Factsheet: Chemical

Aim of the factsheet

The benchmark factsheet is designed for companies or investors to assess a sector's impact on biodiversity. Companies can use the factsheet to compare their impacts (e.g. assessed with the Global Biodiversity Score tool) to the sector average or to estimate their impact and main pressures on biodiversity. Also, investors can use it to screen their biodiversity impact, or rate specific companies' performance against sectoral benchmarks. Finally, factsheets will help nourish the work of the EU Green Taxonomy by identifying low impact companies. It is supported by an explanatory appendix.

What does the sector include?

EXIOBASE industry	Code NACE rev 2
Plastics, basic **N- Fertiliser** **P- and other fertiliser** **Chemicals nec**	**Division 20 Manufacture of chemicals and chemical products** **Division 21 Manufacture of basic pharmaceutical products and pharmaceutical preparations**

Sector's stakes

Ecosystem services dependencies of the chemical sector

The chemical sector is directly dependant on surface water and ground water (about 70% of dependency). However, all other ecosystem services dependencies of the sector are below 40%. The processes of catalytic cracking, fractional distillation and crystallization are highly dependent on surface and ground water and cannot operate without it (ENCORE, 2020).

How does the sector contribute to changes in the state of natural capital ?

The sector affects the natural capital through fertilisers and pesticides use and spreading. N and P fertilisers cause marine and freshwater eutrophication respectively, as well as groundwater pollution, change in species composition and water and soil acidification (OECD 2020). As for pesticides, they contribute to reducing populations of species through both direct exposure and food and habitat alteration (Kennedy et al. 2013, Hallmann et al. 2014). In the United States the sector accounts for 14% of total chemicals releases (EPA, 2020), emphasizing the contribution of the sector to these impact drivers.

The EXIOBASE sector "plastics, basic" represent 13.9% of operations covered by this factsheet and plastic pollution is another important biodiversity threat. Together with invasive alien species and other types of air, soil and water pollution it is the 4th most important driver of change for biodiversity (IPBES, 2019). Plastic is also responsible for biota transport, potentially altering ecosystem composition and genetic diversity (IUCN, 2018).

The consequences of plastic pollution are not well assessed which represent another important risk. Through the activities mentioned the sector contributes highly to pollution, an impact driver responsible for 17.5% of the impact on freshwater biodiversity and for 14% of impacts on overall biodiversity (IPBES, 2019).

Opportunities

Industrials and consumers' increasing awareness of arising impacts is an opportunity for the chemical sector to provide solutions to reduce impacts on biodiversity and tend towards no net loss operations. Also, an other incentive to reduce impacts on biodiversity is to consider the risks linked with the supply chain, due for example to the extraction of raw materials.

Bio-based chemicals reflect the willingness of the sector to explore more sustainable practices. Their production volumes have been steadily increasing from 14.5 to almost 20 million tonnes between 2008 and 2016, reaching for the European bio-based chemicals and plastics sector, a turnover of billion EUR 55 in 2016. However, the benefits of bio-based chemicals for biodiversity are not obvious as land use impacts are significant, and may more than compensate for the reduction in impacts from materials extraction. They also depend on type of crops used to produce the bio-based ethanol (more details in the technical appendix).

Under the NACE classes, fertiliser is the product category with the highest bio-based production volume, followed by other chemical products nec. (respectively 6.6 and 1.25 million tonnes in 2016) (Nova institute 2019, paragraph 3.5, table 3).

Biodiversity footprint

Key figures

Scope 1[1] dynamic terrestrial intensity

1.3 MSA.m²/kEUR ~ 9.9 MSAppb/bEUR

(Scope 1 static terrestrial 0.26 MSA.m²/kEUR ~ 2.0 MSAppb/bEUR)

Scope 1[1] static aquatic intensity

0.082 MSA.m²/kEUR ~ 0.8 MSAppb/bEUR

(Scope 1 dynamic aquatic 2.1×10^{-4} MSA.m²/k€ ~ 0.02 MSAppb/bEUR)

