Recycling plastics from WEEE requires a sensible and practical approach on POPs

A European WEEE recyclers perspective….

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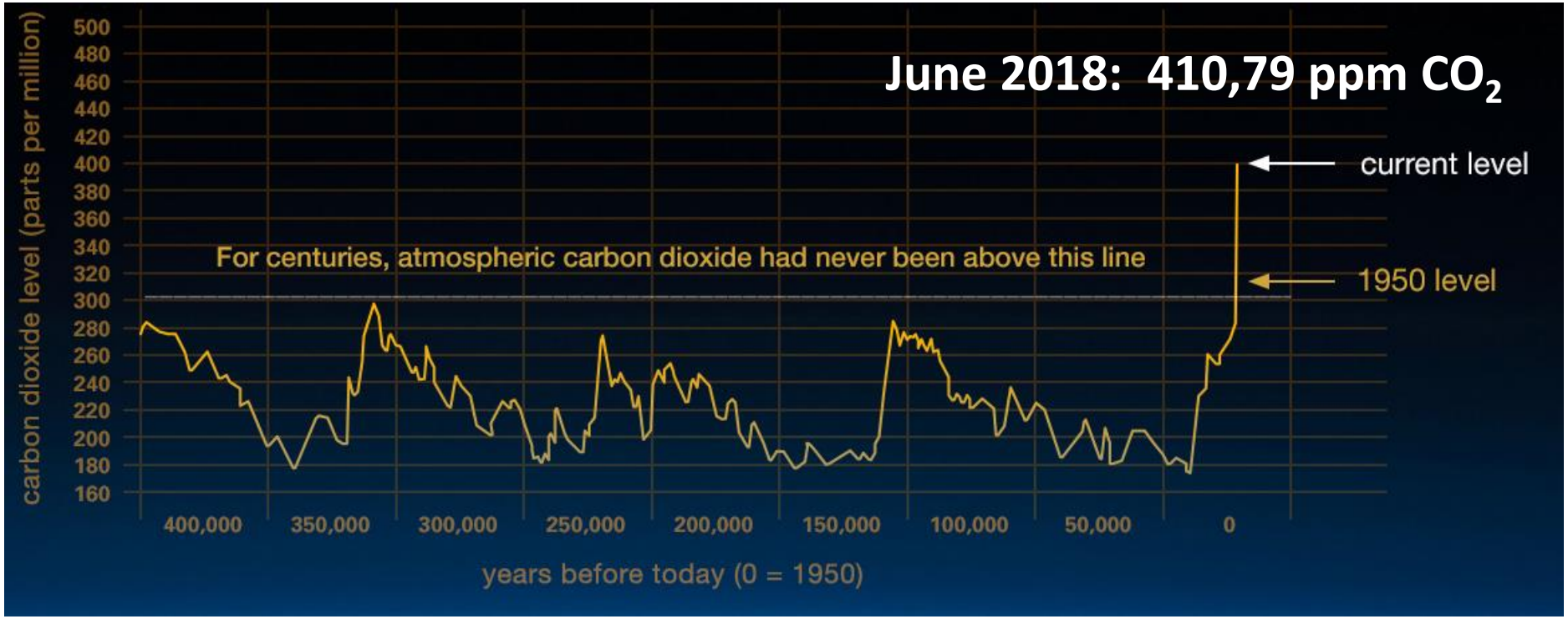
Exponential growth of an “invisible” Pollutant



https://climate.nasa.gov/climate_resources/24/

- Emitting CO_2 is free of charge
- It is a most urgent global environmental threat
- And……..this discussion decoupled from debates over toxics

The Sustainable Model of Re-Producing plastics from WEEE

Procurement

- Growing supply
- E-Waste recycling

- Self-replenishing
- Sustainable and growing supply

Processing

- Mechanical ‘mining’ process
- Innovative processing

- < 10% of energy
- < 10% of water consumption
- Save some 3-4 tons CO_2/ton

Selling

- “Green” products
- Virgin-like quality

- Sustainable product
- PCR plastics

WEEE plastics recycling – MGG Polymers

- Founded in 2004 as JV
- MBA Polymers Austria
- Constructed 2005
- In operation since 2006
- Capacity > 50 kMT
- PCR WEEE plastics
- 100 % MGG since 2017
- Now MGG Polymers

