-related fixed assets;
- Purchases of goods and services related to the operation and office life of the entities.

All activities related to the other categories are excluded, in particular efforts to market music (creation and filming of music videos, communication efforts, etc.).

Below is an extract concerning the data aggregation method:[24]

The office life of organisations

Buildings' energy consumption		Waste	Home-work commutes
kWh/FTE ratio for labels and record companies taken from micro data (questionnaires)	kWh/streaming platform turnover ratio, taken from micro data (questionnaires)	IDEM	IDEM
×	×		
Total number of FTEs in publishing (Xerfi), corrected based on professional observatories	Streaming platforms' turnover in France, IFPI figures		

24. In red: data from questionnaires, which have been collected very satisfactorily – extrapolated to the industry.
In orange: data from questionnaires that were satisfactorily collected, but whose extrapolation is subject to major uncertainties.
In blue: data found in the literature (INSEE, Médiamétrie, etc.) or from ekodev and Carbone 4 studies.

The source data from the questionnaires cannot be published. The data consolidated and extrapolated at industry level are as follows:

Name of data	Unit	2022
Electricity consumption in buildings	kWh	10 962 362
Gas consumption in buildings	kWh PCS	834 481
Amount of recyclable waste produced	tonnes	208
Amount of general waste produced	tonnes	537
Home-Work distances travelled in diesel-fuelled cars	km	131 249
Home-Work distances travelled in petrol-fuelled cars	km	279 644
Home-Work distances travelled in cars (mid-range engine)	km	4 159 965
Home-Work distances travelled on motorbike	km	27 098
Home-Work distances travelled by bus	km	23 752
Home-Work distances travelled by subway	km	11 269 118
Home-Work distances travelled by train	km	1 291 657
Home-Work distances travelled on electric bicycle	km	283
Home-Work distances travelled on soft transport	km	52 807
Name of data	Unit	2022
Kilometres covered by the light vehicle fleet	km	5 796 167
Reimbursement of mileage expenses	k€ excl. VAT	3 255
Spending on air travel	k€ excl. VAT	2 459
Spending on train travel	k€ excl. VAT	3 551
Direct impact “business travel” (streaming platforms)	tCO_2e	1 450
Insurance and banking services and fees	k€ excl. VAT	6 638
Software and other IT services	k€ excl. VAT	8 963
Accommodation (hotels…)	k€ excl. VAT	2 577
Direct impact “Purchases of goods and services” (streaming platforms)	tCO_2e	5 368
Surface area of buildings	m^2	92 872
Amount depreciated over the reference year for the remaining IT equipment (computers, screens, data centres, etc.)	k€ excl. VAT	1 907
Number of vehicles	number	293

The macro data used for the extrapolations are as follows:

Sector’s key figures (macro data)	Unit	Données	Sources
Number of FTE in the music publishing industry (production, publishing, distribution + publishing, without platforms)	number	4 328	Recorded music market XERFI (based on ACOSS = URSSAF)
Number of FTE production, publishing, distribution	number	2 941	Calculation of employer representativeness
Number of FTE music publishing	number	334	Calculation of employer representativeness
Corrected number of FTE production, publishing, distribution	number	3 887	ekodev calculation: includes studios, excludes platforms
Number of streaming platforms	number	73	Baromètre des métiers de la musique – IRMA – 2019
Industry turnover – physical	M€	197	IFPI
Industry turnover – digital	M€	569	IFPI
Industry turnover – neighbouring rights	M€	122	IFPI
Industry turnover – synchronisation	M€	32	IFPI
SPPF "received"	M€	33	SPFF report
SPPF "redistributed"	M€	30	SPFF report
SCCP "received"	M€	122	SCPP report
SCCP "redistributed"	M€	86	SCPP report
Streaming platforms’ turnover (2022)	M€	756,23	ekodev calculation from the XERFI study – Le marché de la musique enregistrée

Conversions into emissions have been made using the emissions factors presented in these appendices.

— Music production: Recording

The perimeter of this activity includes:
- → The artist’s travel from home to the recording location;
- → Fixed assets required for recording, belonging to the studios.

The following were excluded from the perimeter of this category:
- → Home production – due to a lack of reliable data concerning only professional artists (some approaches are nevertheless presented in these appendices);
- → Studio energy consumption, which is not included here, as it was taken into account in the “office life” category;
- → Emissions linked to the creation of the music (which would include trips to the studio for testing or rehearsals and the artist’s equipment).

General assumptions on the scenarios for the movement of artists and crews in the studio: Recording would require an average of eight people.

Three scenarios are considered:
- → A scenario involving air travel (for foreign artists coming to record in France, for example), which represents 2% of recordings. In this case, an artist travels from afar while the host team is local;
- → A scenario without air travel (for French artists recording in France), but with long train journeys to specific studios (in 20% of cases). This recording requires the whole team to travel by train;
- → A scenario without long-distance travel (in 78% of cases).

For the scenario involving air travel, it is assumed that the recording takes place in the Île-de-France region (most of the studios are located in Paris). Performers and crews can take advantage of public transport in the Île-de-France region.

For all journeys made by car, a load factor of three people per car is assumed.

With air travel		Unit	Data	Source	Hypothesis
				/	The hypothesis is that the studio is located in the Ile-de-France region when air travel is involved
Average number of kilometres flown to arrive at studio (return trip)		km	2000	ekodev –CNM hypoth-esis	Air travel mostly departs from Europe (Spain and Germany). The hypothesis is an average one-way distance of 1000 km.
Average number of tracks produced when air travel is involved		number	10	CNM hypothesis	The hypothesis is that an average album contains around ten tracks. The return journey to the studios location is counted only once for the recording of ten tracks.
Number of days in the studio in the host town for one track		number	1	ekodev – CNM hypoth-esis	According to the CNM, the average time to record all sections of one track is one day, across all musical styles and genres.
Average number of kilometres travelled (return journey from host town)		km	10,8	INSEE – Mean home-work distance travelled in a dense urban area in 2019	The estimation of average distance travelled is based on the average home-work commute in dense urban areas.
Number of people in car		number	3	ekodev hypothesis	The hypothesis is that carpooling rates are higher than the national average.
Means of transport (percentage of used transport)	Car	%	68,1	INSEE – Home-work commutes in the Ile-de-France region	The distribution of modal shares was sourced in the Enquête mobilité en Île-de-France. The types of transport used corre-spond to the “artisan” category.
	Public transport (metro)	%	22,2	INSEE – Home-work commutes in the Ile-de-France region	
	Soft transport	%	9,7	INSEE – Home-work commutes in the Ile-de-France region	

With long-distance train travel		Unit	Data	Source	Hypothesis
				/	Here, we are using national averages: our hypothesis is that the studio can be located in any French region.
Average number of kilometres for a train journey to arrive at studio (return trip)		km	800	ekodev – CNM hypothesis	Return trip Paris-Lyon.
Average number of tracks produced when train travel is involved		number	10	CNM hypothesis	The hypothesis is that an average album contains around ten tracks. The return journey to the studios location is counted only once for the recording of ten tracks.
Number of days in the studio in the host town for one track		number	1	ekodev – CNM hypothesis	According to the CNM, the average time to record all sections of one track is one day, across all musical styles and genres.
Average number of kilometres travelled (return journey)		km	25,24294	Enquête mobilité des personnes de 2019	This distance was estimated based on the average French home-work distance.
Number of people in cars		number	3	ekodev hypothesis	The hypothesis is that carpooling rates are higher than the national average.
Means of transport (percentage of used transport)	Car	%	80	Enquête mobilité des personnes de 2019 + CNM – ekodev hypothesis	Percentages have been slightly increased in favour of the car since it is the most-used means of transport for travel to studios.
	Public transport (bus)	%	15	Enquête mobilité des personnes de 2019 + CNM – ekodev hypothesis	
	Soft transport	%	5	Enquête mobilité des personnes de 2019 + CNM – ekodev hypothesis	

No long distance travel		Unit	Data	Source	Hypothesis
				/	Here, we are using national averages: our hypothesis is that the studio can be located in any French region.
Number of days in the studio in the host town for one track		number	1	ekodev – CNM hypothesis	According to the CNM, the average time to record all sections of one track is one day, across all musical styles and genres.
Average number of kilometres travelled (return trip)		km	25,24294	Enquête mobilité des personnes de 2019	This distance was estimated based on the average French home-work distance.
Number of people in cars		number	3	ekodev hypothesis	The hypothesis is that carpooling rates are higher than the national average.
Means of transport (percentage of used transport)	Car	%	80	Enquête mobilité des personnes de 2019 + CNM – ekodev hypothesis	Percentages have been slightly increased in favour of the car since it is the most-used means of transport for travel to studios.
	Public transport (bus)	%	15	Enquête mobilité des personnes de 2019 + CNM – ekodev hypothesis	
	Soft transport	%	5	Enquête mobilité des personnes de 2019 + CNM –ekodev hypothesis	

Here are the “micro” data taken from the questionnaires and extrapolated to the industry covering fixed assets, making it possible to calculate the overall travel activities of artists for recordings:

Name of data	Unit	Energy
Number of recorded tracks	number of tracks	101 539
Amortisation of musical instruments during the reference year	k€ excl. VAT	420,50
Amount depreciated over the reference year for technical equipment (headphones, speakers, consoles, etc.)	k€ excl. VAT	757,50

Conversions into emissions have been made using the emissions factors presented in these appendices.

— Music production: music video production

The scope of this activity includes all the emissions required to produce the video, in particular:

- → Travel by actors and artists to auditions;
- → Travel for location scouting;
- → Immobilisation of all technical equipment;
- → Transport of equipment on site and after dismantling;
- → Production of consumables and small equipment;
- → Food for crews (meals and permanent control room);
- → Crew accommodation;
- → Crew travel during filming.

The following were excluded from the perimeter of this category:

- → Viewing music videos, as this is included in the music listening categories;
- → Post-production, which is neglected because it makes little contribution to a video’s carbon footprint.

