

WELCOME TO THE UCT CHEMICAL NETWORK DISCUSSION



Division of Environmental Health | UCT



School of Public Health
Departement Openbare Gesondheid
Isikolo Sempilo Yoluntu

UNIVERSITY OF CAPE TOWN



Sweden
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Introduce yourself (name, job title, organization and country) in the **chat section**.

Only the presenter and facilitator will speak. Any comments or questions from attendees should be typed in the **chat section**.

Please kindly keep you microphone muted and cameras off during the discussion

NOTE: If you are having **technical difficulties**, please join the WhatsApp group for assistance:

<https://chat.whatsapp.com/CdEJNdPEva30263AB3KYBq>

Discussion Topic: WEEE Plastics - Whose responsibility are they anyway ?

- Date: 7 November 2023
- Time: 14h00 – 15h30 (GMT+2)
- Presenters: Susanne Karcher and Aysha Lotter on behalf of SRI South Africa
- Facilitator: Maxine Brassell, University of Cape Town

PRESENTERS



Susanne Karcher
MSc. Chemical Engineer (KIT@UCT)
SRI Project: National Coordinator



Aysha Lotter
PhD Candidate
SRI Project: WEEE Policy/N&S Expert

INTRODUCTION

PRESENTED BY: SUSANNE KARCHER

- ▶ SRI builds on the success of implementing e-waste recycling systems together with various developing countries since more than 15 years.
- ▶ It is funded by the Swiss State Secretariat of Economic Affairs (SECO) and is implemented by the Swiss Federal Laboratories for Materials Science & Technology
- ▶ Favourable framework conditions enable the development of a sustainable recycling industry for e-waste and related waste streams in SECO partner countries: **Ghana, South Africa, Egypt, Colombia, Peru (Empa)** and the World Resources Forum Association (WRFA).
- ▶ The program now runs until mid 2025

<https://www.sustainable-recycling.org>



BACKGROUND TO QUESTION I

PRESENTED BY: SUSANNE KARCHER

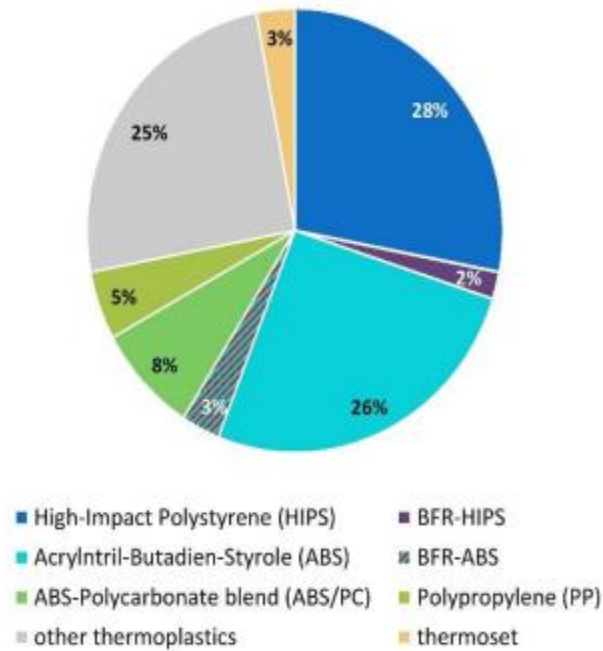
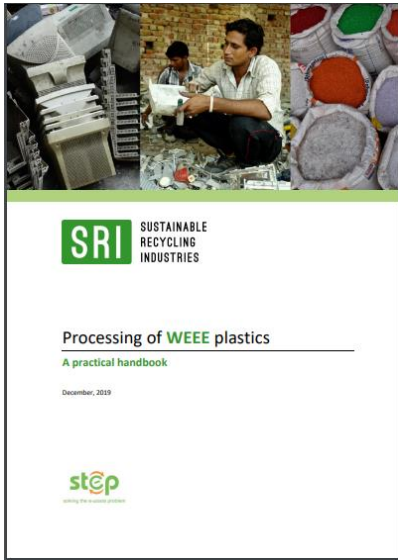
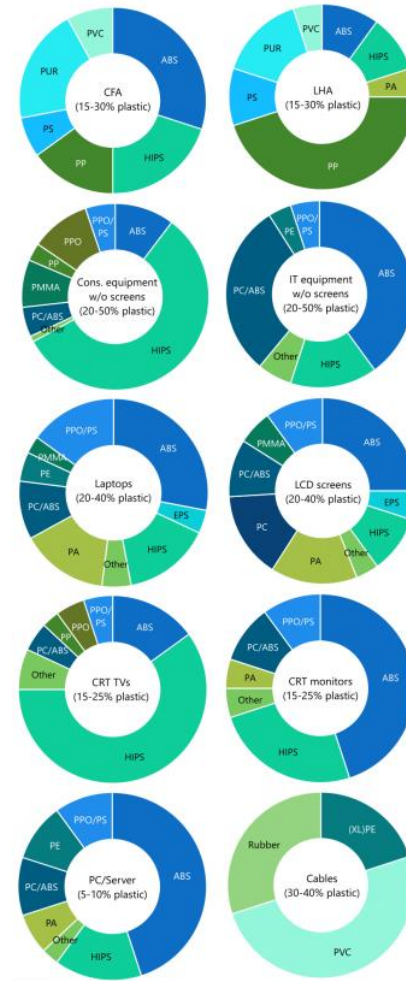