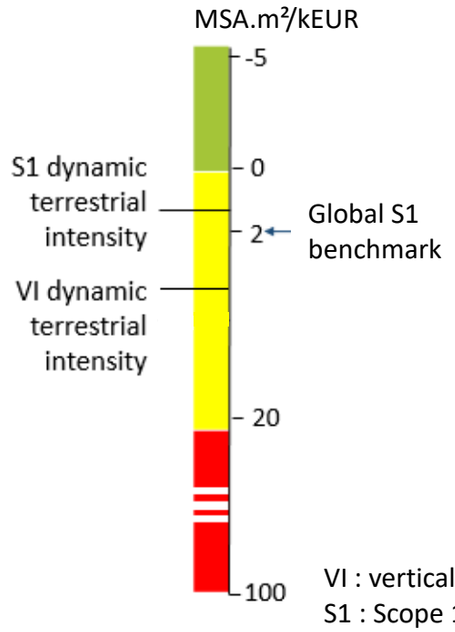
Aggregated Score /bEUR:

10 for Scope 1; 270 if vertically integrated

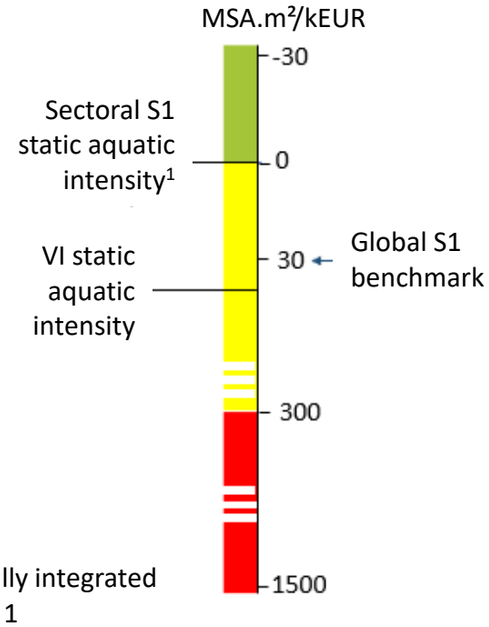
Ecosystem services dependency score:

Scope 1	15%
Upstream Scope 3	14%

Dynamic terrestrial performance of the sector



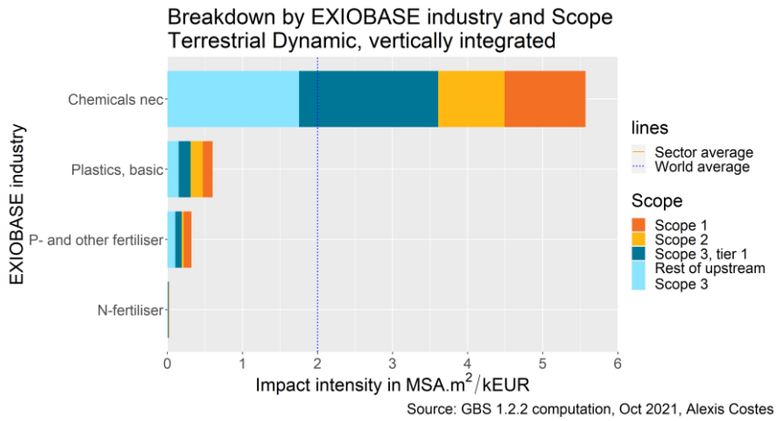
Static aquatic performance of the sector



VI : vertically integrated
S1 : Scope 1

Biodiversity footprint (continued)

		Impact intensity - MSA.m²/kEUR	
		Scope 1	Vertically integrated
Terrestrial	Dynamic	1.3	6.5
	Static	0.26	630
Aquatic	Dynamic	$2.1*10^{-4}$	0.24
	Static	$8.2*10^{-3}$	53

