Overview

Chemicals:

Priority actions towards a nature-positive future

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Version 1.1

Introduction

The USD $4 trillion global chemical sector provides materials for 95% of all manufactured goods worldwide. It is also the largest industrial energy consumer and the third-largest industry sub-sector in terms of direct carbon dioxide emissions.[1] Thus, it is imperative for the chemical sector to ensure it operates within the safe and just Earth system boundaries and ultimately contributes to a nature-positive and net-zero future.[i]

Chemicals are used in our daily lives and in nearly all industrial processes. For example, catalysts and other specialty chemicals are used to manufacture lifesaving drugs, and chemicals are used to make almost every consumer product from cleaning solutions to automobiles.

Many leading businesses in the sector have already made commitments on climate and nature and efforts are underway to reduce greenhouse gas (GHG) emissions and decrease downstream discharges, waste and toxicity.[ii]

While these efforts are welcome, more needs to be done. The sector continues to contribute to drivers of biodiversity loss such as pollution, GHG emissions, freshwater use and land conversion across its value chain.[iii] Like other sectors, the chemical sector is also dependent on environmental assets and ecosystem services to function and grow. Thus, nature loss is a key risk for the sector. Moreover, regulators will soon begin to seek nature-related disclosure from businesses.

To complement ongoing sustainability initiatives, all businesses need to **A**ssess, **C**ommit, **T**ransform, and **D**isclose (ACT-D high-level business actions on nature). They should acknowledge the value of nature to their business; assess and measure their impacts and dependencies on nature; set transparent, time-bound, science-based targets; take actions to address their key impacts and dependencies; and publicly disclose performance and other relevant nature-related information.

This overview provides a sector-level summary of potential key impacts and dependencies on nature. Importantly, it also sets out the priority actions that all businesses should take now to **transform** and ensure the chemical sector plays its role in halting and reversing nature loss by 2030 - the mission at the heart of the Kunming-Montreal Global Biodiversity Framework.

Scope of this overview

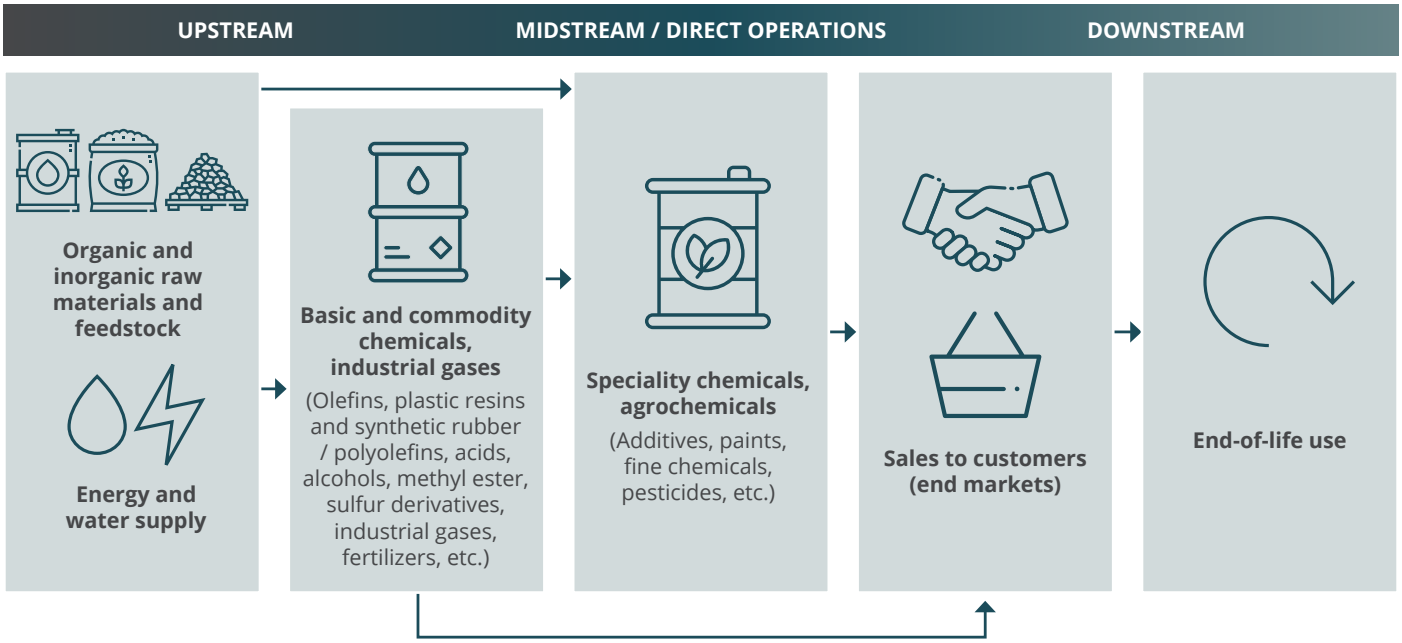
The chemical sector (SICS code: RT-CH) includes businesses that transform organic and inorganic feedstocks into more than 70,000 diverse products to be used in a range of industrial, pharmaceutical, agricultural, housing, automotive and consumer goods applications. The chemical sector is commonly segmented into the following sub-sectors: petrochemicals and commodity chemicals, specialty chemicals, agrochemicals and fertilizers and industrial gases

