Environment and health

Production of hazardous chemicals

Indicator	EU indicator past trend	Selected objective to be met by 2020	Indicative outlook of the EU meeting the selected objective by 2020
Production of chemicals, by hazard class		Risks for the environment and health associated with the use of hazardous substances, including chemicals in products, are assessed and minimised — 7th EAP	
While the production of chemicals that are hazardous to health has declined over the years, it is not possible to equate this to a reduction in the risks to environment and health and the outlook towards 2020 is therefore unclear			

The Seventh Environment Action Programme (7th EAP) includes an objective to assess and minimise risks to the environment and health associated with the use of hazardous substances. The production and subsequent use of chemicals provides benefits to society, but can also entail risks to the environment and human health. Risk is a function of hazard and exposure, and, while the availability of data on the hazardous properties of chemical substances is improving, environmental and human exposure is poorly documented. Tracking the production volumes of industrial chemicals that are hazardous to human health is therefore used as an imperfect proxy for human exposure. From 2005 to 2014, there has been an overall downward trend in EU production of chemicals that are hazardous to health. However, since production volumes are not directly related to actual human and environmental exposure to chemicals, the decline in the production of chemicals that are hazardous to health provides a weak indication of progress towards this objective. Rather, this briefing serves to highlight gaps in the evidence base for assessing risks to the environment and human health associated with the use of hazardous substances.

For further information on the scoreboard methodology please see Box I.1 in the EEA Environmental indicator report 2016

Setting the Scene

The 7th EAP (EU, 2013) includes a number of chemical-related goals, one of which is that health and environmental risks associated with the use of hazardous substances, including chemicals in products, are assessed and minimised by 2020. Under the Regulation on the classification, labelling and packaging of substances and mixtures, chemicals are classified as hazardous on the basis of properties that generate physical, environmental and health hazards (EU, 2008). While the production and subsequent use of chemicals provides benefits to society, exposure to the hazardous chemicals emitted along the chemical life cycle generates significant risks to health and ecosystems. Human exposure to chemicals is associated with a number of disease outcomes (Prüss-Ustün et al., 2011), while chemical pollution degrades air and water quality and can impact negatively on ecosystem services. Hazardous chemicals have been detected in human populations and linked to environmental and dietary exposures (Smolders et al., 2015). Emerging concerns include the health impacts of chemical mixtures, endocrine-disrupting substances and nanomaterials (EEA and JRC, 2013).

Policy targets and progress

The Regulation on the registration, evaluation, authorisation and restriction of chemicals (REACH) (EU, 2006) aims to improve the protection of human health and the environment from the risks posed by chemicals. REACH also calls for the progressive substitution of the most hazardous chemicals, when suitable alternatives have been identified.