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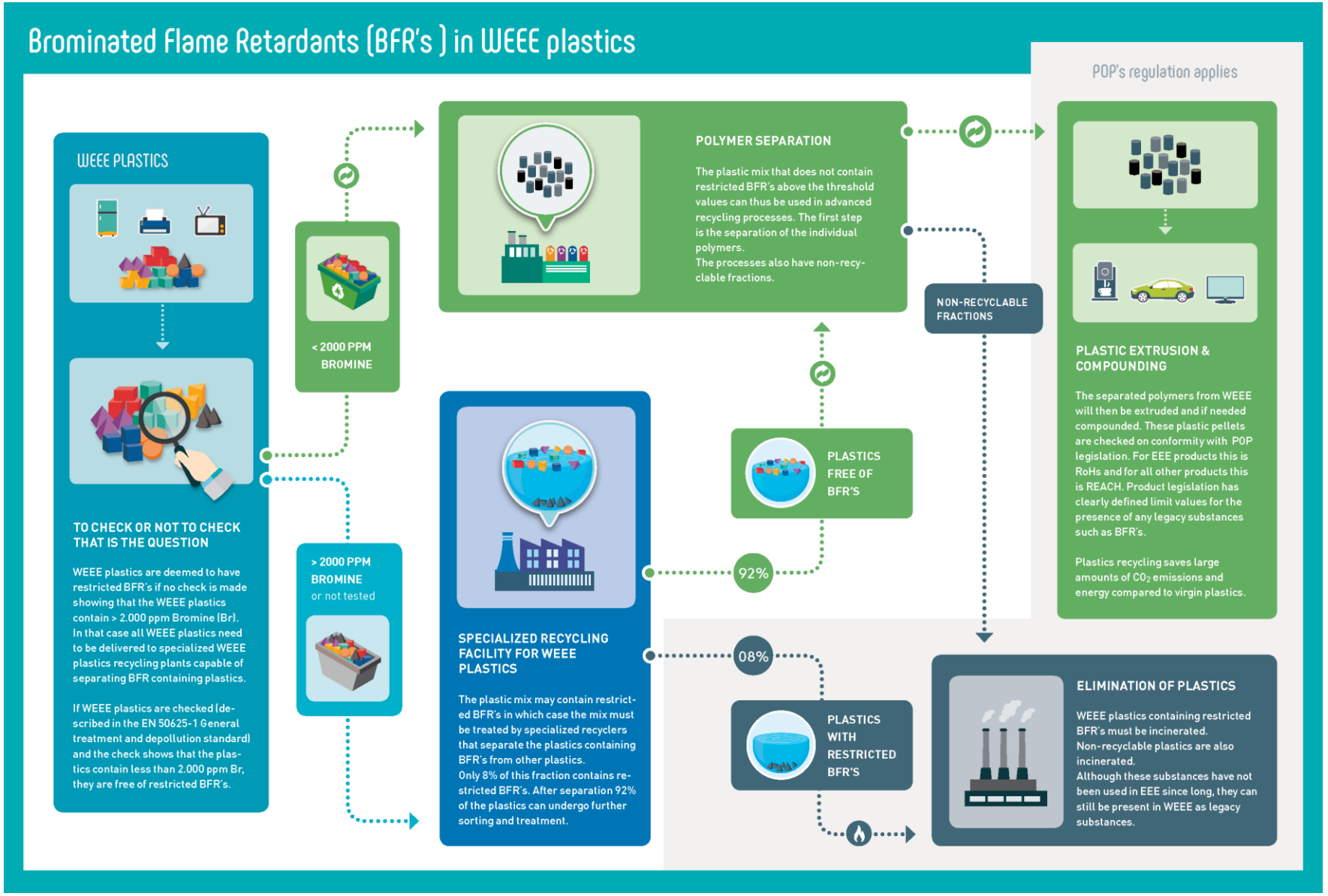
TECHNOLOGY PIONEER 2006

Some examples of products with 100% MGG Polymers

Marketed as Post-Consumer Recycled plastics (**PCR Plastics**)

Please note that this is not the same as Post-Industrial Recycled plastics (**PIR plastics**)

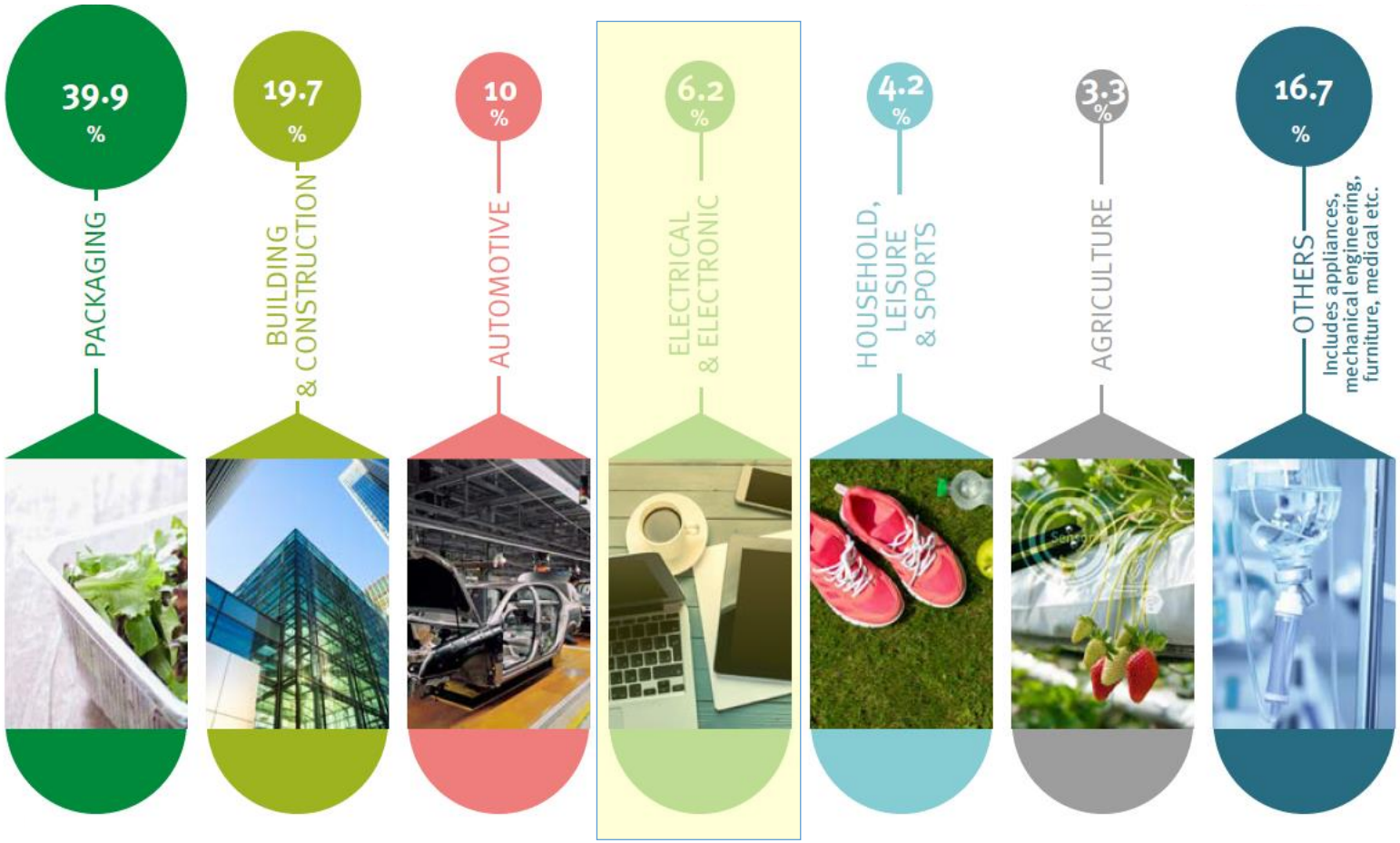
WEEE Plastic Recycling and separation of BFRs



