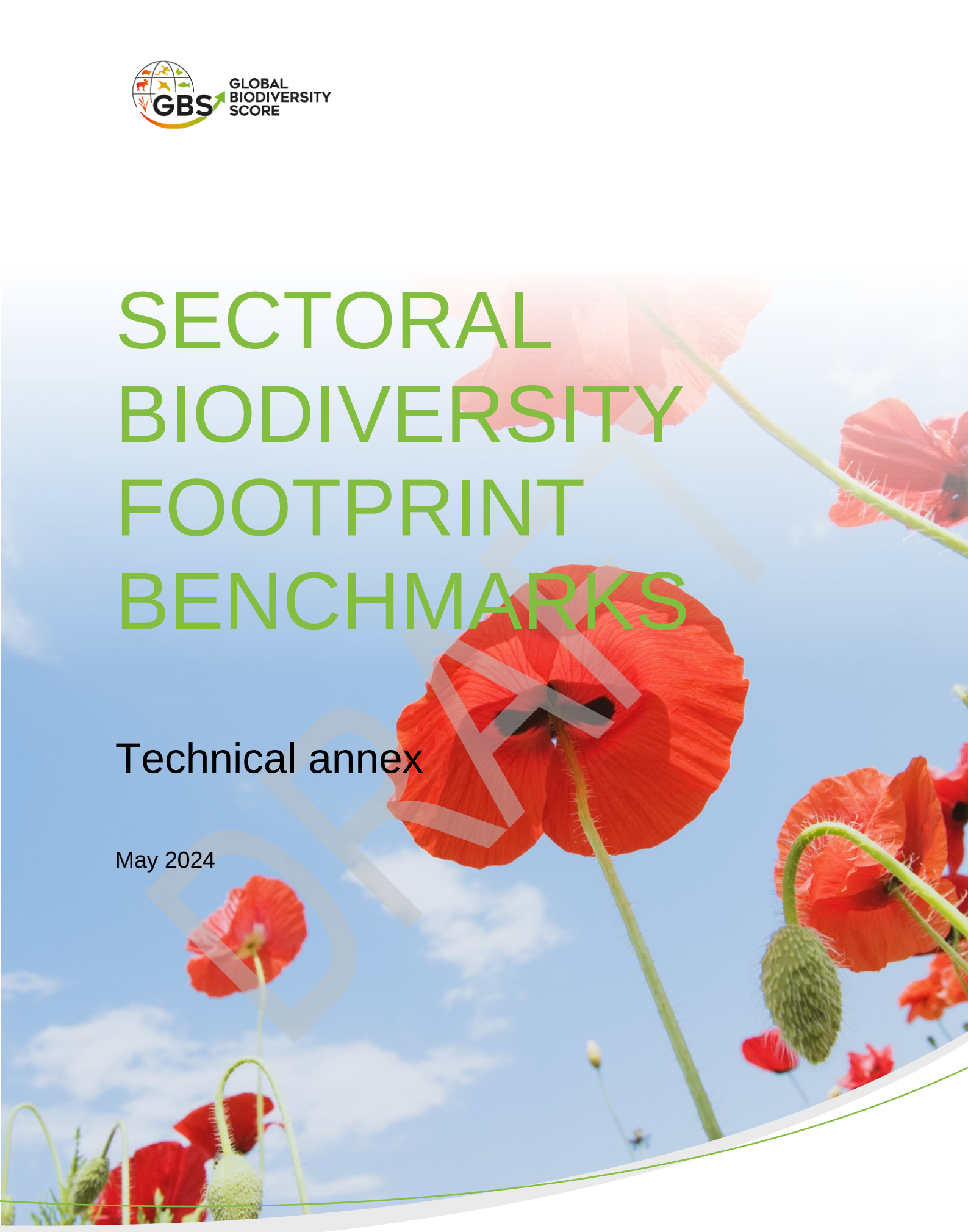
GLOBAL BIODIVERSITY SCORE

SECTORAL BIODIVERSITY FOOTPRINT BENCHMARKS

Technical annex

May 2024



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Version
Sectoral biodiversity footprint benchmarks – Technical annex. Version 1.3, April 2022.

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Citation
CDC Biodiversité, 2022. *Sectoral biodiversity footprint benchmarks - Technical annex*

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Thanks to
The Biodiversity Footprint Department of CDC Biodiversité, especially Sibylle Rouet Pollakis, Rose Choukroun, Manon Bézard, Violette Pradère, Elisa Magueur, João Pereira Da Fonseca, Amandine Kemmel (CDC Biodiversité)
Alison Jones, Tim Polaszek, Justine Saunders (Capitals Coalition)
Katie Leach and Sebastian Bekker (ENCORE)
Paul Chatelain, Pierre Andrieux, Camille Wojcik, Nicolas Graves, Yasser Labchiri, Mohammed Benchekroun (Ponts Engineering School)
All the participants to the consultation process and the webinars. Many thanks to the proofreaders from the following entities: Schneider Electric, TBC, Noé, Biodiv'Corp, Generali Global Infrastructure, Icade, EDF, GRTgaz, Vattenfall, Engie.

More information
About the GBS: https://www.cdc-biodiversite.fr/le-global-biodiversity-score/
Benchmark factsheets: https://www.mission-economie-biodiversite.com/actualites/fiches-benchmark-benchmark-factsheets
Agriculture and Agrifood factsheet: https://www.cdc-biodiversite.fr/wp-content/uploads/2022/04/Fiche-benchmark-Secteur-Agriculture-et-agroalimentaire.pdf
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Energy factsheet: https://www.cdc-biodiversite.fr/wp-content/uploads/2024/01/20231020_factsheet_energy_v6.pdf

Raw materials extraction factsheet: https://www.cdc-biodiversite.fr/wp-content/uploads/2024/01/20230302_Fiche-benchmark-Secteur-Extraction-des-matieres-premieres-draft.pdf
Manufacture of metals factsheet: https://www.cdc-biodiversite.fr/wp-content/uploads/2024/01/20230823_factsheet_Metals-processing_V7.pdf
Manufacturing factsheet: https://www.cdc-biodiversite.fr/wp-content/uploads/2024/01/20230811_factsheet_manufacturing_v5.pdf

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1 General technical elements

1.1 Purpose of the different benchmark documents and how to use them

A THE BENCHMARK FACTSHEETS

The factsheets are short 4-page documents condensing information on a sector's biodiversity performance. They provide information on the sector's current contribution to biodiversity loss, its performance, how it compares to other sectors, how it will be affected by biodiversity loss and what possible actions can be taken to reduce its impacts on biodiversity. The factsheets can be found on CDC Biodiversité's website: https://www.cdc-biodiversite.fr/documentation/

The factsheets also provide detailed information on the sectors' impacts on biodiversity, through breakdowns of the impact by both Scope and pressures and by subsectors when relevant. NACE codes and sectors descriptions displayed in the first section provide information on the activities covered by the factsheet and its perimeter.

Factsheets should be used by companies as a first rough assessment of their impact on biodiversity as part of a given sector. Once they have evaluated their own impact with more precise and specific data, factsheets should be used by companies to assess their performance relatively to their sectors. However, environmental safeguards should be kept in mind during the assessment.

It is important to understand that the sector average given in the factsheet is the overall performance of all the sub-sectors included in the factsheet. For instance, the figures presented in the factsheet "Agriculture and Agrifood" represent the impact caused by the EXIOBASE[1] industry groups Manufacture of food products, Manufacture of beverages, Crop and animal production, as well as Hunting and other related service activities. Impact expressed in MSA.km²/t of raw material may be provided for some sectors. They are calculated as explained in the section Methods.

When reading a factsheet, two other documents can be consulted: the factsheet reading guide and the technical annex (this document). These are detailed below.

[1] See (CDC Biodiversité 2019a) for a description of the EXIOBASE database. The current version of the GBS (1.4.1) uses EXIOBASE 3.8.1

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B THE FACTSHEET READING GUIDE

The factsheet reading guide explains the structure of the factsheets, and provides:

- The main contents of the benchmark factsheets.
- Necessary elements to know how to read the factsheets for readers with limited knowledge about the Global Biodiversity Score.
- Elements of definition, such as pressures, Scopes, or metrics.

C THE TECHNICAL ANNEX (THIS DOCUMENT)

This technical annex provides methodological elements to understand how the sectoral benchmark factsheets are built and how computations and charts are obtained. It also provides additional content that could not be included in the factsheet due to space constraints. Such additional content relates to the perimeter of each factsheet, more detailed results and charts, methodology explanation, as well as guidance on how to read and use the factsheets.

