COLLECTION - SORTING - REPROCESING - LEGISLATION - EXTENDED PRODUCER RESPONSIBILITY - DEPOSIT SYSTEMS - FUTURE TECHNOLOGIES

*Everything you need to know for your brand*

# MASTERCLASS RECYCLING

*a deep dive into recycling of household packaging*

suez circpack® EXPERTISE & CERTIFICATION

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# The PROGRAMM & etiquette of meetings

*a deep dive into recycling of household packaging*

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# The programm

## Five sessions into recycling of household packaging

**1**

26-01-2021 — 10.00 – 11.30 CET

### Collection & Sorting

- What is ‘recyclable’?
- Legal background on packaging waste
- Collection systems
- Sorting of packaging & technologies used.
- Standard design & sorting issues in sorting
- New sorting technologies (digital watermarking & Image recognition)

**2**

02-02-2021 — 10.00 -11.15 CET

### Reprocessing

- Additional sorting at the reprocessor explained
- Technologies in place
- Upcoming reprocessing technologies: Chemical recycling
- Recycling vs LCA vs $CO_2$-emission

**3**

09-02-2021 — 10.00 – 11.15 CET

### Design & Certification

*All participants will receive PDF with Design for recycling Guidelines*

- Design for Recycling Guidelines;
- Training: How to make a self-assessment of recyclability for your packaging
- Mindeststandard in Germany, RecycleCheck in NL
- Certification conform RecyClass

**4**

16-02-2021 — 10.00 – 11.00 CET

### Producer Responsibility

- Everything you want to know on Extended Producer Responsibility (EPR-systems) throughout the world
- What is changing in EPR for packaging
- Presented by Lorax for legislation & registration, supported by SUEZ.circpack for everything on recycling

**5**

60 minutes — **Date to be aligned with you**

### One-on-one session

- Opportunity to ask additional questions in a one-on-one live session with a SUEZ.circpack expert.
- Get answers to your dedicated questions that are really important for you and your company
- No competitors listening!

# Etiquette during the meeting

- Slides will be provided after the meeting
- Question? ask via the chat
- Have your QR-scanning app ready on your mobile:

- SCAN ME -

- Your competitors might be listening. Do not share anything that you do not want to be public
- Do not discuss prices, fees, margins, customers, etc.
- When you feel that regulatory rules are broken, please inform us via chat in order for us to take action.

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# 1 INTRODUCTION

# SUEZ & circpack®

*a deep dive into recycling of household packaging*

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# Short intro SUEZ.circpack®

**We support brand owners, packaging companies and retailers in their quest for circular packaging**

## 1 Workshops & Masterclasses

## 2 Packaging Advice

## 3 Certification on Recyclability

## 4 Country Overviews

## 5 BigData on Packaging

# Short intro SUEZ.circpack

Our **international team** has extensive **knowledge** and **experience** in the fields of **packaging technology**, **environmental science**, **sorting & recycling** technologies and **certification**.

**Sebastian Bidmon – Packaging Engineer of SUEZ.circpack®**

Mannheim, Germany

Sebastian is a packaging engineer with a 7-year background in the packaging industry. With experience in Innovation and R&D he has got a strong customer focus. His extensive knowledge of the recycling processes make for a perfect combination.

**Natasha Chorlton - Packaging and Recycling Business Consultant at SUEZ.circpack®**

Manchester, England

After her studies in Environmental Science, Natasha has been working in the packaging industry for 6 years. Her knowledge and experience brings a lot of added value to customers. She will help to find sustainable packaging alternatives with her understanding of the full packaging value chain.

**Dr. Sascha Dargazanli – Expert of SUEZ.circpack®**

Cologne, Germany

Sascha holds a Ph.D. in Biochemistry and an MBA. He is the expert when it comes to developing new recycling and treatment technologies whilst keeping economic considerations in mind.

## *We are ready to answer your questions!*

**Juliette Guérin – Product Manager of SUEZ.circpack®**

Brussels, Belgium

Juliette is an upcoming expert in the recycling industry. With her environmental engineering background and commercial experience, she has done a 3-year program within the SUEZ group to prepare her for the circular resource revolution. She has been in the circpack-team since 2018.

**Vincent Mooij – Director of SUEZ.circpack®**

Zelhem, The Netherlands

With an extensive background in marketing, product innovation and sustainability, Vincent has a strong customer focus whilst having a clear understanding of technological challenges. >10 years experience in the recycling industry.
Great frontrunner for European alignment on Design Guidelines and Certification.

**Marine Savy-Oliveira – Product Manager of SUEZ.circpack®**

Bonn, Germany

Marine has an international experience in the recycling and recovery industry.
She has an environmental engineering background and strong skills in eco-design, innovation and project development.

*With the help of our **90.000 colleagues** working in **70 countries**, **SUEZ.circpack®** is very well situated to find **local** and **technical expertise within our group**. Combined with our **external network** we ensure **the best answer to your questions**.*

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# What is RECYCLABLE?

*Masterclass Recycling – Session 1*

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# What is ‘RECYCLABLE’?

1. COLLECTION

2. SORTING

3. REPROCESSING

4. APPLICATION

= RECYCLABLE

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# LEGAL background on Packaging Waste

*Masterclass Recycling – Session 1*

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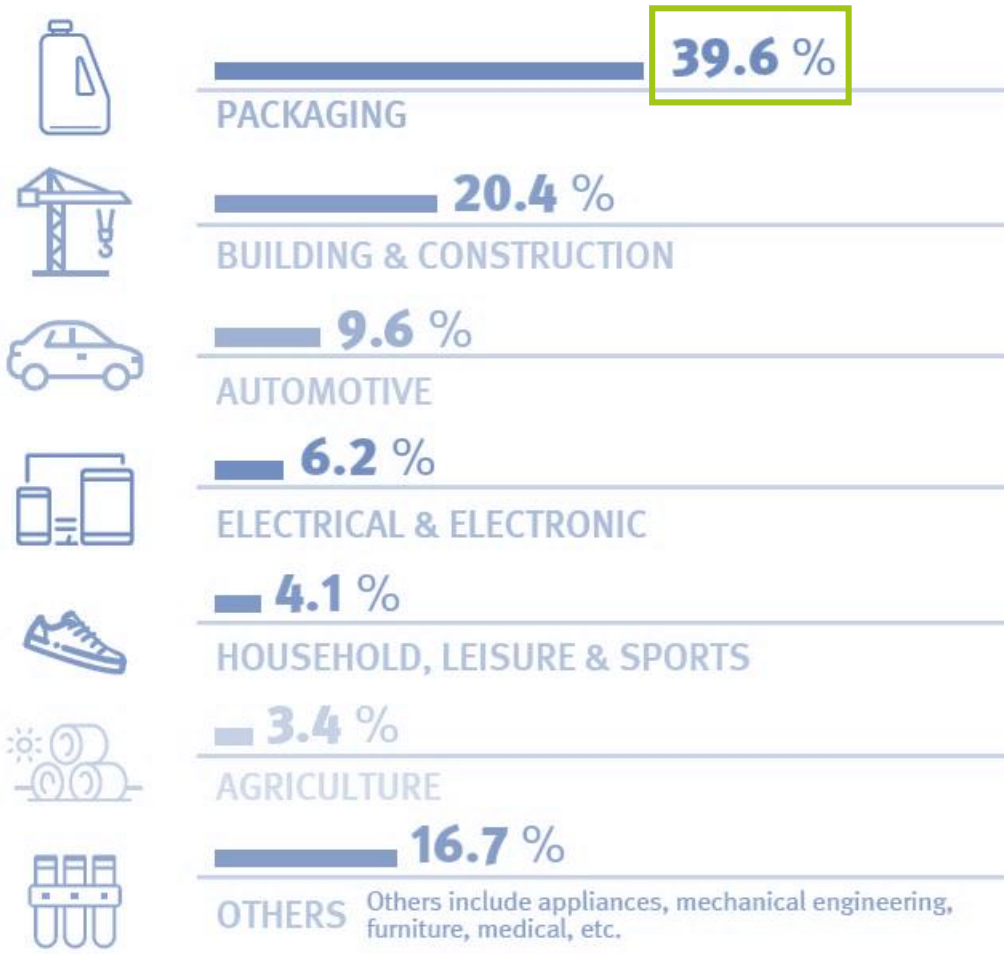
# LEGAL background on packaging waste