EERA is the European Association of Recyclers of Electronic Products – www.eera-recyclers.com

“Forward” Approach

Plastics volume in terms of demand for EEE



Total Converter Demand
49,9 Mio MT

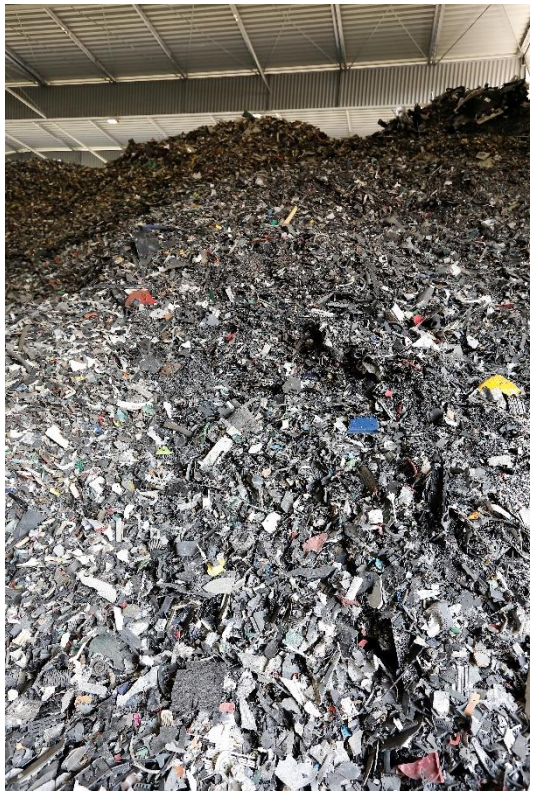
Source: Plastics Europe

The demand for EEE is approx. 3.1 Mio MT’s

“Reverse” Approach

Estimating the quantity of plastics in WEEE

European Market	Mio MT	in %
Placed on Market (POM) EEE	9,50	
Officially reported collections/recycling	3,30	35%
Informal collections/recycling	3,20	34%
Exports (of which 1,3 Mio MT not documented)	1,50	16%
"Scavenging" for parts	0,75	8%
Losses (such as through waste bin)	0,75	8%



WEEE Plastics some 1,2 Mio MT

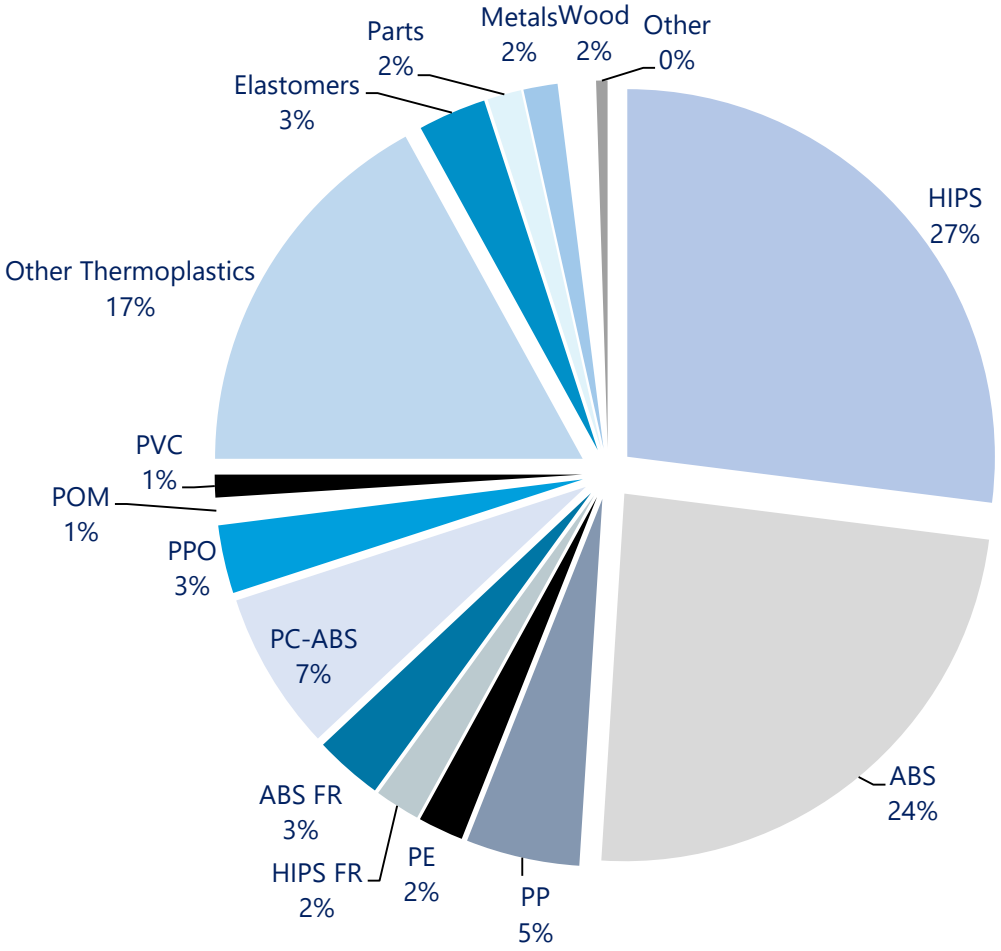
Plastic Content in WEEE per category	
SDA	30%
LDA	15%
ICT	20%
Tools	10%
Temp Control Equipm.	25%
Screens	20%

