Cost of inaction on a system for transparency and traceability of chemicals in plastic products

Only if you know it, you can control it!

The basis for any informed decision-making is access to information. Not least, this is relevant to plastics, which essentially are chemical products composed of polymers, additives, remnants of reaction chemicals, processing chemicals, and impurities. According to the report by the PlastChem Project, more than 16,000 chemicals have been associated with plastics, more than 4200 are known to be hazardous, and for many thousands, insufficient data make hazard assessments inconclusive. Less than 1% of them are currently regulated under multilateral agreements (MEAs).

Circular economy, including reuse, repurposing of plastics, and recycling, is envisioned to be important strategies in the Plastic Treaty, supported by Extended Producer Responsibility Systems and recycled content targets, as already captured by chapters and articles in the Revised Zero Draft.

The Plastic Treaty is also envisioned to regulate the use of chemicals and polymers of concern, although a few countries in the INC process still wrongly believe this is unnecessary and already covered by MEAs, including the voluntary Global Framework on Chemicals.

Regulation and product design criteria should be important mechanisms to limit the presence of hazardous chemicals in plastic materials and products and their recirculation in new products made of recyclates. However, it will take a very long time for countries to agree to ban and restrict all known hazardous chemicals mentioned in the PlastChem Project Report. The reason for that will be the push by the industry to do risk assessments and make socioeconomic considerations, including for alternatives. For many of the chemicals in question, exposure data will be inconclusive and, thus, risk assessments will be highly insufficient.

The best approach would be regulation based on inherent hazards, such as suggested by the authors of the PlastChem report, and many others in the research community.

Since regulation of chemicals and polymers of concern for the above reasons will be insufficient for the foreseeable future, globally harmonized transparency and traceability for disclosed chemical composition data in individual plastic items under the Plastic Treaty jurisdiction will be essential to safeguard that the circular economy is not contaminated with hazardous chemicals in uncontrolled ways.

Hidden costs from hazardous chemicals

Knowledge and recognition among decision-makers of the hidden costs that the uncontrolled spreading of hazardous chemicals causes to society are still insufficient.

A few of these hidden costs are outlined below:

1. Toxic chemical impacts on human health: This includes direct medical expenses from diseases caused or exacerbated by chemical exposures, as well as indirect health-related costs, such as loss of productivity in work or school, due to sickness, loss of IQ points and reduced life expectancy. It also includes the immeasurable costs of quality of life and loss of loved ones.

2. Environmental contamination costs: Chemical contamination of the environment contributes to the hu-

man health impacts noted above. In addition, the costs of environmental contamination can include loss of income and food security (due to polluted, less productive ecosystems), reduced property values in and around contaminated areas, and the cost of clean-up activities. Less quantifiable costs include damage to wildlife and ecosystems.

3. Environmental injustice: Disproportionately, the health impacts and associated costs throughout the life cycle of materials and products, including end-of-life handling and recycling, fall on already vulnerable, often low-income communities. The numerical cost of these impacts may not be readily quantifiable, but the costs to our society are no less clear as a result.

Cost of inaction

In this short information paper, we do not provide exact figures on the cost of failing to implement a transparency and traceability system for plastic chemicals. Time until INC5 is very limited, and it is unrealistic to expect the research community to conduct specific calculations and assessments in time.

However, all logic tells us that preventive actions are cheaper than retrospective ones.

This was demonstrated in the 2013 eye-opening report Costs of Inaction on the Sound Management of Chemicals. It showcases early examples of research on health and environmental costs associated with unsound chemical management. Although the examples in the report are not specific to plastics, the reasoning and logic are transposable to plastics.

Moreover, estimates of the costs of disease burden are available for some groups of chemicals relevant to plastics, for example, endocrine disrupting chemicals (EDCs) with data from the EU and USA , and phthalates with data from the USA .

Many plastic chemicals are known or suspected to be EDCs, including phthalates used as plastic softeners. Calculations for EDCs indicated a median annual disease burden health care cost of €163 billion in the EU in 2016, corresponding to 1.28% of the EU Gross Domestic Product (GDP), and in the USA, it was estimated to be $250 billion in 2018, corresponding to 1.22% of the GDP. In a nationally representative sample from the USA, phthalate exposures were associated with all-cause and cardiovascular mortality, with societal costs approximating $39 billion/year or more.

Although the cited studies did not attempt to link exposure specifically to plastics, and the studied groups of chemicals are also used in other applications, the studies clearly show how burdensome unintended and uncontrolled exposure to hazardous chemicals is for society.

Decision makers already seriously ask themselves if it is not more costly to deal with the annual disease burden costs that also potentially results in productivity losses in the economy, and are an obstacle to poverty reduction, than to regulate problematic chemicals, and set up a transparency and traceability system for such chemicals.

However, setting up national chemical laboratories to verify multiple chemicals in products, both produced and imported, maybe a serious burden for many countries, primarily for developing and transition economies.

Small and medium-sized companies face similar burdens while trying to set up their own transparency and traceability systems and comply with many parallel standards. Moreover, as long as transparency and traceability for chemical composition information is not mandatory, small- and medium-sized companies may struggle to get hold of the necessary information from upstream suppliers. They may be too small customers for the suppliers to pay attention to their information demands. If the supplier is in another jurisdiction, transmitting transparency demands upstream may be even harder. Therefore, increasingly more companies support the establishment of mandatory globally harmonized transparency and traceability systems/standards, that save time and money for companies, protect their brand reputations, and level the playing field in trade.

