

NonHazCity – a flagship project of the Baltic Sea Region

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OVERVIEW

The Baltic Sea environment assessment performed by the Baltic Marine Environment Protection Commission (HELCOM) has shown that the load of hazardous substances (HS) leaking into the marine environment is an issue of major concern. Despite a number of regulations and other measures for emission reduction, HS are still released from land-based sources to the aquatic environment. These releases occur through three main pathways: industrial wastewater, municipal wastewater and stormwater. Consumption-related diffuse sources, including indoor dust, laundry wastewater and excretion of ingested pharmaceuticals, are more important sources for HS in wastewater, compared to release from production-related point sources which nowadays are very few around the Baltic Sea (Gercken, et al. 2018).

The Interreg Baltic Sea Region Project “NonHazCity” (*“Innovative management solutions for minimizing emissions of hazardous substances from urban areas in the Baltic Sea Region”*, 2016-2019) aimed to demonstrate possibilities to reduce emissions of HS. The main focus was on emissions from small scale emitters in urban areas that cannot be controlled by traditional water treatment and enforcement techniques: private households, offices, schools and day-care, recreational facilities, and businesses that are connected to the urban wastewater plants.

The NonHazCity consortium consisted of eighteen partners from nine municipalities and expert organisations in the Baltic Sea Region (BSR) that have taken responsibility to find new ways to tackle the large number of emissions of hazardous substances from small and scattered sources in their urban territories. In addition, a network of 23 associated organisations including other municipalities, water utilities companies, national and international environmental authorities, and non-governmental organisations supported them.

NonHazCity implemented four work packages – the first one aimed at gaining new knowledge and evidence on HS occurrence in pilot municipalities participating in the project. Sampling and analyses were carried out in the wastewater and the aquatic environment of the pilot municipalities as well as in indoor dust from preschools; moreover, old and new preschool articles were analysed and, additionally, urine of volunteers of the household visited. The substances were back-tracked to urban sources and ranked according to their occurrence and level of concern. The findings of evidence were used for communication with the three stakeholder groups of the project: municipalities, businesses and private households.

The three other work packages were designed to initiate HS reduction by these stakeholder groups: Strategic chemical risk reduction goals were set as a part of Chemical Action Plans (CAPs) developed by the partner municipalities. These plans define concrete HS reduction measures for municipal entities, businesses and inhabitants together with strategies for their implementation. Information campaigns and trainings addressing the different stakeholders were carried out and are parts of the CAPs. A group of businesses using products containing HS in their operations were addressed and concrete reduction measures worked out (e.g. hair dressers, cleaning services, car repair shops, hotels and offices – in total approximately 40 companies were reached by direct consultancy activities, ca. 340 by seminars & training courses and ca. 3500 companies received information materials). Furthermore, an intensive information campaign addressing the inhabitants of the partner cities were implemented – public events, information materials, music competitions, (social) media campaigns, and direct consultancy at household checks were performed. NonHazCity has reached more than 15 000 inhabitants face-to-face in its events and more than 150 000 persons by its social media campaign.

NONHAZCITY HIGHLIGHTS AND KEY FINDINGS

Hazardous substances are everywhere!

Some substances are hazardous since they are not readily broken down in the environment and can accumulate in organisms to toxic levels, while others have potential to introduce change in the genetic material, which might lead to cancer. Endocrine disrupting compounds (EDC) are a heterogeneous group of Hazardous Substances which can interfere with the organism's hormonal system. Effects of such substances include cancer and effects on reproduction as well as developmental abnormalities, obesity and negative effects on the immune system, among others. Human exposure to HS occurs via different routes, ingestion of contaminated food or water, direct ingestion from contact with HS containing materials, contact with skin as well as through inhalation.

NonHazCity contributed with its screening activities to new evidence of substance occurrence. The main findings:

- Phthalates, bisphenol A, alkylphenols and PFAS were the substance groups most frequently detected in all wastewater types, sewage sludge and stormwater.
- The project confirmed that households are an important source of hazardous substances. All of the analysed substances were detected in wastewater coming from residential areas, some of them frequently. This suggests that consumer products and articles are important sources of HS in the sewage system.
- Many old articles found in preschools and elsewhere contain high levels of HS. Hence, it is important to sort out and dispose of e.g. old toys and materials in order to reduce the amount of HS present in the indoor environment. Even new articles and materials may contain unwanted and/or restricted substances, but much less frequently and often at lower concentrations than older ones.
- The target substances were found in the samples from volunteers in a field test in Gdansk – after reducing contact with e.g. household plastics the substances were reduced significantly in a second round of urine tests.