## Europe produces a huge amount of plastics:

## 58 MILLION TONNES every year

*Worldwide production = 360 million tonnes*

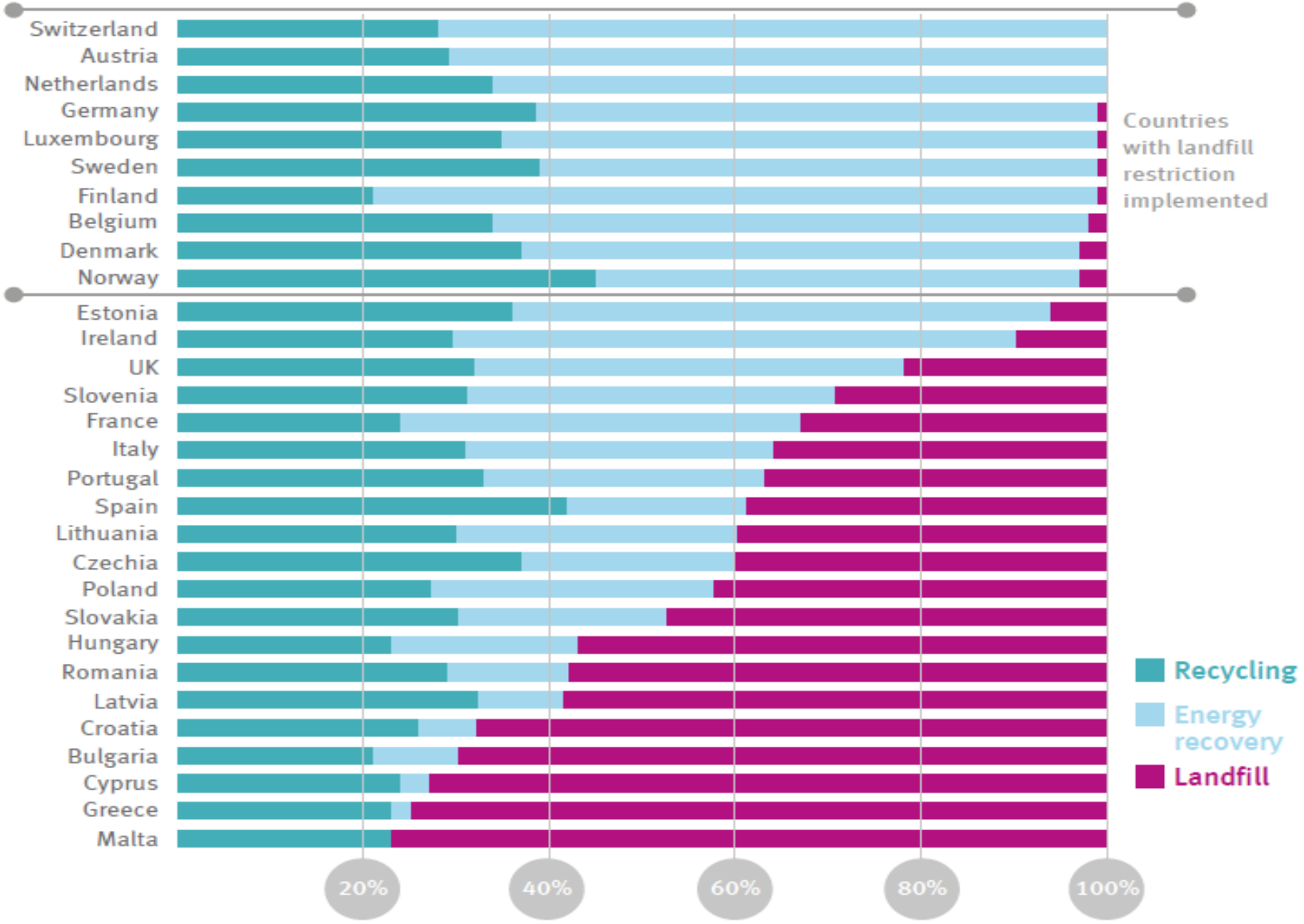
**In 2018, 9.4 million tonnes of plastic postconsumer waste were collected in Europe to be recycled (inside and outside the EU)**




*Source:*
*PlasticsEurope*

# LEGAL background on packaging waste

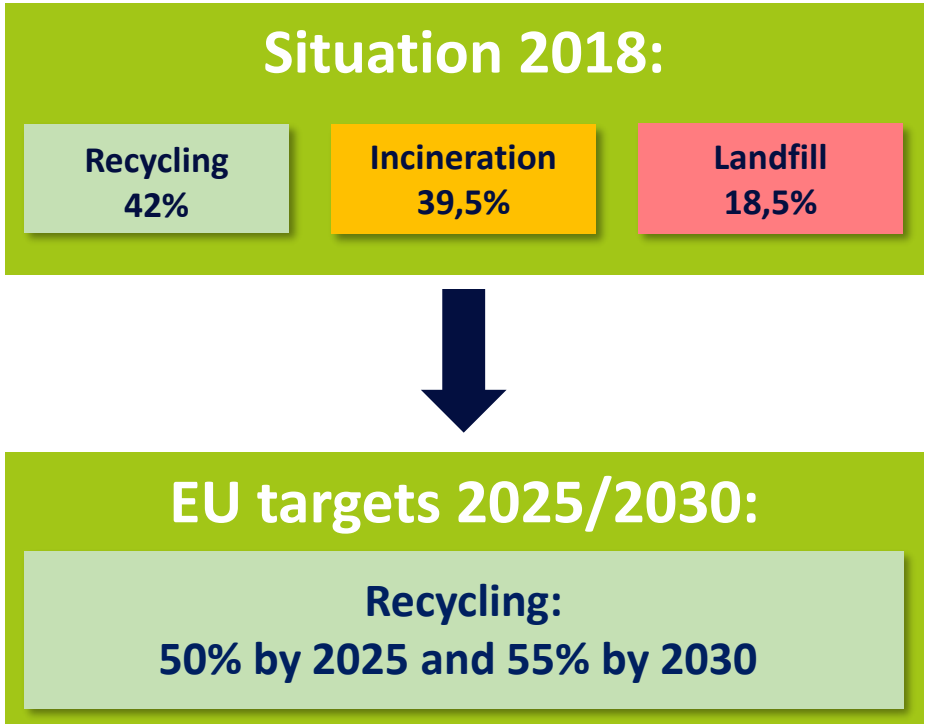
**Treatment of POST-CONSUMER plastic waste in 2018.**