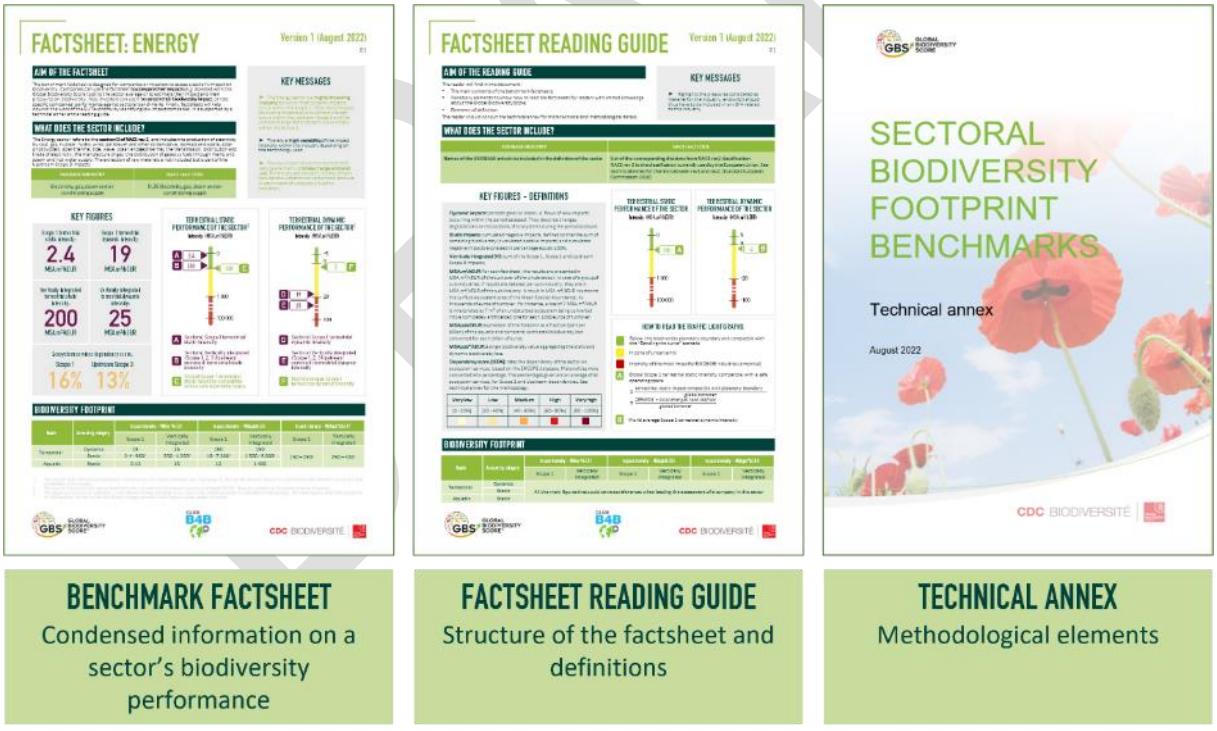

Figure 1: The three benchmark documents

1.2 Required features of the factsheets

The factsheets are intended to be a first lever for companies and sectors to assess and understand their impacts on biodiversity and to implement strategies to achieve biodiversity gains. The specifications required to do so and to ensure that they empower companies and financial institutions to reverse their impact on biodiversity are presented below.

Factsheets are addressed to different types of readers and aim to be useful to all of them. They were thus designed to provide information to both potential users, namely companies and financial institutions, and other potential stakeholders such as consultants, NGOs, public authorities, etc.

Feature	Solution
Relevant aggregation of industries into summary sheets (see section 2.1)	- 13 factsheets: which can be drafted under a reasonable time (about 12-24 months) - Inclusion of the priority sectors of the French National Biodiversity Plan - Repartition of the EXIOBASE sectors based partly on their location within the value chain → activities with similar characteristics are grouped together. This is to ensure that all industries included in a factsheet have impact values that are within the same range. - Links with NACE codes to ensure the consistency of the repartition, the coverage of the whole economy and to help companies to position themselves - When aggregating impacts from multiple industries, averages are weighted by the turnover of each industry.
Representative	- All the sectors are covered and results by industry within each sector are also provided.
Easy communication and interpretation	- Choice of the MSA.m²/kEUR of turnover: same unit as in GBS assessments. Enables the comparison of different sectors for the same amount of turnover. Visual: biodiversity impacts are expressed as the surface area of undisturbed ecosystem artificialized due to the production of EUR 1000 of turnover. - Graphs and maps - Results in MSAppb[2]/bEUR to facilitate comparison of the impacts on terrestrial and aquatic biodiversity. - Display of the aggregated score used by financial institutions.
Scientifically robust	- The factsheets are based on a peer reviewed tool: the GBS (CDC Biodiversité 2020d; 2020e; 2020b; 2020a; 2020f; 2020e) - The factsheets are reviewed by relevant stakeholders and adjusted according to their feedback
Detailed analysis of the impacts	- Geographical split, breakdown by activity, pressure, and Scope to understand where the impacts occur and why

[2] ppb (part per billion) is the equivalent of the percentage except that it gives a value per billion and not per hundred.

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Give insight on how to reduce the impact of the sector	- The sheets contain a section "Possible actions to reduce the impacts on biodiversity"
Comprehensively cover biodiversity impacts	- Biodiversity impacts not covered by the quantitative section are covered by the section environmental safeguards of the factsheets

The aim is to produce benchmark sheets on the biodiversity impact of sectors and to progressively cover all sectors. The first sectors studied are the priority ones, as defined by the French National Biodiversity Action Plan. Indeed the 31st action of the Plan states the following:

"[Action 31] By 2022, we will support four priority sectors (namely: the construction, food, energy and chemical sectors) to enable them to significantly reduce their biodiversity footprint along their whole value chain. Each sector will need to identify its own levers and work on trajectories and scenarios enabling the evolution of practices as well as of the necessary regulatory and methodological frameworks (guidance, labels, incentive tools, regulatory measures, green growth commitments, etc.) to support the transition, together with sector strategic committees"[3] (Comité interministériel biodiversité 2018).

Finally, the biodiversity footprint assessment of Schneider Electric (Schneider Electric and CDC-Biodiversité 2020) was an opportunity to create the factsheet dedicated to the Manufacture of electrical equipment.

1.3 Document content

Selection of figures and tables presented in the factsheets:

A few relevant graphs were selected to keep the factsheet concise and clear. Including all figures would have been space intensive and confusing for the reader.

Climate change impacts on biodiversity are reported separately. This allows to distinguish between impacts already tackled through the assessed entity's climate policy and the non-climate impacts it needs to tackle through additional actions (CDC Biodiversité 2020d).

Nota Bene: the ecotoxicity pressure is considered in the qualitative analysis, but not yet in quantitative figures due to the higher uncertainties of this module.

1.4 The consultation process

Before being published, each factsheet goes through a consultation process:

- A first consultation with the B4B+ Club members from the sector of the factsheet considered,

[3] Translation by CDC Biodiversité

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- A second consultation with the entire B4B+ Club,
- A final public consultation.

The factsheet is then presented during a webinar, and the final version is published on CDC Biodiversité's website.

Figure 2: The consultation process

This consultation process ensures that the factsheets are reviewed by relevant stakeholders and adjusted according to their feedback.

Don't hesitate to send your own feedback to gbs@cdc-biodiversite.fr when you find something relevant to be reported.

1.5 General information on the Global Biodiversity Score and the Mean Species Abundance

The Global Biodiversity Score (GBS) is a corporate biodiversity footprint assessment tool that enables to evaluate the impact of companies or investments on biodiversity. The footprint is expressed in MSA.m², a unit derived from the Mean Species Abundance (MSA) metric. The latter is given as a percentage representing the intactness of the ecosystems. Indeed, the metric does not consider the genetic nor the species diversity directly but only the ecosystem diversity.

The GBS uses the concept of Scopes to avoid double counting when considering value chain impacts:

- The Scope 1 covers direct operation
- The Scope 2 covers non-fuel energy generation
- The Scope 3 covers all other purchases under upstream Scope 3 and downstream impacts reported under downstream Scope 3

Finally, the GBS results are also differentiated between static and dynamic impacts, static impacts being cumulative negative impacts while dynamic impacts are periodic gains or losses within the assessment period.

For additional information see our report "Measuring the contributions of business and finance towards the post-2020 global biodiversity framework", specially the Figure 2 "Differences between metrics, units, tools and

indicators" (CDC Biodiversité 2020g), as well as previous reports on the GBS (CDC Biodiversité 2021; 2020g; 2019a; 2017).

The MSA and the GBS connect with both the Natural Capital Protocol, and natural capital assessments.
It is especially connected with steps 5 and 6 of the Natural Capital Protocol namely "measure impact drivers and/or dependencies" and "Measure changes in the state of natural capital". It also connects with step 7 "Value impacts and/or dependencies" but only partially.

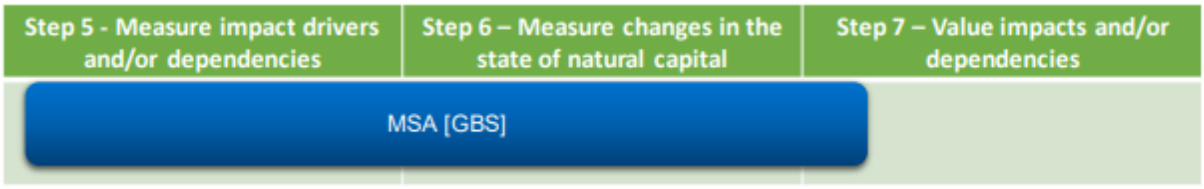

Figure 3: The GBS connects with steps 5 and 6 (and partly 7) of the Natural Capital Protocol (for biodiversity).

The development status of the factsheets is summarised in Table 1.