Source CWIT – MGG Polymers

Qualitative Approach

Average composition of WEEE plastics for recycling

WEEE Plastics	
ABS	24%
HIPS	27%
Polyolefines	7%
PC and PC-ABS	7%
BFR containing plastics	5%
Other plastics	24%
Other contaminants	6%



Source: MGG Polymers

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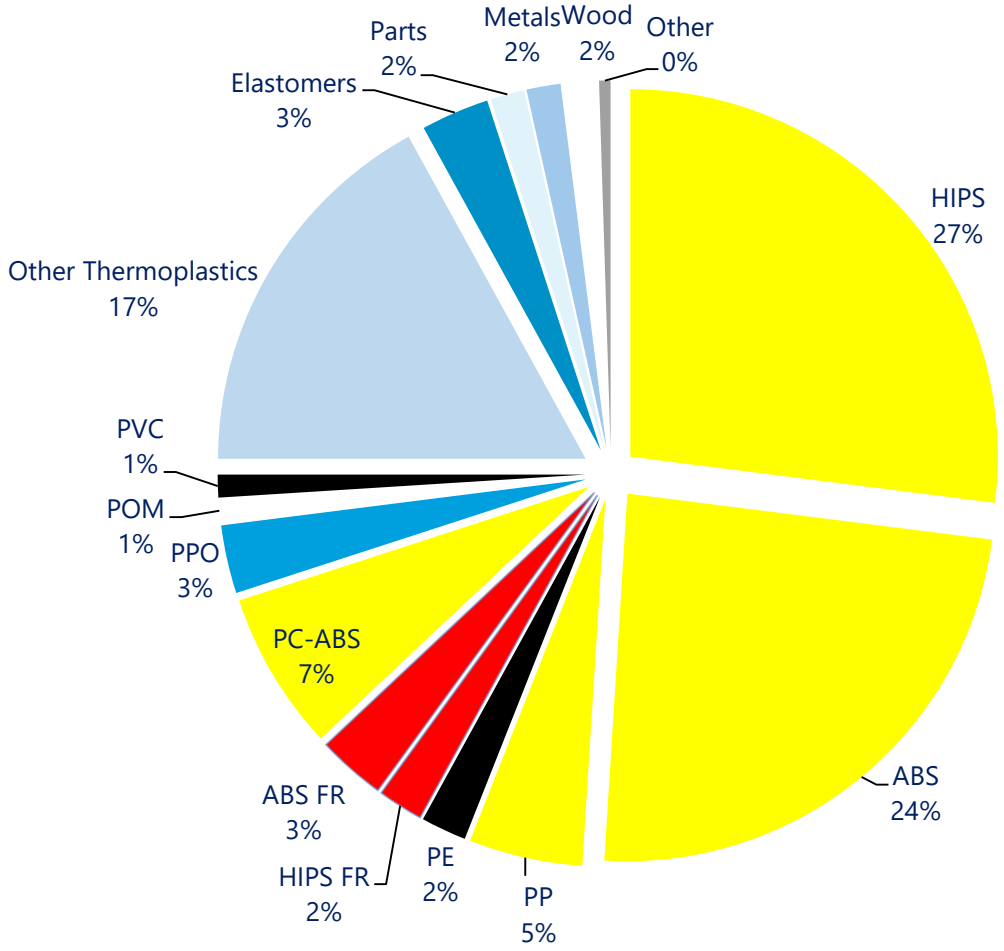