*Source:*
*Conversio Market & Strategy GmbH*

# LEGAL background on packaging waste

**Increase of targets:**




**Success Factors to reach targets:**

- Separate collection of all plastics packaging
- Design for Recycling
- Sophisticated sorting plants
- Enhanced recycling infrastructure
- Consumer involvement
- Integrating more recycled plastics in new products
- Financial incentives (EPR or tax)

# LEGAL background on packaging waste

## Additional challenge: a new calculation methodology:

### Situation 2018:

Recycling 42% | Incineration 39,5% | Landfill 18,5%

### Calculation of recycling:

100% put on market → xx% collected & sorted → 42% brought to reprocessor

### EU targets 2025/2030:

**Recycling:**
**50% by 2025 and 55% by 2030**

### *NEW* Calculation of recycling:

100% put on market → xx% collected & sorted → xx% brought to reprocessor → 50% output of reprocessor

- The weight of packaging waste recycled shall be calculated as the weight of packaging that has become waste which, having undergone all necessary checking, sorting and other preliminary operations to remove waste materials that are not targeted by the subsequent reprocessing and to ensure high-quality recycling, enters the recycling operation whereby waste materials are actually reprocessed into products, materials or substances. By way of derogation from the first subparagraph, the weight of the packaging waste recycled may be measured at the output of any sorting operation provided that: such output waste is subsequently recycled; the weight of materials or substances that are removed by further operations preceding the recycling operation and are not subsequently recycled is not included in the weight of waste reported as recycled.
- Discussion are still ongoing

# LEGAL background on packaging waste

# LEGAL background on packaging waste

# LEGAL background on packaging waste

# LEGAL background on packaging waste

# LEGAL background on packaging waste

**Consumer perception**

↓

**Political awareness**

↓

**Legislation**

# LEGAL background on packaging waste

# LEGAL background on packaging waste

# LEGAL background on packaging waste

## Single Use plastics Directive

**The 2019/904 Directive**
**must become law in all EU Member States by July 3rd, 2021.**

However, within the Directive, specific timelines are applied:

a) The **market restrictions** rules apply from **3 July 2021** onwards.

b) The **product design requirements** for **bottles** apply from **3 July 2024** onwards.

c) The **extended producer responsibility** measures apply from **31 December 2024** onwards.

# LEGAL background on packaging waste

## Single Use plastics Directive

### Products to be banned in the EU by the 3rd of July 2021:

**a) Market restrictions:**

- Plastic **cutlery** (forks, knives, spoons and chopsticks)
- Plastic **plates** (an exemption might be foreseen until 2023)
- Plastic **straws**
- **Food containers** made of **EPS** (expanded polystyrene)

  *such as **fast food boxes**, with or without a cover, used to contain food that is intended for immediate consumption either **on-the-spot or take-away**, and that is **ready to be consumed** without any further preparation, like cooking, boiling or heating*
- Beverage containers & cups made of **EPS**
- Products made from **oxo-degradable plastic**
- **Cotton bud sticks** made of plastic

# LEGAL background on packaging waste

## Single Use plastics Directive

### Products to be reduced in the EU:

**a) Market restrictions:**

- **Plastic Food containers**, such as fast-food boxes, with or without a cover, used to contain food that is intended for immediate consumption either on-the-spot or take-away, and that is ready to be consumed without any further preparation, like cooking, boiling or heating.

- **Plastic cups** for beverages, including their covers and lids

**Member States must achieve an ambitious and sustained reduction** in the consumption of those products **by 2026 compared to 2022**. However, no specific reduction targets have been set in the Directive.

# LEGAL background on packaging waste

## Single Use plastics Directive

### Product Design Requirements:

**b) Recycled content:**

- **From July 2024**, beverage bottles which are manufactured from polyethylene terephthalate as the major component (‘**PET bottles**’) contain **at least 25 % recycled plastic**, calculated as an average for all PET bottles placed on the market on the territory of that Member State;

- **From 2030,** beverage bottles contain **at least 30 % recycled plastic**, calculated as an average for all such beverage bottles placed on the market on the territory of that Member State (this target thus concerns all beverage bottles and not only PET bottles).

**b) Tethered caps:**

- By **June 2024**, caps and lids are to remain attached for all beverage containers up to 3 litres

# LEGAL background on packaging waste

## Single Use plastics Directive

### Separate collection of plastic bottles:

#### c) Extended Producer Responsibility

- Member states shall take necessary measures to ensure separate collection for recycling to achieve targets of **77% by 2025**, and **90% by 2029** for all beverage bottles with a capacity of up to 3 litres, including their caps and lids.

# LEGAL background on packaging waste

## EU plastic 'Tax'

**As part of the COVID-19 recovery package, the EU adopted a proposal to levy a plastic tax with effect from 1 January 2021.**

The tax is implemented as a new national contribution to the EU based on the amount of non-recycled plastic packaging waste in each Member State with an effective rate of €0.80 per kilogram.

**Country specific Implementation & calculation....**

# LEGAL background on packaging waste

## European plastic 'Tax'?

**In some Member States, taxes on plastics were already prepared to be introduced.**
***There may not be a direct correlation with the new EU plastic tax.***

- **Italy** proposed a tax of €0.45/kg applicable to plastic packaging: plastic bottles, carrier bags, food containers and EPS packaging. It has been adopted and will be introduced 1st of January 2021.
- **Spain** has proposed a tax of €0.45/kg applicable to non-reusable plastic packaging. This proposal has not yet been adopted and has been subject to consultation this month. Once approved, entry into force is envisaged for 1st of July 2021.
- **The UK** has proposed a £200 per tonne tax rate for packaging with less than 30% recycled plastic that is currently under consultation. Once adopted, the tax will take effect from April 2022.
- In addition, many member states have already in the past introduced **taxes on Plastic Carrier Bags** (Bulgaria, Croatia, Cyprus, The Netherlands, Poland, Portugal, etc.)