Compound Class	Industrial	Residential	Service	Stormwater	WWTP
Alkylphenols	28%	59%	64%	40%	75%
Bisphenol-A	100%	94%	100%	90%	92%
Pharmaceuticals	11%	59%	29%	10%	75%
Phthalates	94%	100%	86%	100%	100%

Graph 1: Substance occurrence in % of samples from different sources

The results and conclusions from analyses were published in a variety of reports in NonHazCity (Gercken, et al., 2018, Giovanoulis et.al. 2019; Pettersson, Oldén, & Lagerqvist, 2018; Rutkowska, Konieczna 2016).

Municipalities are key player for HS reduction!

NonHazCity showed that municipalities have a great number of opportunities to reduce the HS load in their territories as they can set strategic goals for HS reduction for the entire municipality including businesses and inhabitants. Municipalities can directly reduce the HS load by good housekeeping of chemical products and substitution of those containing HS at their own premises.

Chemicals Action Plans (CAP), as introduced by the City of Stockholm, set strategic goals and define concrete measures and appropriate strategies to phase out HS within the own operations. Turku, Pärnu, Riga, Silale, Kaunas District and Gdansk developed CAPs in the frame of the project. Stockholm and Västerås updated existing CAPs and assessed their implementation. The CAPs became policy documents with high levels commitment for implementation and new priorities for chemicals risk management at the municipality: Riga City Council, for example, decided to establish a new position in its environmental department: a full-time chemicals coordinator.

Some of the CAP measures were implemented within NonHazCity as test cases. The HS reductions associated with each measure were calculated. Results suggested a great HS reduction potential if measures were to be implemented at large scale.

Item	Phthalate plasticizers (kg)	Chlorinated paraffins (kg)	Organophosphorous flame retardants (kg)
Old mattresses	2 100	1,3	230
New mattresses	0	0	0,1
Old toys	170	4,2	-
New toys	0,2	0	-

Graph 2 – Hazardous Substance found in pre-schools (Lagerqvist, A. (2018). Hazardous substance reduction through phase out of old articles and materials in pre-schools – calculations of actual reduction. NonHazCity.)

Public procurement is one of the key tools to reduce HS from urban sources. Municipalities are large-scale purchasers of goods and services and are often responsible for a variety of public entities e.g. schools, pre-schools, care centres, traffic, construction, street and park management, etc. – all of them following public procurement rules. Via clear criteria on HS within their Green Public Procurement (GPP) policy, municipalities can influence large scale purchasing patterns and reduce the amounts of products, articles and materials that contain HS. NonHazCity, therefore, developed guidance materials for making HS issues more explicit within GPP. (Kontturi, K., Lankiniemi, S., & Hannamaria, Y. (2018). *Guide for Chemical Smart Public Procurement*. NonHazCity)

Hazardous substance reduction in businesses – a hard tough nut to crack!

The multitude of businesses in municipalities are important actors for reducing chemical risks. Business operations may involve the use of HS that may be released via wastewater to the environment or there may be occupational exposure at the workplace. The articles or products produced, and businesses may contain HS. Being both source and pathway, businesses can reduce their HS footprint by substitution activities and other related good chemicals management practices.

However, most businesses outside the chemical sector, in particular small businesses (which represent 99% of all businesses in the EU), do not believe that they use HS containing products or articles in their operations and workplaces. Getting businesses to engage in HS reduction meant at first raising their awareness since very few businesses do not have any HS at their workplaces.

NonHazCity in its ambitions to raise awareness of HS in everyday life wanted to show that in some types of businesses, occupational exposure and exposure of customers, can far exceed emissions to the environment. Hairdressers and cleaning services were among the sectors targeted for these activities. Other NonHazCity target sectors included car repair workshops, laundry services, the construction industry, the woodworking industry, healthcare services, hotels and, in general, offices.

Hairdressers use a **huge amount of cosmetic products (shampoos, conditioners, dyes, colours, perms and fragrances)**. **Many of these products contain substances that are classified as hazardous to human health or the environment.** Cleaning products quite often may contain hazardous components such as acids or alkalines, disinfectant compounds, aggressive preservatives and fragrances.