Source: MGG Polymers

Scientific Approach

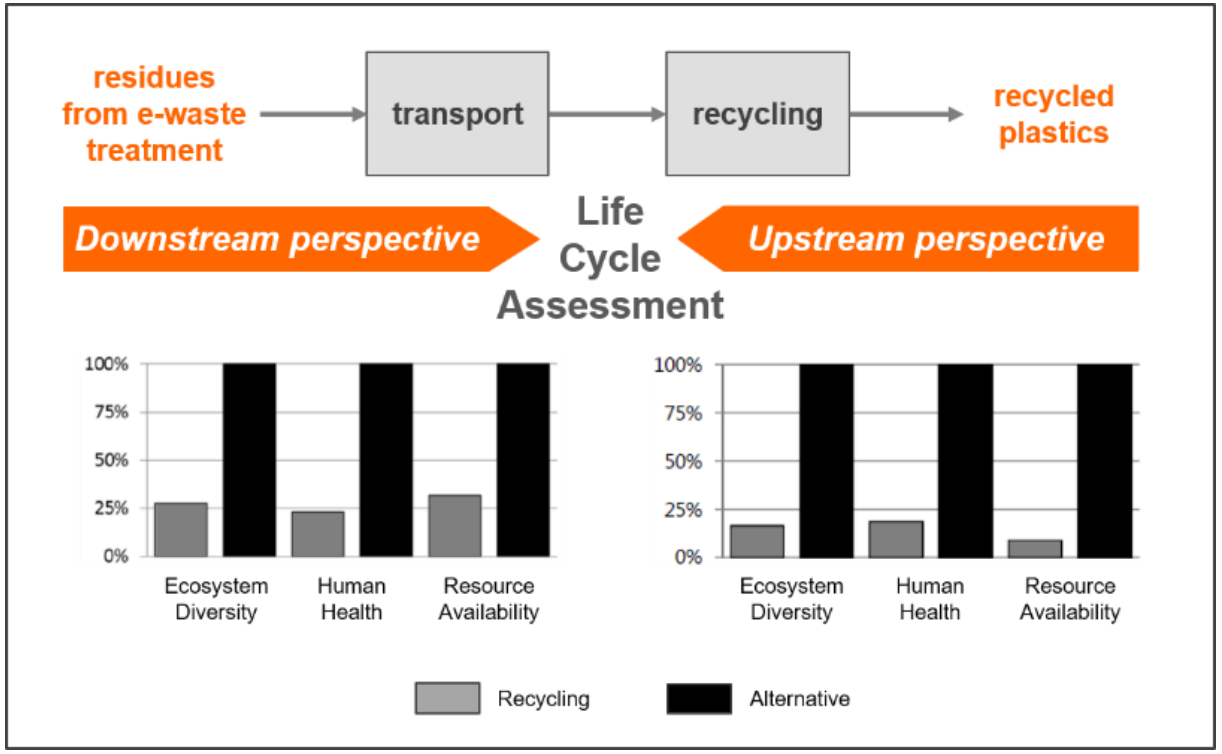
Life Cycle Analyses PCR WEEE Plastic versus

Incineration of WEEE plastic

Recycling PCR WEEE plastics 4 times better than Municipal Solid Waste Incineration.

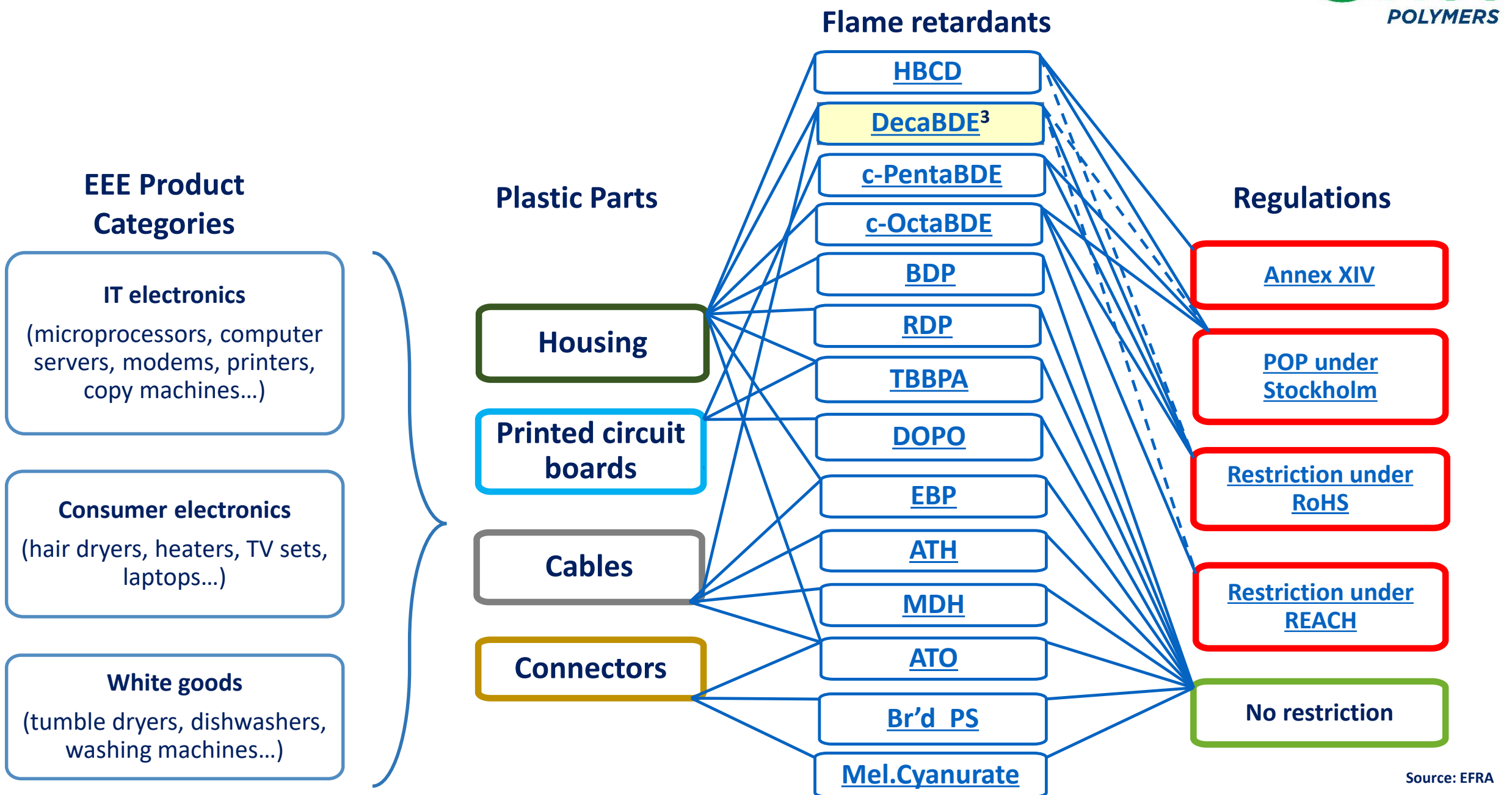
Production virgin plastics

Recycling PCR WEEE recycling option 6-10 times better than producing virgin plastics.