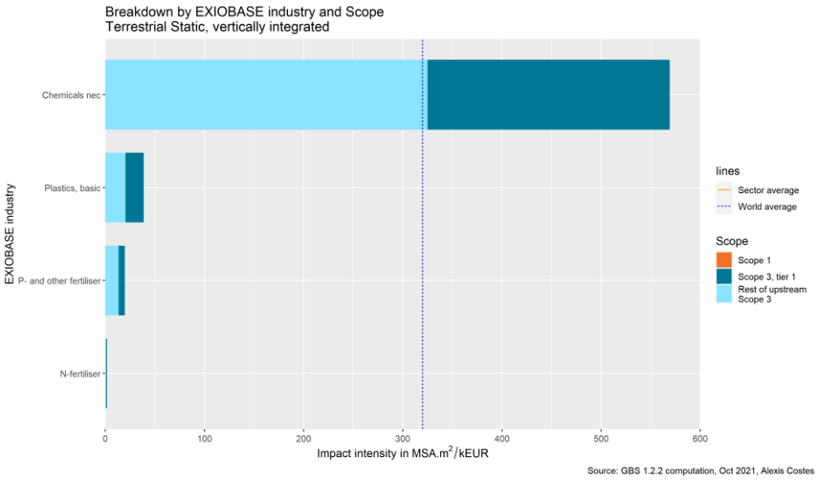


Source: GBS 1.2.2 computation, Oct 2021, Alexis Costes

Scope and industry breakdown

The graphs showing results per sub-sector and per Scope are displayed in MSA.m²/kEUR of turnover of the whole sector Chemical.

For all three EXIOBASE industries the terrestrial dynamic Scope 3 impacts are the most important, especially the rest of upstream Scope 3. This is due to the fact that the sector relies on other sectors for primary raw materials, for which extraction processes are more impactful. Note that the impact due to the extraction of phosphorus (P) is not estimated by the current version of the GBS. The Scope 1 also represents a substantial portion of the impact, mostly due to climate change.



Source: GBS 1.2.2 computation, Oct 2021, Alexis Costes

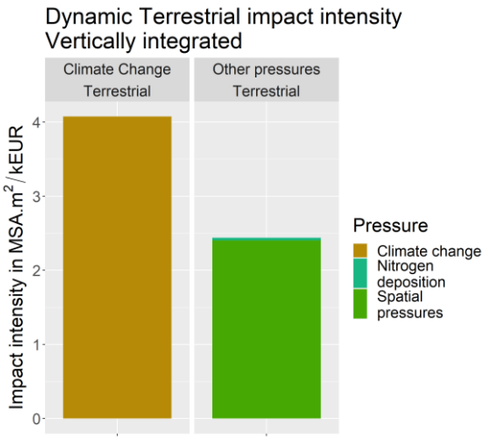
Impact drivers breakdown: what are the main ones?

The sector contributes to changing the state of the natural capital through different impact drivers. Compared to other sectors, the climate change pressures are particularly significant. More specifically:

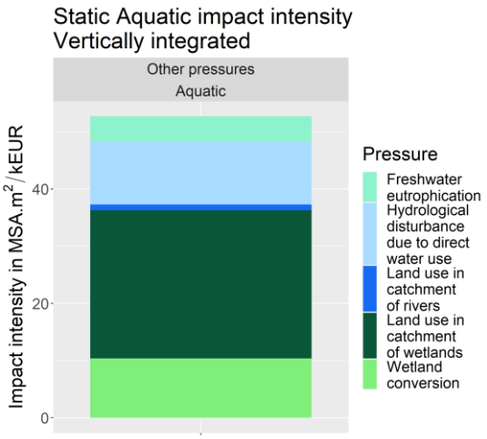
Terrestrial dynamic impacts are due to:
- Climate change: 63%
- Land Use: 36%

Terrestrial static impacts are due to:
- Land use: 78%
- Encroachment: 17%

Aquatic static impacts are due to:
- Land use in watersheds: 51%
- Wetland conversion: 20%
- Hydrological disturbance (due to water use): 21%



Source: GBS 1.2.2 computation, Oct 2021, Alexis Costes



Source: GBS 1.2.2 computation, Oct 2021, Alexis Costes

In an attempt to estimate ecotoxic impacts of the sector, an assessment was made using data from the Environmental Protection Agency as input in the GBS. The data cover the substances released by the chemical sector (NAICS 325) in the United States and in 2019. More information about the aquatic and terrestrial static impacts is available in section 3.3.C.2 of the technical annex.