Table 1: Factsheets' progression and completion

Sector	Status	High-priority sector targeted by the National Biodiversity Action Plan
Agriculture Agri-food	Published	X
Raw material extraction	Draft version published	
Construction	Published	X
Chemical	Published	X
Energy	Draft version published	X
Manufacture of electrical equipment	Draft version published	
Manufacturing industry	Draft version published	
Wholesale and Retail	Being drafted	
Waste and waste management		
Transport		
Financial services		
Non-financial services and other activities		
Processing		

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2 Methods

2.1 How NACE and EXIOBASE are linked

CDC Biodiversité linked both databases manually, the correspondence obtained are shown here:

Table 2: Correspondence between EXIBOASE and NACE industries

EXIOBASE industry name	NACE divisions
Cultivation of paddy rice	Crop and animal production, hunting and related service activities
Cultivation of wheat	Crop and animal production, hunting and related service activities
Cultivation of cereal grains nec	Crop and animal production, hunting and related service activities
Cultivation of vegetables, fruit, nuts	Crop and animal production, hunting and related service activities
Cultivation of oil seeds	Crop and animal production, hunting and related service activities
Cultivation of sugarcane, sugar beet	Crop and animal production, hunting and related service activities
Cultivation of plant-based fibres	Crop and animal production, hunting and related service activities
Cultivation of crops nec	Crop and animal production, hunting and related service activities
Cattle farming	Crop and animal production, hunting and related service activities
Pig farming	Crop and animal production, hunting and related service activities
Poultry farming	Crop and animal production, hunting and related service activities
Meat animals nec	Crop and animal production, hunting and related service activities
Animal products nec	Crop and animal production, hunting and related service activities
Raw milk	Crop and animal production, hunting and related service activities
Processing of meat cattle	Manufacture of food products
Processing of meat pigs	Manufacture of food products
Processing of meat poultry	Manufacture of food products
Production of meat products nec	Manufacture of food products
Processing of vegetable oils and fats	Manufacture of food products
Processing of dairy products	Manufacture of food products
Processed rice	Manufacture of food products
Sugar refining	Manufacture of food products
Processing of Food products nec	Manufacture of food products
Manufacture of beverages	Manufacture of beverages
Plastics, basic	Manufacture of chemicals and chemical products
N-fertiliser	Manufacture of chemicals and chemical products
P-and other fertiliser	Manufacture of chemicals and chemical products
Chemicals nec	Manufacture of chemicals and chemical products
Chemicals nec	Manufacture of basic pharmaceutical products and pharmaceutical preparations
Manufacture of electrical machinery and apparatus n.e.c	Manufacture of electrical equipment

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EXIOBASE industry name	NACE divisions
Construction	Construction of buildings
Construction	Civil engineering
Construction	Specialised construction activities
Production of electricity by coal	Electricity, gas, steam and air conditioning supply
Production of electricity by gas	Electricity, gas, steam and air conditioning supply
Production of electricity by nuclear	Electricity, gas, steam and air conditioning supply
Production of electricity by hydro	Electricity, gas, steam and air conditioning supply
Production of electricity by wind	Electricity, gas, steam and air conditioning supply
Production of electricity by petroleum and other oil derivatives	Electricity, gas, steam and air conditioning supply
Production of electricity by biomass and waste	Electricity, gas, steam and air conditioning supply
Production of electricity by solar photovoltaic	Electricity, gas, steam and air conditioning supply
Production of electricity by solar thermal	Electricity, gas, steam and air conditioning supply
Production of electricity by tide, wave, ocean	Electricity, gas, steam and air conditioning supply
Production of electricity by Geothermal	Electricity, gas, steam and air conditioning supply
Production of electricity nec	Electricity, gas, steam and air conditioning supply
Transmission of electricity	Electricity, gas, steam and air conditioning supply
Distribution and trade of electricity	Electricity, gas, steam and air conditioning supply
Manufacture of gas; distribution of gaseous fuels through mains	Electricity, gas, steam and air conditioning supply
Steam and hot water supply	Electricity, gas, steam and air conditioning supply

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The following table provides a reading guide for the NACE classification, which is divided in sections, divisions, groups and classes.

Table 3: How to read the NACE classification

Section	Division	Group	Class	Description of the class
C	25	25.9	25.91	Manufacture of steel drums and similar containers
	28	28.1	28.11	Manufacture of engines and turbines, except aircraft, vehicle and cycle engines
		28.2	28.24	Manufacture of power-driven hand tools
		28.9	28.93	Manufacture of machinery for food, beverages and tobacco processing
			28.95	Manufacture of machinery for paper and paperboard production
G	46	46.1	46.14	Agents involved in the sale of machinery, industrial equipment, ships and aircraft
		46.6	46.61	Wholesale of agricultural machinery, equipment and supplies
M	71	71.1	71.12	Engineering activities and related technical consultancy

2.2 Methodology to obtain the benchmark values

The GBS tool includes impact factors expressed in MSA.m²/kEUR of turnover. **For each factsheet, the results are presented in MSA.m²/kEUR of the turnover of the whole sector.** In case of a group of industries, if results are detailed per industry, they are in MSA.m²/kEUR of the whole industry unless stated otherwise.

Unless stated otherwise, the values given in the factsheets and displayed in graphs and tables are global (worldwide average) values.

A more thorough explanation of impact factors computations is given in *"Measuring the contributions of business and finance towards the post 2020 global biodiversity framework"*, p.8, *"The GBS in short"*(CDC Biodiversité 2020g)**.**

Impact factors are given by tonne of commodity or by kEUR depending on the purpose of the assessment.

To obtain aggregated results, impact factors by commodity and pressure are summed.

For each benchmark sector, corresponding worldwide EXIOBASE industries are weighted based on the part of worldwide turnover attributed to a given region, to obtain a regional impact factor for each industry. This first computation gives worldwide impact factors for each industry included in the benchmark sector. Finally, when there are multiple EXIOBASE industries included in the benchmark sector, a weighted average based on the share of the worldwide benchmark sector turnover represented by the EXIOBASE industry is computed.

Results Breakdown

The results are given in MSA.m²/kEUR and broken down by **accounting category** (static or dynamic) and **biodiversity realm** (terrestrial or aquatic), thus yielding four values[4].

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Furthermore, results are split by **Scopes**. The main figures given are the Scope 1 impact and the vertically integrated impact (equal to the sum of the Scopes 1, 2 and Upstream 3). This is true for the results presented in the Box "Key Figures" on each factsheet.

In graphs, impact values are further split by **pressures** as can be seen under the section "Impact drivers breakdown: what are the main ones" on each factsheet.

There are five terrestrial pressures: Climate change (CC), Land use (LU), Encroachment (E), Fragmentation (F) and Nitrogen deposition (N). Land use, Encroachment and Fragmentation can also be grouped under the caption "spatial pressures". More details about the different pressure types can be found in the GBS review (CDC Biodiversité 2020e).

There are also five aquatic pressures: Hydrological disturbance due to water use (HD_{water}), Hydrological disturbance due to climate change (HD_{CC}), Wetland conversion (WC), Land use in catchment of rivers (LUR), Land use in catchment of wetlands (LUW), Freshwater eutrophication (FE). More details about the different pressure types can be found in the GBS review (CDC Biodiversité 2020b).

The pressure Ecotoxicity (X) impacting both terrestrial and freshwater biodiversity has been added to the GBS after version 1.1.0 and might be subject to greater uncertainties. Its results are not presented quantitatively in the factsheet, some further analyses are added when relevant.

The GBS review document "Quality assurance" analyses the coverage of the different industries by the GBS (CDC Biodiversité 2020d).

2.3 Aggregation of the intensities in MSAppb/bEUR

An **aggregated score** was introduced in the GBS to provide such a **single figure** linked to biodiversity impacts: the **MSAppb*** *(Part per billion).* This score allows to **obtain a first overview of the biodiversity performance** of a sector or company, before deep diving into the results in MSA.km².

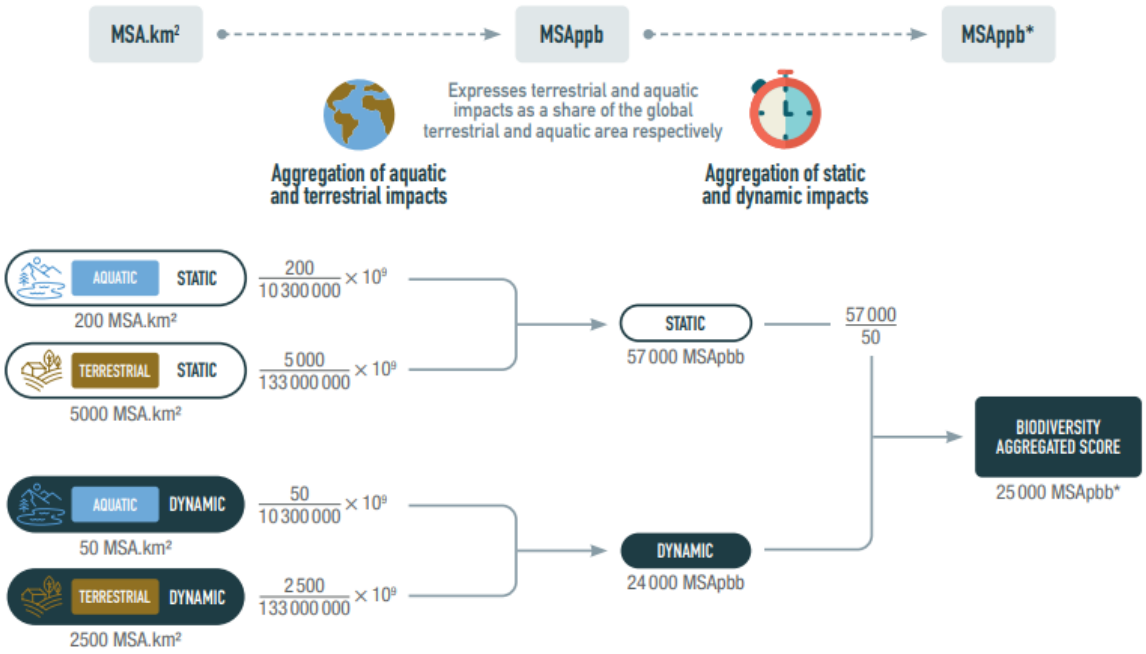
This underlying weighting of each component of the aggregated score is as follows:

- First, the **weighting of aquatic and terrestrial ecosystems** applied in the MSAppb unit, introduced in the latest GBS technical update report (CDC Biodiversité 2024b), reflects the to the following rationale: aquatic and terrestrial have the same importance and losing 1 km^2 of freshwater ecosystem is more problematic than losing 1 km^2 of terrestrial ecosystem because the global surface area of freshwater ecosystem is smaller. In practice, the **weight of aquatic impacts is approximately 13 times higher than that of terrestrial impacts**.
- Then, **dynamic impacts are weighted 50 times higher than static impacts** in an imperfect attempt to compare the relative importance of additional impacts today and historic cumulated impacts (in practice

static impacts are divided by 50 before being summed to dynamic impacts)[5].

