

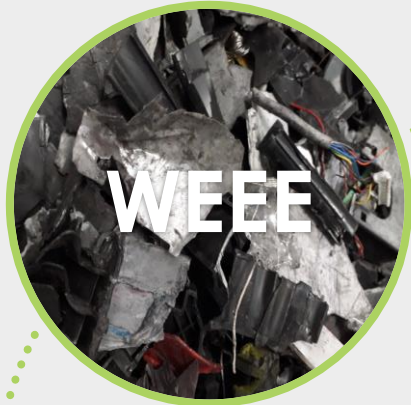
# COMPLIANCY AND RECYCLING: A WAY TO SORT IT ALL OUT

## Plastics Circularity Multiplier

Mathilde Taveau [**Coolrec**] on behalf of the **CREAToR** project

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More information on **CREAToR**: [www.creatorproject.eu](http://www.creatorproject.eu)

# Why is it challenging to recycle?



WEEE

ABS	Br-FR
HIPS	Talc
PP	Pigments
PC	Glass fiber
PC/ABS	P-FR
PA	Cl-FR
PE	...
...	

Complexity of the stream

## SUBSTANCES

equipment on the market

2000

end of life - discarded

2020

collection system

2020

treated in a recycling facility

2020

## SUBSTANCES OF CONCERN

# CREATOR

COLLECT • PURIFY • REUSE

## THE PROCESS



## INNOVATION

A new, cost-effective approach



Consideration of the **whole value chain** for various polymers **ABS, PC, PA, PS**



Characterisation and sorting of large polymer parts containing brominated flame retardants at **kg scale**  
Removal of Br-FR down to **0,1 wt-%** in continuous process at kg scale

## MARKET INTEGRATION

CREAToR delivers solutions to various steps of the production chain

**construction & demolition**



waste source  
end-product re-use

**electrical & electronic equipment**



waste source  
end-product re-use

**aeronautics industry**



waste source  
end-product re-use

**automotive industry**



end-product re-use

**recyclers**



characterisation in the sorting and removal of hazardous components

**polymer parts manufacturers**



labeling and re-additivation

DEVELOPMENT OF INTEGRAL LOGISTIC CONCEPT



collection of waste



separation of polymer parts



continuous extraction for removal of Br flame retardant



labelling of Br free material



modification for reuse



Sorting line with LIBS technology (Laser-Induced Breakdown Spectroscopy) for characterisation



Extractive extrusion with super critical CO<sub>2</sub> and NADES ionic liquids for the purification



Re-additivation for the re-use (new flame retardants, processing additives)



Labeling of the material to ensure hazardous flame retardant content < 0,1 wt-%

## TECHNOLOGIES

Is there a match between the complexity of the streams and the compliancy to the European legislation?

**SORTING**

# The Coolrec case · WEEE recycling

WASTE PLASTICS



METAL  
SEPARA  
TION

METALS



DENSITY  
BATH

HEAVY PLASTICS



ABS BFR  
PS BFR  
ABS/PC

GRANU  
LATOR

SUCTION

LIGHT FRACTION



DENSITY  
BATH

POLYOLEFINS

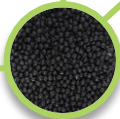
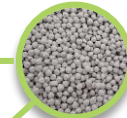


DENSITY  
BATH

STYRENICS



COMPO  
UNDING



BACK TO NEW PRODUCTS

## EXTRA SORTING STEPS

- Electrostatic separator
- Color separator
- Rubber separator

Annually, Coolrec processes 31 000 tons of plastics from WEEE.

# THE SORTING CHALLENGE

## Material



Target polymers:  
ABS, HIPS, ABS/PC

Particle size:  
40-60mm

Wet material

## SoC



Target elements:

Heavy metals:  
Cadmium, Lead,  
Chrome

Bromine based  
flame retardant

Chlorine based  
flame retardant

## Process



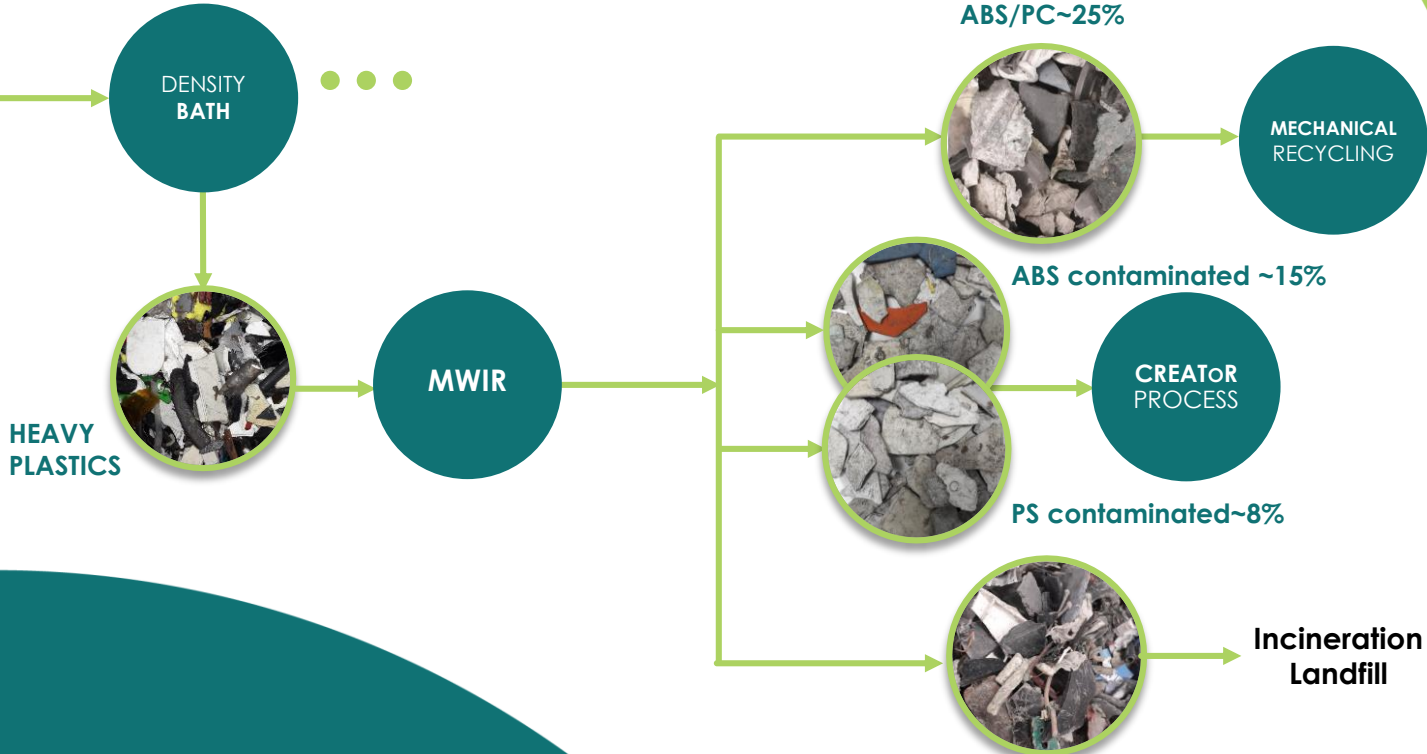
Need to see  
black plastics  
(low reflectance  
in the NIR region)