Figure 1: Main plastic types used in EEE ²



- WEEE contains many different types of plastics.
- **Thermoplastics** soften and melt when heated and harden when they cool. Thermosets, become rigid when heated and also stay rigid after they cool down, which makes their recycling impossible
- Plastics often contain additives, some of which are hazardous to human health and the environment.
- Most problematic plastic additives are Brominated Flame Retardants (BFRs) and additives based on heavy metals (mostly Pb and Cd).
- Plastics containing such hazardous substances need to be removed and disposed of in appropriate ways.

BACKGROUND TO QUESTION I

PRESENTED BY: SUSANNE KARCHER

Fortunately, most plastics found in WEEE can be **recycled**.

However, with some few exceptions (e.g. ABS/PC), mixing these plastics in the recycling process has negative effects on material qualities like flexibility, hardness or durability.

The key to WEEE plastic recycling is therefore effective sorting, which is challenging as more than 15 different types of plastics are present in WEEE

Nearly 70% of the total mass of WEEE plastics consists of the same four plastic types all FREE of BRFs and which can be collected, processed and sold in large volumes: HIPS, ABS, ABS/PC, PP



High levels of BFRs can often be found in plastic housings of screens, IT-equipment and small electronic devices while BFR levels in plastics from large household appliances (e.g. fridges, freezers, washing machines, tumbling dryers etc.) are generally below legal limit values.



Different flame-retardants are used in combination with different plastic types. BFRs are mostly present in ABS and HIPS plastics. As indicated in Figure 1, around 10% of all ABS and HIPS plastics found in WEEE contain BFRs.

Agriculture



Main plastics: PE, PVC
Others: PP, PC

Automotive



Main plastics: PP, PVC
Others: ABS, PC/ABS, PE, PC, HIPS

Construction



Main plastics: PVC, PE
Others: PP, PC

Consumer goods



Main plastics: PP, PE
Others: PC, ABS, HIPS

Food & water



Recycled WEEE plastics should not be used

Toys



Recycled WEEE plastics should not be used

BACKGROUND TO QUESTION 1

PRESENTED BY: SUSANNE KARCHER

ISO tag

According to the ISO 11469 standard, plastic parts weighing more than 100 grams should be marked with a visual identifier.