Music videos are divided into three categories according to their expenditure: this division has the impact of designating the number of people involved in filming the video.

Music videos all follow the same sequence of phases:

- → Pre-production: location scouting (which involves moving a few vehicles) + casting for a certain percentage of videos produced (we take into account the travel of extras who come to audition);
- → Purchases: we take into account expenditure on food, small items of equipment and large items of equipment (sets + large items of equipment to be used);
- → Shooting the video: this takes into account travel by the teams to the shooting locations and accommodation for the clips concerned.

It is assumed that all journeys are made by car or van, but that the car-pooling rate is relatively high.

Types of music video				Source	Hypothesis
Videos between 0 and 15,000€	Percentage of all videos	%	40,3	CNM – Aide à la production de musique en images	The percentage comes from CNM data about video funding support.
	Average budget for a video in this category	€	9796,01	CNM – Aide à la production de musique en images	The percentage comes from CNM data about video funding support.
	Number of people working on-shoot	number	4	ekodev – CNM hypothesis	For videos between 0 and 15k€, the hypothesis is that four people will work on-shoot.
Videos between 15,001 and 30,000€	Percentage of all videos	%	32,6	CNM – Aide à la production de musique en images	The percentage comes from CNM data about video funding support.
	Average budget for a video in this category	€	21328,97	CNM – Aide à la production de musique en images	The percentage comes from CNM data about video funding support.
	Number of people working on-shoot	number	8	ekodev – CNM hypothesis	For videos between 15k€ and 30k€, the hypothesis is that eight people will work on-shoot.
Videos above 30,001€	Percentage of all videos	%	27,1	CNM – Aide à la production de musique en images	The percentage comes from CNM data about video funding support.
	Average budget for a video in this category	€	57661,65	CNM – Aide à la production de musique en images	The percentage comes from CNM data about video funding support.
	Number of people working on-shoot	number	20	ekodev – CNM hypothesis	For videos above 30k€, the hypothesis is that twenty people will work on-shoot.

Preproduction		Sources	Hypothesis
Percentage of videos using extras	57	CNM – Aide à la production de musique en images	The percentage comes from CNM data about video funding support and repre-sents the proportion of videos that require casting.
Number of people to audition	10	ekodev – CNM hypothesis	This is the number of people who travelled to the audition.
Average distance travelled for a return journey (in km)	25,24	Enquête mobilité des per-sonnes de 2019	The distance was estimated from the average French home-work distance: the hypothesis is that extras travel to auditions in cars.

Scouting			Hypothesis
Average distance travelled for a return journey (in km)	793	Enquête mobilité des personnes de 2019	“Déplacement exceptionnel” Enquête mobilité des personnes.
Number of planned return journeys for scouting	3	CNM hypothesis	According to the CNM, two or three trips to the shooting location are needed before the shoot.
Number of different shooting locations	2	CNM hypothesis	According to the CNM, the are generally two or three locations for a music video.
Number of cars	2	CNM hypothesis	The hypothesis is that the head technician + director + accompanying person will travel, by car.

Fixed assets			Hypothesis
Purchased equipment (sound and lighting, set dec)	33,40 %	CNM – Aide à la production de musique en images	The average expenditure for scenery or equipment in taken from CNM data on video funding support.
Number of days for rented equipment	2	ekodev – CNM hypothesis	The equipment is rented for two days: one day for shooting and one day for the equipment’s return.
Equipment depreciation period (in years)	5	Ademe – ekodev hypothe-sis	The hypothesis is that the equipment is amortised over five years.
Kilometres travelled by the equipment	793	Enquête mobilité 2019 – average distance for a work trip in the “Employee” category	

Purchases			Hypothesis
Purchasing small technical equipment	3%	CNM – Aide à la production de musique en images	The average amount spent on small equipment is taken from CNM data on funding support for music videos.
Number of meals per day and per person	2	CNM hypothesis	Two meals per person per day.
Other food (snacks, full meal equivalent) per person	1	CNM hypothesis	According to the CNM, catering is often provided on-set (bananas, biscuits, drinks)

Accommodation			Hypothesis
Percentage of music videos concerned by accom-modation	43	CNM – Aide à la production de musique en images	The percentage is taken from CNM data about funding support for music videos requiring one night of accommodation.
Expenditure for accommodation	12 %	ekodev hypothesis	

Travel			Hypothesis
Average distance travelled for a return trip (in km)	793	Enquête mobilité des personnes de 2019 – average distance for professional commute in the “employee” category.	
Number of different shooting locations	2	CNM hypothesis	According to the CNM, generally speaking, two or three locations are involved in shooting a music video.
Car load factor (number of people per car)	3	ekodev – CNM hypothesis	The hypothesis is that carpooling rates are higher than the national average.

It has been estimated that around 1,807 clips were shot in 2022, with an average budget of €12,500.

— Music production: Music marketing

This activity includes all efforts made by producers and distributors to market music.

The data below is extrapolated from micro data collected from producers and distributors, excluding double counting.

Name of data	Unit	Data
Textile merchandising purchases	k€ excl. VAT	21 983,25
Other merchandising (excluding digital and print communica-tion)	k€ excl. VAT	1 033,22
Budget for Digital communication	k€ excl. VAT	39 035,55
Budget for Printed communication	k€ excl. VAT	5 944,68

Ademe’s monetary ratios were used to transform this expenditure into emissions.

— Manufacture and end-of-life of physical media

These are emissions linked to the manufacture and then the end-of-life of the physical carriers of the music. We considered the manufacture of an average record and the manufacture of an average CD, taking into account different assumptions about the record’s weight and different assumptions about packaging (in particular box sets), as supplied by MPO. This data is confidential and cannot be disclosed. Nevertheless, here are the consolidated results:

Name of EF	Item type	Location	Item total (non decomposed)
Manufacture of a CD, raw material, $kgCO_2e$/unit	Raw material and fixed assets		0,200
Manufacture of a record, raw material, $kgCO_2e$/unit	Raw material and fixed assets		0,797
Manufacture of a CD in France, Energy, $kgCO_2e$/unit	Energy	France	0,0176
Manufacture of a record in France, Energy, $kgCO_2e$/unit	Energy	France	0,545
Manufacture of a CD in Germany, Energy, $kgCO_2e$/unit	Energy	Germany	0,0954
Manufacture of a record in Germany, Energy, $kgCO_2e$/unit	Energy	Germany	0,660
Manufacture of a CD elsewhere in Europe, Energy, $kgCO_2e$/unit	Energy	Europe	0,0682
Manufacture of a record elsewhere in Europe, Energy, $kgCO_2e$/unit	Energy	Europe	0,655
End-of-life of a CD, $kgCO_2e$/unit			0,143
End-of-life of a record, $kgCO_2e$/unit			0,547

The data below are sectoral data extrapolated from micro data collected from distributors, excluding double counting:

Name of data	Unit	2022
Total number of distributed records	number of units	7 104 539
Number of records made in France	number of units	154 497
Number of records made in Germany	number of units	3 943 392
Number of records made elsewhere in Europe	number of units	3 006 649
Number of destroyed or recycled records (no sale)	number of units	92 865
Total number of distributed CDs	number of units	21 009 068
Number of CDs made in France	number of units	456 869
Number of CDs made in Germany	number of units	11 661 137
Number of CDs made elsewhere in Europe	number of units	8 891 062
Number of destroyed or recycled CDs (no sale)	number of units	3 885 619

With regard to the end-of-life of CDs and records, we have considered in this item the destruction of packaging after purchase or after the CD’s end-of-life, as well as the destruction of the media as such, whatever their sales channels (or lack thereof). The treatment of unsold copies is more closely monitored than that of end-of-life media after purchase. Nevertheless, as of the date of the study, the treatment of unsold copies – and by hypothesis that of CDs sold – is equivalent to the industry average. The same approach has been adopted for packaging.

The emissions factors used to model this end-of-life process come mainly from the Empreinte database and some from ecoinvent. Here are the consolidated results:

Categories	Name of EF	Total item (non decomposed)	Unit
CD	End-of-life of a CD, $kgCO_2e$/unit	0,143	$kgCO_2e$/unit
Records	End-of-life of a record, $kgCO_2e$/unit	0,547	$kgCO_2e$/unit

— Physical distribution

These are the GHG emissions linked to the activities required to transport the physical media and their packaging to the auditor’s site. This item includes:

- Post-manufacturing freight from the manufacturing site to France (global storage points of the main French retailer);
- E-commerce transport;
- Freight from the main storage points to the points of sale;
- Travel by listeners to shops.

Here is the source activity data used:

Name of data	Unit	2022
Number of records made in France	number of units	154 497,21
Number of records made in Germany	number of units	3 943 392,73
Number of records made elsewhere in Europe	number of units	3 006 649,30
Number of destroyed or recycled records (no sale)	number of units	92 865,06
Number of records sold in supermarkets	number of units	1 282 922,52
Number of records sold in department stores	number of units	3 519 549,31
Number of records sold in small outlets (record shops...)	number of units	688 551,57
Number of records sold on e-commerce platforms	number of units	1 520 650,77
Number of records sold excluding e-commerce	number of units	**5 491 023,41**
Total number of sold records	number of units	**7 011 674,18**
Number of CDs made in France	number of units	456 868,82
Number of CDs made in Germany	number of units	11 661 136,99
Number of CDs made elsewhere in Europe	number of units	8 891 062,02
Number of destroyed or recycled CDs (no sale)	number of units	3 885 619,44
Number of CDs sold in supermarkets	number of units	5 325 359,30
Number of CDs sold in department stores	number of units	7 493 914,35
Number of CDs sold in small outlets (record shops...)	number of units	583 878,16
Number of CDs sold on e-commerce platforms	number of units	3 720 296,58
Number of CDs sold excluding e-commerce	number of units	**13 403 151,81**
Total number of sold CDs	number of units	**17 123 448,39**

Post-manufacturing freight

The approach here is simplified. Here are the key assumptions:

- Production in France: 510 km on average between the main production sites and the logistics sites (MPO mapping study – Arvato Logistics warehouses);
- Production in Germany: 980 km on average between the main production sites and logistics sites (Optimal Media mapping study – Arvato Logistics warehouses);
- Production in mid-Europe: 690 km on average between the main production sites and the logistics sites (mapping study by Optimal Media, GZ media, Record Industry, Pallas Group, Sonopress – Arvato Logistics warehouses).

