FAQ

Decarbonisation and detoxification of the chemicals industry

How does the chemical industry relate to the Earth's planetary boundaries?

The chemical industry has a profound influence on most of the Earth's planetary boundaries - the environmental limits that define a "safe operating space" for humanity. In 2022, scientists confirmed **that humanity has already overshot the planetary boundary for "novel entities"** such as PFAS, plastics, pesticides, and other persistent chemicals that are now ubiquitous in air, water, soils and bodies. Cumulative exposures are associated with increasing rates of cancers, infertility and metabolic and immune disorders.

Additionally, chemical pollution is closely linked to other **six of the nine planetary boundaries**. The sector also contributes to climate change through energy-intensive processes and fossil-based feedstocks, and to ocean acidification via carbon dioxide emissions. It affects ozone depletion through historical and current use of halogenated compounds and influences biogeochemical flows of nitrogen and phosphorus through fertilizer production. The industry is also linked to aerosol loading, which alters atmospheric chemistry and regional climate, and to biodiversity loss through pollution, and the release of persistent and toxic substances.

By addressing chemical pollution and transforming how chemicals are manufactured, used, and managed as waste, the sector can substantially reduce its impacts and contribute to keeping human activity within planetary limits.

How does the chemical industry contribute to the global climate crisis?

The chemical industry is a major driver of the climate crisis, both through its heavy reliance on fossil fuels for energy and feedstocks, and the climate-wrecking properties of some of its products, such as plastics and fluorinated gases (F-gases).

The sector is the **largest industrial energy consumer**[1] and the **third largest industrial source of direct CO2 emissions**, responsible for around 5% of Europe's total net greenhouse gas emissions in 2021. Around **99 % of all synthetic chemicals – as well as 99% of all plastics - are derived from oil and gas**, making the sector structurally dependent on fossil fuels.

Plastics production alone is responsible for a substantial share of demand for fossil fuels, with petrochemicals projected to drive 70% of global oil demand growth by 2026. Plastics are also carbon-intensive across its lifecycle, emitting 850 million tonnes of GHGs in 2019 (equivalent of 189 500-megawatt coal plants), a figure expected to rise to 1.34 gigatonnes annually by 2030 (equivalent of 295 new 500-megawatt coal-fired power plants) if current production trends continue.

Other products like Fluorinated gases ("F-gases") used in most cooling and heating systems add another layer of impact. They are among the **most potent greenhouse gases known** to modern science, with global warming potentials **up to 24,000 times higher than CO_2,** and represent the **fastest growing class of greenhouse gas emissions worldwide**. Many also pose toxic risks to ecosystems and human health.

[1] In 2023, chemical and petrochemical accounted for 21.5% of EU total industrial energy consumption.

How does the chemical industry drive global pollution and biodiversity loss?

Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)[2] lists chemical pollution among the top 5 direct drivers of biodiversity loss and a major threat to ecosystem health. The current model of chemicals industry therefore lies at the heart of the global pollution and biodiversity emergency.

In addition, some of the industry's products, including PFAS, F-gases and plastics, impose a heavy toxic load on a planetary scale. For example, F-gases account for **63% of total PFAS emissions** each year, making them the main source of "forever chemicals". **some PFAS compounds are the strongest greenhouse gases currently known**.

Plastic pollution is especially alarming. With production expected to **double by 2040**, it is projected that by 2050, **the weight of plastics in the ocean will largely exceed that of all fish**. Yet, most plastic pollution (80 %) originates from land (e.g. from landfills, open waste burning). Microplastics and their chemical additives are now found in nearly almost every tested human and animal body. About 25% of all plastics-related chemicals are classified as substances of concern, while data are lacking for 40% others. Growing evidence links exposure to such chemicals to non-communicable diseases such as infertility to cancers and neurological disorders.

How does climate breakdown multiply chemical pollution?

As chemical industry fuels climate breakdown, climate change in turn **amplifies chemical risks**: Rising temperatures, extreme weather, droughts, floods and sea-level rise all alter how contaminants are released, transported and transformed , widening exposure pathways. Droughts and floods mobilise contaminants from soils and sediments; rising seas and storm surges increase leaching from contaminated sites; and changing temperatures and hydrological shifts affect chemical persistence and toxicity. In short, climate disruption destabilises and spreads existing contamination, magnifying risks to ecosystems and human health.