Factsheet: Chemical

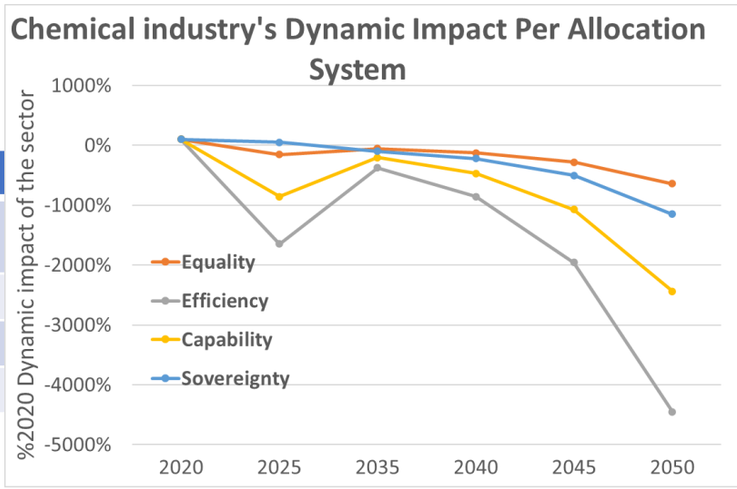
Science-Based Target for Biodiversity (SBT)

Different effort distribution methods have been defined to draw different trajectories of reducing global impact on biodiversity. The trajectories are designed for the whole world (not only the Chemical sector) to:

- Reach a global no net loss in 2030, meaning a world dynamic impact of 0 in 2030
- Return in the "zone of functional integrity of the Earth system" by 2050

Allocation	Approach	Data used
Equality	Everyone has the same right	Number of employees in the sectors (2010)
Efficiency	Cost-effectiveness	Cost of restoration (€.MSA/m²)
Capability	Industries' ability to pay	Turnover (M€) (2011)
Sovereignty	Grandfathering	2020 dynamic impact (MSA.km²/year)

The efficiency allocation seems very severe to the chemical sector. This can be explained by the relatively low dynamic impact of the sector and lower restoration costs. On the opposite, the equality allocation is more advantageous for the sector due to a relatively low proportion of employees.



Possible actions to reduce the impact on biodiversity[1]

Scope 1	During fertilisers production process, use filters to avoid spreading of particulates Improve filtration and treatments of all rejections to air, soils or water Use water efficient processes Reduce prevalence of leaks, spills and reduce intentional and unintentional fugitive emissions Adopt carbon capture and storage technology Increase output efficiency and reduce need for facilities (reducing land occupancy)
Scope 2	For the production process use renewable electricity with demonstrated low impact on biodiversity Optimise the production process to reduce energy consumption
Upstream Scope 3	Work with suppliers to improve current practices and switch suppliers only if no sufficient improvement can be made Research lower impact substitutes for current raw materials Step up recycling content of materials used Use agricultural waste to produce bio-based solutions and minimize the impact, examples of bio-based products can be found in the annex (Adopt an eco design approach to reduce material content of products)
Downstream Scope 3	Improve waste collection and treatment schemes Increase proportions of waste valorisation and recycling Adopt application methods for pesticides that are least harmful to ecosystems

Environmental safeguards

Some impacts and impact drivers are not yet covered by the GBS methodology. They should not be ignored when defining the biodiversity action plan. For example:

- Avoid locating activities on or near sites of high environmental value or establish a specific management plan. For instance, avoid deforestation and encroachment on protected areas for livestock or crop production (in Brazil, Congo, etc.);
- Take measures to limit the spread of invasive species, particularly during the transport of marine species. Implement measures to detect and eradicate such invasions;

The green taxonomy describes Do No Significant Harm for ecosystems (DNSH) for the manufacture of organic and inorganic basic materials, fertilisers and nitrogen compound and plastics in primary form. Activities should:

- Ensure an environmental impact assessment (EIA) has been completed in accordance with the EU Directives on Environmental Impact Assessment and Strategic Environmental Assessment.
- For sites/operations located in or near biodiversity-sensitive areas ensure that an appropriate assessment has been conducted in compliance with the provisions of the EU Biodiversity Strategy

For such sites/operations, ensure that:

- a site-level biodiversity management plan exists and is implemented in alignment with the IFC Performance Standard 6
- all necessary mitigation measures are in place to reduce the impacts on species and habitats; and
- a robust, appropriately designed and long-term biodiversity monitoring and evaluation program exists and is implemented.

Key messages

- **A highly impacting industry for which most impacts occur within the upstream Scope 3**.
- **Downstream pollution is another important source of impact** and should be considered when assessing a company's impact.
- The key impact drivers to monitor and reduce are mainly **land use, climate change** and **ecotoxicity**. For the aquatic impacts, the key drivers include also **wetland conversion** and **land use in catchment of wetlands (linked to pollution)**.