The emissions factor used was FE “articulated 40 to 44 tonnes, road diesel, 7% biodiesel blended, mainland France, Base Carbone v23.2”.

E-commerce transport

Much of the modelling of e-commerce transport was based on the Ademe study: Ademe – e-commerce: modélisation des impacts et recommandations filières et grand public (“Ademe – e-commerce: impact modelling and recommendations for the industry and the general public”). Detailed assumptions are given below:

E-commerce delivery methods			Source
Share of e-commerce purchases with home delivery	%	54	Chiffres clés e-commerce 2022 – Fédération e-commerce et vente à distance, page 6
Share of e-commerce purchases delivered to collection points	%	46	Chiffres clés e-commerce 2022 – Fédération e-commerce et vente à distance, page 6

Failure rate for home deliveries			Source
Failure rate for home deliveries	%	30	Fédération e-commerce et vente à distance – Les chiffres clés – 2018

Transport of a CD through e-commerce			Source
Average emissions from the successful delivery of a CD from the distributor to the consumer's place of residence	$kgCO_2e$/ CD	0,11	ekodev calculation based on Ademe Study: Ademe – e-commerce: modélisation des impacts et recommandations filières et grand public
Average emissions from failed delivery of a CD from distributor to consumer's place of residence	$kgCO_2e$/ CD	0,72	ekodev calculation based on Ademe Study: Ademe – e-commerce: modélisation des impacts et recommandations filières et grand public
Average emissions for the transport of an e-commerce CD from distributor to point of collection	$kgCO_2e$/ CD	0,35	ekodev calculation based on Ademe Study: Ademe – e-commerce: modélisation des impacts et recommandations filières et grand public

Record transport for e-commerce			Source
Average emissions from the successful delivery of a record from the distributor to the consumer's place of residence	$kgCO_2e$/ vinyle	0,13	Calcul ekodev sur la base de l’étude Ademe: Ademe – e-commerce: modélisation des impacts et recommandations filières et grand public
Average emissions from failed delivery of a record from distributor to consumer's place of residence	$kgCO_2e$/ record	0,75	ekodev calculation based on Ademe Study: Ademe – e-commerce: modélisation des impacts et recommandations filières et grand public
Average emissions for the transport of an e-commerce record from distributor to point of collection	$kgCO_2e$/ record	0,39	ekodev calculation based on Ademe Study: Ademe – e-commerce: modélisation des impacts et recommandations filières et grand public

Freight from main storage points to points of sale

This type of freight includes the transport of media from the distributor’s warehouse to the shops’ logistics platforms (assumed to be 450 km on average in a 40 to 44 tonne articulated vehicle), then the transport of media from the logistics platforms to the shops (assumed to be 43 km based on the Observatoire des territoires – Agence Nationale de la cohésion des territoires – Insee and integration mainly at the departmental level of the main distribution channels).

Audience visits to shops

Emissions from this activity were related to the number of products in the average shopping basket, depending on the type of outlet considered. Details of the assumptions are given below:

Consumer movements to points of sale			Source
Average number of kilometres travelled by consumers	km	10	Ademe – e-commerce: modélisation des impacts et recommandations filières et grand public, page 89
Percentage use of thermal car	%	71	Chiffres clés e-commerce 2022 – Fédération e-commerce et vente à distance, page 10
Percentage use of public transport	%	13	Chiffres clés e-commerce 2022 – Fédération e-commerce et vente à distance, page 10
Percentage use of motorcycle	%	1	Chiffres clés e-commerce 2022 – Fédération e-commerce et vente à distance, page 10
Percentage use of soft transport	%	15	Chiffres clés e-commerce 2022 – Fédération e-commerce et vente à distance, page 10

Average baskets			Source
Average consumer basket in department stores	number of items in an average basket	20	Ademe – Digitalisation des services culturels, page 48
Average consumer basket in supermarkets	number of items in an average basket	35	Observatoire des prix 2019 – Familles rurales
Average consumer basket in record stores	number of items in an average basket	1	ekodev hypothesis

— Impact of physical listening – CDs

The impacts here include the manufacture and end-of-life of the terminals used for listening to CDs, as well as their energy consumption. The Ademe assumptions have been used to transform a number of CD discs sold into a number of listening hours, coming out at 856,172,419.53 hours.

In the case of physical distribution, all CDs distributed by French players were distributed in France (this is not the case for digital distribution). On this basis, the following assumptions were made about the use of terminals:

Breakdown of listening by terminal			Source
computer	%	11	ekodev + Hadopi hypothesis – Les pratiques d’écoute de musique en ligne
Hi-fi stereo	%	48	ekodev + Hadopi hypothesis – Les pratiques d’écoute de musique en ligne
CD player	%	19	ekodev + Hadopi hypothesis – Les pratiques d’écoute de musique en ligne
Car radio + car speakers	%	22	ekodev + Hadopi hypothesis – Les pratiques d’écoute de musique en ligne

Computer market share by volume			Source
Laptop computer	%	59	Windowsreport – Desktop vs laptop market share
Desktop computer	%	41	Canalysis Market Pulse, PC Analysis, July 2023

Breakdown of listening by sound amplifier			Source
Pair of speakers	%	11	ekodev hypothesis
No additional amplifier	%	89	ekodev hypothesis

Lifespan of terminals in hours of use			Source
Laptop computer	hours	4419,43	Ademe – Arcep 2022 + Ademe – Impact de la digitalisation des services culturels
Desktop computer	hours	4419,43	Ademe – Arcep 2022 + Ademe – Impact de la digitalisation des services culturels
Screen	hours	5303,32	Ademe – Arcep 2022 + Ademe – Impact de la digitalisation des services culturels
Classic stereo hi-fi	hours	2739,32	Ademe Arcom Arcep 2024
CD player	hours	3652,43	ekodev – Moyenne des équipements électroniques NégaOctet + ICT Impact study, page 213
Pair of speakers	hours	4382,91	Ademe Arcom Arcep 2024
Car radio	hours	2739,32	Ademe Arcom Arcep 2024
Car speakers	hours	2739,32	Ademe Arcom Arcep 2024

Average terminal power consumption			Source
Laptop computer	watt	25,00	NégaOctet v1.4
Desktop computer	watt	50,00	NégaOctet v1.4
Screen	watt	30,00	NégaOctet v1.4
Classic stereo hi-fi	watt	47,10	ICT *Impact study*, page 100 (considered power = stereo hi-fi "component stereo" in active CD mode)
CD player	watt	10,30	ICT *Impact study*, page 100
Pair of speakers	watt	60,00	Hi-fi stereo equivalent
Car radio	watt	30,00	ekodev hypothesis (2,5 A use intensity) + Kenwood Electronics – Car radio KDC-W3044A
Car speakers	watt	60,00	JVC – 2-way coaxial loudspeakers, 16 cm CS-J620

For car radios and car speakers, the energy consumed comes from the vehicle’s battery, which is recharged indirectly by the vehicle’s fuel consumption. Specific treatment is therefore required, unlike for other terminals which consume electricity directly from the grid.

We have considered a combined engine/alternator efficiency of 30% on average for diesel and petrol vehicles, giving the following emissions for electricity consumption inside the vehicle:

EF used	Unit	Non decomposed
1 kWh of electricity consumed in a thermal vehicle	$kgCO_2e/kWh$	1,037915792
1 kWh of electricity consumed in a thermal vehicle	$kgCO_2e/kWh$	1,037915792

The emission factors for the manufacture and end-of-life of terminals, as well as electricity consumption on the network, are detailed in the “List of emission factors used” section below.

— Impact of physical listening – records

The impacts here include the manufacture and end-of-life of the terminals used for listening to records, as well as their energy consumption. By default, the same assumptions of use as for CDs have been used to transform a number of vinyl records sold into a number of hours of listening.

Total number of listening hours – Records (in hours)	350 583 708,91

In the case of physical distribution, all records distributed by French players were distributed in France (this is not the case for digital distribution). On this basis, the following assumptions were made about the use of terminals:

Lifespan of terminals in hours of use			Source
Turntable	hours	1314,87	ekodev hypothesis based on Hi-fi stereos from the Ademe Study – Impact de la digitalisa-tion des services culturels
Classic stereo hi-fi	hours	2739,32	Arcom-Arcep-Ademe 2024

Average power for terminal use			Source
Turntable	watt	3,20	FNAC – Audio-Technica AT-LP-120XBT-USB Noir
Classic stereo hi-fi	watt	47,10	Ademe – Impact de la digitalisation des services culturels

The emission factors for the manufacture and end-of-life of terminals, as well as electricity consumption on the network, are detailed in the “List of emission factors used” section below.

— Digital distribution impact

Greenhouse gas emissions linked to the manufacture and end-of-life of networks and equipment used to transmit data linked to music recorded on networks are included here.

This includes fixed and mobile networks (for audio and video streaming), FM networks for radio and IPTV and DTT networks for television.

Unlike other modes of listening, data on listening times for music distributed by French players via radio or television are unknown and cannot be easily reconstructed. The interviews revealed that the export of music distributed by French players internationally was relatively low. As a result, listening to music distributed by French players abroad was neglected by default in the study, and listening to music distributed by French players in France was estimated on the basis of listening to music produced in France and listened to in France as monitored by Médiamétrie and the CNM.