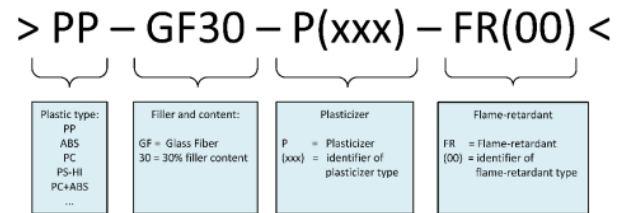


Figure 3: ISO tag interpretation

- The letters GF on an ISO tag refer to the presence of glass fiber as a filler material. This can be problematic in the recycling process. (See section 1 about additives)
- Flame-retardant identifiers 14, 15 and 18-21 may indicate hazardous BFRs. Plastic parts with these markings have to be removed and appropriately managed.
- WEEE plastics are often unmarked, mismarked or only show incomplete tags. The information obtained from an ISO tag should therefore be used with caution.

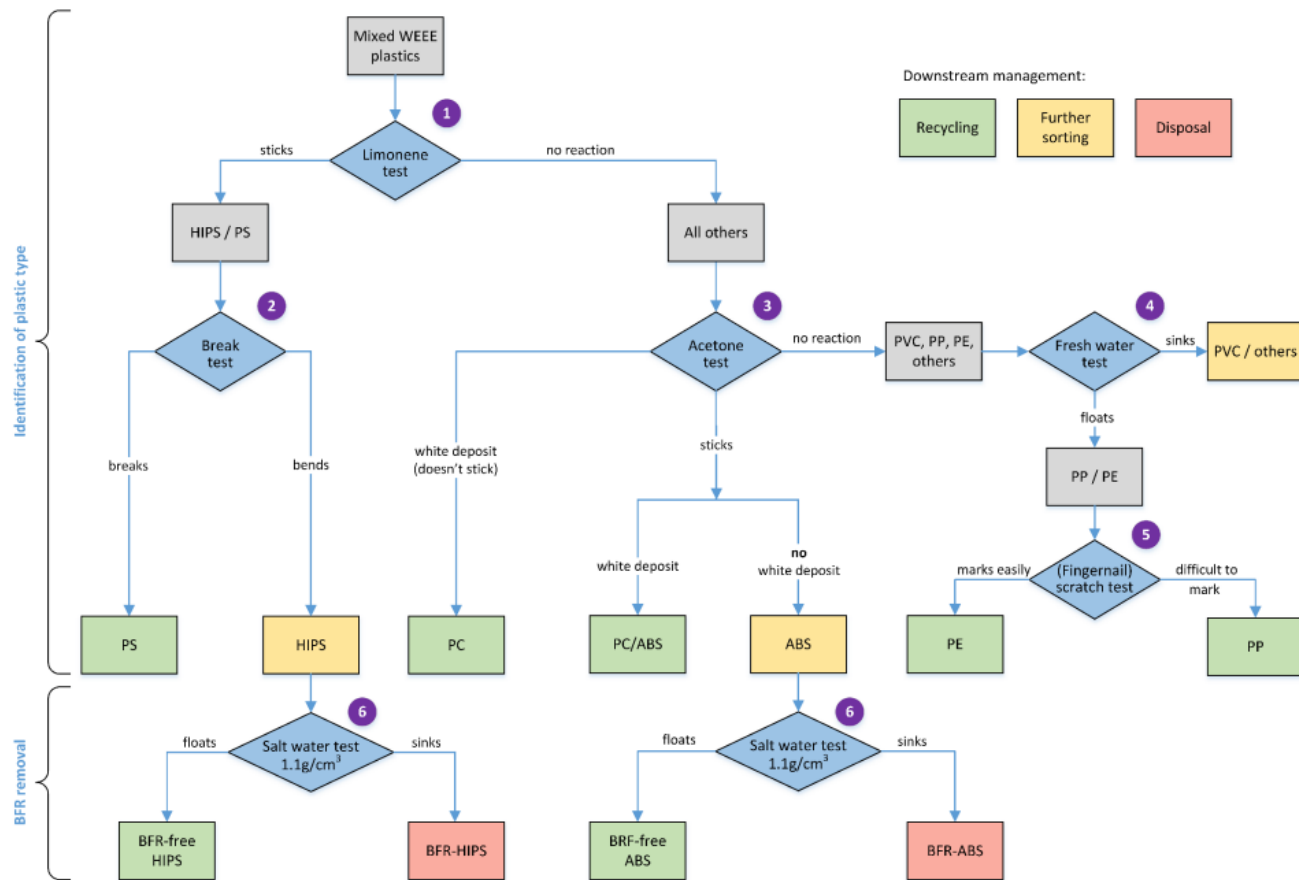


Figure 7: Systematic identification of WEEE plastics (Source: Empa 2016)