The **aggregated score of an asset is the sum of its four components of impacts**, weighted as explained above (Figure 4).

Figure 4: Construction of the MSAppb aggregated score. Source: (CDC Biodiversité 2024a).*



However, the aggregation of the four results creates bias that should be kept in mind when using the aggregated score:

- Climate change static impacts are usually **not calculated** during assessments conducted with the GBS and the **uncertainty of aquatic dynamic impact** assessment significantly **distorts the scoring** compared to a situation where they would both be properly assessed and included.
- Since dynamic impacts have a higher weight, i.e. 1 MSA.km² dynamic loss represents more MSAppb* than a static impact of 1 MSA.km², companies will tend to prioritize actions which reduce dynamic losses or lead to dynamic gains6. **The current aggregated score thus leads to prioritise dynamic impacts over static impacts**. Figure 5 below illustrates this effect with a simplified example considering only terrestrial impacts: by the end of the year, company A and company B will both have a static terrestrial impact of

[5] This weighting matches the restoration time of ecosystems of non-forest biomes: they recover their integrity state after 50 years after land abandonment (Schipper et al. 2016). It also matches the assumption related to ecosystem recovery in the ASN bank report (CREM and PRé Consultants 2016).To some extent, a static impact can be seen as an opportunity cost, *i.e.,* the persistence of the impact hindering biodiversity gains and this opportunity cost can be considered equal to the biodiversity gain which would occur over the period (here, one year) if the impact stopped.

[6] By construction, the use of MSAppb* breaks the accounting rule that the static impact of year n+1 is equal to the addition of static and the dynamic of year n. That leads to incoherent situations from an accounting perspective.

11 MSA.km2 since dynamic impacts accumulate into static impacts at the end of each assessment period, but their MSAppb* scores are very different. This is also relevant at economic sectors' scale.

- Furthermore, the weighting of aquatic versus terrestrial ecosystems (approximately 13 versus 1) may lead to stakeholders favouring restoring one or the other to maximise their MSAppb* gains if the ratio of restoration cost between aquatic or terrestrial ecosystems differs significantly.

Figure 5: Calculation of an aggregated score for two companies, example for terrestrial impacts.

	Terrestrial impacts			
	(1) Static impact at the beginning of the period (MSA.km²)	(2) Dynamic impact (MSA.km²)	(3) Static impact at the end of the period (MSA.km²) (3) = (1) + (2)	Aggregated score (MSAppb*)
Company A	10	+ 1	11	$\frac{10}{133\,000\,000} \times 10^9 \times \frac{1}{50} + \frac{1}{133\,000\,000} \times 10^9 = \mathbf{9,0}\ \boldsymbol{MSAppb*}$
Company B	11	0	11	$\frac{11}{133\,000\,000} \times 10^9 \times \frac{1}{50} + 0 = \mathbf{1,7}\ \boldsymbol{MSAppb*}$

To be able to compare a sector to another, or different industries of the same sector, an aggregated impact intensity can be calculated in a similar way to the MSA.m²/kEUR metric. By dividing the aggregated score by the company, industry or sector's turnover in billion euros, an aggregated impact intensity in MSAppb/bEUR is obtained. The aggregated impact intensities of each sector are presented in the "Key figures" box of the factsheets.

2.4 Assessing the dependency of a sector on ecosystem services

A sector is dependent on an ecosystem service when at least one of its production processes depends on this service to function properly. The ENCORE (Exploring Natural Capital Opportunities, Risks and Exposure) model (Natural Capital Finance Alliance (Global Canopy, UNEP FI, and UNEP-WCMC) 2021)[7] assesses dependencies of each sector to each ecosystem service. It is based on existing classifications of ecosystem services and economic sectors. Dependencies are assessed through literature review and expert interviews when the literature is not sufficient.

A SCOPE 1 DEPENDENCIES

[7] https://encore.naturalcapital.finance/en

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Based on ENCORE database and on the EXIOBASE classification and industries descriptions, sectoral dependency scores were computed for each EXIOBASE industry based on the following methodology (Benchekroun, et al. 2020).

In order to obtain the ecosystem services dependency values, several information are connected: **the sector** (with associated ENCORE sub-industries and production processes), the **global turnover of the sector**, the list of **ecosystem services** and **the materiality of each ecosystem service** for the industry. The materiality of potential dependencies is a value which describes both the loss of functionality in the production process and the associated financial loss if the ecosystem service is disrupted (Natural Capital Finance Alliance (Global Canopy, UNEP FI, and UNEP-WCMC) 2021). Three tables are used to do so:

- A table of materialities extracted from the ENCORE database reporting the materialities for each process of each ENCORE sub industry (classification based on the GICS classification). Materialities were converted into percentage: 0% for no known dependency, 20% for Very Low, 40% for Low, 60% for Medium, 80% for High and 100% for Very High dependency.
- A table of EXIOBASE industries, with their global production, the corresponding GBS benchmark sector and their share in the production within the GBS benchmark sector (used as weight).
- A correspondence table between EXIOBASE and ENCORE industries. ENCORE sub-industries which have no equivalent in EXIOBASE are excluded. For each ENCORE sub-industry corresponding to an EXIOBASE industry, only the processes included in the definition of the EXIOBASE industry are kept. A weight was attributed to each ENCORE production process depending on its importance in the sub-industry.

The first and second tables are joined thanks to the third (correspondence table).

Finally, the dependency of the benchmark sector *I* on the ecosystem service *j* is calculated as:

$$Dependency_{i,j} = \sum_{\substack{k \in EXIOBASE\ industries \\ in\ benchmark\ sector\ i}} \sum_{\substack{l \in processes \\ in\ industry\ k}} Weight_l \times Materiality_l \times \frac{Turnover_k}{Turnover_i}$$

This formula gives more weight to the most important processes of an industry and to industries with the largest turnovers. A single score (in percentage) is obtained by averaging the dependencies on all ecosystem services, in line with (Crépin 2020).

B UPSTREAM DEPENDENCIES

Industries' reliance on biodiversity is complex because their supply chains also depend on ecosystem services. For instance, even though the food-processing sector has a limited dependency on ecosystem services such as pollination through its direct operations, it relies heavily on other sectors in its supply chain, such as the agricultural sector, which are highly dependent on pollination, but also on other ecosystem services. As a result, to fully capture the dependency of one sector on services provided by nature it is necessary to consider the dependency of its whole supply chain (World Economic Forum and PwC 2020).

Using the EXIOBASE Input-Output table, and more specifically the Leontief Inverse Matrix that exhibits all the value chain interrelations required to produce an output, the upstream dependencies of each sector can be identified. More information on the EXIOBASE Input-Output Table and the Leontief Inverse Matrix, is available in the GBS' Input Output critical review report (CDC Biodiversité 2020c).

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To obtain the upstream dependencies (without Scope 1), the Scope 1 interrelations need to be subtracted from the Leontief Inverse Matrix. This is done by subtracting the Identity matrix from the Leontief matrix. Besides, since the dependency scores cannot be summed up, the Leontief matrix also needs to be normalized. It would otherwise result in upstream dependency scores, sometimes exceeding 100%. To do so, the coefficients of the Leontief inverse matrix are divided by the sum of the industry's upstream purchases.

$$(Leontief\ inverse\ matrix - Identity\ matrix)_{normalised} = (Leontief\ inverse\ matrix - Identity\ matrix) \times diag(1/Purchases)$$

Considering the direct operations (Scope 1)' dependency matrix constructed using the ENCORE materiality scores mentioned in the previous section, the upstream dependencies of the EXIOBASE industries on the different ecosystem services are computed thanks to the following formula:

$$Upstream\ dependency\ matrix = Scope\ 1\ dependency\ matrix \times (Leontief\ inverse\ matrix - Identity\ matrix)_{normalised}$$

The following table shows the shape of the Scope 1 dependency matrix

Table 4: Scope 1 dependency matrix

	Country $_r$		**Country $_s$**		**…**
	Industry $_g$	**Industry $_k$**	**Industry $_g$**	**Industry $_k$**	**…**
Ecosystem service $_j$	Scope 1 dependency $_{g,j}$	Scope 1 dependency $_{k,j}$	Scope 1 dependency $_{g,j}$	Scope 1 dependency $_{k,j}$	…
Ecosystem service $_m$	Scope 1 dependency $_{g,m}$	Scope 1 dependency $_{k,m}$	Scope 1 dependency $_{g,m}$	Scope 1 dependency $_{k,m}$	…
Ecosystem service $_n$	Scope 1 dependency $_{g,n}$	Scope 1 dependency $_{k,n}$	Scope 1 dependency $_{g,n}$	Scope 1 dependency $_{k,n}$	…
…	…	…	…	…	…

With $Scope\ 1\ dependency_{k,j} = \sum_{l \in processes\ in\ industry\ k} Weight_l \times Materiality_l$

Since there are 21 ecosystem services, 163 industries, and 49 regions, the Scope 1 dependency matrix is of size (21; 7987). It is important to note that there is no information on regional dependency and thus the dependencies of each EXIOBASE industry on each ecosystem service is the same over all EXIOBASE regions, meaning that direct dependency $_{g,j}$ in country $_r$ is equal to direct dependency $_{g,j}$ in country $_s$.

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The resulting upstream dependency matrix is of the same shape and size but reversed (7987; 21) and for industry $_k$ within country $_s$, the dependency on ecosystem service $_j$ is the upstream dependency $_{k,j}$ instead of the Scope 1 dependency $_{k,j}$.