Annual French radio audience for music produced in France (in hours)	**6 780 006 363**
Annual audience in France for television clips produced in France (in hours)	**382 211 856**

Here is the total number of audio streams of music distributed by French players listened to in France and abroad following micro analysis of players in the industry:

Data name	**All audio streaming platforms combined** (in numbers of streams)
Data not categorised by country	2 151 883 015,84
France	72 402 195 636,05
South Africa	198 505 478,79
Germany	5 082 210 113,02
Argentina	455 634 715,60
Australia	1 214 676 810,07
Belgium	1 739 393 478,80
Brazil	1 012 284 756,45
Canada	1 831 372 133,54
China	1 227 324 024,53
South Korea	161 231 031,80
Spain	1 061 396 140,66
USA	45 378 069 225,03
India	462 402 002,19
Indonesia	162 644 002,51
Ireland	115 868 617,23
Italy	1 270 295 806,44
Japan	590 220 447,08
Mexico	1 100 826 963,42
Nigeria	57 389 102,16
New Zealand	219 544 334,09
Holland	1 522 391 256,81
Poland	500 225 789,63
UK	13 843 125 475,34
Russia	915 695 361,89
Sweden	1 453 570 135,51
Other countries	6 803 618 853,10
Total number of music listening hours on audio streaming platforms (in hours)	**8 916 110 265,94**

Average length of music listening time on audio streaming platforms (in hours)	0,05472	Source: Statista – *The Shorter the Song, the Sweeter the Stream ?*

Similarly, here is the data for total video streams of music distributed by French players, listened to in France and internationally following micro analysis with players in the industry:

Data name	**All long video streaming platforms combined (YouTube, Dailymotion…)** (in numbers of streams)
Data not categorised by country	984 574 326,80
France	24 952 569 784,84
South Africa	19 118 178,86
Germany	596 771 501,91
Argentina	127 309 812,40
Australia	48 420 416,12
Belgium	1 403 665 866,08
Brazil	314 549 818,35
Canada	326 679 682,68
China	1 159 759,04
South Korea	30 274 265,83
Spain	308 439 558,47
USA	648 998 722,92
India	6 952 253 362,57
Indonesia	70 083 543,02
Ireland	16 826 889,34
Italy	396 878 148,39
Japan	1 339 020 093,35
Mexico	179 747 709,72
Nigeria	5 086 592,52
New Zealand	8 249 620,77
Holland	129 754 157,83
Poland	156 858 620,12
UK	241 420 858,91
Russia	112 290 728,95
Sweden	48 604 633,20
Other countries	6 093 811 123,46
Total number of music listening hours on long video platforms (in hours)	2 490 595 361,66

Data name	All short video platforms combined (TikTok, Instagram, YouTube Shorts...) (in numbers of streams)
Data not categorised by country	77 508 785,77
France	181 205 033 423,10
South Africa	1 366 089 361,82
Germany	7 928 378 393,63
Argentina	3 579 938 900,69
Australia	1 655 101 306,48
Belgium	6 169 837 482,09
Brazil	11 292 437 202,20
Canada	3 516 585 085,22
China	22 347 815 772,37
South Korea	1 212 701 819,96
Spain	7 182 515 553,33
USA	22 630 008 323,00
India	1 645 619 906,92
Indonesia	11 595 009 331,88
Ireland	452 035 925,99
Italy	8 750 915 706,54
Japan	3 368 893,50
Mexico	10 427 795 441,06
Nigeria	1 863 974 694,53
New Zealand	358 142 440,03
Holland	2 238 370 361,83
Poland	2 000 807 461,73
UK	5 770 682 884,67
Russia	4 579 975 445,70
Sweden	1 073 282 663,81
Other countries	145 227 749 752,39
Total number of music listening hours on short video platforms (in hours)	**1 942 298 676,33**

Name of data	Other video platforms (uncategorised)
France	3 483 822 687,54
Total number of music listening hours on other video platforms (in hours)	30 182 666,00
Average length of listening/watching videos on a long video application (YouTube, Dailymotion) (in hours)	**0,05472**
Average length of listening/watching videos on a short video application (TikTok, Reels, Shorts) (in hours)	**0,00417**

From there, aggregated data on the impact of manufacturing and network use were used:

Name of data	Unit	Data	Source
Average music quality on audio platforms	GB/h	0,0720	High sound quality – Spotify: 160 kbit/sec
Average video quality on long video platforms	GB/h	3,000	*Assessment of the energy footprint of digital actions and services* – EUROPEAN COMMISSION – 2023
Average video quality on “Other video platforms (uncatego-rised)”	GB/h	1,795	mix ekodev and *Assessment of the energy footprint of digital actions and services* – Commission européenne – 2023
Average video quality on short video platforms	GB/h	0,250000	*Assessment of the energy footprint of digital actions and services* – Commission européenne – 2023
Audio – Data centre of origin – Electricity consumption	kWh/h	0,000735	Arcom-Arcep-Ademe 2024
Audio – Cache audio servers – Electricity consumption	kWh/GB	0,000431	Arcom-Arcep-Ademe 2024
Video – Data centre of origin and cache video servers – Electricity consumption	kWh/h	0,001300	Arcom-Arcep-Ademe 2024
Radio – FM network (mean scenario) – Electricity consump-tion	kWh/h	0,001908	Arcom-Arcep-Ademe 2024 + Enquête sur la diffusion des technologies de l’information and de la communication dans la société française, Arcom-Arcep-Ademe
TV – IPTV and TNT networks – Electricity consumption	kWh/h	0,023368	Arcom-Arcep-Ademe 2024 + Enquête sur la diffusion des technologies de l’information and de la communication dans la société française, Arcom-Arcep-Ademe
internet – Mobile network – Use	kWh/GB	0,237000	Arcom-Arcep-Ademe 2024
Internet – Fixed network – Use	kWh/GB	0,069561	Arcom-Arcep-Ademe 2024
Internet – Average Network, fixed and mobile – Use	kWh/GB	0,116444	Évaluation de l’impact environnemental du numérique en France et analyse prospective, Ademe Arcep

For units, understand “h” as “hours of music listened to” and “GB” as “GB of music data transferred”. For example, 20 minutes of music on a long video platform transfers 1 GB of data, consuming around 0.43 Wh of electricity for a cache server and an origin server, and 116 Wh of electricity for the fixed and mobile networks.

The energy consumption data for the networks is mainly local, so the energy consumption of the networks and data centres has been transformed into climate impact using the emission factors for the local electricity mix (see “List of emission factors used”, below).

The emissions factors for the manufacture and end-of-life of the various networks are presented in the list of emissions factors used in this appendix, below.

— Audience impact – radio and TV

The same audience data as for digital distribution are used here to estimate the impact of listening.

Annuel French radio audience for music produced in France (in hours)	**6 780 006 363**
Annuel audience in France for music videos produced in France (in hours)	**382 211 856**

For radio, the assumptions for terminal use are as follows:

Breakdown of listening by main terminal			Source
Computer	%	8	Baromètre du numérique 2022
Mobile phone	%	11,9	Médiamétrie – La digitalisation de la radio s’accélère
Car radio + speakers	%	49	Médiamétrie – L’année radio 2023
CD player	%	16	Baromètre du numérique 2022
Tablet	%	8	Baromètre du numérique 2022
Voice command speaker	%	8	Baromètre du numérique 2022

Market share of computers by volume			Source
Laptop computer	%	59	Windowsreport – *Desktop vs laptop market share*
Desktop computer	%	41	Canalysis Market Pulse, *PC Analysis*, july 2023

Breakdown of listening by secondary terminal			Source
Pair of speakers	%	8	ekodev hypothesis
Bluetooth speaker	%	9	ekodev + Hadopi hypothesis – Les pratiques d’écoute de musique en ligne
Classic stereo hi-fi	%	7	ekodev hypothesis
Bluetooth headphones	%	3	ekodev + Gfk hypothesis – Chiffre d’affaires entre écouteurs Bluetooth and arceaux Bluetooth
Bluetooth earphones	%	7	ekodev + Gfk hypothesis – Chiffre d’affaires entre écouteurs Bluetooth and arceaux Bluetooth
No additional terminal	%	67	ekodev hypothesis

Lifespan of terminals in hours of use			Source
Laptop computer	hours	4419,43	Ademe – Impact de la digitalisation des services culturels
Desktop computer	hours	4419,43	Ademe – Impact de la digitalisation des services culturels
Screen	hours	5303,32	Ademe – Impact de la digitalisation des services culturels
Mobile phone	hours	3561,11	Arcom-Arcep-Ademe 2024
Car radio	hours	2739,32	Arcom-Arcep-Ademe 2024
Car speakers	hours	2739,32	Arcom-Arcep-Ademe 2024
CD player	hours	3652,43	ICT Impact study, page 213
Tablet	hours	427,33	Ademe – Arcep 2022
Voice command speaker	hours	7304,85	Arcom-Arcep-Ademe 2024
Pair of speakers	hours	4382,91	Arcom-Arcep-Ademe 2024
Bluetooth speaker	hours	2739,32	Arcom-Arcep-Ademe 2024
Classic stereo hi-fi	hours	2739,32	Arcom-Arcep-Ademe 2024
Bluetooth headphones	hours	2600,00	ekodev calculation
Bluetooth earphones	hours	2600,00	ekodev calculation

Average power used by terminals			Source
Laptop computer	watt	25,00	NégaOctet v1.4
Desktop computer	watt	50,00	NégaOctet v1.4
Screen	watt	30,00	NégaOctet v1.4
Mobile phone	watt	5,60	NégaOctet v1.4
Car radio	watt	30,00	ekodev hypothesis (2,5 A intensity of use) + Kenwood Electronics – Car radio KDC-W3044A
Car speakers	watt	60,00	JVC – 2-way coaxial loudspeakers, 16 cm CS-J620
CD player	watt	10,30	*ICT Impact study*, page 100
Tablet	watt	15,00	NégaOctet 1.4
Voice command speaker	watt	4,20	*ICT Impact study*, page 212
Pair of speakers	watt	60,00	Hi-fi stereo equivalent
Bluetooth speaker	watt	9,20	*ICT Impact study*, page 211
Classic stereo hi-fi	watt	47,10	*ICT Impact study*, page 100 (considered power = hi-fi "component stereo" with active CD mode)
Bluetooth headphones	watt	0,13	*The Climate Impact of the Usage of Headphones and Headsets*, Tayla Herrmann, Anna Zimmerer, Claus Lang-Koetz & Jörg Woidasky, July 2023
Bluetooth earphones	watt	0,13	ekodev hypothesis – headphones equivalent

The emission factors for the manufacture and end-of-life of terminals, as well as electricity consumption on the network, are detailed in the “List of emission factors used” section below.

