

IMPACTS ALONG THE VALUE CHAIN

Chemicals can cause harm at all stages of the product life cycle, including extraction, manufacturing, transport, use and disposal. In fact, some hazardous chemicals may cause their greatest harm during mining or manufacturing. Various schemes have been developed to address these problems, including onsite audits, tracking of chemical use, and certification, but enforcement is sometimes difficult. As a result of these multiple opportunities for harm, and frequent lack of oversight, addressing supply chain chemical use can be challenging for sustainable purchasing programs.

Extraction phase

In some cases, the mining and processing of raw materials uses toxic substances that can injure workers and devastate the environment. For example, much of the gold mined in the world is extracted using a mercury process to separate gold from ore. In many instances, workers have no protection from mercury exposure, and mercury runs off from mines into the environment, contaminates water supplies, and injures wildlife and humans. Gold is used in many electronic products that purchasers may procure.

Manufacturing phase

Process Chemicals

Many manufacturing processes use toxic chemicals that are not present in finished products. In these cases, factory workers suffer the greatest health risks, often in countries with inadequate worker protection laws. For example, most leather tanning uses chromium III, which oxidizes to form chromium VI, a carcinogen. While the finished leather does not usually contain significant levels of chromium VI, the workers who treat the leather can be heavily exposed. Another example is the electronics industry, where hazardous solvents are used for cleaning and degreasing. While they are generally not present in finished products, exposure to workers is common, with debilitating effects.

Production releases

Chemical pollution from production facilities is not well regulated in many regions. Worst affected are fenceline communities, those that are near manufacturing sites where hazardous and persistent chemicals are used and disposed - even where use has been discontinued. For example, PCBs formerly used to manufacture electric capacitors still pollute the [Hudson river to unsafe levels](#) despite years of remediation efforts by GE. They continue to contaminate fish to levels that make them unsafe for local residents to catch and eat. In Louisiana, residents that live along the "chemical corridor" between Baton Rouge and New Orleans-an area sadly nicknamed "Cancer Alley"- are exposed to multiple pollutants released from fossil fuel and chemical industries. The result is high rates of cancers in those communities, [up to 50 times the national average](#).

The discharge of untreated textile effluent makes up approximately 80% of the emissions generated by the textile industry ([Wang 2016](#)). The large volume of non-biodegradable organic compounds makes many water bodies receiving effluent uninhabitable for wildlife ([Lellis et al 2019](#)). Some textile dyes act as toxic, carcinogenic and mutagenic agents that persist as environmental pollutants and cross entire food chains. In developing countries, it is common practice to use wastewater as irrigation for agricultural crops, potentially exposing humans and livestock who ingest contaminated food crops.

Environmental justice efforts lay bare the disproportionate impact of these sorts of releases on poor communities and communities of color. These community health and well-being impacts are highly relevant to procurement professionals whose organizations have committed to equity, even if the harm occurs far from their company premises.

Use Phase

Hazardous chemicals in finished materials or products

Sustainable purchasing programs are better able to limit the use of certain chemicals at the use phase, that is, when they are actually present in the product. Numerous certifications have been established for this purpose (see Guidance on various product categories)[[LINK to Certs and Ecolabels document](#)] Some hazardous chemicals are intentionally added to products because they provide specific benefits. For example, polyfluorinated alkyl substances (PFAS) protect against stains on carpets and furniture, BPA resins are used in food and beverage can linings to protect food and increase shelf-life, and phthalates provide flexibility to plastics.

Disposal Phase

End of product life

The problematic chemicals included in many products can continue to cause harm after those products are discarded. Certain hazardous chemicals must be handled through a complex and costly system of hazardous waste regulation in most developed countries - systems that are often lacking in poorer countries. Even waste that does not require such handling can contaminate the environment and impact community health and the environment. Water soluble chemicals can leach out of products in landfills and enter groundwater. Persistent chemicals such as PFAS are intentionally added to textiles and food packaging, and continue to build up in the environment. PFAS and certain halogenated flame retardants can render some products unrecyclable. Incinerating waste can release toxic incineration byproducts into the air.

Landfills and Incinerators

More than a third of local soil contaminants come from poorly managed municipal and industrial waste ([EEA](#)). Landfills have negative impacts on soil, air, water and natural life, with most of the hazardous chemicals being released into the local environment through leachate generated during decomposition of the waste ([Iravanian and Ravari 2020](#)).

Landfill leachates and polluted air from incinerators disproportionately impact nearby communities, which are statistically poorer and more likely to be people of color. These communities have higher rates of certain diseases than the norm. For example, eye irritation, from toxic landfill gasses, and body weaknesses were identified in a greater number of the population who lived close to a landfill in a [South African study](#)

Because hazardous chemicals have impacts and cause harm throughout their lifecycle, the best approach to reducing such harm is to restrict and eliminate the use of such substances in the products we purchase, to prevent this chain of devastating consequences.