Even though there is no information on regional dependency in the Scope 1 dependency matrix, the Leontief matrix contains information on differences in the regional mix of purchases so once the two matrices have been multiplied to compute the upstream dependency matrix, regional granularity appears. For the sectoral benchmarks, a global dependency score is calculated based on the average dependency scores over all regions weighted by the total turnover in the region and sector of interest. This results in one single value for each couple *{Benchmark Sector; Ecosystem service}.*

The upstream dependencies of the benchmark sectors (which include several EXIOBASE industries each) can then be computed thanks to the following formula:

$$Upstream\ Dependency_{i,j} = \sum_{k \in EXIOBASE\ industries\ in\ sector\ i} \times Upstream\ dependency_{k,j}\ x \frac{Purchase_k}{Purchase_i}$$

As for Scope 1 dependencies, a single score is finally calculated by averaging the dependencies on all ecosystem services.

C CRITICAL DEPENDENCIES

While impacts on biodiversity are the main focus of the GBS, the assessment of the dependency to biodiversity of activities and their value chain was added in version 1.3.0, via the average dependency score. The average dependency score measures the dependency of a sector, a company, or a portfolio, on average on all ecosystem services. The methodology of this average dependency score was published in CDC Biodiversité's previous publication (CDC Biodiversité 2021).It gives an indication of the overall materiality of the dependencies. Usually this score is low, as a low dependency on one ecosystem service can counterbalance a high dependency on another, and companies are rarely highly dependent on all ecosystem services. Therefore, a low overall average dependency score often hides high dependencies on some ecosystem services.

The critical dependency score offers a complementary view and has been added in version 1.4.3 of the GBS. It evaluates the proportion of a company's activity or value chain which is critically dependent on at least one ecosystem service. A critical dependency is defined as a High or Very High dependency according to ENCORE (Exploring Natural Capital Opportunities, Risks and Exposure): it is considered that the ecosystem service is non-substitutable. An EXIOBASE industry is critically dependent if at least one of the ENCORE processes included in this industry is critically dependent (High or Very High dependency).

The Scope 1 critical dependency score of the EXIOBASE industry k on the ecosystem service j can therefore be calculated as:

$$Dependency\ score_{k,j} = \begin{cases} 1\ if\ at\ least\ one\ process\ is\ critically\ dependent\ on\ the\ ecosystem\ service\ j \\ 0\ if\ not \end{cases}$$

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The overall Scope 1 critical dependency score of the industry k is then calculated as:

$$Dependency\ score_k = \begin{cases} 1\ if\ the\ industry\ is\ critically\ dependent\ on\ at\ least\ one\ ecosystem\ service \\ 0\ if\ not \end{cases}$$

This Scope 1 critical dependency score can then be aggregated on at company level (a weighted mean by turnover of each sector), and at portfolio level (a weighted mean by invested amount in each company). This critical score at company or portfolio level therefore represents the proportion of a company or portfolio's activity which is critically dependent on at least one ecosystem service.

The critical dependency score is also calculated for the upstream value chain. The methodology is identical to the methodology used for average dependencies (CDC Biodiversité 2021), but the Scope 1 critical dependencies are used:

$$\begin{aligned} &Upstream\ dependency\ matrix \\ &\quad = Scope\ 1\ critical\ dependency\ matrix \\ &\quad \times (Leontief\ inverse\ matrix - Identity\ matrix)_{normalised} \end{aligned}$$

Like for Scope 1 dependencies, this upstream critical dependency score can then be aggregated on at company and portfolio level. This upstream critical score represents the proportion of a company or portfolio's upstream value chain which is critically dependent on at least one ecosystem service.

2.5 Terrestrial static impact for the pressure Climate Change

Climate Change static impacts are not currently assessed by the GBS because historical emissions are needed to compute them. Here, assumptions are made to estimate the static impacts of Climate change in 2022, based on the same multiplier as global emissions which is an estimated ratio between historic emissions (from 1750 to 2018) and 2019 emissions, called the Global factor$_{1750}$. The ratio was approximated from Our World in Data numbers on CO_2 emissions from 1750 to 2020 (Ritchie, Roser, and Rosado 2020a).

$$Global\ factor_{1750} = \frac{global\ historic\ emissions\ from\ 1750\ to\ 2018}{global\ 2019\ emissions} = 50$$

This leads to the following calculation to obtain the climate change static impact:

$$Climate\ change\ static_{2022} = 50 * Climate\ change\ dynamic_{2022}$$

This factor can then be refined by sector, by estimating a sectoral ratio between historic emissions of the sector and 2019 emissions. However, emissions by sector are only available between 1990 and 2019. Therefore, a sectoral factor is estimated between historic emissions of the sector since 1990 and 2019 emissions, called Sectoral factor$_{1990}$. A Global factor$_{1990}$ is also calculated.

$$Global\ factor_{1990} = \frac{global\ historic\ emissions\ from\ 1990\ to\ 2018}{global\ 2019\ emissions} = 23$$

$$Sectoral\ factor_{1990} = \frac{historic\ emissions\ of\ the\ sector\ from\ 1990\ to\ 2018}{2019\ emissions\ of\ the\ sector}$$

Finally, a sector ratio is calculated and applied to the Global factor$_{1750}$ in order to obtain estimations of a sectoral factor$_{1750}$.

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$$Sector\ ratio = \frac{Sectoral\ factor_{1990}}{Global\ factor_{1990}}$$

$$Sectoral\ factor_{1750} = Sector\ ratio * Global\ factor_{1750}$$

This

$$Sectoral\ factor_{1750} = \frac{\frac{historic\ emissions\ of\ the\ sector\ from\ 1990\ to\ 2018}{2019\ emissions\ of\ the\ sector}}{\frac{global\ historic\ emissions\ from\ 1990\ to\ 2018}{global\ 2019\ emissions}} * \frac{global\ historic\ emissions\ from\ 1750\ to\ 2018}{global\ 2019\ emissions}$$

$$= \frac{historic\ emissions\ of\ the\ sector\ from\ 1990\ to\ 2018}{2019\ emissions\ of\ the\ sector} * \frac{global\ historic\ emissions\ from\ 1750\ to\ 2018}{global\ historic\ emissions\ from\ 1990\ to\ 2018}$$

The Sectoral factors are presented in **Erreur ! Source du renvoi introuvable.** below.

Table 5: Sector factors to calculate the Climate change static impact of the different sectors

Sector	Sectoral factor$_{1990}$	Sector ratio	Sectoral factor$_{1750}$
Building	28	1.2	60
Industry	18	0.76	38
Transport	22	0.97	49
Manufacturing and construction	23	0.99	49
Electricity and heat	22	0.98	49
Fugitive emissions from energy production	29	1.3	64
Global	**23**	**1**	**50**

2.6 Construction of different trajectories to achieve the upcoming international biodiversity targets

A THE CENTRAL TRAJECTORY – GLOBAL MSA BUDGET

A "central trajectory" to bend the curve of biodiversity loss is built based on an interpretation of the CBD's Zero draft. It will be adapted to the outcomes of the COP15 when available[8]. In the central trajectory, a global budget of maximum biodiversity loss (from 2020 to 2030), as well as minimum biodiversity gain (from 2031 to 2050) at the global level are defined as follows.

[8] CDC Biodiversité does not plan to update the trajectory to take into account the First draft nor the changes brought to the global biodiversity framework following the Open-Ended Working Group 4 meeting in Nairobi in June 2022. The trajectory will only be updated after the final COP15 decision is known.

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In 2020, the global remaining terrestrial biodiversity was about 65.4% MSA which means that 34.6% of the MSA had already been lost (= static impact or cumulated negative impact). The dynamic impact (or periodic gain or loss) on that year was a loss of 0.27% MSA or 360 000 MSA.km^2.

In the central trajectory, between 2020 and 2030, MSA dynamic net loss is reduced by 10% (of the 2020 value) each year to finally reach no net loss in 2030. In other words, the world has a budget of impact that decreases by 10% per year between 2020 and 2030, reaching a no net biodiversity loss in 2030. However, not all economic sectors reach a net zero impact in 2030 but the entire world reaches net zero impact by that time.

Table 6: Budget of""allowed losse"" from 2020 to 2030 in the central trajectory

Year	Global remaining MSA (%)	Budget of allowed losses (MSA.km^2)	% of global 2020 loss
2020	65.4	360 000	100 %
2021	65.1	320 000	90 %
2022	64.9	290 000	80 %
2023	64.7	250 000	70 %
2024	64.5	220 000	60 %
2025	64.3	180 000	50 %
2026	64.2	140 000	40 %
2027	64.1	110 000	30 %
2028	64.0	72 000	20 %
2029	63.94	36 000	10 %
2030	63.91	0	0 %

In the central trajectory, from 2031, biodiversity is gradually restored. The restoration budget increases by 17.9% every year compared to the previous year (exponential increase) and is negative (a negative impact here corresponds to a biodiversity gain). This effort allows the global remaining terrestrial biodiversity to reach around 76% MSA in 2050 which is in the safe operating space in terms of planetary boundaries (threshold of 72%).

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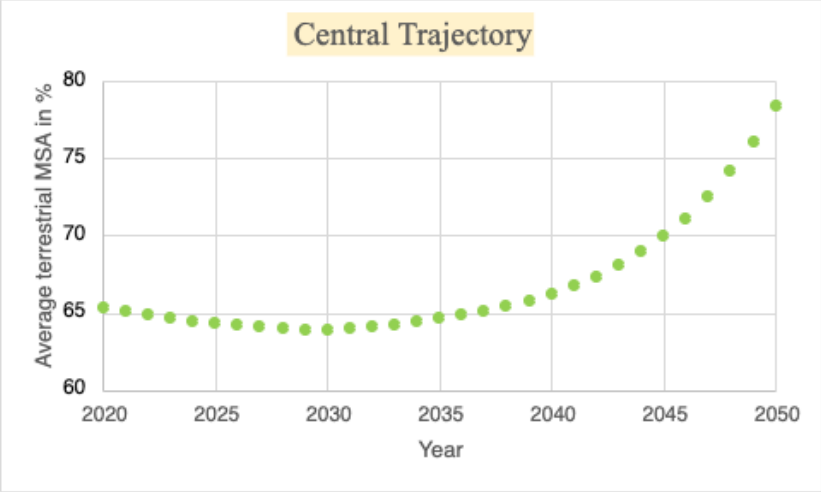

Figure 6: The central trajectory, reaching a no net loss in 2030 and restoring biodiversity after 2030

B DIFFERENT ALLOCATION SYSTEMS

The amount of efforts is shared between the 13 benchmark sectors. Methods to share or allocate these efforts between the sectors are described in the following paragraph. Four allocation systems have been developed by the PBL: Sovereignty, Capability, Equality, and Efficiency (Lucas and Wilting 2018).