[i] *In May 2023, the Earth Commission published the first quantification of safe and just Earth system boundaries, developed by more than 40 researchers across the globe. See **Safe and just Earth system boundaries** (Nature, 2023).*

[ii] *For example, releases of persistent organic pollutants (POPs), first listed under the Stockholm Convention, have decreased in most high-income countries. In Europe, the chemical sector saw an overall decreasing trend of over 51% in nitrogen and 66% in phosphorous emissions into water between 2007 and 2017. See **Global Chemicals Outlook II** (United Nations Environment Programme, 2019), **Chemical sector environmental performance** (CEFIC, 2023).*

[iii] *Five key drivers of nature loss identified by the **Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) Global Assessment Report**.*

Chemicals value chain (as covered in this overview)



Nature-related impacts

To protect and enhance the ecosystems on which they depend, businesses in the chemical sector should direct their efforts toward addressing the most significant impacts on nature in their operations and value chains, namely:

- **Pollution and chemical run-off** – Although the sector is taking action to limit toxic pollution discharge,[iv] hazardous releases into water, air and soil from manufacturing processes, downstream use and a product's end-of-life still exist. For instance, in the downstream phase, environmental issues arise from the uncontrolled or inappropriate application of pesticides, the overuse of nitrate-based fertilizers, the discharge of pharmaceuticals into water bodies and the persistent nature of certain chemicals.

  The prevalence of pollution often reflects the presence or absence of local regulatory standards and enforcement.[2]

- **Water use** – While most of the used water is returned and therefore non-consumptive, the process of manufacturing chemicals withdraws vast volumes of water and can be water-intensive (especially for fossil fuels-based approaches), through a range of technical processes, including the heating and cooling of plants, rinsing and distillation. In Europe, the chemical and petroleum refining industries account for 11% of freshwater use.[3]

- **Greenhouse gas (GHG) emissions** – Chemical companies generate an estimated 7% of total global GHG emissions and 20% of emissions tied to industry.[4] This is partly the result of the significant amounts of fossil fuels consumed by the sector, driven primarily by high manufacturing energy demands and fossil feedstocks used for products such as plastics and fertilizers. The degradation of some fossil fuel-based chemicals can also release GHGs like carbon dioxide and methane into the atmosphere, further exacerbating climate change.

- **Land use change** – Bio-based feedstocks may require significant areas of land for production and — if not sustainably produced — can lead to soil degradation, land conversion and deforestation. As the sector continues to shift towards bio-based feedstocks to reduce dependencies on fossil fuels, safeguards need to be put in place to avoid unintended consequences for nature and biodiversity.