Source: Science of the Total Environment 529 (2015) 158–167, Patrick Wäger, Roland Hischier EMPA

Legislation and Flame Retardants



Source: EFRA

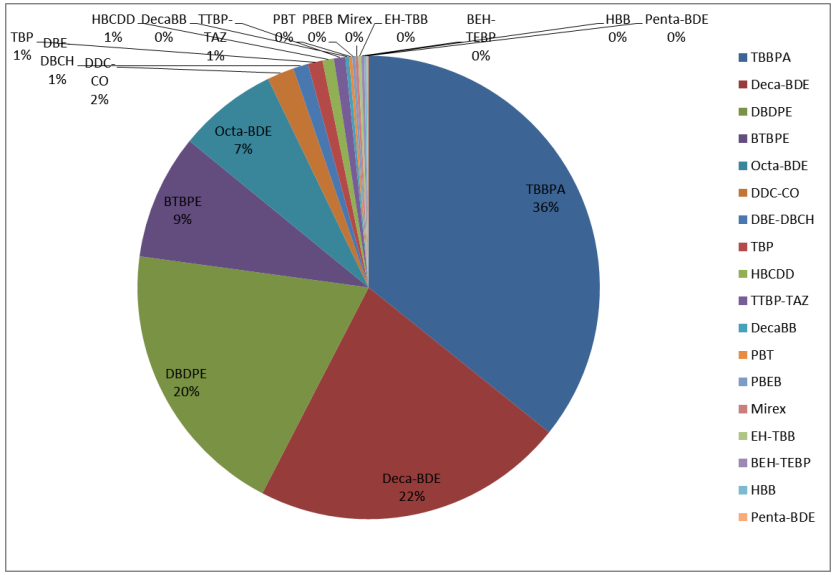
Why can't we live with a UTC threshold of 10 ppm for Deca-BDE ?

Complex analyses methods such as Chromatography cannot be used for recycling

- Continuous analyses are required per batch of 1000 kg
- Preparation of samples is too complex
- The time required for one analysis is too big
- The costs are prohibitive – higher than the value of the recyclates.

X-ray fluorescence spectrometry (XRF Analysis)

- XRF analysis has proven to be the only viable method for recycling processes in practice
- There is a standard for this EN 62321-3-1:2014
- It screens not only BFR's but also other RoHS substances material
- XRF measures total bromine
- Making the analysis impossible for extremely low concentrations.
- **XRF method is validated for 1000 ppm**
- **Lower values (<1000 ppm) for UTC and LPC would have serious repercussions**
- Deca-BDE in larger batches represent 22 % of BFR's



All restricted BFR's in E-Waste have 1000 ppm threshold

- One different value for deca-BDE would complicate QM procedures a lot
- We fail to see why deca-BDE would be treated differently then other PBDE's
- Deca-BDE was listed in the EU Chemical Legislation (REACH) only last year

The WEEE recycling industry needs an UTC threshold of 1000 ppm for deca-BDE

What is needed to keep this WEEE plastics recycling alive?

Some legal certainty and clarity is required to stimulate this new recycling industry

A threshold for POP BFR Substances such as deca-BDE – min. 1.000 ppm

- A threshold of 10 ppm is below the practical detection limit for deca-BDE for all practicle QM purposes
- To place this in a context: a flame retarded TV housing has 150 000 ppm
- Recycling requires analyses to be made on industrial scale (i.e. low cost XRF methods)
- These are validated for 1000 ppm