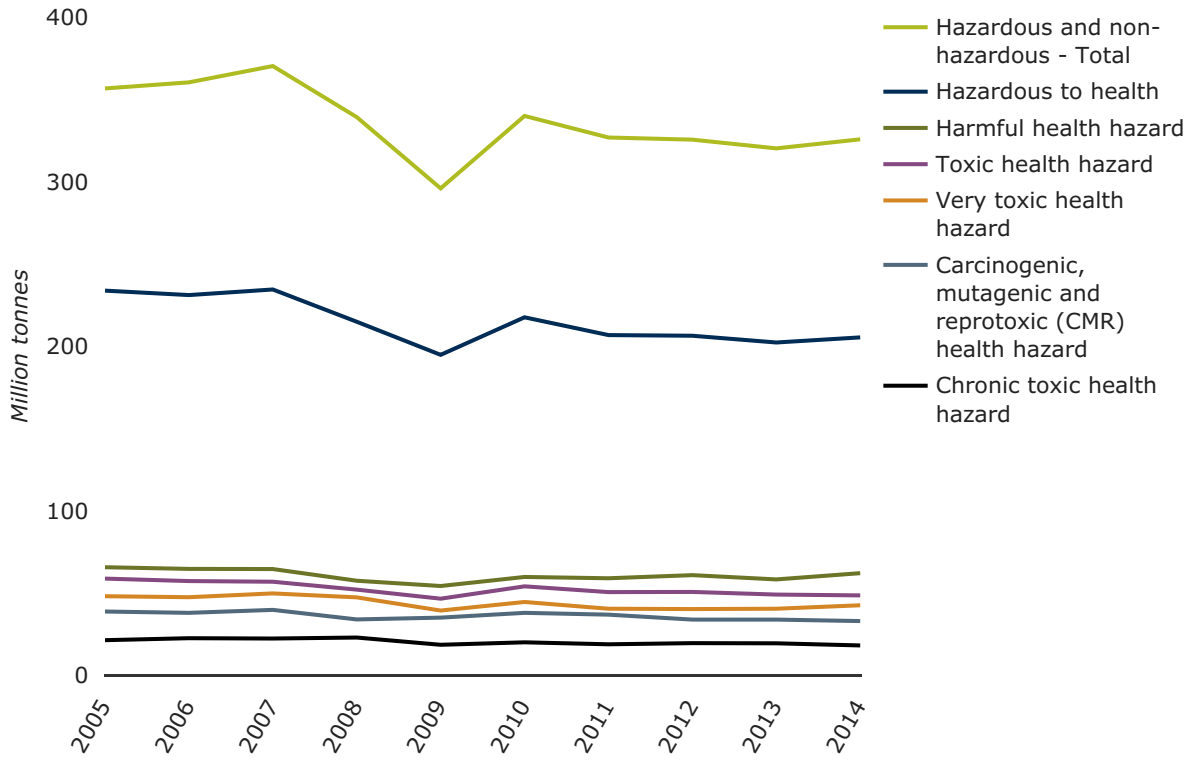
Eurostat developed a set of indicators to monitor progress towards two major goals of REACH: to improve the quality of data for chemical risk assessment, and to reduce the risks posed by chemicals to humans and the environment (Eurostat, 2009). An analysis using these indicators suggests that REACH implementation resulted in better risk control from 2007 to 2011 (Eurostat, 2012).

In making the link between the production of chemicals that are hazardous to human health and resulting risks to human health, the assumption is that reduced production volumes will equate to a reduction in the overall risk profile of chemicals incorporated into products and sold in the EU. The production of chemicals that are hazardous to health in the EU followed a gradual downward trend from 2005 to 2014, with an overall decline of 28 million tonnes in 2014, representing a 12 % drop from 2005 production levels. Within this period, production fell sharply during the economic downturn in 2008 and 2009, and rebounded in 2010, to then decline again more gradually.

Figure 1 provides an overview of the production of chemicals that are hazardous to health by hazard class in the EU from 2005 to 2014, as well as showing total chemical production. The proportion of total EU chemical production that comprises chemicals that are hazardous to

human health also followed a gradual downward trend over the 10 years, declining from 66 % in 2005 to 63 % in 2014. The proportion of chemicals that are carcinogenic, mutagenic and toxic for reproduction in total EU-28 chemical production declined from 11 % in 2005 to 10 % in 2014. Such chemicals are considered to pose the most significant risks to human health. These trends may be indicative of a shift in production towards less hazardous chemicals, driven by substitution.

Figure 1. Production of chemicals, by hazard class in the EU-28



Data sources: Eurostat. Production of toxic chemicals, by toxicity class (tsdph320)

However, production volumes for chemicals that are hazardous to health do not provide direct insight into risks, since production is not synonymous with exposure. On the one hand, some chemicals are handled in closed systems, or as intermediate goods in controlled supply chains, implying that no or limited exposure takes place (Eurostat, 2014). On the other hand, it is also possible that reductions in EU production of chemicals that are hazardous to health are being offset by increased imports of products that contain such chemicals, potentially leading to exposures along the product life cycle. In addition, the EU is a net importer of chemicals and in

2015 the volume of chemicals hazardous to health that was consumed in the EU was 7 % higher than the volume produced. EU chemical consumption also saw a downward trend from 2005 to 2014. However, while EU production of chemicals that are hazardous to health declined by 12 % between 2005 and 2014, consumption declined by only 9 % (Eurostat, 2016a).