[iv] *For example, acidifying emissions by the chemical sector in the EU27 dropped more than 60% since 2007. See Chemical sector environmental performance (CEFIC), 2023.*

Nature-related dependencies

Like many sectors, the chemical sector relies on environmental assets and ecosystem services to function and grow. Most of its dependencies are embedded in the sector's supply chain. More than 50% of the gross value-added of chemical businesses' supply chains is highly or moderately dependent on nature.[5] In particular, chemical businesses rely heavily on:

- **Freshwater** – Although the sector is increasingly looking to reduce overall water consumption and recycle wastewater, it continues to use freshwater as an important resource.
- **Biomass provisioning** – As the sector seeks to reduce its dependency on depletable resources, it increasingly uses renewable ones, such as biomass for energy production and bio-based feedstock. The sector also sometimes uses plant-based raw materials, such as wild medicinal plant species.
- **Mineral and fossil resources** – Petroleum products and liquefied natural gas are important feedstocks for the sector. Many chemicals also depend on mined resources, such as platinum, palladium, lithium, rare earths and rhodium. Currently, the sector's substantial energy demand is primarily generated using fossil fuels.

These dependencies strengthen the business case to invest in the protection and restoration of nature.

Priority actions and opportunities

To reduce the sector's negative impacts on nature while mitigating risks to their operations and unlocking commercial opportunities, chemical companies should prioritize five key actions:

1. **Reduce pollution risk and negative impact including by product innovation, circularity and customer education** – Start by building an understanding of how the manufacturing process and products affect nature and biodiversity. Take action to reduce negative impacts by minimizing ecotoxicity and reducing pollution risk through design, risk assessments, portfolio development and end-of-life solutions. Where possible, move to circular models in the sourcing of feedstock, the design and manufacturing of products and the downstream use of chemicals. When developing new products, make them sustainable by design from inception and look to introduce products and services that avoid negative impacts on nature or serve the nature-positive transition of another sector.

   Invest in campaigns that educate both business-to-business (B2B) and business-to-consumer (B2C) customers on product use and disposal to reduce the nature footprint of a product. For example, an agricultural chemical company can offer eco-friendly pest control solutions and technical advice to encourage farmers to adopt best practices.

2. **Increase efficiency in the manufacturing process and expand the use of renewable energy to reduce greenhouse gas (GHG) emissions** – Heat and energy efficiency gains can be achieved by digitizing or automizing the manufacturing process, recycling heat or improving heat distribution. These improvements could contribute to 40% of the sector's target to achieve carbon neutrality by 2050.[6] Expand the use of renewable energy sources for power generation to reduce the depletion of natural resources and decrease Scope 2 emissions. In addition, new biomanufacturing opportunities look to offer a more energy-efficient approach to the production of certain chemicals over the medium and long term.

3. **Improve water stewardship by establishing sustainable water management strategies and practices, remediating water stress in supply chains, and replenishing watersheds** – Improved freshwater management and optimization of usage have the potential to reduce water consumption by up to 30% by 2030.[7] In particular, recycling water and introducing closed-loop systems in chemical plants can help with this optimization, although this could increase energy consumption. Focus on understanding risks related to decreased water availability or quality in the supply chain and incorporate opportunities to replenish watersheds into corporate water management plans (especially in regions experiencing water stress).

4. **Source responsibly, improve supply chain traceability and transparency and explore switching to sustainably sourced bio-based or recyclable materials** – Assess the impacts and risks associated with suppliers, especially when sourcing raw materials — whether it is exposure to higher Scope 3 emissions, deforestation, pollution or loss of biodiversity. Engage with suppliers to maximize their sustainability performance and improve product transparency and traceability, which also allows users to make more informed decisions on purchase and usage.

