



UNITED NATIONS  
INDUSTRIAL DEVELOPMENT ORGANIZATION

Progress by innovation

A low-angle, upward-looking photograph of a modern, curved building with a grid-like facade. Several national flags are flying from tall white poles against a clear blue sky. The image is overlaid with a semi-transparent blue banner at the bottom containing the title text.

## Chemicals and Waste Data for promoting circularity and safe and sound environmental final disposal



# Waste Management and Circular Economy

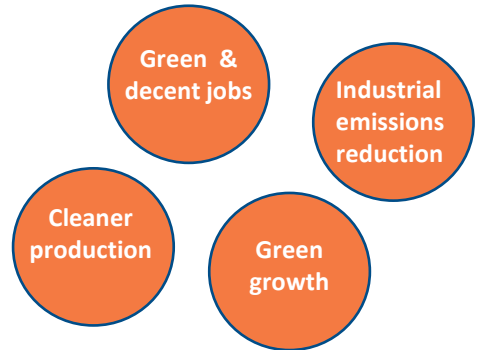
## E-Waste - Chemicals & Waste Data

Responsible Materials and Chemicals Management Unit

KEY  
SERVICES



### CONTRIBUTIONS & TARGETED IMPACT





# Waste Management and Circular Economy

## E-Waste - Chemicals & Waste Data

Division of Circular Economy & Green Industry

KEY  
SERVICES of  
the division



PROYECTO RESIDUOS ELECTRÓNICOS  
AMÉRICA LATINA-PREAL  
ONUDI - FMAM

Case Study – **PREAL PROJECT**, created for 13 Countries in Latin America

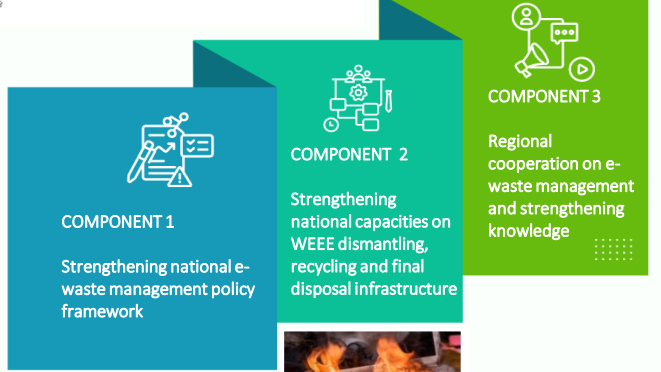
The PREAL Project addresses POPs contained in WEEE of LAC Countries, generally linked to BFR, and supports hazardous substances management within the lifecycle of electrical and electronic products in 13 countries.



# Waste Management and Circular Economy

## E-Waste - Chemicals & Waste Data

Case Study – PREAL, 13 Countries in Latin America



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







# PREAL PROJECT

## Data Collection

### COMPONENT 2

Strengthening national capacities on WEEE dismantling, recycling and final disposal infrastructure

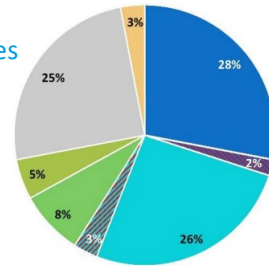


## Plastic identification & sorting

140 waste managers

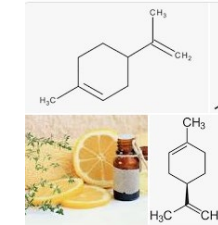


### Plastic Types



- High-Impact Polystyrene (HIPS)
- Acrylnitril-Butadien-Styrole (ABS)
- ABS-Polycarbonate blend (ABS/PC)
- other thermoplastics
- BFR-HIPS
- BFR-ABS
- Polypropylene (PP)
- thermoset

### Reaction to solvents



### Sink/float test





# PREAL PROJECT

## Data Collection

### COMPONENT 2

Strengthening national capacities on WEEE dismantling, recycling and final disposal infrastructure



## Plastic identification & sorting

### 1. Limonene test

The limonene test can be used first to recognize PS and HIPS plastics.