QUESTION 1: IN SOUTH AFRICA ACCORDING TO A RECENT SRI WEEE RECYCLER SURVEY: IT SEEMS THAT CURRENTLY THE VAST MAJORITY OF ALL WEEE PLASTICS TYPES ARE LANDFILLED-VERY LITTLE GETS RECOVERED FOR RECYCLING.

Are there any initiatives in your country to recycle any BFR-Free WEEE plastics?
How can this be improved?

There will be 15 minutes to discuss this question in the chat section.

Please keep your cameras off and microphones muted.

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BACKGROUND TO QUESTION 2

PRESENTED BY: SUSANNE KARCHER

If successfully depolluted the BRF containing HIPS and ABS fractions are about 5% of all WEEE plastics averaged over all WEEE types.

Plastics from both Large HH Appliances and Cooling and Freezing Appliances as well as Cables are a SAFE bet altogether regarding BFR levels

	ABS	HIPS	PP	PS	PE	ABS+PC	PVC
CRT screens	x	x				x	
Flat screens	x	x				x	
IT equipment	x	x				x	
Large Household Appliances (LHA)	x	x	x	x			
Cooling and Freezing Appliances (CFA)	x	x	x	x			
Small electronic devices	x	x	x				
Cables					x		x

Table 1: Hazardous additives in main plastic types obtained from various WEEE categories. Red: BFR concentration potentially above legal threshold values, blue: heavy-metal concentration potentially above legal thresholds values, black: concentrations of hazardous additives generally below legal threshold values.

BACKGROUND TO QUESTION 2

PRESENTED BY: SUSANNE KARCHER

International standards and treaties

Various international standards define limit values for hazardous substances in plastic products and regulate exports and trade of hazardous plastic fractions.

Limit values: EU-regulation: Restriction of Hazardous Substances Directive (RoHS)⁶

- 1000 ppm (0.1%) limit value for various BFRs (PBBs & PBDEs)
- 1000 ppm (0.1%) limit value for various heavy metals (Pb, Hg, Cr)
- 100 ppm (0.01%) limit value for cadmium (Cd)

European WEEE treatment standard series EN/TS 50625⁷

- 2000 ppm (0.2%) limit value for total bromine

Trade: The transboundary movement of hazardous wastes (including WEEE plastics) is regulated by the Basel Convention.⁸

- After January 1st 2021, exports of mixed plastic fractions (with the exception of PE, PP, PET mixtures) require the Prior Informed Consent (PIC) procedure⁹. This procedure states that before an export shipment containing hazardous substances can leave the country of origin, permission has to be granted by the country of destination.
- PIC procedures complicate exports and often make them impossible. These complications can be avoided by only exporting pure plastic fractions with hazardous additive contents below international standard levels.
- In the case of PVC, even pure fractions will be subject to the PIC procedure. This is due to the fact that PVCs are halogenated plastics, often contain heavy metals as heat stabilizers or in the form of pigments, and are therefore considered as hazardous.

BFR containing plastics are a serious financial liability and a challenge to subject them to the best “final treatment” option....

Flame-retardants

Flame-retardants are used to make plastics more resistant to fire. During their use in EEE, certain plastic parts are regularly exposed to heat, which is why WEEE plastics often contain significant amounts of flame retardants. These additives can be sorted into three main groups:

- Mineral flame retardants
- Phosphorus-based flame retardants
- Brominated Flame Retardants (BFRs)

Some flame retardants are hazardous to human health and the environment. Various chemicals belonging to the third group are persistent organic pollutants (POPs) and therefore especially problematic, which is why their use is restricted by regulatory limits (e.g. PBBs, PBDEs, HBCDD). Plastics containing BFRs therefore need to be sorted out and appropriately managed.