Automated  
sorting process

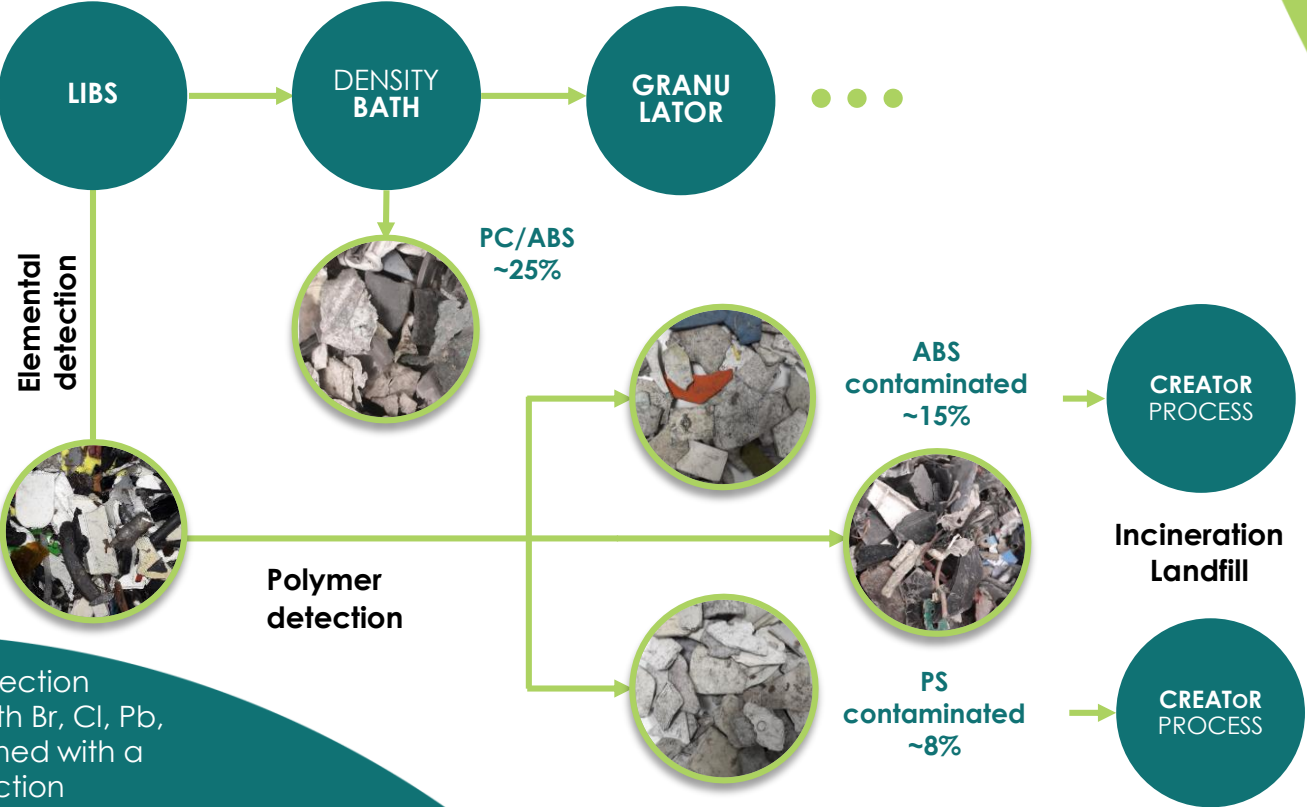
Good ratio purity  
/ efficiency

# A solution to many challenges

Option 1:  
Traditional sorting  
processes  
combined  
with MWIR  
(MidWave  
InfraRed)  
on the  
waste  
fraction



# A solution to many challenges



Option 2:  
LIBS system  
in input  
combined  
with traditional  
sorting  
processes  
on the  
free of  
SoC  
fraction

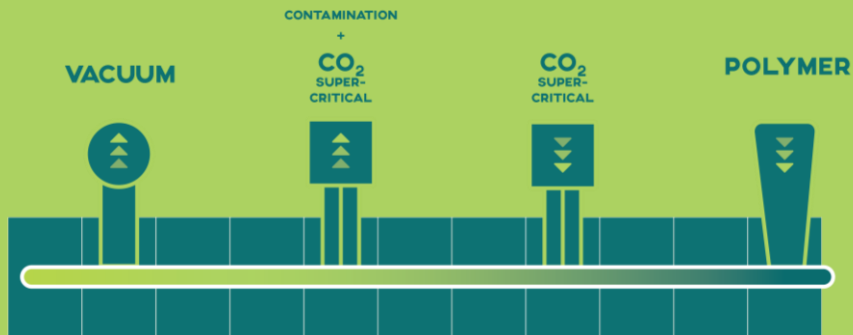
Elemental detection  
Exit plastics with Br, Cl, Pb,  
Cr, Cd combined with a  
polymer detection



# WHAT'S NEXT?

# CONTINUOUS PURIFICATION OF THE TWO SORTED WASTE FRACTIONS USING MECHANICAL AND PHYSICAL PROCESSES

**Contaminated stream**  
Extractive, physical recycling



**Clean stream free of SoC**  
Mechanical recycling



# Impacts



## TECHNICAL

Accurate system leading to a **precise separation of the plastics**

**Increasing the recycling rate** by recovering plastics fractions that are today send to incineration (reduction of more than 45% of the waste plastic fraction)

Overcoming the challenge of the **black plastics** by using another detection technic than the NIR

Compliancy to **REACH, POP** and **RoHS**



## SOCIAL & ECONOMIC

Ensuring new material sources lowers the dependencies from **petroleum sources** within Europe and lead to more **circular models**

Keeping recycling technology at outmost technical level and therefore **protecting jobs** in the sector in Europe

Ensuring **controlled disposal of legacy additives**

Offering treatment solutions for a **wider range of waste** within Europe

**Shifting the vision of recycled plastics** towards a safe secondary raw material



# RESEARCH & INNOVATION TO DRIVE THE **GREEN DEAL** EUROPEAN PLASTICS STRATEGY

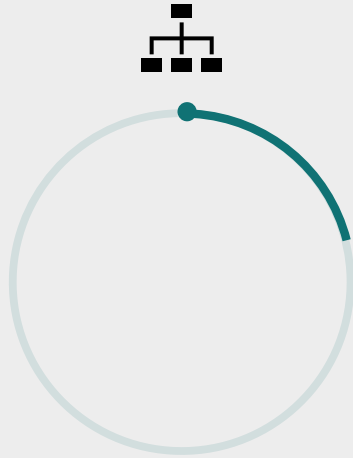
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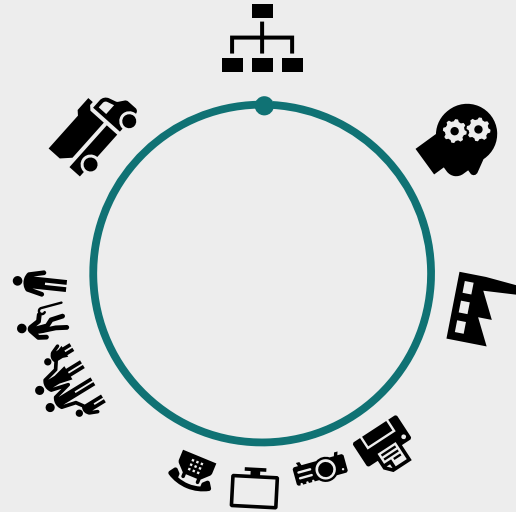
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COLLECT · PURIFY · REUSE

# Yes but...this is only a tiny part of the loop

Trying to be circular



Being circular



COLLABORATION



# Thank you!



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