5.7. Guidance
Avoid regrettable substitution

This document is part of the *International Chemicals Management Toolkit for the Toy Supply Chain* developed by the United Nations Environment Programme (UNEP) in collaboration with the Baltic Environmental Forum (BEF) within the framework of the Global Environment Facility (GEF) project ID: 9771 on Global Best Practices on Emerging Chemical Policy Issues of Concern under the Strategic Approach to International Chemicals Management (SAICM).

What is regrettable substitution?

A substitution is called 'regrettable' if it results in the same or even a higher level of risk because the chosen alternative (chemical or material) has similar or even worse hazardous properties compared to those of the substance that was replaced, which may be known or unknown to the company implementing the substitution.

Regrettable substitution should be avoided because companies spend resources on a process that ultimately does not improve the overall situation and may eventually require another substitution if the alternative is also regulated. The most common reasons for regrettable substitutions being made are:

- **Lack of hazard data for the alternative**. Companies implementing the substitution may:
    - wrongly interpret the lack of hazard information and/or the lack of a classification as a lack of hazard and make a substitution believing their alternative is less or not hazardous;
    - be aware of the risk that the substance could have (similar or even worse) hazardous properties but, due to high (regulatory) pressure may nevertheless choose the alternative despite the gaps in the data, so as to ensure compliance.
- **Lack of competences about chemicals hazards and risks.** Companies may react to regulatory pressure by substituting chemicals with chemicals that are not regulated without considering their hazardous properties (or their potential risks and the likelihood of future regulation).
- **Insufficient assessment of exposures and risks arising from the use of an alternative.** If the substitution involves the use of different materials and/or a substance being included in a product in a different manner, it may be acceptable to use an alternative with similar hazardous properties, as the overall risk can be reduced. However, this type of substitution and alternatives assessment requires a high level of expertise and, due to the risk of future regulation in the case of severe hazards (such as carcinogenicity), is not recommended.

How to avoid regrettable substitution

To avoid regrettable substitution, it is essential that there is a thorough assessment of the alternatives (and their hazards), as well as a precautionary approach in decision making where information is lacking. Suppliers and customers should be involved in the decision making about alternatives where possible (sometimes confidentiality may prevent information exchange with suppliers or customers), to ensure the best option, which reduces risks and can be implemented in the long-term, is chosen.

The following checks aid in the identification and rejection of potentially problematic alternatives

- Check that the alternative is not subject to regulatory requirements in your target markets and ideally also not in other markets/ sectors.
- Identify hazardous properties of the alternatives from your supplier and back-up with public database and:
    - exclude all alternatives with the same or more severe hazards;
    - identify hazard endpoints according to the GHS, for which no or very little / very old data is available, discuss the likelihood that these hazards are absent with others (e.g., authorities in your country, scientists that can apply hazard models);
    - take a precautionary approach in the case of missing data – assume the existence of a hazard rather than its absence.
- Avoid structurally similar alternatives as they may have similar properties that are currently unknown; you could check the SINimilarity tool, which indicates if a chemical (CAS number or name) belongs to a group of chemicals that is known to have hazardous properties of high concern.

Additionally, consider whether the entire product could be redesigned to achieve the same result without necessitating the use of chemicals. For example, if a toy consists of a plastic material that requires several additives that are of concern, the use of a different plastic material with fewer and less harmful additives may be a better solution than replacing the individual substances.

Example BPA

One example of a regrettable substitution is the replacement of bisphenol A (BPA) with other bisphenols in several applications, including in polycarbonate plastic, which is used in several types of goods, including baby products and toys (Andaluri, Muruganandham and Rominder 2018; CHEM Trust 2018). Due to its widespread use and emissions, BPA is found in the wastewater of cities and in rivers (Petrie *et al* 2019). According to test results Bisphenol A is among other things toxic to reproduction and to aquatic life and is considered an endocrine disrupter in the European Union. BPA has also been identified as an issue of concern at global level (UNEP 2020).

Several companies have replaced BPA with other bisphenols that are structurally similar (CHEM Trust 2018). Examples include bisphenol F, bisphenol S and others. However, there is evidence that these structurally similar analogues of bisphenol A may also exhibit similar undesirable properties. In a Swedish report (Kemi 2017) 37 bisphenols were assessed and identified as potentially having endocrine disrupting properties.

Beyond toxicity – other lifecycle impacts

The assessment of alternatives 'traditionally' includes an analysis of (information on) hazardous properties and, if this does not clearly indicate the 'best' alternative, an assessment of exposures and risks of the use of alternatives. When judging the likelihood of a substitution's success, consider the move towards sustainable use of chemicals and assess impacts other than the toxicity of a chemical.

Aspects that could be considered in addition to the chemical risks could be the (change in the) use of resources like energy or water, the use of fossil or renewable input materials, or the greenhouse gas emissions related to the use of a substance. For example, the replacement of a solvent-based lacquer by a water based one may increase the need for energy because of a much slower evaporation of water. Another example could be the use of plastics made from renewable resources rather than from

petrochemicals. Here, the material could be identical, but the sourcing would involve a lower greenhouse gas potential.

These considerations may complement the assessment of an alternative's hazards and risks and could contribute to decision making between similar alternatives. In the context of toys, safety is of paramount importance, and therefore the impact of substitutions on these additional aspects should not be considered more important than the impact on the chemical risk aspect.

References:

- Andaluri, G., Muruganandham M., and Rominder S. (2018). *Plastic toys as a source of exposure to bisphenol-A and phthalates at childcare facilities. Environmental monitoring and assessment 190.2: 1-9.* https://doi.org/10.1007/s10661-017-6438-9 . Accessed 22 December 2021.
- CHEM Trust (2018). *From BPA to BPZ: A toxic soup?* http://www.chemtrust.org/wp-content/uploads/chemtrust-toxicsoup-mar-18.pdf. Accessed 22 December 2021.
- Kemi (2017). *Bisfenoler – en kartläggning och analys Rapport från ett deluppdrag inom Handlingsplanen för en giftfri vardag (Swedish with English Summary*). https://www.kemi.se/download/18.60cca3b41708a8aecdbba25d/1586867003323/rapport-5-17-bisfenoler-en-kartlaggning-och-analys.pdf. Accessed 22 December 2021.
- Petrie, B., Lopardo, L., Proctor, K., Youdan, J., Barden, R. and Kasprzyk-Hordern B. (2021). *Assessment of bisphenol-A in the urban water cycle. Science of the total environment* 650, 900-907. https://doi.org/10.1016/j.scitotenv.2018.09.011. Accessed 22 December 2021.
- United Nations Environment Programme (2020). *An Assessment Report on Issues of Concern: Chemicals and Waste Issues Posing Risks to Human Health and the Environment.* https://wedocs.unep.org/handle/20.500.11822/33807 . Accessed 22 December 2021.