Flame-retardants are used to prevent plastics from catching fire when exposed to heat

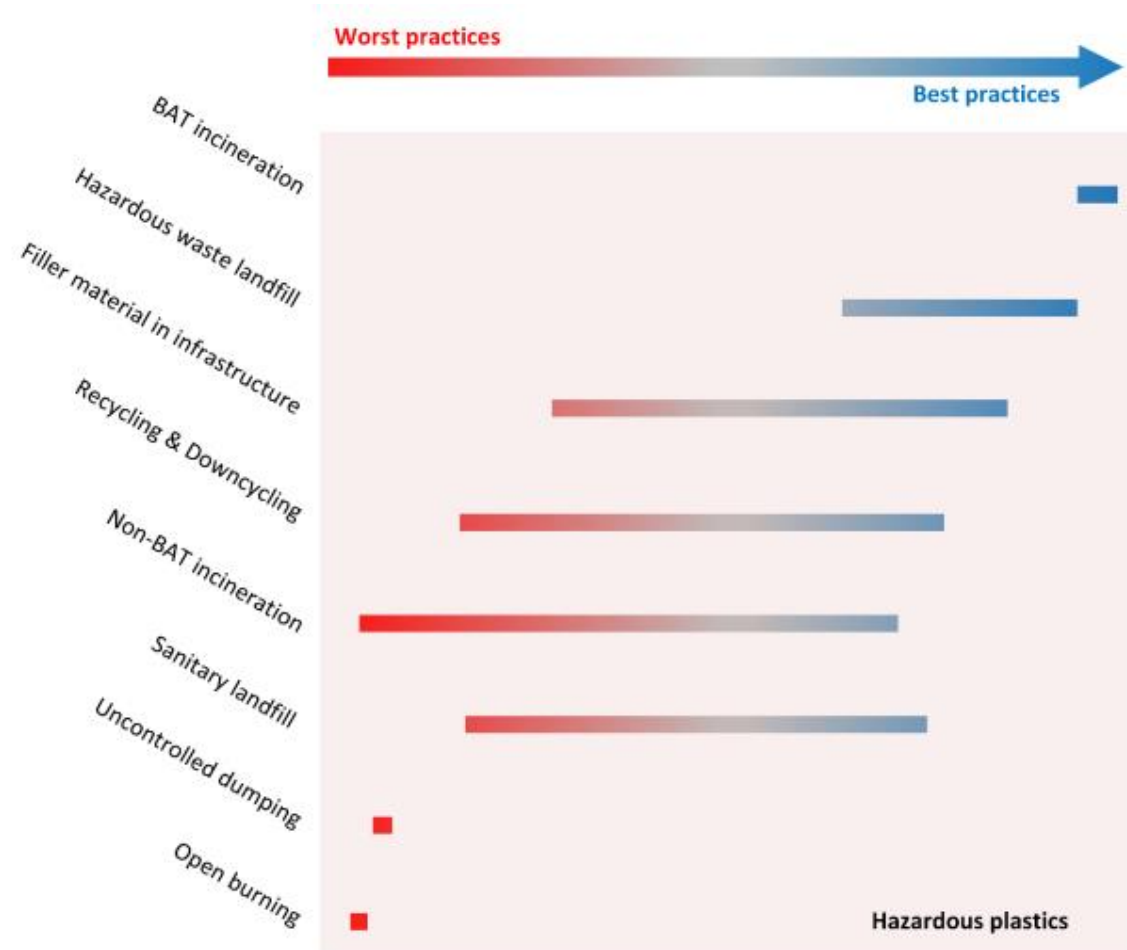
BACKGROUND TO QUESTION 2

PRESENTED BY:

BFR containing plastics are typically a serious financial liability and a challenge to give them the best “final treatment” option....