### 2. Break test

A break test allows to further distinguish between PS and HIPS. PS breaks easily while HIPS bends and white marks appear at the rupture.

### 3. Acetone test

Plastics that did not react with limonene are tested with acetone. ABS, ABS/PC and PC can be distinguished based on their reaction to acetone

### 4. Sink/float test in fresh water (1.0 kg/l)

A sink/float test in fresh water is applied on the remaining plastics. The floating fraction consists of light plastics (PP and PE). Plastics that did not react to any of the solvents and sink in fresh water are none of the main WEEE plastics and are not identified with this method.

### 5. Scratch test

PE and PP plastics float in fresh water. In general, floating pieces are made of PP, as PE is not often present in EEE. To make sure, a scratch test can be used. PE is softer and can easily be scratched with a fingernail. PP is harder and it is more difficult to leave scratch marks on PP.

### 6. Sink/float test in salty water (1.1 kg/l)

Some of the ABS and HIPS plastics, previously identified using solvents, contain hazardous BFRs and have to be removed. This can be achieved using a sink/float test in salty water. When BFRs are present, the plastic is heavier and sinks in salty water with a density of 1.1 kg/l. BFR-free ABS or HIPS on the other hand will float in this solution.

Source: [https://www.sustainable-recycling.org/wp-content/uploads/2020/04/Plastic-Handbook-Final\\_cc-by-sa.pdf](https://www.sustainable-recycling.org/wp-content/uploads/2020/04/Plastic-Handbook-Final_cc-by-sa.pdf)





# PREAL PROJECT

## Data Collection

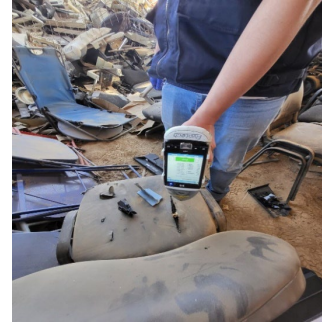
### COMPONENT 2

Strengthening national capacities on WEEE dismantling, recycling and final disposal infrastructure



## Plastic identification & sorting

Advanced identification & sorting technologies



Handheld / portable X-ray  
fluorescent (XRF)  
analyzers

Gas chromatography-mass  
spectrometer



Source: [https://forschungsinfrastruktur.bmbwf.gv.at/en/fi/gas-chromatography-flame-ionization-detector-mass-spectrometer-gc-fid-ms\\_3239](https://forschungsinfrastruktur.bmbwf.gv.at/en/fi/gas-chromatography-flame-ionization-detector-mass-spectrometer-gc-fid-ms_3239)