# LEGAL background on packaging waste

## Who pays for all of this?

- **The consumer pays!** - the polluter pays principle
- **Via Brand owners**
- **Via EPR's - Extended Producer Responsibility Systems**
- **Via taxation.**

*More on EPRs in session 4, hosted by Lorax.*

# LEGAL background on packaging waste

## EU Recycling targets for packaging:

| Recycling targets per packaging category | Rate (weight) End 2018 | Rate End 2025 | Rate End 2030 |
|---|---|---|---|
| **All types of packaging** | | **60%** | **65%** |
| Plastic packaging | 22,5% | 50% | 55% |
| Wood packaging | 15% | 25% | 30% |
| Ferrous metals packaging | 50% | 70% | 80% |
| Aluminium packaging | X | 50% | 60% |
| Glass packaging | 60% | 70% | 75% |
| Paper cardboard packaging | 60% | 75% | 85% |

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# COLLECTION of Packaging Waste

*Masterclass Recycling – Session 1*

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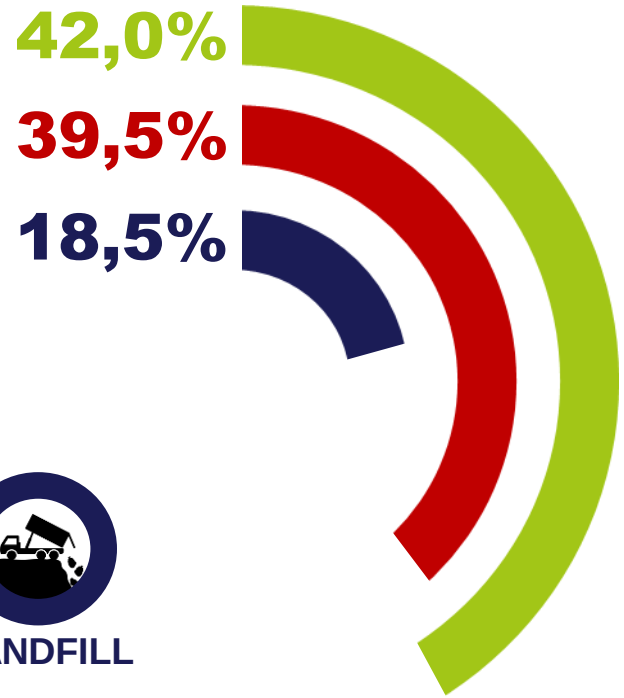
# COLLECTION of packaging waste

IN THE EU, RECYCLING IS THE FIRST OPTION FOR PLASTIC PACKAGING WASTE

**17.8** Mt **collected plastic post-consumer packaging waste**




**COLLECTION & TREATMENT of plastic packaging waste in 2018.**

**RECYCLING**

**ENERGY RECOVERY**

**LANDFILL**

***Source:***
*Conversio Market & Strategy GmbH*
*2018*

*EU28 + NO/CH*

# COLLECTION of packaging waste


## Differences in Collection:

- B2B & B2C
- General waste & Source separated
- Curbside collection
- Municipal drop-off depots
- Deposit systems
- Own take-back system:
  - Return logistics
  - Send it via postal services
  - Bring to shop

# COLLECTION of packaging waste

## Cost.....

**Required for collection:**

- Truck
- Diesel
- Driver
- Planning & administration
- Depot
- Transfer to final destination

## Result.....

**What did I collect:**

- A mix of materials: different types of plastic, combined with steel and aluminium, glass, labels, stickers and glue attached.
- On top of that we collected non-packaging material
- 5kg per household stop

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# SORTING of Packaging Waste

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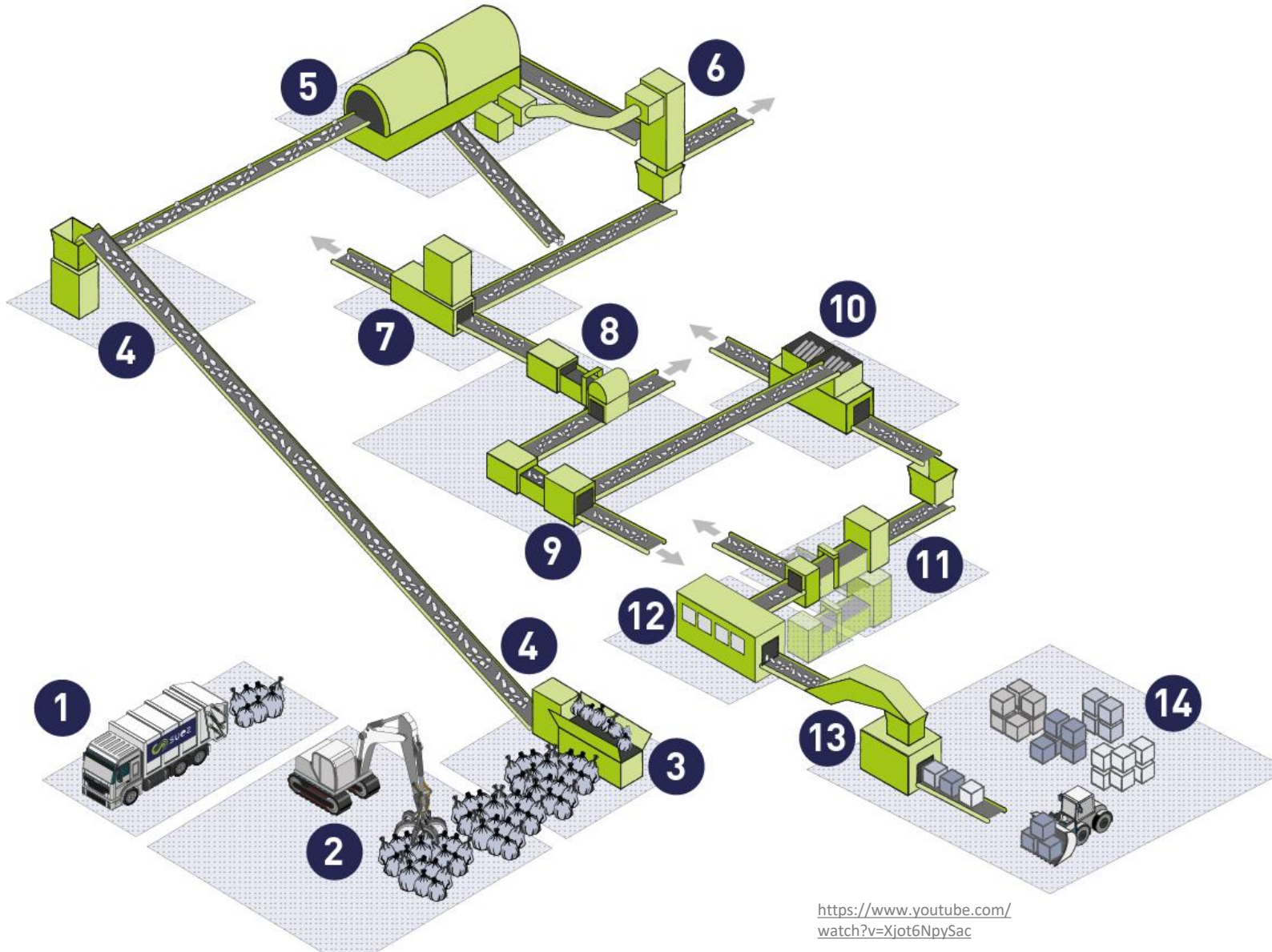
# SORTING of packaging waste