Status Quo: In South Africa the overwhelming amount of WEEE plastics gets either landfilled, dumped or illegally burnt- irrespective of its composition....

BAT Incineration option is preferred by far and to some degree landfilling at a hazardous landfill is second best and for South Africa the most viable option...



QUESTION 2:

How can your country grow the interest, capacity and knowledge to recycle BFR free plastics AND recover for the required final safe treatment the flame retardant containing ones ?

There will be 15 minutes to discuss this question in the chat section.

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BACKGROUND TO QUESTION 3

PRESENTED BY: AYSHA LOTTER

In 2020, the department responsible for environmental affairs, published the Extended Producer Responsibility Regulations alongside a suite of product-specific notices. Hence, the beginning of mandatory Extended Producer Responsibility (EPR) in South Africa.

Constitution

- Section 24
- Right to an environment that is not harmful to one's health or well-being

National Environmental Management Act

- Principle Act furthering the constitution

National Environmental Management: Waste Act

- Focuses on the cooperative environmental governance of waste related issues
- Section 18: financial and physical responsibility for a product throughout its life cycle waste minimization programs, financial arrangements for the reduction, reuse, recycling, and recovery of waste, awareness programmes for public interest

Waste Regulations

- EPR Regulations



BACKGROUND TO QUESTION 3



WHO is responsible?

- **Producers**
 - person or category of persons, including a brand owner, who is engaged in the commercial manufacture, conversion, refurbishment (where applicable), or import of new or used identified products as identified by the Minister
- **Producer Responsibility Organisations (PROs)**
 - Not-for-profit organisation established by producers or any person operating in any of the industrial sectors to support the implementation of their extended producer responsibility scheme and may represent either individual or collective producers,



WHAT are they responsible for?

- **Producers**
 - establish and implement an extended producer responsibility scheme that includes the entire value chain
 - life cycle assessments
 - Broad-based black economic empowerment transformation charter with targets, timelines and implementation measures
 - implement mandatory take-back
 - implement environmental labels
- **Producer Responsibility Organisations**
 - develop and maintain a system to collect the extended producer responsibility fees
 - Comply to various audits
 - maintain register of members
 - Maintain collection, recycling and recovery records.
 - Documentation to SAWIS
 - Manage service providers
 - Integrate and compensate the informal sector
 - Implement transformation and promote small businesses
 - Establish infrastructure
 - Establish secondary markets for recycled content

BACKGROUND TO QUESTION 3 AND THE MONEY?

- The extended producer responsibility fee must be based on nett cost recovery, including a differentiated rate per item category of each product or class of product, which a producer must pay to fund extended producer responsibility schemes and be dependent on the following:
 - (a) weight of product;
 - (b) ease of recyclability;
 - (c) current demand for the material for recycling purposes
 - (d) costs for establishing a collection system for the identified products;
 - (e) collection, transport, storage and treatment costs for separately collected waste;
 - (f) administrative costs;
 - (g) costs for public communication and awareness-raising
 - (on waste prevention, litter reduction, separate collection, etc.);
 - (h) costs for the appropriate surveillance of the system (including auditing); and
 - (i) less revenues from recycled material sales.
- The annual financial plan and annual budget must include the **methodology for allocating and disbursing revenue for implementing the extended producer responsibility scheme** amongst the collection, waste minimisation, recycling, waste reuse and any other relevant component of the extended producer responsibility scheme.

QUESTION 3:

How will your country finance treatment solutions for problematic WEEE materials such as flame-retardant treated plastics?

There will be 20 minutes to discuss this question in the chat section.

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THANK YOU FOR JOINING UCT'S CHEMICAL NETWORK DISCUSSION

**Save the date:
Chemicals Network
Discussion 6
Date: TBC
14h00 - 15h30
(GMT+2)**

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The views herein shall not be taken to reflect the official opinion of Sida or the Swedish Chemicals Agency.