How does chemical pollution exacerbate the climate crisis?

Beyond its direct emissions, chemical pollution undermines natural climate buffers. For example, plastic breakdown interferes with the **ocean's ability to absorb CO_2,** reducing one of the planet's most important carbon sinks. Similarly, pollution that harms soil and plant life weakens terrestrial carbon storage. These feedback loops mean that chemical pollution and climate change are deeply interconnected crises, each intensifying the other.

Are carbon capture and storage (CCS) and chemical recycling real solutions to the climate crisis?

No. Despite being marketed as "silver bullets" or "circular" technologies, **CCS** and **chemical recycling** largely **reinforce** fossil-fuel dependence while creating new environmental and health risks, diverting investment and attention from systemic solutions.

CCS is used by corporate actors as a 'bargaining chip' to justify continued fossil fuel extraction and consumption, creating structural lock-in rather than transformation, while ignoring the physical limit of any type of storage for a limitless usage of fossil fuel. It also relies on toxic solvents that present occupational health and safety risks from potential leaks and waste streams.

[2] IPBES is an independent intergovernmental body established by States in 2012 to strengthen the science-policy interface for biodiversity and ecosystem services in support of sustainable use and human well-being.

Similarly, “Chemical recycling” is another (fake) solution marketed as a path toward a “clean” and “circular” chemical industry. Chemical recycling is energy-intensive and low-yield. Studies show that it can emit up to **four times** more greenhouse gases than plastic landfilling, while producing additional toxic by-products. Moreover, labelling these processes as “circular” was found to be misleading - plastics sent to facilities labelled as “chemical recycling” are mostly burned to produce fuel or energy, with only a small fraction, **between 1% to 14%, actually being converted into new products**. Far from being circular, chemical recycling stands as a paradigmatic false solution, distracting from systemic solutions, such as reducing plastic production phasing out hazardous substances, and investing in safer materials.

Will restricting PFAS hinder the EU’s green transition?

No. **PFAS-free alternatives already exist**, even in challenging sectors such as semiconductors. Only about **8% of fluoropolymer production serves genuinely “essential” uses**, meaning that PFAS can be replaced in roughly 92% of the cases. Their continued use is largely driven by artificially low prices that ignore and externalise health and environmental costs such as health costs or environmental remediation costs.

The EU-proposed universal PFAS includes time-limited derogations where substitutes are not yet available. Far from slowing the green transition, eliminating PFAS (including many F-gases, see above) would boost EU competitiveness, avoid costly, energy-intensive cleanup technologies and accelerate innovation in safer chemistries. It would also send a strong global market signal supporting a worldwide move towards safer alternatives.

Are EU policies addressing decarbonisation and detoxification together?

Not quite. Recent EU initiatives emphasise decarbonisation, but often treat it in isolation from detoxification and circularity.

The “**Clean Industrial Deal**” released in February 2025, defines “clean” narrowly as “decarbonised”, which risks tolerating ongoing toxic production and undermines true sustainability, making this clean deal a rather **dirty** one. To be effective, such flagship publications must be holistic addressing all planetary boundaries, by integrating decarbonisation, detoxification and circularity into a single policy vision.

Similarly, the “Chemicals Industry Action Plan” in July 2025 focusses on short-term concerns and prop up the long-term lock-in of the industry in its current unsustainable business model, rather than systemic reform. It channels public subsidies without environmental or social conditions, labels polluting sites as “critical,” and promotes false solutions such as CCS and chemical recycling. To be effective, EU policy must align decarbonisation, detoxification, and circularity under a single regulatory vision.

How can the EU build a modern, competitive and sustainable chemical industry?

Progress requires a coherent, systemic approach that combines regulatory reform, conditional public finance and industrial strategy. Public support should be tied to binding environmental and social conditions, while a 2050 roadmap should set clear interim targets for decarbonisation, detoxification and circularity.

Key priorities include:

- Phasing out the most hazardous substances
- Scaling genuinely safe innovation from lab to market
- Reducing production and material intensity
- Shifting toward sustainable feedstocks and high-value specialty chemistry
- Ensuring fair competition through import standards
- Supporting a just transition for workers and communities

By transforming how chemicals are produced, used, and managed as waste, the industry can substantially reduce its impacts and help bring human activity back within planetary boundaries.