Sovereignty

This allocation system is based on a grandfathering approach, *i.e.* the obligations of industries (or companies) are based on their historic impacts, here their 2020 biodiversity dynamic impact.

Between 2020 and 2030, all industries will be asked to reduce their 2020 dynamic impact by the same proportion, maintaining the same distribution of impacts between industries as in 2020. An industry's share of efforts corresponds to its share of the 2020 global dynamic impact.

Capability

This allocation system is based on industries' ability to pay. It allocates the budget between industries according to their turnover. The efforts asked from industries are computed based on their share of global (2020) turnover. Thus, sectors with high turnovers compared to other sectors will be asked to contribute more to both biodiversity loss reduction and biodiversity gains.

Equality

This allocation system is based on the idea that each person has the same "rights". It means that the rate of effort should be the same per capita.

The allocation is based on the number of people employed in each sector. The more people the industries employ, the higher their biodiversity budget.

Efficiency

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This allocation system is based on a principle of cost-effectiveness: the industries that can perform restoration actions at the lowest cost will be asked to do more. This system minimizes overall costs for a given budget achieved. The cost of restoration of each industry is the indicator used to allocate efforts. All industries must spend the same amount of money each year to restore biodiversity. Costs induced by reducing biodiversity loss and those induced to restore biodiversity are assumed to be equal. These expenses will have different impacts on biodiversity as the costs of restoration vary by sector, especially due to the technologies used.

Table 7 summarizes the parameter used for each trajectory.

Table 7: Summarize the different allocations, and the data used to draw sectoral trajectories

Allocation	Approach	Parameter	Parameter data source
Equality	Everyone has the same right	Number of employees in the sectors	Eurostat (2010)
Efficiency	Cost-effectiveness	Cost of restoration (EUR/[MSA.m²])	CDC Biodiversité internal estimation
Capability	Industries' ability to pay	Turnover (MEUR)	EXIOBASE (2011)
Sovereignty	Grandfathering	2020 dynamic impact (MSA.km²/year)	GBS computation

C COMPUTATIONS

The **global budget of dynamic impacts** for year *n* ($Dynamic\ budget_n$) is computed as follows:

- **Between 2021 and 2030**: each year, the allowed dynamic impact shall not increase and should be reduced by 10% compared to the 2020 global dynamic impact as described in the section 2.6A. In 2030, No Net Loss is expected (global budget of dynamic impacts = 0 MSA.km²).

$$Dynamic\ budget_n = Dynamic\ impact_{2020} \times (1 - \frac{n - 2020}{10})$$

- **Between 2031 and 2050**: the global remaining biodiversity trajectory follows an exponential dynamic gain, meaning that the MSA gain increases by 17.9 % compared to the previous year's budget as described in the section 2.6A. Each year, the gains of MSA (%) are multiplied by the total terrestrial area to obtain a budget in MSA.km².

Then, **each sector's effort or dynamic impact for the sector *s* at the year *n*** (between 2031 and 2050)**, with the allocation method *a*** is computed as follows:

$$Dynamic\ impact_{n,s,a} = Dynamic\ budget_n \times\ Proportion_{s,a}$$

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The **proportions** that each sector represents are calculated for the four allocation systems in Table 8. For example, the Chemical sector represents 1 % of the total number of employees and will thus be responsible of 1 % of the effort in this Equality allocation system. A strong assumption is made: it is assumed that the proportions stay the same until 2050.

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Table 8: data used, and proportion of each allocation for each sector. The sovereignty proportions for the remaining sectors will be displayed later.

Allocation system	Equality		Efficiency		Capability		Sovereignty	
Sector	Number employees (thousand persons)	*proportion*	Restoration cost (EUR /[MSA.m²])	*proportion*	Turnover (MEUR)	*proportion*	Net Impact 2020[9] (MSA.km² /year)	*proportion*
Agriculture and Agri-Food	14 000[7]	6 %	10[0]	3 %	7 000 000[9]	7 %	100 000[4]	39 %
Raw materials extraction	1 100[2]	0 %	20[0]	1 %	4 100 000[3]	4 %		
Building sector	15 000[3]	6 %	20[0]	1 %	7 500 000[3]	7 %	4 000[8]	2 %
Chemicals industry	18 00[1]	1 %	5.0[0]	5 %	2 900 000[3]	3 %	3 500[7]	1 %
Energy (production and supply of electricity)	1 200[5]	1 %	1.0[0]	26 %	1 700 000[5]	2 %	50 000[7]	19 %
Electrical and electronic equipment	10 000[2]	4 %	5.0[0]	5 %	1 500 000[1]	1 %		
Manufacturing industry	15 000[3]	6 %	5.0[0]	5 %	20 000 000[2]	20 %		
Wholesale and Retail	30 000[1]	13 %	6.0[0]	4 %	4 100 000	4 %		
Waste and waste management sector	1 300[7]	1 %	5.0[0]	5 %	800 000[5]	1 %		
Transport	7 300[8]	3 %	4.0[0]	7 %	3 300 000[8]	3 %		
Financial services	5 800[6]	2 %	5.0[0]	5 %	4 800 000	5 %		
Non financial services and other activities	130 000[4]	56 %	1.0[0]	26 %	40 000 000[6]	40 %		
Processing	660[0]	0 %	5.0[0]	5 %	3 300 000[8]	3 %		
Total	**230 000[9]**	**100 %**	**3.8[2]**	**100 %**	**100 000 000[2]**	**100 %**	**260 000[5]**	**100 %**

[9] Dynamic terrestrial impact, vertically integrated (sum of Scopes 1, 2, 3 Upstream)

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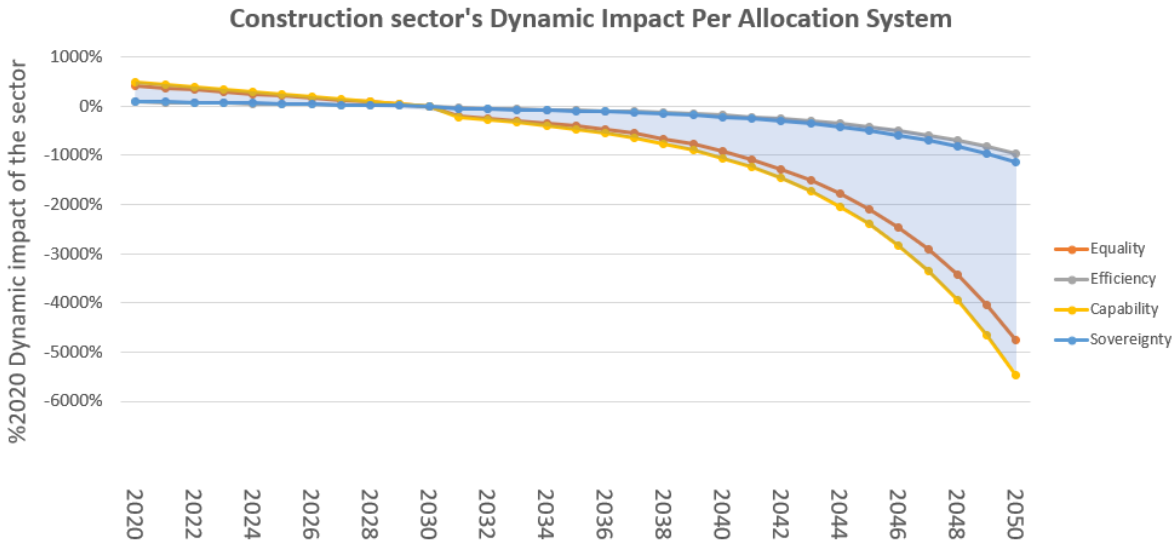

Figure 7: distribution of efforts according to different allocation methods (example of the Construction sector)

Figure 7 is an example obtained for one sector (Construction here), showing the target trajectory for the dynamic impacts of the sector from 2020 to 2050 according to the different allocation systems. The vertical axis corresponds to the percentage of the dynamic impact of the sector in 2020, it starts at 100% in 2020. For instance, with the capability allocation system, the Construction sector needs to achieve an impact of –1000 % in 2040 (relative to 2020), corresponding to a positive impact on biodiversity (meaning for example ecological restorations), *i.e.* it should restore biodiversity at a rate ten times its negative 2020 dynamic impact.

As shown in Table 8, the **Agricultural and Agrifood** sector has the highest share of efforts in the **Sovereignty** allocation because of its high 2020 dynamic impact (proportion of effort up to 39% of the global budget). In the same way, the **Efficiency** allocation assigns a large part of the efforts to the **Energy** sector (proportion of 26%). This can be explained by the relatively low dynamic impact of the sector and lower restoration costs. The sector "N**on-financial services and other activities**" has the highest share of effort in the **Capability** allocation mode due to its high revenue compared to other sectors and in the **Equality** mode, due to the large amount of workers in the tertiary sector across the world nowadays. Thanks to this preliminary work, we observe that depending on the allocation, the effort varies a lot from one sector to another, while some sectors would benefit, and others would be penalized. Data are more readily available to compute the proportions of some allocation systems, especially Capability (based on turnover data) and Equality (based on the number of employees). Efforts according to the **Efficiency** is **harder to estimate** due to lack of data on the ecosystem restoration costs. The allocation mode **Sovereignty, based on past impacts,** may also be **easier to implement politically** (as it freezes the current balance of power between industries)**. Further allocation systems mixing those four basic ones** may be explored.