We need the recognition that POPs in WEEE plastics do not make then hazardous

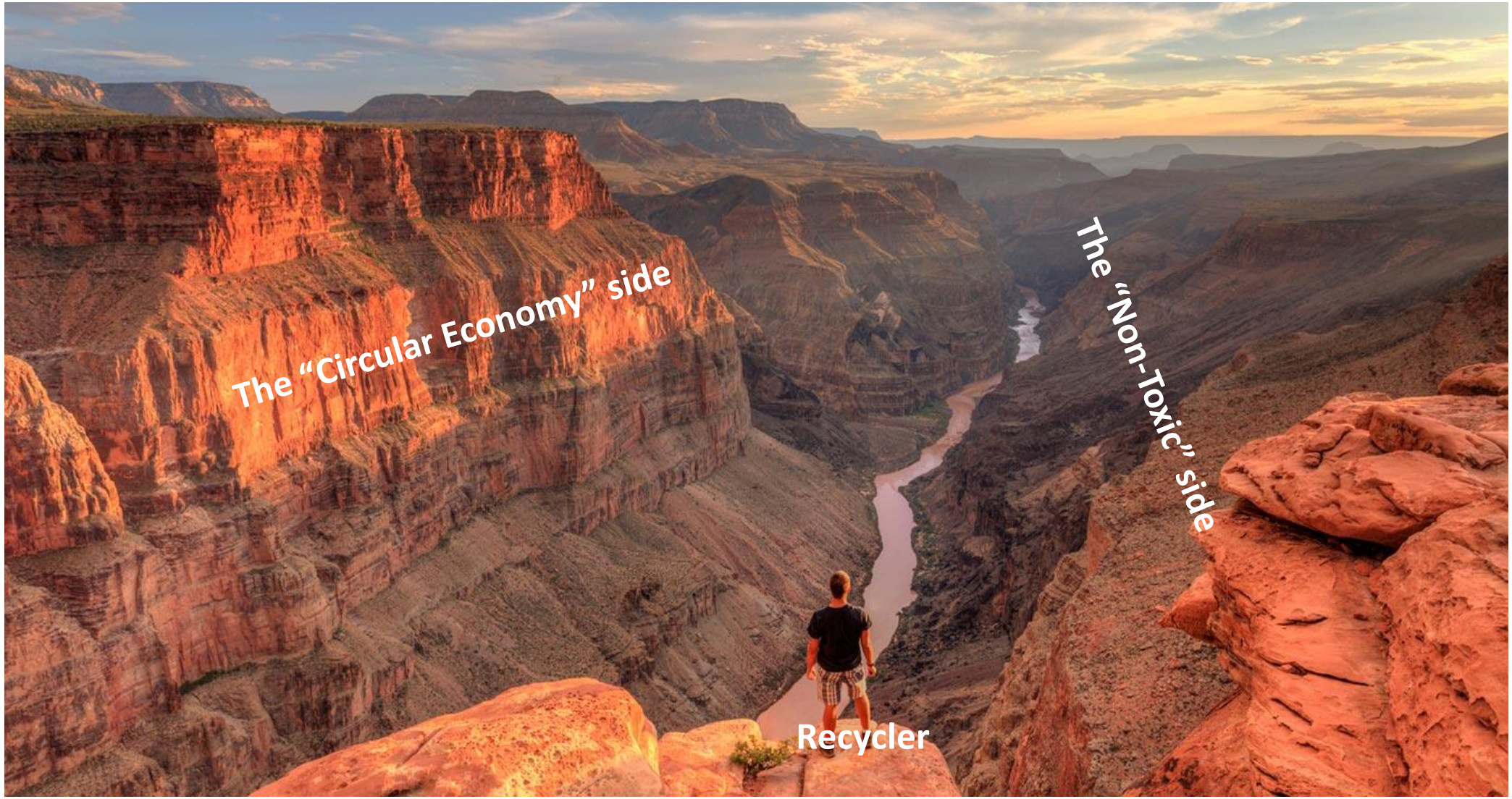
- BFRs are firmly embedded in the polymer structure of the solid plastic
- No plastic recycling plant has a permit to accept hazardous wastes

We need a practical and simple procedures for transboundary transports

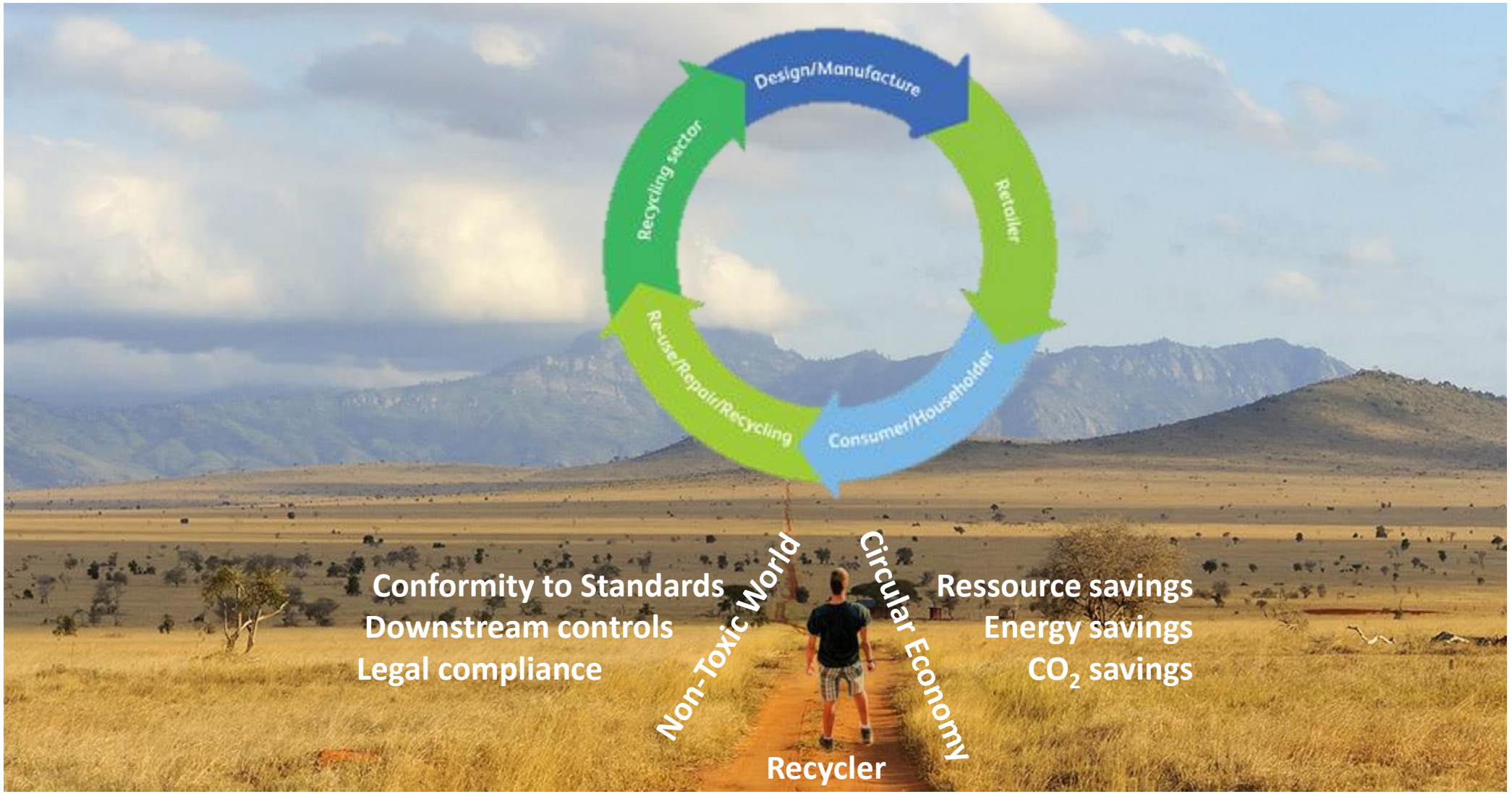
- Fast Track Notifications
- Allowing WEEE plastics to move out of developing nations
- To be properly recycled
- Right now too many BFR containing plastics are exported illegally