Biodiversity Footprint Assessment

General objectives of a GBS-based assessment

- **To assess quantitatively the biodiversity footprint** generated by the activity of the company or portfolio and **to assess the contribution of the company to global biodiversity erosion**;
- To understand what are the main impact drivers on biodiversity the company is responsible for;
- To provide elements for a **short-term** and a **mid-term action plan to reduce the footprint** on biodiversity and alleviate the contribution of the company to biodiversity erosion

To **anticipate future mandatory biodiversity footprint disclosure** in France and in the European Union (action 30 of the French National Biodiversity Plan, post-2020 Biodiversity Agenda)

Limitations: The assessment does not consider some pollution impact drivers nor the existence of invasive species, the impacts on genetic and marine biodiversity

Data: Calculation based on data from the input-output table and the environmental extensions of EXIOBASE 3.8.1 and the impact factors developed by CDC Biodiversité

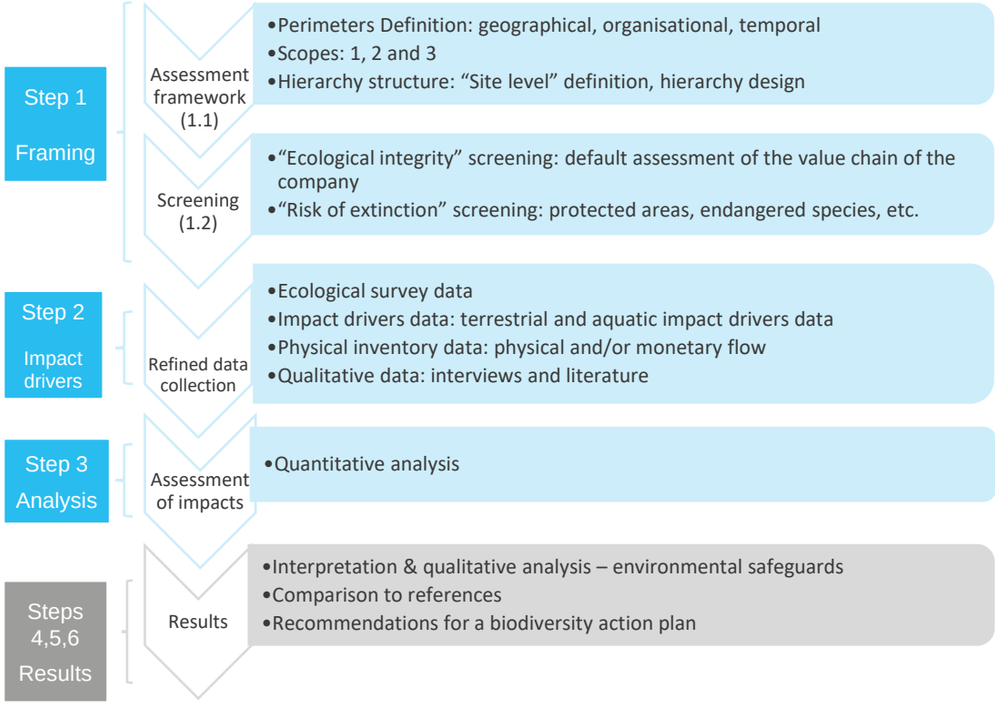
How to lead a Biodiversity Footprint Assessment based on the Global Biodiversity Score?

A GBS-based assessment can be led by various organisms:

- The company itself
- A service-provider, instructed by the company
- A non-financial rating agency

The relevance of the assessment depends on:

- The inclusion of direct operations and value chain impacts on natural capital
- The consistency and transparency of the data and methodology used
- The appropriate quality assurance and complete disclosure of the results



Factsheet version 1.0 October 2021. GBS computations : GBS 1.2.2, October 2021, Alexis Costes.

More information
About the GBS: https://www.cdc-biodiversite.fr/gbs/
About the factsheets: https://www.mission-economie-biodiversite.com/actualites/fiches-benchmark-benchmark-factsheets
Global Biodiversity Score: a tool to establish and measure corporate and financial commitments for biodiversity (CDC Biodiversité, 2019)
Measuring the contributions of business and finance towards the post-2020 global biodiversity framework (CDC Biodiversité, 2020)
The sources are referenced in the section « Chemical » of the technical appendix.