   Explore shifting towards alternative feedstocks to reduce carbon and nature footprints. Over 40% of circular-economy investments made by global chemical manufacturers in 2020 were related to bio-based or recycled material for feedstocks.[8] However, bio-based feedstocks carry their own set of risks that must be considered. These can be related to the chemical properties of products made from alternative input materials and the competition for land that could otherwise be used to produce feedstocks for feed, food, fiber and fuel. Thus, risk-based assessments and life-cycle analyses of bio-based products are needed to avoid or minimize trade-offs or unfortunate substitutions.[9]

5. **Support nature conservation and restoration and advocate for policy and regulatory changes that protect nature** – Work with organizations trying to conserve and restore nature within and beyond the value chain through Nature-based Solutions and/or ecosystem-based approaches such as green infrastructure. Promote the conservation and restoration of degraded ecosystems by supporting regenerative agriculture, sustainable sourcing and landscape conservation and restoration initiatives. Consider supporting innovative nature financing mechanisms, such as payment for ecosystem services or nature restoration funds, which can further facilitate nature conservation and restoration.

   Moreover, contribute to a progressive regulatory and policy environment by engaging with policymakers, supporting effective regulation and joining ambitious business coalitions (such as making the case for a United Nations treaty on plastic pollution),[v] to enable the implementation of the Global Biodiversity Framework and the Sustainable Development Goals.

Importantly, efforts to deliver these priority actions and transform the sector must be delivered in alignment with a just and equitable transition, including meaningful dialogue with affected groups, such as employees, local communities, Indigenous Peoples and marginalized communities.

Adopting the priority actions can help businesses contribute to societal and environmental objectives, including the Global Biodiversity Framework (GBF) and the Sustainable Development Goals (SDGs). Read the GBF-SDG mapping to see how the priority actions can contribute to these objectives.

[v] *Examples include the ongoing negotiation towards the new global treaty to end plastic pollution, the Strategic Approach and sound management of chemicals and waste beyond 2020 by the International Conference on Chemicals Management (ICCM4), and the EU Sustainable Use of Pesticide Regulation (SUR)*

Resources

This overview was derived from the World Economic Forum's report Nature Positive: Role of the Chemical Sector (2023).

The following **sector-specific analysis, guidance, and tools** are currently available to businesses in the chemical sector:

- Responsible Care Global Charter (International Council of Chemical Associations)
- How to build a more climate-friendly chemical industry (World Economic Forum, 2020)
- Managing chemical risk in the agriculture sector: Application booklet (International Labour Organization, 2022)
- Managing the systemic use of chemicals in Europe (European Environment Agency, 2023)
- Achieving Nature-Positive Plant Nutrition: Fertilizers and Biodiversity (Scientific Panel on Responsible Plant Nutrition, 2021)
- Planet Positive Chemicals (Center for Global Commons/Systemiq, 2022)
- Science-based targets for chemicals companies, in development (Science Based Targets initiative – SBTi)
- Sectoral Materiality Tool (Science Based Targets Network – SBTN)
- Safe and sustainable by design chemicals and materials - Framework for the definition of criteria and evaluation procedure for chemicals and materials (European Commission, 2022)
- Safe and Sustainable by Design: A Transformative Power (European Chemical Industry Council – CEFIC, 2022)
- Chemical Industry Methodology for Portfolio Sustainability Assessment (PSA) (World Business Council for Sustainable Development, 2017)
- ZDHC Wastewater Guidelines (Zero Discharge of Hazardous Chemicals – ZDHC, 2022)
- ZDHC Manufacturing Restricted Substance List (ZDHC)
- AFIRM Restricted Substances List (The Apparel and Footwear International RSL Management Group – AFIRM)

For additional **sector-agnostic resources**, please refer to Business for Nature's High-level Business Actions on Nature.

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[1] Chemicals overview (International Energy Agency)

[2] Global Chemicals Outlook II (UNEP, 2019)

[3] Economically and Ecologically Efficient Water Management in the European Chemical Industry (European Commission and CORDIS, 2016)

[4] Ibid.

[5] Nature Risk Rising (WEF, 2020)

[6] The 2023 decarbonization challenge: the path to the future of energy (Deloitte)

[7] Is water management the next priority for Europe and the chemical industry? (CEFIC, 2023)

[8] Can repurposing drive your purpose in a circular economy? (EY, 2021)

[9] Safe and Sustainable by Design: chemicals and materials (EU Commission, 2022)

This is version 1.1 with minor updates made in April 2024