NonHazCity provided information including newsletters and brochures, direct consultancy and training courses for hairdressers and cleaning services to realise the HS reduction potential within their sectors. Overall, the HS reduction potential in the two sectors is considerable, although at a single business it might look marginal:

- There are 400–500 000 hairdressing salons in the EU employing ca. 1 million people and serving ca. 350 million potential customers per year. (European Cosmetic Industry, 2018). About 1.8 million hair dye products were sold in Denmark in 2010. The highly sensitizing chemicals parphenyldiamine (PPD) and resorcinol were analysed in hair dyes at concentration ranges from 0.04 – 0.25% and 0.05 – 2.2% respectively. The potential for substitution of these two hazardous chemicals in one product group is considerable. (Danish EPA, 2013)
- In 2006, the cleaning sector in the EU employed approximately 3.6 million workers contracted in 129 000 companies. Cleaning employees may be exposed to a broad range of HS in cleaning products and by contact with polluted dust, dirt and indoor air at the premises. Some substances in cleaning agents may also cause health problems to people who visit or work in the facilities where they are used. This includes, e.g., allergenic fragrances. Other substances can be detrimental to the aquatic environment. In Sweden the estimated amount of cleaning products used is 50 000 tons per year. Even though hazardous ingredients may only be present at a low percentage this would account for a considerable emission of HS, primarily to the aquatic environment.



Graph 3: hairdressers are an especially vulnerable professional group (Photo: Isabella Antonelli, iStock)

Please, find the full report on the work with businesses in: Alijošiutė, A., et al. (2019). *Successful substitution of hazardous substances is possible for businesses*. NonHazCity.

Hazardous substances – the unknown flat-mates.

Consumers use a wide variety of products, articles and materials in their households which may contain hazardous substances: detergents, cosmetics or paints – but also articles like: furniture, clothes, interior textiles, flooring materials, toys, kitchen utensils, electronic devices, etc. The presence of HS in articles is mostly unknown to people, even the environmentally informed.

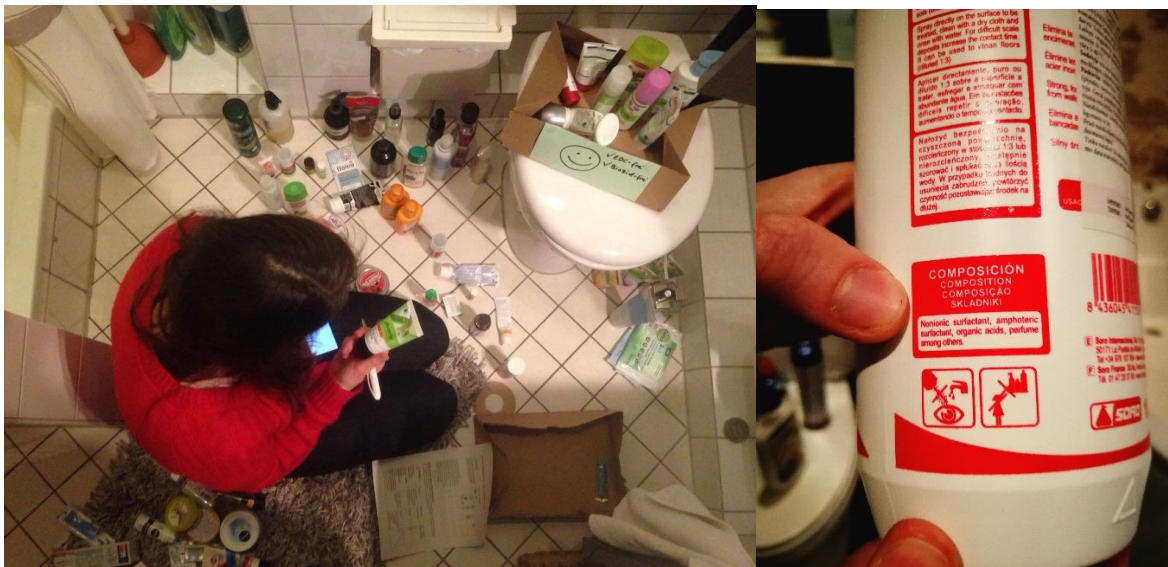
Many of these HS-containing products can be used less, substituted or even completely avoided. A change of consumption pattern one way to reduce the use of HS containing products and by this reduce one's own exposure as well as emissions into the environment. Emissions are mainly distributed via wastewater, for example via chemical products flushed when washing up and cleaning, from cosmetic products washed off when showering, from floor wiping of dust where HS have been deposited after being emitted from articles in the indoor environment and from laundry of textiles. (Lagerqvist, 2018).