For TV, the assumptions for the use of terminals are as follows:

Breakdown of listening by main terminal			Source
Television + internet box	%	100	

Breakdown of listening by additional terminal			Source
Pair of speakers	%	30	ekodev hypothesis
No additional terminal	%	70	ekodev hypothesis

Lifespan of terminals in hours of use			Source
Television	hours	11687,76	Arcom-Arcep-Ademe 2024
TV Box	hours	7304,85	Arcom-Arcep-Ademe 2024
Pair of speakers	hours	4382,91	Arcom-Arcep-Ademe 2024

Average power used by terminals			Source
Television	watt	122,00	ekodev estimation from the Ademe study – Impact de la digitalisation des services culturels
TV Box	watt	70,00	ekodev estimation from the Ademe study – Impact de la digitalisation des services culturels
Pair of speakers	watt	60,00	Hi-fi stereo equivalent

The transformation of energy consumption into climate impacts uses the emissions factors given below in these appendices.

— Listening impact – audio streaming

The same data on the number of streams by country and by type as for digital distribution is used here to estimate the impact of listening on the climate, as is the case for the duration of streams.

For audio streaming, the assumptions for terminal use are as follows:

Breakdown of listening by main terminal			Source
Computer	%	34	ekodev + Hadopi hypothesis – Les pratiques d’écoute de musique en ligne
Mobile phone	%	40	ekodev + Hadopi hypothesis – Les pratiques d’écoute de musique en ligne
Tablet	%	16	ekodev + Hadopi hypothesis – Les pratiques d’écoute de musique en ligne
Voice command speaker	%	10	ekodev + Hadopi hypothesis – Les pratiques d’écoute de musique en ligne

Market share of computers by volume			Source
Laptop computer	%	59	Windowsreport – *Desktop vs laptop market share*
Desktop computer	%	41	Canalysis Market Pulse, *PC Analysis,* july 2023

Breakdown of listening by secondary terminal			Source
Pair of speakers	%	7	ekodev + Hadopi hypothesis – Les pratiques d’écoute de musique en ligne
speaker Bluetooth	%	10	ekodev + Hadopi hypothesis – Les pratiques d’écoute de musique en ligne
Classic stereo hi-fi	%	12	ekodev + Hadopi hypothesis – Les pratiques d’écoute de musique en ligne
Bluetooth Headphones	%	10	ekodev + Gfk hypothesis – Chiffre d’affaires entre écouteurs Bluetooth and arceaux Bluetooth
Bluetooth earphones	%	27	ekodev + Gfk hypothesis – Chiffre d’affaires entre écouteurs Bluetooth and arceaux Bluetooth
No other terminal	%	20	ekodev hypothesis
Car radio + speakers	%	14	ekodev + Hadopi hypothesis – Les pratiques d’écoute de musique en ligne

Lifespan of terminals in hours of use			Source
Laptop computer	hours	4419,43	Ademe – Arcep 2022 + Ademe – Impact de la digitalisation des services culturels
Desktop computer	hours	4419,43	Ademe – Arcep 2022 + Ademe – Impact de la digitalisation des services culturels
Screen	hours	5303,32	Ademe – Arcep 2022 + Ademe – Impact de la digitalisation des services culturels
Mobile phone	hours	3561,11	Ademe Arcom Arcep 2024
Tablet	hours	427,33	Ademe – Arcep 2022
Voice command speaker	hours	7304,85	Arcom-Arcep-Ademe 2024
Pair of speakers	hours	4382,91	Ademe Arcom Arcep 2024
Bluetooth speaker	hours	2739,32	Arcom-Arcep-Ademe 2024
Classic stereo hi-fi	hours	2739,32	Ademe Arcom Arcep 2024
Bluetooth headphones	hours	2600,00	*The Climate Impact of the Usage of Headphones and Headsands*, Tayla Herrmann, Anna Zimmerer, Claus Lang-Koetz & Jörg Woidasky, july 2023 + ekodev calculation
Bluetooth earphones	hours	2600,00	ekodev hypothesis + ekodev calculation
Car radio	hours	2739,32	Ademe Arcom Arcep 2024
Car speakers	hours	2739,32	Ademe Arcom Arcep 2024

Average power used by terminals			Source
Laptop computer	watt	25,00	NégaOctet v1.4
Desktop computer	watt	50,00	NégaOctet v1.4
Screen	watt	30,00	NégaOctet v1.4
Mobile phone	watt	5,60	NégaOctet v1.4
Tablet	watt	15,00	NégaOctet v1.4
Voice command speaker	watt	4,20	*ICT Impact study*, page 212
Pair of speakers	watt	60,00	Hi-fi stereo equivalent
Bluetooth speaker	watt	9,20	*ICT Impact study*, page 211
Classic stereo hi-fi	watt	47,10	*ICT Impact study*, page 100 (considered power = "component stereo" hi-fi with active CD mode)
Bluetooth headphones	watt	0,13	*The Climate Impact of the Usage of Headphones and Headsands*, Tayla Herrmann, Anna Zimmerer, Claus Lang-Koetz & Jörg Woidasky, july 2023
Bluetooth earphones	watt	0,13	ekodev hypothesis – headphones equivalent
Car radio	watt	30,00	ekodev hypothesis (2,5 A intensity of use) + Kenwood Electronics – Car radio KDC –W3044A
Car speakers	watt	60,00	JVC – 2-way coaxial loudspeakers, 16 cm CS-J620

The transformation of energy consumption into climate impacts uses the emissions factors given below in these appendices. In particular, electricity depends on the countries concerned, and when energy is consumed in the car (car radio + car speakers), the impact assumptions linked to petrol consumption are detailed in the “Listening impact – radio and TV” section in these appendices.

— Impact of streaming video

The same data on the number of video streams per country and by type as for digital distribution are used here to estimate the impact viewing has on the climate, as is the case for the duration of video streams.

It should be noted that some video streams could not be categorised according to platform type (short or long videos), so an “average” scenario has been created based on the balance of short video/long video viewing times and the data on the impacts of viewing short and long videos.

For video streaming on long video platforms, the assumptions for terminal use are as follows:

Breakdown of listening by main terminal			Source
Computer	%	65	*Share of global YouTube viewing time Q2 2021, by device* – Statista
Mobile phone	%	12	*Share of global YouTube viewing time Q2 2021, by device* – Statista
Tablet	%	8	*Share of global YouTube viewing time Q2 2021, by device* – Statista
Television + internet box	%	14	*Share of global YouTube viewing time Q2 2021, by device* – Statista

Market share of computers by volume			Source
Laptop computer	%	59	Windowsreport – *Desktop vs laptop market share*
Desktop computer	%	41	Canalysis Market Pulse, *PC Analysis*, july 2023

Breakdown of listening by additional terminal			Source
Pair of speakers	%	11	ekodev + Hadopi hypothesis – Les pratiques d’écoute de musique en ligne
Bluetooth speaker	%	10	ekodev + Hadopi hypothesis – Les pratiques d’écoute de musique en ligne
Classic stereo hi-fi	%	4	ekodev + Hadopi hypothesis – Les pratiques d’écoute de musique en ligne
Bluetooth headphones	%	15	ekodev + Gfk hypothesis – Chiffre d’affaires entre écouteurs Bluetooth et arceaux Bluetooth
Bluetooth earphones	%	40	ekodev + Gfk hypothesis – Chiffre d’affaires entre écouteurs Bluetooth et arceaux Bluetooth
No terminal	%	20	ekodev hypothesis

For video streaming on short video platforms, the assumptions for use of the terminals are as follows:

Breakdown of listening by main terminal			Source
Computer	%	5	ekodev hypothesis from field observations and hypotheses about the use of long videos
Mobile phone	%	90	ekodev hypothesis from field observations and hypotheses about the use of long videos
Tablet	%	5	ekodev hypothesis from field observations and hypotheses about the use of long videos

Market share of computers by volume			Source
Laptop computer	%	59	Windowsreport – *Desktop vs laptop market share*
Desktop computer	%	41	Canalysis Market Pulse, *PC Analysis*, july 2023

Breakdown of listening by additional terminal			Source
Pair of speakers	%	7	ekodev + Hadopi hypothesis – Les pratiques d’écoute de musique en ligne
Bluetooth speaker	%	10	ekodev + Hadopi hypothesis – Les pratiques d’écoute de musique en ligne
Bluetooth headphones	%	14	ekodev + Gfk hypothesis – Chiffre d’affaires entre écouteurs Bluetooth et arceaux Bluetooth
Bluetooth earphones	%	39	ekodev + Gfk hypothesis – Chiffre d’affaires entre écouteurs Bluetooth et arceaux Bluetooth
No terminal	%	30	ekodev hypothesis

As for the use of terminals, here are the key assumptions used:

Lifespan of terminals in hours of use			Source
Laptop computer	hours	4419,43	Ademe – Arcep 2022 + Ademe – Impact de la digitalisation des services culturels
Desktop computer	hours	4419,43	Ademe – Arcep 2022 + Ademe – Impact de la digitalisation des services culturels
Screen	hours	5303,32	Ademe – Arcep 2022 + Ademe – Impact de la digitalisation des services culturels
Mobile phone	hours	3561,11	Arcom-Arcep-Ademe 2024
Tablet	hours	427,33	Ademe – Arcep 2022
Television	hours	11687,76	Arcom-Arcep-Ademe 2024
TV Box	hours	7304,85	Arcom-Arcep-Ademe 2024
Pair of speakers	hours	4382,91	Arcom-Arcep-Ademe 2024
Bluetooth speaker	hours	2739,32	Arcom-Arcep-Ademe 2024
Classic stereo hi-fi	hours	2739,32	Arcom-Arcep-Ademe 2024
Bluetooth headphones	hours	2600,00	*The Climate Impact of the Usage of Headphones and Headsets*, Tayla Herrmann, Anna Zimmerer, Claus Lang-Koetz & Jörg Woidasky, july 2023 + ekodev calculation
Bluetooth earphones	hours	2600,00	Hypothèse ekodev + Calcul ekodev