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2.7 EU taxonomy for sustainable activities

The European Union taxonomy is a classification system of sustainable economic activities to redirect investments towards greener activities and to protect from greenwashing.

To be considered taxonomy aligned, an activity must:

- **Contribute substantially** to at least one of the six environmental objectives. This means that, based on the technical screening criteria, the economic activity either has a substantial positive environmental impact or substantially reduces negative impacts of the activity on the environment.
- **Do no significant harm (DNSH)** to any of the other five environmental objectives.
- Comply with **minimum social safeguards**. An economic activity should be carried out in compliance with minimum standards on human rights, social responsibility, labour rights, and anti-corruption procedures.

Some **Technical Screening Criteria (TSC)** define specific requirements and thresholds that each activity will need to meet in order to be considered as significantly contributing to a sustainability objective and doing no significant harm to others. These TSCs are being elaborated in secondary legislation called Delegated Acts (DAs).

Figure 8 below is extracted from the methodological report of the Platform on sustainable finance (Platform on Sustainable Finance 2022a).

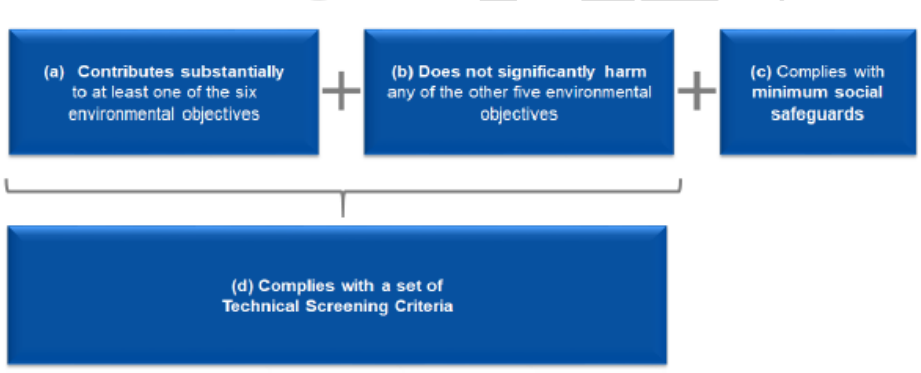

Figure 8: The 4 basic conditions for an activity to be considered taxonomy-aligned, extracted from the Platform on sustainable finance report of March 2022

The basis for this taxonomy was published in June 2020, in particular establishing the six environmental objectives (Official Journal of the European Union 2020):

1. Climate change mitigation
2. Climate change adaptation
3. The sustainable use and protection of water and marine resources
4. The transition to a circular economy
5. Pollution prevention and control
6. The protection and restoration of biodiversity and ecosystems

The development of the EU taxonomy relies on extensive input from experts from across the economy and civil society. Therefore, the Platform on sustainable finance (PSF) is tasked with advising the European Commission on further developing the EU taxonomy, improving its usability, and exploring its expansion to social objectives, activities that significantly harm the environment or activities that are neutral towards the environment.

The Technical Screening Criteria (TSC) for climate change objectives are available in the Delegated act on the climate objectives published in the official journal on December 9th, 2021. This delegated act establishes the technical screening criteria for determining the conditions under which an economic activity qualifies as contributing substantially to climate change mitigation (Annex I) or climate change adaptation (Annex II) (Official Journal of the European Union 2021). In the same way, an environmental Delegated Act was published in 2022 and explains the Technical Screening criteria for the four remaining objectives (European Commission 2023)

Additional information on the taxonomy related considerations for the sector are available for each factsheet in part **Erreur ! Source du renvoi introuvable.**.

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3 Glossary

All definitions can be found in the document "How to conduct a Biodiversity Footprint Assessment with the Global Biodiversity Score" (CDC Biodiversité 2019b).

4 Sources

Sources cited in this document (Technical annex) are listed here, in addition to the sources specific to each factsheet in their respective sections.

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5 Additional tables and figures

Table 9: Correspondence between Benchmark industries and EXIOBASE industries

EXIOBASE_industry	EXIOBASE_industry_group	Benchmark industry
Cultivation of paddy rice	Crop and animal production, hunting and related service activities	Agriculture and Agri-Food
Cultivation of wheat	Crop and animal production, hunting and related service activities	Agriculture and Agri-Food
Cultivation of cereal grains nec	Crop and animal production, hunting and related service activities	Agriculture and Agri-Food
Cultivation of vegetables, fruit, nuts	Crop and animal production, hunting and related service activities	Agriculture and Agri-Food
Cultivation of oil seeds	Crop and animal production, hunting and related service activities	Agriculture and Agri-Food
Cultivation of sugarcane, sugar beet	Crop and animal production, hunting and related service activities	Agriculture and Agri-Food
Cultivation of plant-based fibers	Crop and animal production, hunting and related service activities	Agriculture and Agri-Food

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EXIOBASE_industry	EXIOBASE_industry_group	Benchmark industry
Cultivation of crops nec	Crop and animal production, hunting and related service activities	Agriculture and Agri-Food
Cattle farming	Crop and animal production, hunting and related service activities	Agriculture and Agri-Food
Pigs farming	Crop and animal production, hunting and related service activities	Agriculture and Agri-Food
Poultry farming	Crop and animal production, hunting and related service activities	Agriculture and Agri-Food
Meat animals nec	Crop and animal production, hunting and related service activities	Agriculture and Agri-Food
Animal products nec	Crop and animal production, hunting and related service activities	Agriculture and Agri-Food
Raw milk	Crop and animal production, hunting and related service activities	Agriculture and Agri-Food
Wool, silk-worm cocoons	Crop and animal production, hunting and related service activities	Agriculture and Agri-Food
Forestry, logging and related service activities	Forestry and logging	Raw materials extraction
Mining of coal and lignite; extraction of peat	Mining of coal and lignite	Raw materials extraction
Extraction of crude petroleum and services related to crude oil extraction, excluding surveying	Extraction of crude petroleum and natural gas	Raw materials extraction
Extraction of natural gas and services related to natural gas extraction, excluding surveying	Extraction of crude petroleum and natural gas	Raw materials extraction
Extraction, liquefaction, and regasification of other petroleum and gaseous materials	Extraction of crude petroleum and natural gas	Raw materials extraction
Mining of uranium and thorium ores	Mining of metal ores	Raw materials extraction
Mining of iron ores	Mining of metal ores	Raw materials extraction
Mining of copper ores and concentrates	Mining of metal ores	Raw materials extraction
Mining of nickel ores and concentrates	Mining of metal ores	Raw materials extraction
Mining of aluminium ores and concentrates	Mining of metal ores	Raw materials extraction
Mining of precious metal ores and concentrates	Mining of metal ores	Raw materials extraction
Mining of lead, zinc and tin ores and concentrates	Mining of metal ores	Raw materials extraction
Mining of other non-ferrous metal ores and concentrates	Mining of metal ores	Raw materials extraction
Quarrying of stone	Other mining and quarrying	Raw materials extraction
Quarrying of sand and clay	Other mining and quarrying	Raw materials extraction

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EXIOBASE_industry	EXIOBASE_industry_group	Benchmark industry
Mining of chemical and fertilizer minerals, production of salt, other mining and quarrying n.e.c.	Other mining and quarrying	Raw materials extraction
Processing of meat cattle	Manufacture of food products	Agriculture and Agri-Food
Processing of meat pigs	Manufacture of food products	Agriculture and Agri-Food
Processing of meat poultry	Manufacture of food products	Agriculture and Agri-Food
Production of meat products nec	Manufacture of food products	Agriculture and Agri-Food
Processing vegetable oils and fats	Manufacture of food products	Agriculture and Agri-Food
Processing of dairy products	Manufacture of food products	Agriculture and Agri-Food
Processed rice	Manufacture of food products	Agriculture and Agri-Food
Sugar refining	Manufacture of food products	Agriculture and Agri-Food
Processing of Food products nec	Manufacture of food products	Agriculture and Agri-Food
Manufacture of beverages	Manufacture of beverages	Agriculture and Agri-Food
Manufacture of fish products	Manufacture of food products	Agriculture and Agri-Food
Manufacture of tobacco products	Manufacture of tobacco products	Manufacturing industry
Manufacture of textiles	Manufacture of textiles	Manufacturing industry
Manufacture of wearing apparel; dressing and dyeing of fur	Manufacture of wearing apparel	Manufacturing industry
Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear	Manufacture of leather and related products	Manufacturing industry
Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	Manufacturing industry
Re-processing of secondary wood material into new wood material	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	Processsing
Pulp	Manufacture of paper and paper products	Processsing
Re-processing of secondary paper into new pulp	Manufacture of paper and paper products	Processsing
Paper	Manufacture of paper and paper products	Manufacturing industry
Publishing, printing and reproduction of recorded media	Printing and reproduction of recorded media	Manufacturing industry
Manufacture of coke oven products	Manufacture of coke and refined petroleum products	Manufacturing industry
Petroleum Refinery	Manufacture of coke and refined petroleum products	Manufacturing industry
Processing of nuclear fuel	Electricity, gas, steam and air conditioning supply	Processsing
Plastics, basic	Manufacture of chemicals and chemical products	Chemicals industry
Re-processing of secondary plastic into new plastic	Manufacture of coke and refined petroleum products	Processsing
N-fertiliser	Manufacture of chemicals and chemical products	Chemicals industry
P- and other fertiliser	Manufacture of chemicals and chemical products	Chemicals industry