NonHazCity addressed the inhabitants of the pilot municipalities as “consumers” in their homes. The project teams wanted to show the inhabitants their individual hazardous substance emission share and give information about how to use less hazardous substances in every-days life to help to protect the Baltic Sea environment and their own health by reducing exposure. Partners implemented intensive information campaigns in pilot cities and a large suite of local language information material has been developed and distributed (Senele, K. (2018). *Overview of the inhabitants' campaigns in the cities and the most successful campaign elements.*)

One shiny and very successful communication measure was a Campaign called “Test your household – how many chemicals do you use” in which the teams of the project partners went to more than 50 volunteering households and did a check for the presence of products and articles potentially containing HS. The aim was to discuss which products could be replaced by which alternatives and to achieve a reduction in number of products and target substances.

Many more hoarded products were found in the households than expected. More than 50 different cosmetic products and cleaning agents were found in some households and many products contained HS, of which some were EDCs. At a second visit (half a year later) kitchen appliances such as pans, or food containers were exchanged; a decrease in detergents was noticed and some personal care products were substituted. The results for changes in cosmetics were inconclusive: Several people held on to specific luxury cosmetic products (e.g. make-up) which were difficult to substitute since these products satisfy their requirements or they have been used for a lifetime and therefore have an emotional value. That made cosmetics a delicate topic.

The measures taken by the volunteers as well as their thoughts about the issue were documented and disseminated through several channels in order to inspire others and to show an example of what an individual person can do.



Graph 4: The NonHazCity household check (Photo: Martin Krekeler, Egle Ruskute)

Please, find the full report on the household check work in: Fammler, et al. (2019). *Reduction of hazardous substances in private households*. NonHazCity.

NONHAZCITY - A VALUABLE CONTRIBUTION TO HAZARDOUS SUBSTANCE REDUCTION

The NonHazCity consortium shares the opinion that the most important result of the project was the evidence that HS occur everywhere in urban life. Hazardous substances become a visible issue when we talk about specific products and articles: the evidence from testing during the project (in water, articles, dust and human samples) supported the discussions at peoples' homes on occurrence and effects.

The three stakeholder groups targeted by NonHazCity – municipal entities, businesses and inhabitants - proved to be “in charge and able” to substantially contribute to reduction of substance emissions and exposure by substitution or avoidance of products and articles containing HS.

NonHazCity recommends to ALL municipalities anywhere: Targeting diffuse urban sources of hazardous substances should be a high priority in their policy agenda:

- The findings of the pilot screening and the source tracking studies showed that HS source control can be a key measure for reducing chemical emissions into wastewater treatment plants (WWTPs), and into recipient surface waters.
- The control or restriction of HS in products, articles and materials used by the multitude of small-scale emitters upstream of WWTPs is essential in order to protect aquatic life in surface waters, as well as to reduce the human exposure to HS.
- The frequent presence of hazardous substances in wastewater from residential areas should encourage municipalities to prepare information campaigns for small-scale businesses and households about HS in our daily lives.
- Municipal purchasing strategies can promote more informed and HS free choices. Criteria on HS should be explicit in green public procurement requirements together with follow-up of compliance with set criteria and legislation. A dialogue with suppliers is one important first step towards substituting equivalent products or articles that do not contain HS. It is a market stimulus and clear sign to business.
- Developing Chemical Action Plans is an excellent way to achieve a non-toxic everyday environment.

NonHazCity recommends to ALL businesses anywhere: You are users of hazardous substances, you need to start thinking and acting to reduce their amounts!

NonHazCity recommends to ALL NGOs anywhere: Municipalities, businesses and consumers are key players that you could cooperate with, give support to and raise the awareness of!

NonHazCity recommends to ALL National and EU authorities: Municipalities, SMEs and consumers need support to reduce their hazardous substances use: First of all, they need tools to make good choices – better information on the contents of articles is a good start. And they need guidance about what to use and choose for which purposes. You have the power to get regulations implemented!

<http://nonhazcity.eu/>