Costs to verify compliance of plastic materials and products with chemicals provisions in the Treaty, and other relevant considerations

We have identified two basic and complementary approaches to verify the fulfilment of chemicals provisions for materials and products in the Plastics Treaty.

1. Spot checks of materials and products at points of import to the country or spot checks in connection with inspections at manufacturing or retail facilities, followed by chemical analyses of the sampled materials and products.
2. The use of a digital transparency and traceability system, where chemical composition data for materials and products can be retrieved from a database, via a "digital chemicals passport" unique to a plastic item, such as outlined in our previous information paper . The information in a "digital chemicals passport" could be verified by unnotified inspections at manufacturing and recycling facilities, to check that the data in the "passport" corresponds to the recipes of the plastic items, or logs for pooled plastic materials recycled.

Delegates at INC4 asked us for cost estimates for different systems of data carriers, development of data retrieval apps, and database solutions. This is, again a question for an expert group or a research project, and the time available until INC5 makes it unlikely that they can provide us with figures.

Instead, decision-makers should ask themselves how the costs of the two approaches to verify compliance with the Treaty chemicals provisions for materials and products compare, using sound logic.

Chemical analyses

The burden of cost for chemical analyses falls entirely on countries.

Setting up a laboratory with expensive analytical equipment, educating staff, and operational costs are considerable. To many low and middle-income countries, this is a significant financial burden, in addition to the challenge of properly operating such complex laboratory systems.

Construction costs for chemical laboratory spaces can differ widely across regions and cities, influenced by labor costs, real estate prices, material availability, and geographic location.

Moreover, laboratories must adhere to stringent safety and regulatory standards for construction and renovation to ensure everyone's safety. These standards encompass various measures, such as air filtration systems, designated safe work areas, essential safety equipment, first aid stations, eyewash stations in laboratory sinks, safety showers, and the use of biological safety cabinets to protect samples from contamination. Additionally, they include the strategic placement of fire extinguishers, the installation of firewalls, accessible emergency exits, air pressurization zones, and fume hoods for handling flammable and hazardous materials, among other precautions.

Furthermore, it is crucial for national laboratories to become accredited according to international standards, such as the ISO/IEC 17025. Such certification ensures the production of valid test results and evidentiary data, uniform and harmonized results, and reporting across all accredited laboratories.

In addition, laboratory equipment must be properly maintained throughout its operational lifespan. Many laboratories outsource this responsibility to third-party specialists who focus on maintaining and repairing laboratory assets. Having a maintenance contract in place often proves cost-effective by increasing uptime, enhancing accuracy, and extending the lifespan of the equipment.

Moreover, screening for large numbers of chemicals in materials and products, as you seldom know exactly what you expect to find, is very laborious and costly. For many of the chemicals of concern identified in the PlastChem report, for example, there may be no reference chemicals for calibration of analytical methods available on the market, or no analytical standards have been developed. Developing new analytical standards will be costly and time-consuming.

Many chemical analyses are time-consuming in themselves, so this is a bottleneck for verification of Treaty provisions for large numbers of plastic materials and products.

Digital transparency and traceability system

Setting up a globally harmonized digital transparency and traceability system is likely to be initially costly, as standards and guidelines for "data carriers" (see our previous information paper) are developed, and production lines for plastics are adjusted to include the "data carriers," and a global database to host disclosed data is developed. However, many of these costs do not fall on separate countries. Harmonization processes and setting up and maintaining a global database, for example, are processes that countries contribute jointly to. This should make the system more cost-efficient and secure against tampering, as countries collectively share experiences and expertise on security issues.

Cost-savings can also be made through the globally harmonized approach, instead of each country developing their own systems, with potential issues related to data incompatibility and additional costs to fix this.

Investments for adjusting production lines to labelling with "data carriers" primarily fall upon companies, but if countries need to support their companies in the transition phase, technical and financial support should be secured in the Treaty negotiations. This extra cost in the financing arrangement of the treaty should be worth taking for all countries to make the transparency and traceability system work properly.

The task and cost of reporting data to "digital chemicals passports" in the global database are entirely on the companies, not the state. This is secured by transposing the data reporting provision envisioned in the Plastic Treaty to companies when the provision is implemented in national legislation. The exact legal arrangement may differ between countries.

Once the system is up and running, considerable gains are expected.

A likely advantage will be the ease of access to information. Many low- and middle-income countries are net importers of plastics. Instead of doing costly and time-consuming chemical analyses that may not even be available in the country to them, they can retrieve the chemical composition data directly from the database for the materials and products they import. Consequently, per time unit, many more materials, and products can be checked for compliance with Treaty and national provisions.

In contrast to chemical analyses, a digital transparency and traceability system readily supports informed decision-making for all life stages of a material and product, for both regulatory agencies, companies and consumers. This is exactly what is necessary to secure that circular economy for plastics is free from harmful chemicals, such as countries committed to in Article 8 of the Bonn Declaration.

Final notes

This information paper does not provide monetary estimates for the cost of inaction in establishing a transparency and traceability system, including the resulting disease burden or environmental costs due to a circular economy contaminated by chemicals and polymers of concern. Additionally, it does not estimate the costs of various „data carriers," data retrieval apps, and databases. However, we can infer general conclusions about the costs related to disease and environmental burdens from chemicals based on other scientific publications.

The message is clear! The cost of inaction on unsound management of chemicals is always high!

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