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EXIOBASE_industry	EXIOBASE_industry_group	Benchmark industry
Chemicals nec	Manufacture of chemicals and chemical products	Chemicals industry
Manufacture of rubber and plastic products	Manufacture of rubber and plastic products	Manufacturing industry
Manufacture of glass and glass products	Manufacture of other non-metallic mineral products	Manufacturing industry
Re-processing of secondary glass into new glass	Manufacture of other non-metallic mineral products	Processsing
Manufacture of ceramic goods	Manufacture of other non-metallic mineral products	Manufacturing industry
Manufacture of bricks, tiles and construction products, in baked clay	Manufacture of other non-metallic mineral products	Manufacturing industry
Manufacture of cement, lime and plaster	Manufacture of other non-metallic mineral products	Manufacturing industry
Re-processing of ash into clinker	Manufacture of other non-metallic mineral products	Processsing
Manufacture of other non-metallic mineral products n.e.c.	Manufacture of other non-metallic mineral products	Manufacturing industry
Manufacture of basic iron and steel and of ferro-alloys and first products thereof	Manufacture of basic metals	Manufacturing industry
Re-processing of secondary steel into new steel	Manufacture of basic metals	Processsing
Precious metals production	Manufacture of basic metals	Manufacturing industry
Re-processing of secondary preciuos metals into new preciuos metals	Manufacture of basic metals	Processsing
Aluminium production	Manufacture of basic metals	Manufacturing industry
Re-processing of secondary aluminium into new aluminium	Manufacture of basic metals	Processsing
Lead, zinc and tin production	Manufacture of basic metals	Processsing
Re-processing of secondary lead into new lead	Manufacture of basic metals	Processsing
Copper production	Manufacture of basic metals	Processsing
Re-processing of secondary copper into new copper	Manufacture of basic metals	Processsing
Other non-ferrous metal production	Manufacture of basic metals	Manufacturing industry
Re-processing of secondary other non-ferrous metals into new other non-ferrous metals	Manufacture of basic metals	Processsing
Casting of metals	Manufacture of basic metals	Manufacturing industry
Manufacture of fabricated metal products, except machinery and equipment	Manufacture of fabricated metal products, except machinery and equipment	Manufacturing industry
Manufacture of machinery and equipment n.e.c.	Manufacture of machinery and equipment n.e.c.	Manufacturing industry
Manufacture of office machinery and computers	Manufacture of computer, electronic and optical products	Manufacturing industry
Manufacture of electrical machinery and apparatus n.e.c.	Manufacture of electrical equipment	Electrical and electronic equipment
Manufacture of radio, television and communication equipment and apparatus	Manufacture of electrical equipment	Manufacturing industry

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EXIOBASE_industry	EXIOBASE_industry_group	Benchmark industry
Manufacture of medical, precision and optical instruments, watches and clocks	Manufacture of computer, electronic and optical products	Manufacturing industry
Manufacture of motor vehicles, trailers and semi-trailers	Manufacture of motor vehicles, trailers and semi-trailers	Manufacturing industry
Manufacture of other transport equipment	Manufacture of other transport equipment	Manufacturing industry
Manufacture of furniture; manufacturing n.e.c.	Manufacture of furniture	Manufacturing industry
Recycling of waste and scrap	Waste collection, treatment and disposal activities; materials recovery	Processing
Recycling of bottles by direct reuse	Waste collection, treatment and disposal activities; materials recovery	Processing
Production of electricity by coal	Electricity, gas, steam and air conditioning supply	Energy
Production of electricity by gas	Electricity, gas, steam and air conditioning supply	Energy
Production of electricity by nuclear	Electricity, gas, steam and air conditioning supply	Energy
Production of electricity by hydro	Electricity, gas, steam and air conditioning supply	Energy
Production of electricity by wind	Electricity, gas, steam and air conditioning supply	Energy
Production of electricity by petroleum and other oil derivatives	Electricity, gas, steam and air conditioning supply	Energy
Production of electricity by biomass and waste	Electricity, gas, steam and air conditioning supply	Energy
Production of electricity by solar photovoltaic	Electricity, gas, steam and air conditioning supply	Energy
Production of electricity by solar thermal	Electricity, gas, steam and air conditioning supply	Energy
Production of electricity by tide, wave, ocean	Electricity, gas, steam and air conditioning supply	Energy
Production of electricity by Geothermal	Electricity, gas, steam and air conditioning supply	Energy
Production of electricity nec	Electricity, gas, steam and air conditioning supply	Energy
Transmission of electricity	Electricity, gas, steam and air conditioning supply	Energy
Distribution and trade of electricity	Electricity, gas, steam and air conditioning supply	Energy
Manufacture of gas; distribution of gaseous fuels through mains	Electricity, gas, steam and air conditioning supply	Energy
Steam and hot water supply	Electricity, gas, steam and air conditioning supply	Energy
Collection, purification and distribution of water	Water collection, treatment and supply	Non financial services and other activities
Construction	Construction	Construction
Re-processing of secondary construction material into aggregates	Waste collection, treatment and disposal activities; materials recovery	Processing

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EXIOBASE_industry	EXIOBASE_industry_group	Benchmark industry
Sale, maintenance, repair of motor vehicles, motor vehicles parts, motorcycles, motor cycles parts and accessoiries	Wholesale and retail trade and repair of motor vehicles and motorcycles	Wholesale and Retail
Retail sale of automotive fuel	Wholesale and retail trade and repair of motor vehicles and motorcycles	Wholesale and Retail
Wholesale trade and commission trade, except of motor vehicles and motorcycles	Wholesale trade, except of motor vehicles and motorcycles	Wholesale and Retail
Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods	Retail trade, except of motor vehicles and motorcycles	Wholesale and Retail
Hotels and restaurants	Accommodation and food service activities	Non financial services and other activities
Transport via railways	Land transport and transport via pipelines	Transport
Other land transport	Land transport and transport via pipelines	Transport
Transport via pipelines	Land transport and transport via pipelines	Transport
Sea and coastal water transport	Water transport	Transport
Inland water transport	Water transport	Transport
Air transport	Air transport	Transport
Supporting and auxiliary transport activities; activities of travel agencies	Travel agency, tour operator and other reservation service and related activities	Non financial services and other activities
Post and telecommunications	Post and telecommunications	Non financial services and other activities
Financial intermediation, except insurance and pension funding	Financial service activities, except insurance and pension funding	Financial services
Insurance and pension funding, except compulsory social security	Insurance, reinsurance and pension funding, except compulsory social security	Financial services
Activities auxiliary to financial intermediation	Activities auxiliary to financial services and insurance activities	Financial services
Real estate activities	Real estate activities	Non financial services and other activities
Renting of machinery and equipment without operator and of personal and household goods	Other personal service activities	Non financial services and other activities
Computer and related activities	Computer and related activities	Non financial services and other activities
Research and development	Scientific research and development	Non financial services and other activities
Other business activities	Other business activities	Non financial services and other activities
Public administration and defence; compulsory social security	Public administration and defence; compulsory social security	Non financial services and other activities
Education	Education	Non financial services and other activities
Health and social work	Human health and social work activities	Non financial services and other activities

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EXIOBASE_industry	EXIOBASE_industry_group	Benchmark industry
Incineration of waste: Food	Waste collection, treatment and disposal activities; materials recovery	Waste and waste management sector
Incineration of waste: Paper	Waste collection, treatment and disposal activities; materials recovery	Waste and waste management sector
Incineration of waste: Plastic	Waste collection, treatment and disposal activities; materials recovery	Waste and waste management sector
Incineration of waste: Metals and Inert materials	Waste collection, treatment and disposal activities; materials recovery	Waste and waste management sector
Incineration of waste: Textiles	Waste collection, treatment and disposal activities; materials recovery	Waste and waste management sector
Incineration of waste: Wood	Waste collection, treatment and disposal activities; materials recovery	Waste and waste management sector
Incineration of waste: Oil/Hazardous waste	Waste collection, treatment and disposal activities; materials recovery	Waste and waste management sector
Biogasification of food waste, incl. land application	Waste collection, treatment and disposal activities; materials recovery	Waste and waste management sector
Biogasification of paper, incl. land application	Waste collection, treatment and disposal activities; materials recovery	Waste and waste management sector
Biogasification of sewage slugde, incl. land application	Waste collection, treatment and disposal activities; materials recovery	Waste and waste management sector
Composting of food waste, incl. land application	Waste collection, treatment and disposal activities; materials recovery	Waste and waste management sector
Composting of paper and wood, incl. land application	Waste collection, treatment and disposal activities; materials recovery	Waste and waste management sector
Waste water treatment, food	Water collection, treatment and supply	Waste and waste management sector
Waste water treatment, other	Water collection, treatment and supply	Waste and waste management sector
Landfill of waste: Food	Waste collection, treatment and disposal activities; materials recovery	Waste and waste management sector
Landfill of waste: Paper	Waste collection, treatment and disposal activities; materials recovery	Waste and waste management sector
Landfill of waste: Plastic	Waste collection, treatment and disposal activities; materials recovery	Waste and waste management sector
Landfill of waste: Inert/metal/hazardous	Waste collection, treatment and disposal activities; materials recovery	Waste and waste management sector
Landfill of waste: Textiles	Waste collection, treatment and disposal activities; materials recovery	Waste and waste management sector

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EXIOBASE_industry	EXIOBASE_industry_group	Benchmark industry
Landfill of waste: Wood	Waste collection, treatment and disposal activities; materials recovery	Waste and waste management sector
Activities of membership organisation n.e.c. (91)	Activities of membership organisation n.e.c.	Non financial services and other activities
Recreational, cultural and sporting activities (92)	Arts, entertainment and recreation	Non financial services and other activities
Other service activities (93)	Other service activities	Non financial services and other activities
Private households with employed persons (95)	Activities of households as employers of domestic personnel	Non financial services and other activities
Extra-territorial organizations and bodies	Activities of extraterritorial organisations and bodies	Non financial services and other activities

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