Average power			Source
Laptop computer	watt	25,00	NégaOctet v1.4
Desktop computer	watt	50,00	NégaOctet v1.4
Screen	watt	30,00	NégaOctet v1.4
Mobile phone	watt	5,60	NégaOctet v1.4
Tablet	watt	15,00	NégaOctet v1.4
Television	watt	122,00	ekodev estimation from Ademe study – Impact de la digitalisation des services culturels
TV Box	watt	70,00	ekodev estimation from Ademe study – Impact de la digitalisation des services culturels
Pair of speakers	watt	60,00	Stereo hi-fi equivalent
Bluetooth speaker	watt	9,20	*ICT Impact study*, page 211
Classic stereo hi-fi	watt	47,10	*ICT Impact study*, page 100 (considered power = Hi-fi “stereo component” in active CD mode)
Bluetooth headphones	watt	0,13	*The Climate Impact of the Usage of Headphones and Headsands*, Tayla Herrmann, Anna Zimmerer, Claus Lang-Koetz & Jörg Woidasky, july 2023
Bluetooth earphones	watt	0,13	ekodev hypothesis – headphones equivalent

List of emission factors used

Categories	Name of EF	Item type	Location	Total item not broken down	Unit	Source	Recomposed name
CD	Manufacture of a CD, raw material, kgCO_2e/unit	Raw material and fixed assets		0,200	kgCO_2e/unit	ACV ekodev based on Ademe studies and MPO data, ecoinvent procedure	Manufacture of a CD, raw material kgCO_2e/unit, raw material and fixed assets; kgCO_2e/unit
Records	Manufacture of a record, raw material, kgCO_2e/unit	Raw material and fixed assets		0,797	kgCO_2e/unit	Ademe – ekodev	Manufacture of a record, raw material, kgCO_2e/unit, raw material and fixed assets; kgCO_2e/unit
CD	Manufacture of a CD in France, Energy, kgCO_2e/unit	Energy	France	0,0176	kgCO_2e/unit	Ademe – ekodev	Manufacture of a CD in France, energy, kgCO_2e/unit, energy; kgCO_2e/unit
Records	Manufacture of a record in France, Energy, kgCO_2e/unit	Energy	France	0,545	kgCO_2e/unit	Ademe – ekodev	Manufacture of a record in France, Energy, kgCO_2e/unit, Energy; kgCO_2e/unit
CD	Manufacture of a CD in Germany, Energy, kgCO_2e/unit	Energy	Germany	0,0954	kgCO_2e/unit	Ademe – ekodev	Manufacture of a CD in Germany, energy, kgCO_2e/unit, energy; kgCO_2e/unit
Records	Manufacture of a record in Germany, Energy, kgCO_2e/unit	Energy	Germany	0,660	kgCO_2e/unit	Ademe – ekodev	Manufacture of a record in Germany, energy, kgCO_2e/unit, energy; kgCO_2e/unit
CD	Manufacture of a CD elsewhere in Europe, Energy, kgCO_2e/unit	Energy	Europe	0,0682	kgCO_2e/unit	Ademe – ekodev	Manufacture of a CD elsewhere in Europe, energy, kgCO_2e/unit, energy; kgCO_2e/unit
Records	Manufacture of a record elsewhere in Europe, Energy, kgCO_2e/unit	Energy	Europe	0,655	kgCO_2e/unit	Ademe – ekodev	Manufacture of a record elsewhere in Europe, energy, kgCO_2e/unit, energy; kgCO_2e/unit
CD	End-of-life of a CD, kgCO_2e/unit			0,143	kgCO_2e/unit	Ademe – ekodev	End-of-life of a CD, kgCO_2e/unit; kgCO_2e/unit
Records	End-of-life of a record, kgCO_2e/unit			0,547	kgCO_2e/unit	Ademe – ekodev	End-of-life of a record, kgCO_2e/unit; kgCO_2e/unit

Categories	Name of EF	Item type	Location	Total item not broken down	Unit	Source	Recomposed name
Hotel	Overnight stay in hotel including breakfast, France continentale, NosGestesClimat		France	9,91	$kgCO_2e$/nigh	NosGestesClimat	Overnight stay in hotel including breakfast, NosGestesClimat; $kgCO_2e$/night
Van	Minibus or van, France continentale, ekodev methodology from Ademe data	total not broken down	France	0,311	$kgCO_2e$/km	ekodev – Ademe	Minibus or van, France continentale, ekodev methodology from Ademe data, total not broken down; $kgCO_2e$/km
Van	Minibus or van, France continentale, ekodev methodology from Ademe data	Manufacture	France	0,0580	$kgCO_2e$/km	ekodev – Ademe	Minibus or van, France continentale, ekodev methodology from Ademe data, manufacture; $kgCO_2e$/km
Van	Minibus or van, France continentale, ekodev methodology from Ademe data	Upstream	France	0,0490	$kgCO_2e$/km	ekodev – Ademe	Minibus or van, France continentale, ekodev methodology from Ademe data, upstream; $kgCO_2e$/km
Van	Minibus or van, France continentale, ekodev methodology from Ademe data	Combustion	France	0,203	$kgCO_2e$/km	ekodev – Ademe	Minibus or van, France continentale, ekodev methodology from Ademe data, combustion; $kgCO_2e$/km
Sound card	Sound card	Manufacture + end-of-life		58,6	$kgCO_2e$/unit	ekodev	Sound card, manufacture + end-of-life; $kgCO_2e$/unit
Headphones	Headphones Blue-tooth, ACV Jabra Evolve2 85 head-phones	Manufacture + end-of-life		12,0	$kgCO_2e$/unit	*The Climate Impact of the Usage of Headphones and Headsands*, Tayla Herrmann, Anna Zimmerer, Claus Lang-Koetz & Jörg Woidasky, july 2023	Bluetooth headphones, based on ACV Jabra Evolve2 85 headphones; Manufacture + end-of-life; $kgCO_2e$/unit
Earphones	Bluetooth earphones, ACV Jabra Evolve2 85 earphones	Manufacture + end-of-life		2,79	$kgCO_2e$/unit	ekodev, *The Climate Impact of the Usage of Headphones and Headsands*, Tayla Herrmann, Anna Zimmerer, Claus Lang-Koetz & Jörg Woidasky, july 2023	Bluetooth earphones, based on ACV Jabra Evolve2 85 earphones; manufacture + end-of-life; $kgCO_2e$/unit
Microphone	Microphone	Manufacture + end-of-life		40,0	$kgCO_2e$/unit	ekodev	Microphone, manufacture + end-of-life; $kgCO_2e$/unit
Midi controller	Midi controller	Manufacture + end-of-life		150,6	$kgCO_2e$/unit	ekodev	Midi controller, manufacture + end-of-life; $kgCO_2e$/unit
Classic stereo hi-fi	Classic stereo hi-fi	Manufacture + end-of-life		159,9	$kgCO_2e$/unit	ekodev, Ademe	Classic stereo hi-fi, manufacture + end-of-life; $kgCO_2e$/unit

Categories	Name of EF	Item type	Location	Total item not broken down	Unit	Source	Recomposed name
Bluetooth speaker	Bluetooth speaker	Manufacture + end-of-life		20,5	kgCO_2e/unit	ekodev, Ademe	Bluetooth speaker, manufacture + end-of-life; kgCO_2e/unit
Turntable	Turntable	Manufacture + end-of-life		197	kgCO_2e/unit	ekodev	Turntable, manufacture + end-of-life; kgCO_2e/unit
Laptop computer	Laptop computer	Manufacture + end-of-life		185	kgCO_2e/unit	ekodev, Ademe	Laptop computer, manufacture + end-of-life; kgCO_2e/unit
Desktop computer	Desktop computer	Manufacture + end-of-life		181	kgCO_2e/unit	ekodev, Ademe	Desktop computer, manufacture + end-of-life; kgCO_2e/unit
Screen	Screen, 21,5 inch	Manufacture + end-of-life		232	kgCO_2e/unit	ekodev, Ademe	Screen, 21,5 inch, manufacture + end-of-life; kgCO_2e/unit
Mobile phone	Classic smartphone	Manufacture + end-of-life		79,5	kgCO_2e/unit	ekodev, Ademe	Classic smartphone, manufacture + end-of-life; kgCO_2e/unit
CD player	CD player	Manufacture + end-of-life		57,7	kgCO_2e/unit	ekodev	CD player, manufacture + end-of-life; kgCO_2e/unit
Tablet	Classic tablet, 9 to 11 inch	Manufacture + end-of-life		84,4	kgCO_2e/unit	ekodev, Ademe	Classic tablet, 9 to 11 inch, manufacture + end-of-life; kgCO_2e/unit
Television	Television, 40-49 inch	Manufacture + end-of-life		341	kgCO_2e/unit	ekodev, Ademe	Television, 40-49 inch, manufacture + end-of-life; kgCO_2e/unit
Box TV	TV Box (decoder equivalent)	Manufacture + end-of-life		63,0	kgCO_2e/unit	ekodev, Ademe	TV Box (decoder equivalent), manufacture + end-of-life; kgCO_2e/unit
Car radio	Car radio	Manufacture + end-of-life		43,2	kgCO_2e/unit	ekodev	Car radio, manufacture + end-of-life; kgCO_2e/unit
Car speakers	Car speakers	Manufacture + end-of-life		23,2	kgCO_2e/unit	ekodev	Car speakers manufacture + end-of-life; kgCO_2e/unit
Voice command speaker	Voice command speaker	Manufacture + end-of-life		20,5	kgCO_2e/unit	ekodev, Ademe	Voice command speaker, manufac-ture + end-of-life; kgCO_2e/unit
Pair of speakers	Pair of speakers (sound bar equiva-lent)	Manufacture + end-of-life		44,2	kgCO_2e/unit	ekodev, Ademe	Pair of speakers (sound bar equiva-lent), manufacture + end-of-life; kgCO_2e/unit
Snack	Snack			0,648	kgCO_2e/unit	ekodev	Snack; kgCO_2e/unit
Electricity from a vehicle	1 kWh of electricity used in a thermal vehicle	Upstream	Europe	0,182	kgCO_2e/kWh	ekodev	1 kWh of electricity used in a thermal vehicle, upstream; kgCO_2e/kWh
Electricity from a vehicle	1 kWh of electricity used in a thermal vehicle	Combustion	Europe	0,856	kgCO_2e/kWh	ekodev	1 kWh of electricity used in a thermal vehicle, combustion; kgCO_2e/kWh