1. INSPECTION & ACCEPTANCE
2. INPUT WITH CRANE
3. BUNKER
4. BAG OPENER
5. SIEVE DRUM
6. WIND SIFTER: FILM
7. MAGNET: FERRO METALS
8. NIR: BEVERAGE CARDBOARDS
9. EDDY CURRENT: NON FERRO METALS
10. BALLISTIC SEPERATION: 2D/3D
11. NIR: PET – PE – PP – (PS)
12. QUAILITY CONTROL
13. BALE PRESSING




https://www.youtube.com/watch?v=Xjot6NpySac

# SORTING of packaging waste

## Sorting facility

## SUEZ - Rotterdam

- SCAN ME -

https://www.youtube.com/watch?v=Xjot6NpySac

3min40

# SORTING of packaging waste

## Sieve drum:

- Sorting packaging by size


# SORTING of packaging waste

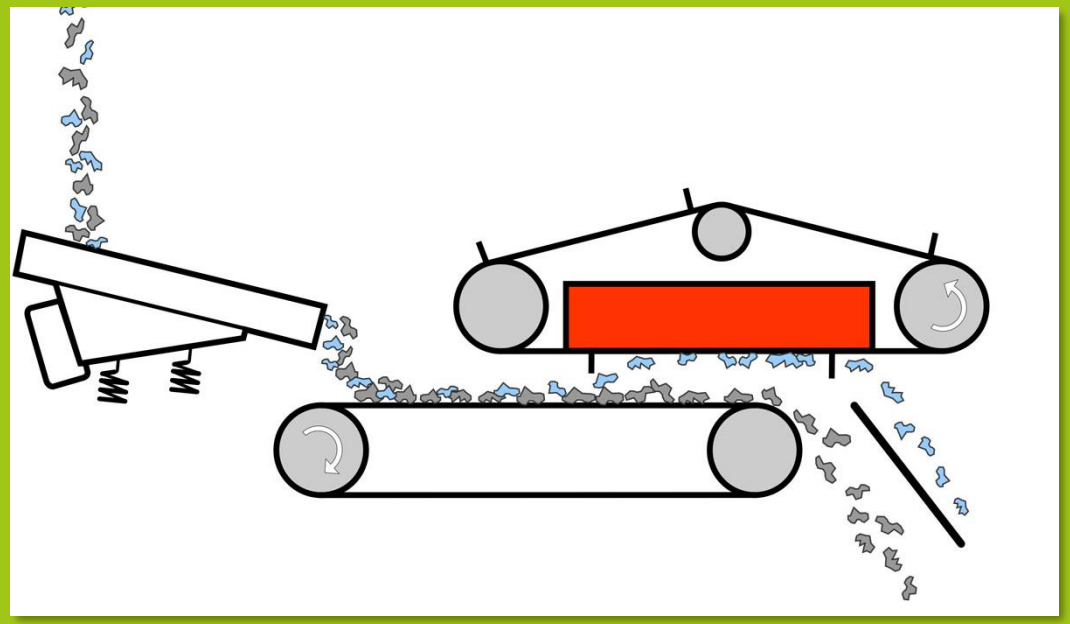
## Wind sifter:

- Separating lightweight material (flexibles from ridgids)


# SORTING of packaging waste

## Overbelt Magnet:

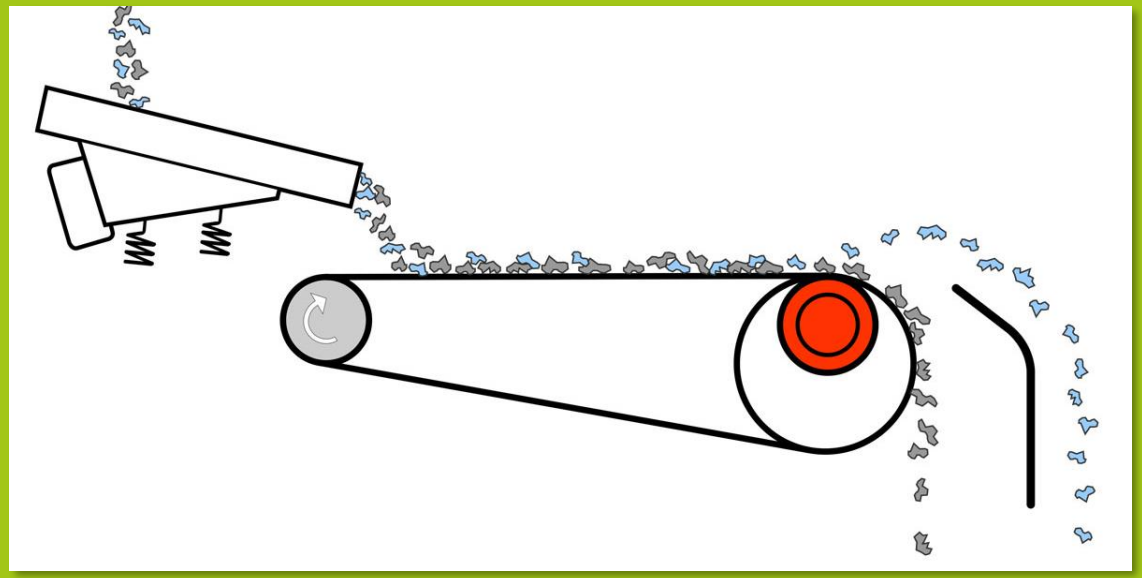
- Taking out most of the steel packaging
- Food cans etc.