These factors confound the use of EU production volumes of chemicals that are hazardous to health as a proxy for exposure. It is therefore not possible to accurately report progress towards the goal of minimising risks to the environment and health on the basis of this indicator.

Additional concerns focus on the health impacts of chemicals that affect the human hormone system (known as endocrine disruptors), risks to children's health, nanomaterials and chemical combination effects. The 7th EAP calls for these aspects to be effectively addressed in EU legislation by 2020. The indicator on the production of chemicals that are hazardous to health does not provide specific insight on these concerns.

Outlook beyond 2020

Chemical risk is an area characterised by uncertainties regarding exposure levels, as well as associations between exposure and health outcomes and the causal mechanisms involved. New initiatives to generate data on the exposure of the European population to chemicals using human biomonitoring should serve to improve the knowledge base. This would provide a valuable evidence base for strengthening the protection of human health from chemical risks.

The 7th EAP calls for the development of an EU strategy for a non-toxic environment by 2018, to address the concerns listed above, as well as exposure to chemicals in products, including imported products, with a view to promoting non-toxic material cycles and reducing indoor exposure to harmful substances. This strategy is expected to set a framework for actions to minimise chemical risks beyond 2020.

Current efforts to promote a circular economy also have implications for chemicals in products. The reuse or recycling of products that are contaminated with hazardous chemicals may lead to unforeseen exposures of both humans and the environment. Further research is required to identify those material flows that are likely to be contaminated with hazardous chemicals and to understand the potential exposures that might arise from recycling these materials. Such knowledge might then inform decisions on whether to prioritise increasing the quantity of materials channelled for recycling, or to separate out contaminated materials for management as hazardous waste, so guaranteeing the quality of recycled materials.

At the United Nations level, in 2002, participants at the World Summit of Sustainable Development, including the EU and its Member States, made a commitment to the sound management of chemicals throughout their life cycle, 'aiming to achieve, by 2020, that chemicals are used and produced in ways that lead to the minimization of significant adverse effects on human health and the environment' (UN, 2002). This goal was reaffirmed at Rio+20 (UN, 2012), with the 7th EAP explicitly calling for action to attain this goal at EU level. In addition, the Sustainable Development Goals (UN, 2015) set a global agenda until 2030 and define the risks from chemicals under several topics, including goals to ensure sustainable consumption and production patterns, to ensure healthy lives and promote well-being for all at all ages, and to ensure availability and sustainable management of water and sanitation for all.

About the indicator

The indicator tracks the production of industrial chemicals that are hazardous to human health. It is restricted to chemicals under five toxicity classes, including, and beginning with the most dangerous: chemicals that are carcinogenic, mutagenic and reproductive toxicants; chemicals suspected to be carcinogenic, mutagenic and reproductive toxicants as well as skin and respiratory sensitisers (collectively called chronic toxic chemicals); very toxic chemicals; toxic chemicals; and harmful chemicals (Eurostat, 2016b). Collectively these classes comprise those chemicals deemed hazardous to health. These classes of chemicals exhibit properties that impact on human health, and are derived from the hazard statements described under the Regulation on the classification, labelling and packaging of substances and mixtures (EU, 2008).

The scope of the indicator is limited, since it does not cover all possible impacts on human health, nor does it cover chemicals that impact only on the environment. Taking the production of chemicals that are hazardous to health as an imperfect proxy for exposure, a fall in production may imply a reduction in exposure. However, there are a number of limitations when extrapolating exposure from production. First, exposure depends upon the uses to which synthesised chemicals are put and on safety measures in place to control emissions along the chemical life cycle, including production, use in products, waste and any recycling and/or reuse stages. Second, total production in the EU does not fully reflect total volume of chemicals incorporated into products and sold on the EU market, since it does not account for imports of chemicals and products containing chemicals.

Footnotes and references

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