# PREAL PROJECT

## Data Collection



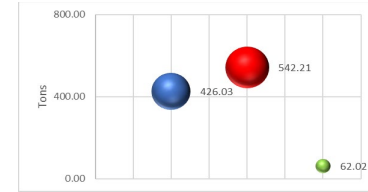
Exported, mainly to Europe and Asia

### RISK LIST

**RED** – confirmed for BRF-POP

**BLUE** - suspected of having BFR-POP

**GREEN** – potentially free of BFR-POP



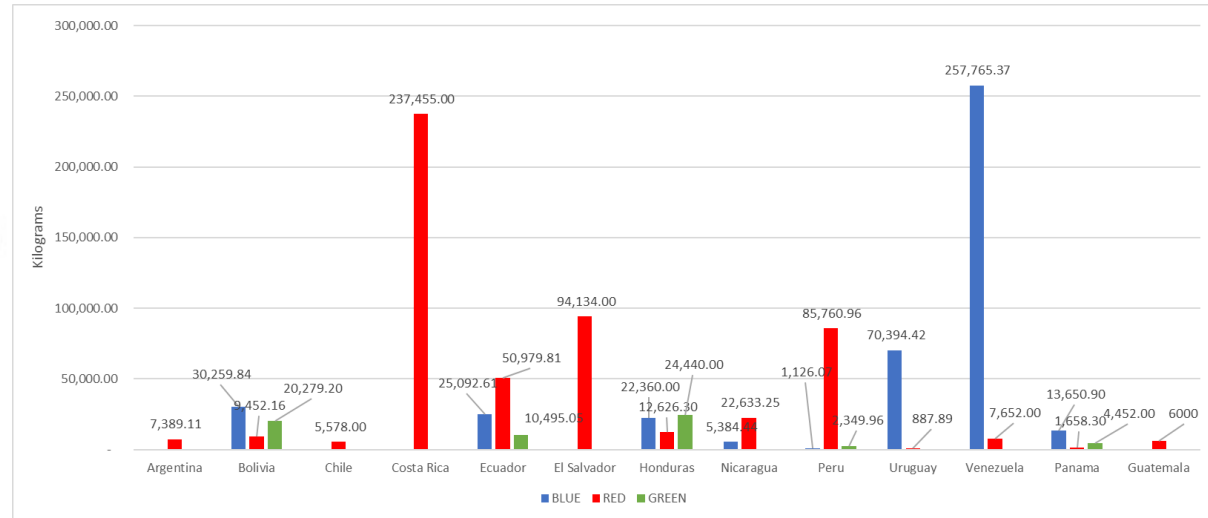
País	TOTAL LISTADOS
	1,030.257
Argentina	7.38
Bolivia	59.989
Chile	5.578
Costa Rica	237.455
Ecuador	86.567
El Salvador	94.134
Guatemala	6
Honduras	59.426
Panama	19.761
Peru	89.236
Uruguay	71.281
Venezuela	265.417
Nicaragua	28.018