What is needed: an intelligent balance between “Non-Toxic” and “Circular Economy”

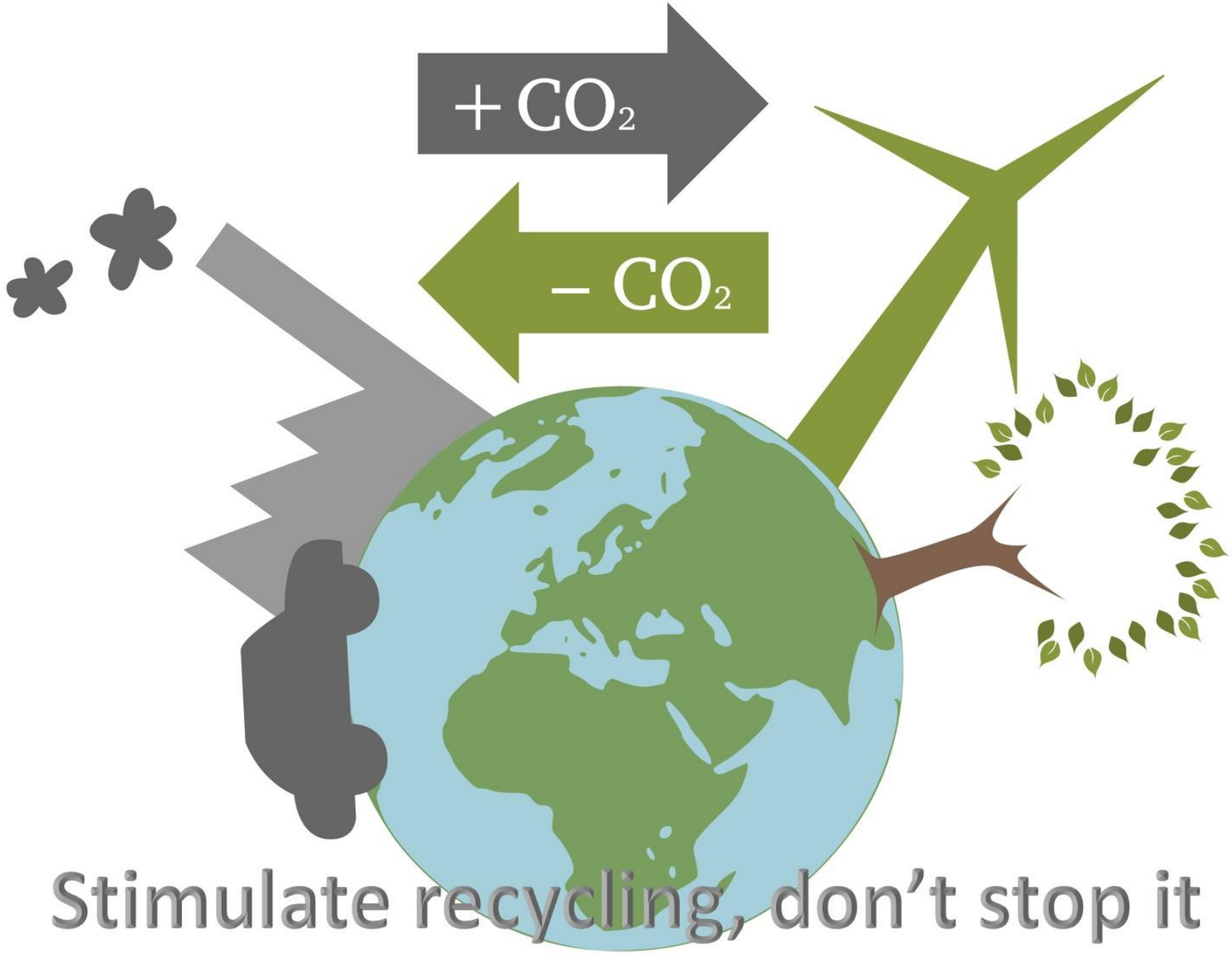
This is how it feels……..



This is how we believe it should be……



An intelligent balance between “Non-Toxic” and “Circular Economy”



Thank you…