Categories	Name of EF	Item type	Location	Total item not broken down	Unit	Source	Recomposed name
Electricity South Africa	Electricity, IEA – combustion, South Africa	Combustion	South Africa	0,932	$kgCO_2e/kWh$	IEA	Electricity, IEA – combustion, South Africa, combustion; $kgCO_2e/kWh$
Electricity South Africa	Electricity, IEA – Upstream and losses, South Africa	Upstream and losses	South Africa	0,140	$kgCO_2e/kWh$	IEA	Electricity, IEA – Upstream and losses, South Africa, upstream and losses; $kgCO_2e/kWh$
Electricity Germany	Electricity, IEA – combustion, Germany	Combustion	Germany	0,345	$kgCO_2e/kWh$	IEA	Electricity, IEA – combustion, Germany, combustion; $kgCO_2e/kWh$
Electricity Germany	Electricity, IEA – Upstream and losses, Germany	Upstream and losses	Germany	0,0889	$kgCO_2e/kWh$	IEA	Electricity, IEA – Upstream and losses, Germany, upstream and losses; $kgCO_2e/kWh$
Electricity Argentina	Electricity, IEA – combustion, Argentina	Combustion	Argentina	0,287	$kgCO_2e/kWh$	IEA	Electricity, IEA – combustion, Argentina, combustion; $kgCO_2e/kWh$
Electricity Argentina	Electricity, IEA – Upstream and losses, Argentina	Upstream and losses	Argentina	0,113	$kgCO_2e/kWh$	IEA	Electricity, IEA – Upstream and losses, Argentina, upstream and losses; $kgCO_2e/kWh$
Electricity Australia	Electricity, IEA – combustion, Australia	Combustion	Australia	0,685	$kgCO_2e/kWh$	IEA	Electricity, IEA – combustion, Australia, combustion; $kgCO_2e/kWh$
Electricity Australia	Electricity, IEA – Upstream and losses, Australia	Upstream and losses	Australia	0,0974	$kgCO_2e/kWh$	IEA	Electricity, IEA – Upstream and losses, Australia, upstream and losses; $kgCO_2e/kWh$
Electricity Belgium	Electricity, IEA – combustion, Belgium	Combustion	Belgium	0,165	$kgCO_2e/kWh$	IEA	Electricity, IEA – combustion, Belgium, combustion; $kgCO_2e/kWh$
Electricity Belgium	Electricity, IEA – Upstream and losses, Belgium	Upstream and losses	Belgium	0,0710	$kgCO_2e/kWh$	IEA	Electricity, IEA – Upstream and losses, Belgium, upstream and losses; $kgCO_2e/kWh$
Electricity Brazil	Electricity, IEA – combustion, Brazil	Combustion	Brazil	0,104	$kgCO_2e/kWh$	IEA	Electricity, IEA – combustion, Brazil, combustion; $kgCO_2e/kWh$
Electricity Brazil	Electricity, IEA – Upstream and losses, Brazil	Upstream and losses	Brazil	0,0695	$kgCO_2e/kWh$	IEA	Electricity, IEA – Upstream and losses, Brazil, upstream and losses; $kgCO_2e/kWh$
Electricity Canada	Electricity, IEA – combustion, Canada	Combustion	Canada	0,129	$kgCO_2e/kWh$	IEA	Electricity, IEA – combustion, Canada, combustion; $kgCO_2e/kWh$
Electricity Canada	Electricity, IEA – Upstream and losses, Canada	Upstream and losses	Canada	0,0412	$kgCO_2e/kWh$	IEA	Electricity, IEA – Upstream and losses, Canada, upstream and losses; $kgCO_2e/kWh$
Electricity China	Electricity, IEA – combustion, China	Combustion	China	0,622	$kgCO_2e/kWh$	IEA	Electricity, IEA – combustion, China, combustion; $kgCO_2e/kWh$
Electricity China	Electricity, IEA – Upstream and losses, China	Upstream and losses	China	0,0803	$kgCO_2e/kWh$	IEA	Electricity, IEA – Upstream and losses, China, upstream and losses; $kgCO_2e/kWh$

Categories	Name of EF	Item type	Location	Total item not broken down	Unit	Source	Recomposed name
Electricity South Korea	Electricity, IEA – combustion, South Korea	Combustion	South Korea	0,515	$kgCO_2e/kWh$	IEA	Electricity, IEA – combustion, South Korea, combustion; $kgCO_2e/kWh$
Electricity South Korea	Electricity, IEA – Upstream and losses, South Korea	Upstream and losses	South Korea	0,0772	$kgCO_2e/kWh$	IEA	Electricity, IEA – Upstream and losses, South Korea, upstream and losses; $kgCO_2e/kWh$
Electricity Spain	Electricity, IEA – combustion, Spain	Combustion	Spain	0,198	$kgCO_2e/kWh$	IEA	Electricity, IEA – combustion, Spain, combustion; $kgCO_2e/kWh$
Electricity Spain	Electricity, IEA – Upstream and losses, Spain	Upstream and losses	Spain	0,0733	$kgCO_2e/kWh$	IEA	Electricity, IEA – Upstream and losses, Spain, upstream and losses; $kgCO_2e/kWh$
Electricity USA	Electricity, IEA – combustion, USA	Combustion	USA	0,382	$kgCO_2e/kWh$	IEA	Electricity, IEA – combustion, USA, combustion; $kgCO_2e/kWh$
Electricity USA	Electricity, IEA – Upstream and losses, USA	Upstream and losses	USA	0,0841	$kgCO_2e/kWh$	IEA	Electricity, IEA – Upstream and losses, USA, upstream and losses; $kgCO_2e/kWh$
Electricity France	Electricity, IEA – combustion, France	Combustion	France	0,0418	$kgCO_2e/kWh$	IEA	Electricity, IEA – combustion, France, combustion; $kgCO_2e/kWh$
Electricity France	Electricity, IEA – Upstream and losses, France	Upstream and losses	France	0,0189	$kgCO_2e/kWh$	IEA	Electricity, IEA – Upstream and losses, France, upstream and losses; $kgCO_2e/kWh$
Electricity India	Electricity, IEA – combustion, India	Combustion	India	0,722	$kgCO_2e/kWh$	IEA	Electricity, IEA – combustion, India, combustion; $kgCO_2e/kWh$
Electricity India	Electricity, IEA – Upstream and losses, India	Upstream and losses	India	0,186	$kgCO_2e/kWh$	IEA	Electricity, IEA – Upstream and losses, India, upstream and losses; $kgCO_2e/kWh$
Electricity Indonesia	Electricity, IEA – combustion, Indonesia	Combustion	Indonesia	0,762	$kgCO_2e/kWh$	IEA	Electricity, IEA – combustion, Indonesia, combustion; $kgCO_2e/kWh$
Electricity Indonesia	Electricity, IEA – Upstream and losses, Indonesia	Upstream and losses	Indonesia	0,139	$kgCO_2e/kWh$	IEA	Electricity, IEA – Upstream and losses, Indonesia, upstream and losses; $kgCO_2e/kWh$
Electricity Ireland	Electricity, IEA – combustion, Ireland	Combustion	Ireland	0,294	$kgCO_2e/kWh$	IEA	Electricity, IEA – combustion, Ireland, combustion; $kgCO_2e/kWh$
Electricity Ireland	Electricity, IEA – Upstream and losses, Ireland	Upstream and losses	Ireland	0,0959	$kgCO_2e/kWh$	IEA	Electricity, IEA – Upstream and losses, Ireland, upstream and losses; $kgCO_2e/kWh$
Electricity Italy	Electricity, IEA – combustion, Italy	Combustion	Italy	0,285	$kgCO_2e/kWh$	IEA	Electricity, IEA – combustion, Italy, combustion; $kgCO_2e/kWh$
Electricity Italy	Electricity, IEA – Upstream and losses, Italy	Upstream and losses	Italy	0,102	$kgCO_2e/kWh$	IEA	Electricity, IEA – Upstream and losses, Italy, upstream and losses; $kgCO_2e/kWh$