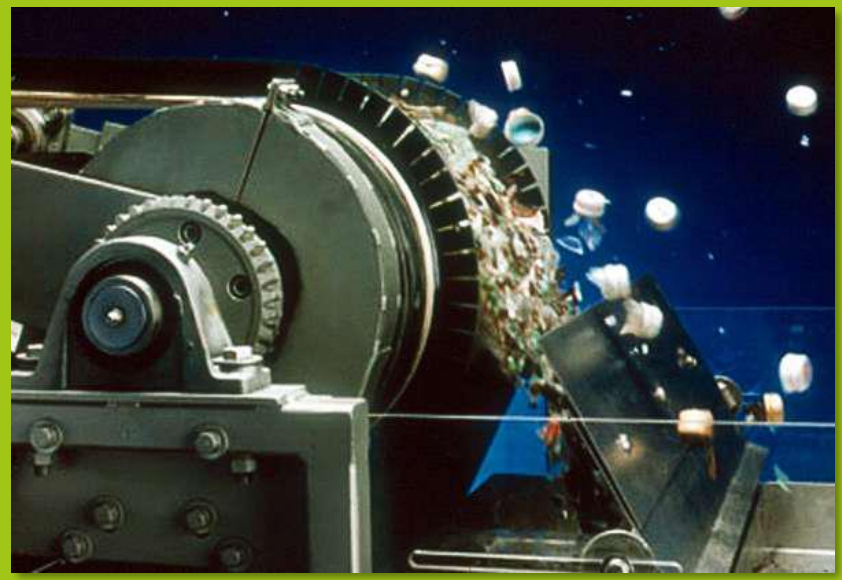


# SORTING of packaging waste

## Eddy Current:

- Taking out most of the aluminium packaging
- Soda cans etc.

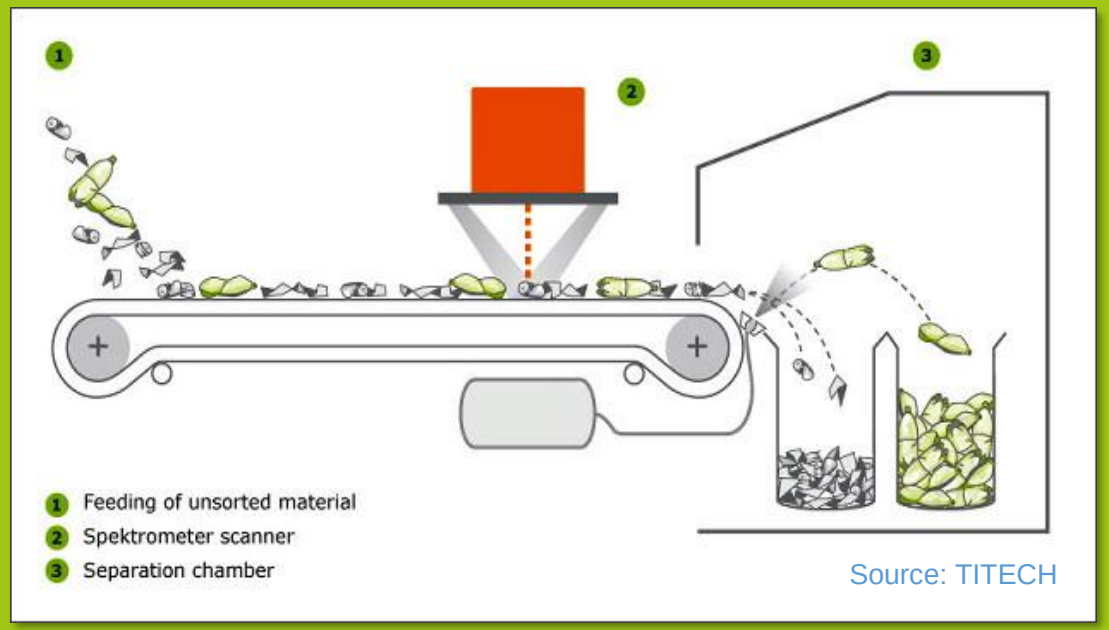




# SORTING of packaging waste

## Near Infra Red – technical limits:

- Depending on throughput: purities 80-95%.
- **Black colored** packs can not be detected
- **Multi materials** or **covered by sleeves** might end up in the wrong material fraction.




# SORTING of packaging waste

## Black plastic packaging……

- Black pigments are mostly based on **carbon black**
- Carbon black **reflects** almost **no light**. It also strongly **absorbs ultra-violet** (UV) and **infrared** (IR).
- Carbon black allows the colours in the food to stand out. It is low cost, has good dispersion and masking properties.
- Carbon black is **not detectable** by Near infrared (NIR)
- That is why Carbon Black is **not recyclable!**
- **A**lternatives are available!

# SORTING of packaging waste

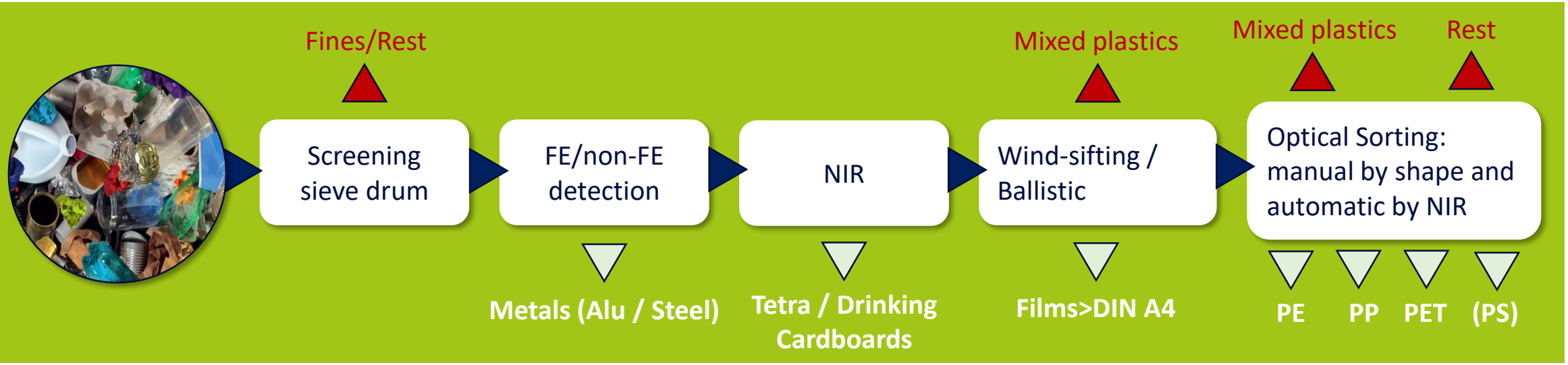
## Black plastic packaging……

**Alternatives for Carbon Black** (tests done by WRAP)

http://www.wrap.org.uk/sites/files/wrap/Recyclability%20of%20black%20plastic%20packaging.pdf

| | Detectable with NIR Spectroscopy? | | | Average Recognition Rate | | |
|---|---|---|---|---|---|---|
| **Polymer/Colourant** | **PET** | **PP** | **PS** | **PET** | **PP** | **PS** |
| Sicopal K0095 | ✓ | ✓ | ✓ | 100% | 100% | 96.7% |
| Lumogen FK4210 | ✓ | ✓ | ✓ | 98.9% | 100% | 98.3% |
| Carbon Black UN MB | X | X | X | 0% | 0% | 0% |
| Colour Tone IRR 95530 | ✓ | ✓ | ✓ | 97.6% | 100% | Not tested |
| Colour Tone IRR 95550 | ✓ | ✓ | ✓ | 100% | Not tested | Not tested |
| ColorMatrix Dye Black-5 | ✓ | ✓ | ✓ | 100% | Not tested | Not tested |

# SORTING of packaging waste




## Do not forget:

- Differences per country / EPR system
- Difference per sorting installation (manual vs machine)
- New technologies under development

# SORTING of packaging waste

## Output of Sorting Facility

- Quality requirements to supply reprocessors
- Difference per sorting installation  & per reprocessor
- Role of the EPR-system?