# PREAL PROJECT

## Data Collection

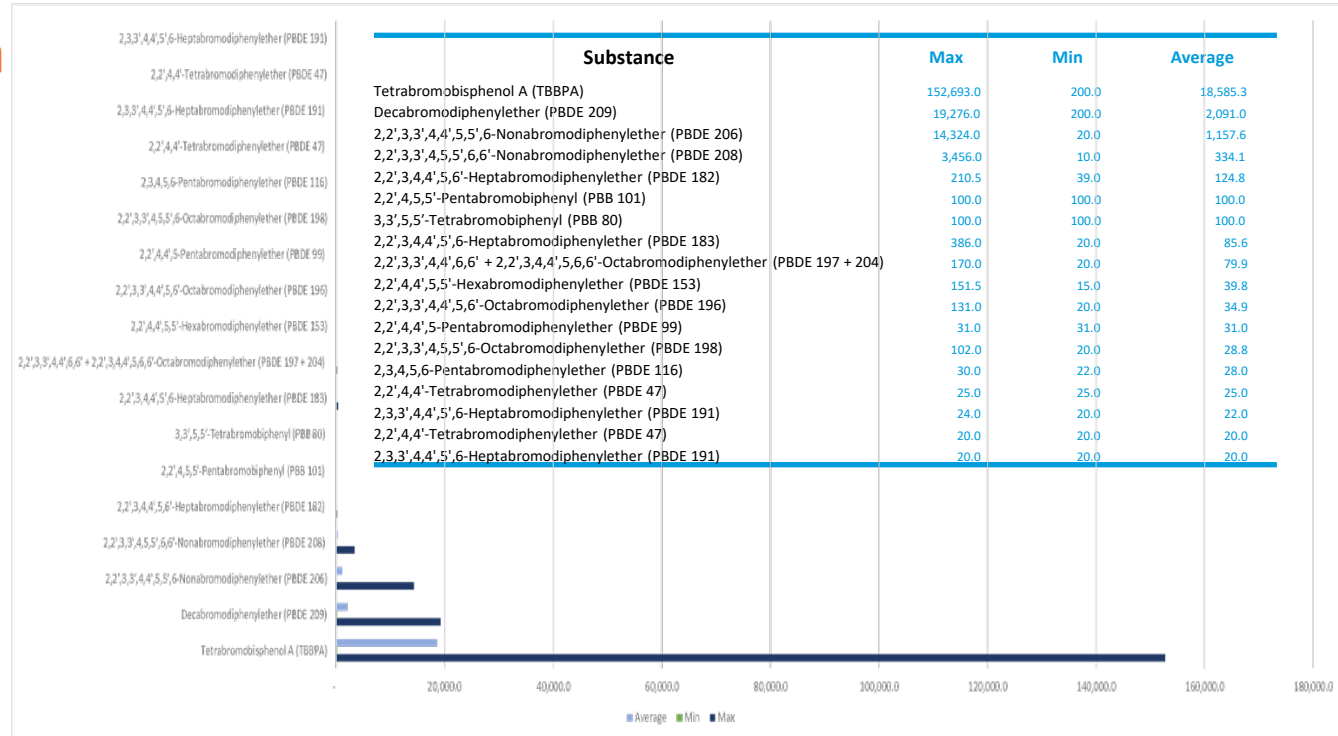




# PREAL PROJECT

## Data Collection

### PBDE/TBBPA





# PREAL PROJECT

## Data Collection

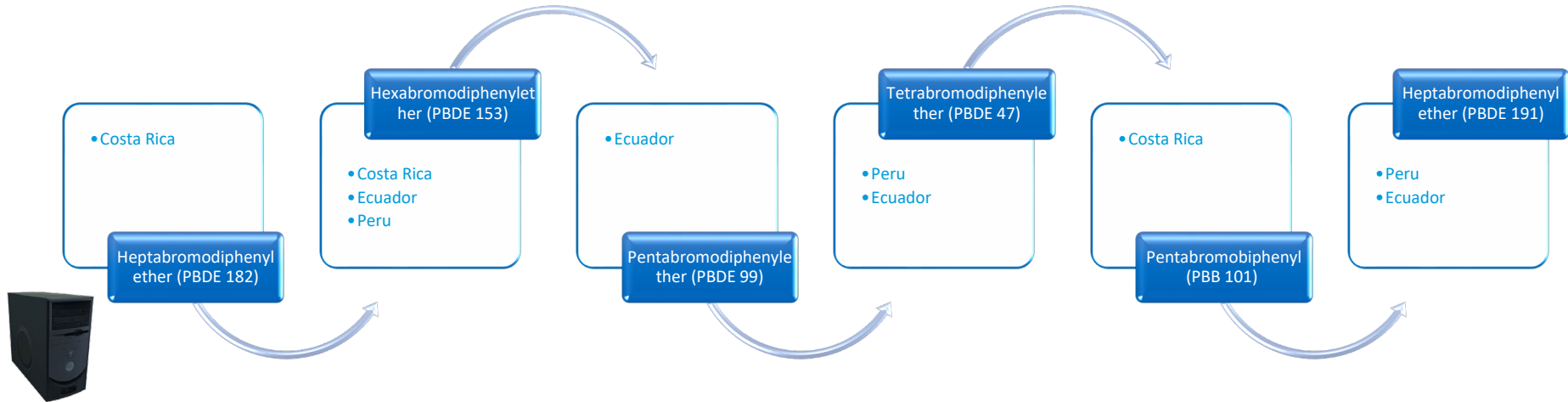






# PREAL PROJECT

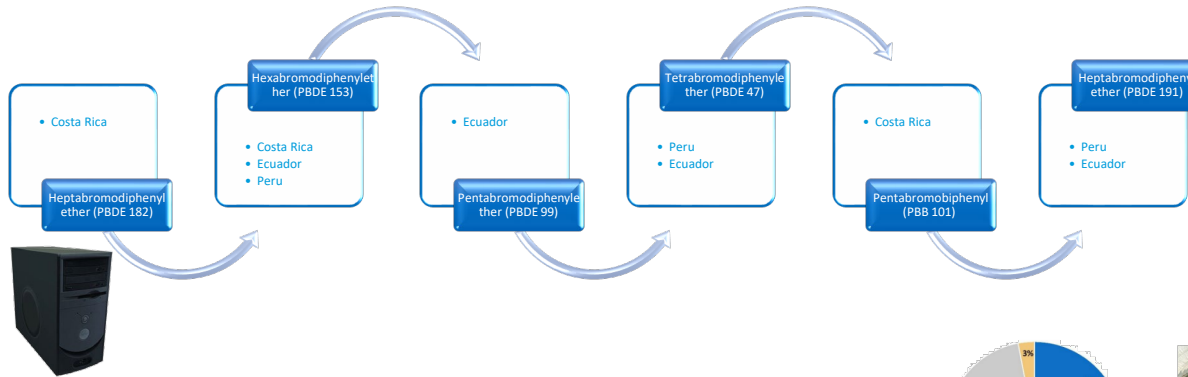
## Data Collection



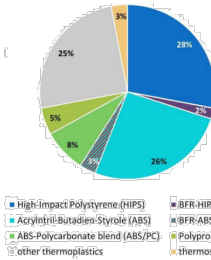


# PREAL PROJECT

## Data Collection



## Controlled Coprocessing in Cement Kilns and Hazardous Waste Landfill



**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



# PREAL PROJECT

## Data Collection



Refurbished and reuse



Reinserted in the market



Extension of useful life for at least 10 years

Client Database -  
Electronic register  
of waste



**PUNTOS DE RECEPCI...**  
MAPEO PREAL

En este mapa podrás encontrar los puntos disponibles para entregar tus residuos de aparatos eléctricos y electrónicos (RAEE) en 1,356 vistas  
Publicado en 22 de marzo  
[COMPARTIR](#)

- ARGENTINA.xlsx
  - Todos los elementos
- CHILE.xlsx
  - Todos los elementos
- COSTA RICA.xlsx
  - Todos los elementos

Adiliz Barrera – Panamá  
Francisco Zurita – Ecuador  
José A. Piedra - Ecuador

Datos del mapa ©2024 Google, INEGI Condiciones 1,000 km





# PREAL PROJECT

## Main Takeaways

- Enhanced waste collection, identification, and sorting data are crucial in our collective efforts to prevent contaminated fractions from being reinserted in industrial processes. The role of waste facilities managers and databases in this process is invaluable.
- Strengthening the Bromine detection systems by XRF and PBDE local laboratory analysis in Latin America is still necessary to identify plastic types with BFR-POP.
- PDBEs have been found in the assessed electric and electronic equipment, but TBBPA has the most significant presence in the samples.
- Latin American countries found a way to export plastic material without applying the conditions of the Basel Convention, which demands enhancing policies and reinforcement of international supervision methods.
- The PBDE measurement effort of PREAL is still an embryonic sample of the total volume of WEEE existing in each country.
- Sorting assessments that considered not only the type of equipment, color, and type of plastic but also the brand of the equipment have had more detailed results and could guide more selective e-waste separation efforts in the future. This could also introduce the concept of extended producer responsibility.
- The same type of electrical or electronic equipment in different countries may have different BFR-POPs.
- Efforts to repair and extend the useful life of electrical and electronic equipment continue to increase, which, although having favorable conditions, lengthens the life of POPs in future electronic waste streams.
- The more we strengthen national legislation and law enforcement for promoting BFR-POP identification and sorting from the plastic coming from e-waste, the more we can avoid contaminating recycling streams, hence promoting cleaner production, a safe circular economy, green growth, a healthy work environment, and the reduction of polluting emissions.



UNITED NATIONS  
INDUSTRIAL DEVELOPMENT ORGANIZATION

Progress by innovation



Thank you

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