Categories	Name of EF	Item type	Location	Total item not broken down	Unit	Source	Recomposed name
Electricity Japan	Electricity, IEA – combustion, Japan	Combustion	Japan	0,487	$kgCO_2e/kWh$	IEA	Electricity, IEA – combustion, Japan, combustion; $kgCO_2e/kWh$
Electricity Japan	Electricity, IEA – Upstream and losses, Japan	Upstream and losses	Japan	0,0974	$kgCO_2e/kWh$	IEA	Electricity, IEA – Upstream and losses, Japan, upstream and losses; $kgCO_2e/kWh$
Electricity Mexico	Electricity, IEA – combustion, Mexico	Combustion	Mexico	0,397	$kgCO_2e/kWh$	IEA	Electricity, IEA – combustion, Mexico, combustion; $kgCO_2e/kWh$
Electricity Mexico	Electricity, IEA – Upstream and losses, Mexico	Upstream and losses	Mexico	0,125	$kgCO_2e/kWh$	IEA	Electricity, IEA – Upstream and losses, Mexico, upstream and losses; $kgCO_2e/kWh$
Electricity World	Electricity, IEA – combustion, World	Combustion	World	0,475	$kgCO_2e/kWh$	IEA	Electricity, IEA – combustion, World, combustion; $kgCO_2e/kWh$
Electricity World	Electricity, IEA – Upstream and losses, World	Upstream and losses	World	0,0964	$kgCO_2e/kWh$	IEA	Electricity, IEA – Upstream and losses, World, upstream and losses; $kgCO_2e/kWh$
Electricity Nigeria	Electricity, IEA – combustion, Nigeria	Combustion	Nigeria	0,410	$kgCO_2e/kWh$	IEA	Electricity, IEA – combustion, Nigeria, combustion ; $kgCO_2e/kWh$
Electricity Nigeria	Electricity, IEA – Upstream and losses, Nigeria	Upstream and losses	Nigeria	0,140	$kgCO_2e/kWh$	IEA	Electricity, IEA – Upstream and losses, Nigeria, upstream and losses; $kgCO_2e/kWh$
Electricity New Zealand	Electricity, IEA – combustion, New Zealand	Combustion	New Zealand	0,122	$kgCO_2e/kWh$	IEA	Electricity, IEA – combustion, New Zealand, combustion; $kgCO_2e/kWh$
Electricity New Zealand	Electricity, IEA – Upstream and losses, New Zealand	Upstream and losses	New Zealand	0,0470	$kgCO_2e/kWh$	IEA	Electricity, IEA – Upstream and losses, New Zealand, upstream and losses; $kgCO_2e/kWh$
Electricity Holland	Electricity, IEA – combustion, Holland	Combustion	Holland	0,368	$kgCO_2e/kWh$	IEA	Electricity, IEA – combustion, Holland, combustion; $kgCO_2e/kWh$
Electricity Holland	Electricity, IEA – Upstream and losses, Holland	Upstream and losses	Holland	0,109	$kgCO_2e/kWh$	IEA	Electricity, IEA – Upstream and losses, Holland, upstream and losses; $kgCO_2e/kWh$
Electricity Poland	Electricity, IEA – combustion, Poland	Combustion	Poland	0,665	$kgCO_2e/kWh$	IEA	Electricity, IEA – combustion, Poland, combustion; $kgCO_2e/kWh$
Electricity Poland	Electricity, IEA – Upstream and losses, Poland	Upstream and losses	Poland	0,103	$kgCO_2e/kWh$	IEA	Electricity, IEA – Upstream and losses, Poland, upstream and losses; $kgCO_2e/kWh$
Electricity UK	Electricity, IEA – combustion, UK	Combustion	UK	0,208	$kgCO_2e/kWh$	IEA	Electricity, IEA – combustion, UK, combustion ; $kgCO_2e/kWh$
Electricity UK	Electricity, IEA – Upstream and losses, UK	Upstream and losses	UK	0,108	$kgCO_2e/kWh$	IEA	Electricity, IEA – Upstream and losses, UK, Upstream and losses; $kgCO_2e/kWh$

Categories	Name of EF	Item type	Location	Total item not broken down	Unit	Source	Recomposed name
Electricity Russia	Electricity, IEA – combustion, Russia	Combustion	Russia	0,374	$kgCO_2e/kWh$	IEA	Electricity, IEA – combustion, Russia, combustion; $kgCO_2e/kWh$
Electricity Russia	Electricity, IEA – Upstream and losses, Russia	Upstream and losses	Russia	0,0955	$kgCO_2e/kWh$	IEA	Electricity, IEA – upstream and losses; $kgCO_2e/kWh$
Electricity Sweden	Electricity, IEA – combustion, Sweden	Combustion	Sweden	0,0127	$kgCO_2e/kWh$	IEA	Electricity, IEA – combustion, Sweden, combustion; $kgCO_2e/kWh$
Electricity Sweden	Electricity, IEA – upstream and losses, Sweden	Upstream and losses	Sweden	0,0494	$kgCO_2e/kWh$	IEA	Electricity, IEA – Upstream and losses, Sweden, upstream and losses; $kgCO_2e/kWh$
Electricity All countries combined	Electricity, IEA – combustion,	Combustion	All countries combined	0,381	$kgCO_2e/kWh$	ekodev, IEA	Electricity, IEA – combustion, all countries combined, combustion; $kgCO_2e/kWh$
Electricity All countries combined	Electricity, IEA – Upstream and losses, all countries combined	Upstream and losses	All countries combined	0,0941	$kgCO_2e/kWh$	ekodev, IEA	Electricity, IEA – Upstream and losses, all countries combined, upstream and losses; $kgCO_2e/kWh$
TNT Network	TNT network – Manufacture + transport	Manufacture + transport		0,000754	$kgCO_2e/h$	I care study Arcom-Arcep-Ademe 2024	TNT network – manufacture + transport, manufacture + transport; $kgCO_2e/h$
TNT Network	TNT network – end-of-life	End-of-life		0,000000572	$kgCO_2e/h$	I care study Arcom-Arcep-Ademe 2024	TNT network – end-of-life, end-of-life; $kgCO_2e/h$
IPTV Network	IPTV network – Manufacture + transport	Manufacture + transport		0,00211	$kgCO_2e/h$	I care study Arcom-Arcep-Ademe 2024	IPTV network – manufacture + transport, manufacture + transport; $kgCO_2e/h$
IPTV Network	IPTV network – end-of-life	End-of-life		–	$kgCO_2e/h$	I care study Arcom-Arcep-Ademe 2024	IPTV network – end-of-life, end-of-life; $kgCO_2e/h$
Cache audio servers	Cache audio servers – carbon impact of manufacture and transport	Manufacture + transport		0,000259	$kgCO_2e/Go$	I care study Arcom-Arcep-Ademe 2024	Cache audio servers – carbon impact of Manufacture and transport, manufacture + transport; $kgCO_2e/Go$
Cache audio servers	Cache audio servers – carbon impact of end-of-life	End-of-life		0,00000807	$kgCO_2e/Go$	I care study Arcom-Arcep-Ademe 2024	Cache audio servers – carbon impact of end-of-life, end-of-life; $kgCO_2e/Go$
Data centre of origin	Data centre of origin – carbon impact of manufacture and transport	Manufacture + transport		0,000207	$kgCO_2e/h$	I care study Arcom-Arcep-Ademe 2024	Data centre of origin – carbon impact of Manufacture and transport, manufacture + transport; $kgCO_2e/h$
Data centre of origin	Data centre of origin – carbon impact of end-of-life	End-of-life		0,00000476	$kgCO_2e/h$	I care study Arcom-Arcep-Ademe 2024	Data centre of origin – carbon impact of end-of-life, end-of-life; $kgCO_2e/h$
Cache video servers	Cache video servers – carbon impact of manufacture and transport	Manufacture + transport		0,000259	$kgCO_2e/Go$	I care study Arcom-Arcep-Ademe 2024	Cache video servers – carbon impact of manufacture and transport, manufacture + transport; $kgCO_2e/Go$

Categories	Name of EF	Item type	Location	Total item not broken down	Unit	Source	Recomposed name
Cache video servers	Cache video servers – impact carbone de la end-of-life	End-of-life		0,00000807	$kgCO_2e/Go$	I care study Arcom-Arcep-Ademe 2024	Cache video servers – carbon impact of end-of-life, end-of-life; $kgCO_2e/Go$
FM Network – mean scenario	FM network – mean scenario – carbon impact of manufacture and transport	Manufacture + transport		0,000122	$kgCO_2e/h$	I care study Arcom-Arcep-Ademe 2024	Network FM – mean scenario – carbon impact of manufacture and transport, manufacture + transport; $kgCO_2e/h$
FM Network – mean scenario	Network FM – mean scenario – carbon impact of end-of-life	End-of-life		0,000000172	$kgCO_2e/h$	I care study Arcom-Arcep-Ademe 2024	FM Network – mean scenario – carbon impact of end-of-life, end-of-life; $kgCO_2e/h$
Average television network	Average television network – manufacture + transport	Manufacture + transport		0,00165	$kgCO_2e/h$	I care study + Enquête sur la diffusion des technologies de l’information et de la communication dans la société française, Arcom-Arcep-Ademe	Average television network – manufacture + transport, manufacture + transport; $kgCO_2e/h$
Average television network	Average television network – manufacture + transport	End-of-life		0,000000195	$kgCO_2e/h$	I care study + Enquête sur la diffusion des technologies de l’information et de la communication dans la société française, Arcom-Arcep-Ademe	Average television network – manufacture + transport, end-of-life; $kgCO_2e/h$
Mobile internet network	Mobile internet network – manufacture + transport + end-of-life	Manufacture + transport + end-of-life		0,00892	$kgCO_2e/Go$	Synthèse Ademe Arcep 2022	Mobile internet network – manufacture + transport + end-of-life, Manufacture + transport + end-of-life; $kgCO_2e/Go$
Fixed internet network	Fixed internet network – manufacture + transport + end-of-life	Manufacture + transport + end-of-life		0,00468	$kgCO_2e/Go$	Synthèse Ademe Arcep 2022	Fixed internet network – manufacture + transport + end-of-life, manufacture + transport + end-of-life; $kgCO_2e/Go$
Average internet network	Average internet network – manufacture + transport + end-of-life	Manufacture + transport + end-of-life		0,00587	$kgCO_2e/Go$	Synthèse Ademe Arcep 2022	Average internet network – manufacture + transport + end-of-life, manufacture + transport + end-of-life; $kgCO_2e/Go$
Video origin data centre	Video origin data centre – carbon impact of manufacture and transport	Manufacture + transport		0,000116	$kgCO_2e/h$	I care study Arcom-Arcep-Ademe Study, 2024	Video origin data centre – carbon impact of manufacture and transport, manufacture + transport; $kgCO_2e/h$
Video origin data centre	Video origin data centre – end-of-life carbon impact	End-of-life		0,00000420	$kgCO_2e/h$	I care study Arcom-Arcep-Ademe Study, 2024	Video origin data centre – carbon impact of end-of-life, end-of-life; $kgCO_2e/h$

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