Deutsche Gesellschaft für Kreislaufwirtschaft und Rohstoffe mbH

| PET | Purity | Impurities | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Spec/Description | | Max. total | Metallic and mineral (>100g) | Other metal articles | Other plastic material | PVC articles | Plastic films | Other residual material |
| Used, emptied, dimensionally stable, system-compatible packaging<br>PET, volume <= 5 L<br>1. bottles transparent,<br>2. other dimensionally stable PET packaging (clear, coloured, opaque incl. closures, labels, etc.) | 90 mass % | 2 mass % | Forbidden | < 0.5 mass % | < 2 mass % | < 0.1 mass % | < 2 mass % | < 2 mass % |

| PE | Purity | Impurities | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Spec/Description | | Max. total | Metallic and mineral (>100g) | Other metal articles | PP articles | Expensed plastics incl. EPS articles | Plastic films | Other residual material |
| Used, emptied, dimensionally stable, system-compatible PE packaging, volume <= 5 L, such as bottles and containers, incl. components such as closures, labels, etc. | 94 mass % | 6 mass % | Forbidden | < 0.5 mass % | < 3 mass % | < 0.5 mass % | < 5 mass % | < 3 mass % |

| PP | Purity | Impurities | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Spec/description | | Max. total | Metallic and mineral (>100g) | Other metal articles | PE articles | Expensed plastics incl. EPS articles | Plastic films | Other residual material |
| Used, emptied, dimensionally stable, system-compatible plastic article made of PP, volume <= 5 L, such as bottles and containers, incl. components such as closures, labels, etc. | 94 mass % | 6 mass % | Forbidden | < 0.5 mass % | < 1 mass % | < 0.5 mass % | < 2 mass % | < 3 mass % |

| Mixed plastics | Purity | Impurities | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Spec/description | | Max. total | Metallic and mineral (>100g) | Paper, cardboard | Other metal articles | PET bottles, transparent | PVC article other than packaging | Other residual material |
| Used, completely emptied, system-compatible articles made of plastic that are typical for packaging (PE, PP, PS, PET) incl. packaging parts such as caps, lids, labels, etc. | 90 mass % | 10 mass % | Forbidden | < 5 mass % | < 2 mass % | < 4 mass % | < 0.5 mass % | < 3 mass % |

| Plastic films | Purity | Impurities | | | | |
|---|---|---|---|---|---|---|
| Spec/description | | Max. total | Metallic and mineral (>100g) | Other metal articles | Other plastic article | Other residual material |
| Used, completely emptied, system-compatible articles made of plastic film, surface DIN A4. | 92 mass % | 8 mass % | Forbidden | < 0.5 mass % | < 4 mass % | < 4 mass % |

| Drinking Cardboards | Purity | Impurities | | | | | |
|---|---|---|---|---|---|---|---|
| Spec/description | | Max. total | Metallic and mineral (>100g) | Other metal articles | Other plastic article | Other paper/cardboard | Other residual material |
| Used & emptied packaging for drinks and pasty products, made of cardboard/PE or CB/Aluminium/PE | 90 mass % | 10 mass % | Forbidden | < 0.5 mass % | < 4 mass % | <2,5 mass % | < 3 mass % |

# SORTING of packaging waste

## Cost.....

**Required for sorting:**

- Transport to sorting facility
- CAPEX – sorting equipment, conveyor belts, bunkers, wiring, process automation, bailers, facility
- OPEX – People, maintenance, handling, energy, etc.
- Administration

## Result.....

**What did I sort:**

- Bales of packaging with high concentrations **(>80%)** of a specific type of material. (e.g. PET, PP, Aluminium)
- Contamination with:
  - Other materials on packaging
  - Other materials
  - Residue

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# STANDARD DESIGN ISSUES

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# Standard Design Issues

## SORTING DISASTERS (1/2)

TOP 25





*Note: Info is based on sorting results of German and Dutch waste in one facility in Germany during 2019*
*We are aware that brands might have changed their packaging in the mean time.*

# Standard Design Issues

## SORTING DISASTERS (2/2)

TOP 25















*Note: Info is based on sorting results of German and Dutch waste in one facility in Germany during 2019*
*We are aware that brands might have changed their packaging in the mean time.*

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7

# New sorting technologies

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# New Sorting Technologies

**Robotization**

**Image Recognition**

**Deep learning**


- SCAN ME -

https://www.youtube.com/watch?v=ZwBvMigVbyE

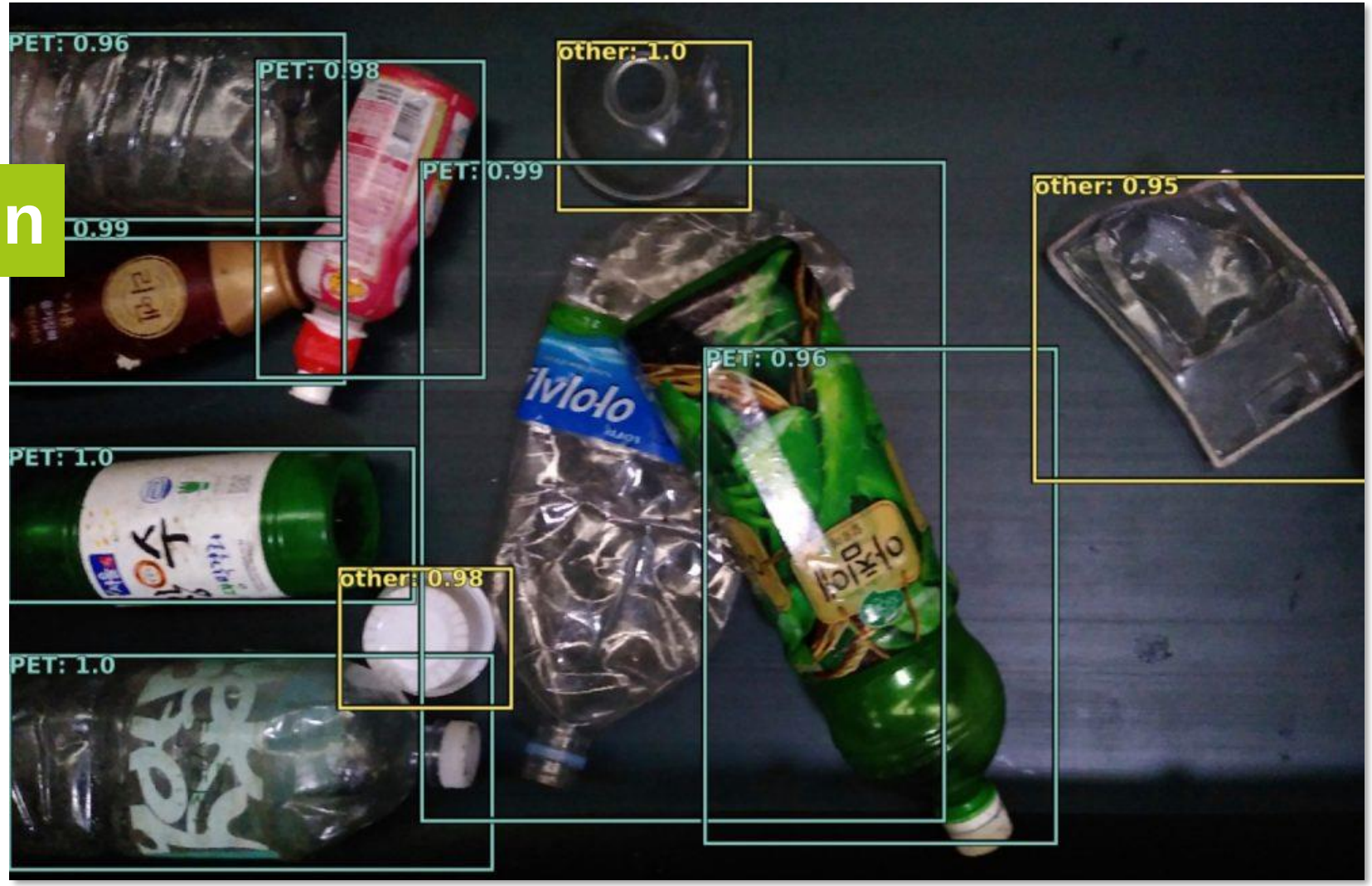
1min40

# New Sorting Technologies

**Robotization**

**Image Recognition**

**Deep learning**



# New Sorting Technologies

## Digital Watermarks

Holy Grail 2.0
Intelligent Sorting

- SCAN ME -

https://www.bbc.com/news/av/business-50335737

4min58


**Looks** like this

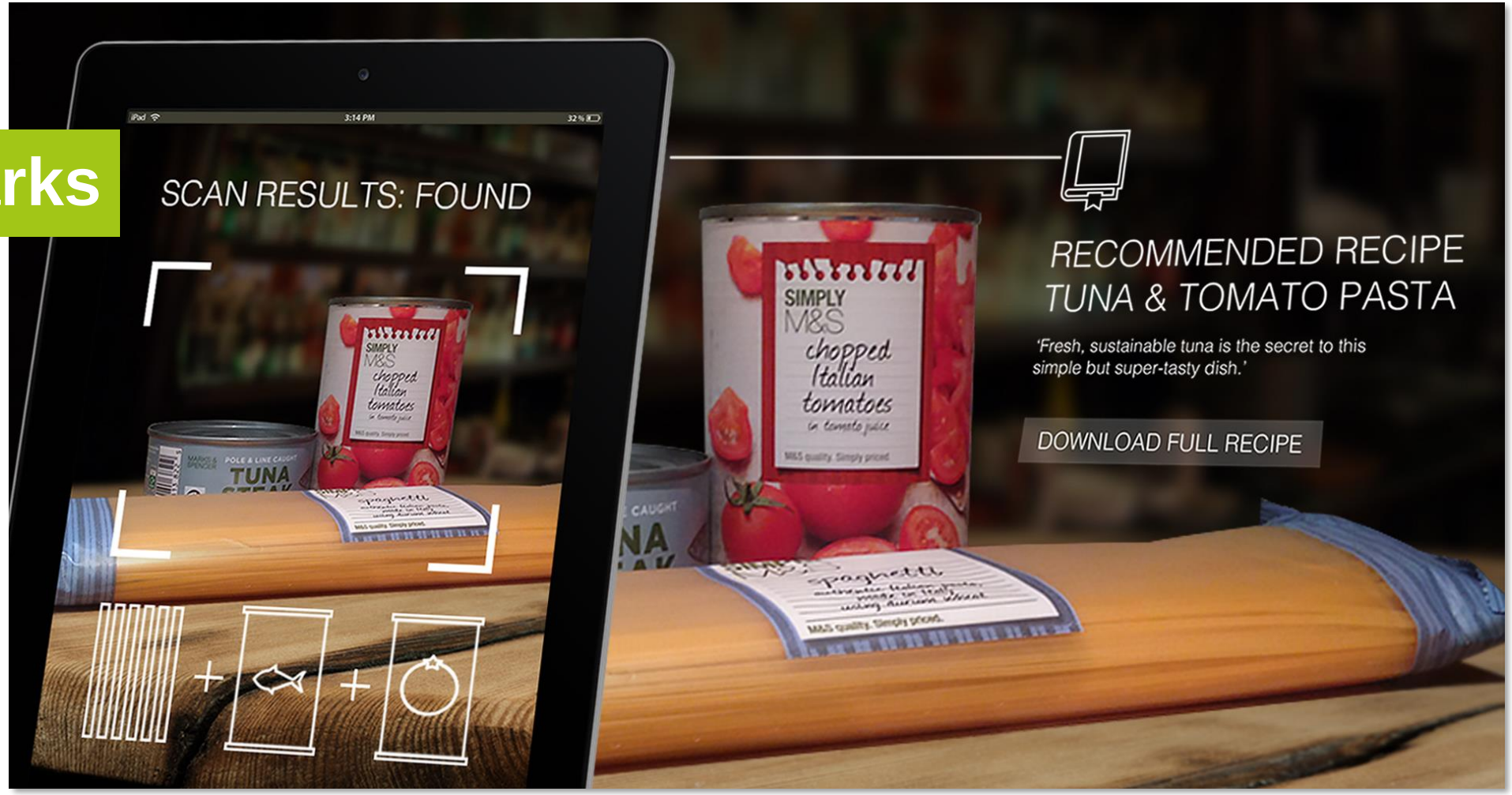
**Performs** like this


**Looks** like this

**Performs** like this

# New Sorting Technologies

## Digital Watermarks




Commercial use of Digital Watermarks could look something like this:

COLLECTION - SORTING - REPROCESING - LEGISLATION - EXTENDED PRODUCER RESPONSIBILITY - DEPOSIT SYSTEMS - FUTURE TECHNOLOGIES

*Everything you need to know for your brand*

# Questions & Answers

*Masterclass Recycling – Session 1*

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COLLECTION - SORTING - REPROCESING - LEGISLATION - EXTENDED PRODUCER RESPONSIBILITY - DEPOSIT SYSTEMS - FUTURE TECHNOLOGIES

***Everything you need to know for your brand***

# MASTERCLASS RECYCLING

## Thank you for your attention

*See you next week!*

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