VALUE CIRCLE OF CIRCULAR ECONOMY

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TEHNOEKO
11. MEĐUNARODNA KONFERENCIJA OZAŠTITI OKOLIŠA
5.-7. lipnja 2024., POREČ
AbfallverwertungsTECHNIK & AbfallWIRTSCHAFT

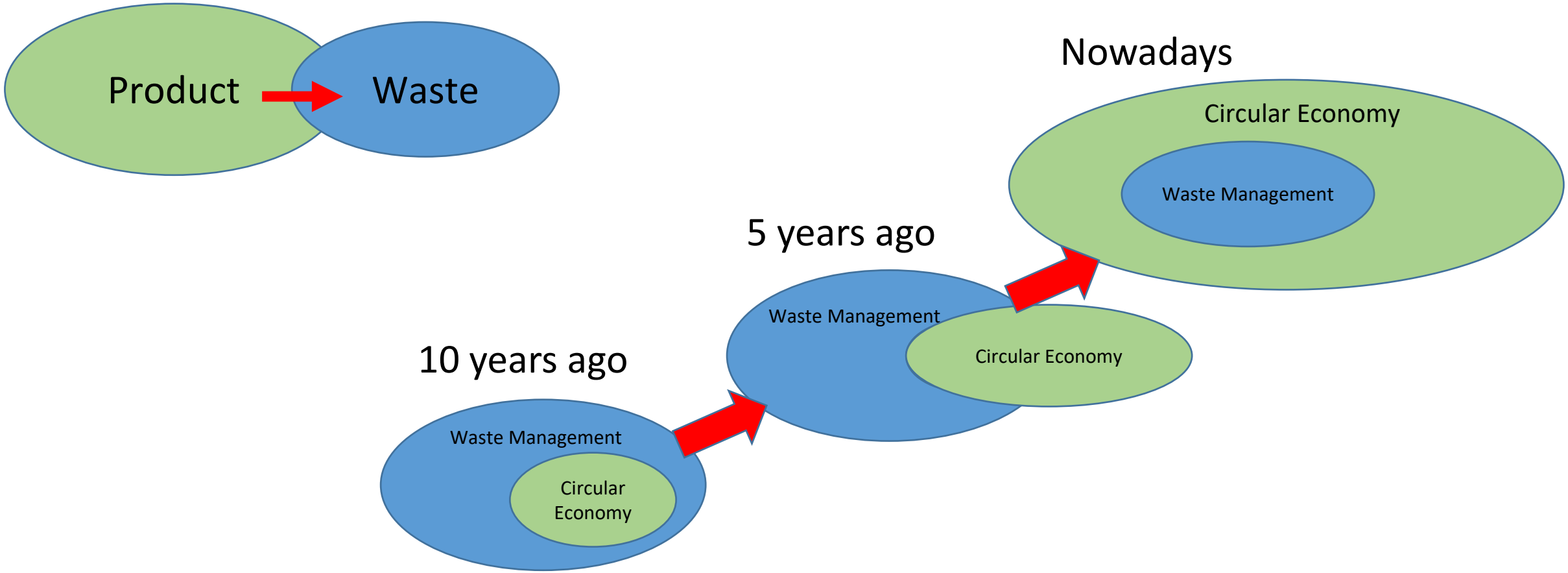
Development of "waste" legislation as basic framework for sustainable raw material and energy management

- **1973: The first Environmental Action Programme …**
- **2015: The first Circular Economy Action plan was adopted...**
- **2016: Paris agreement set the global framework for climate protection**
- **2018:** EU adopted **Plastics Strategy**. By 2030, **all plastics packagings** placed on the EU market should either be **reusable or allow cost-efficient recycling**.

  Revision of **Landfill Directive - municipal waste landfilled is limited to 10% by 2035.**
- **2019: European Green Deal (EGD)**

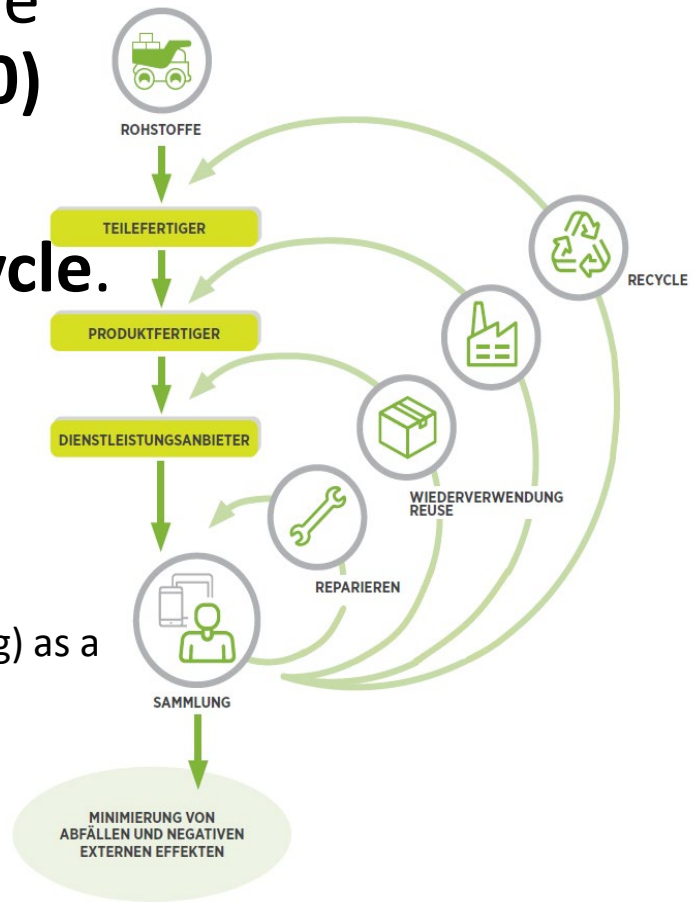
  SUP Directive (EU) 2019/904) set for the first time mandatory recycled content in products (!!!) => PET bottles 25% by 2025 etc.
- **2020: 8th EAP, Taxonomy Regulation etc.**
- **2021: „Fit for 55“ Climate Package**
- **2024: Corporate Sustainability Due Diligence Directive (CSDDD): i.a. environmental standards**

Waste Management is a part of the Circular Economy



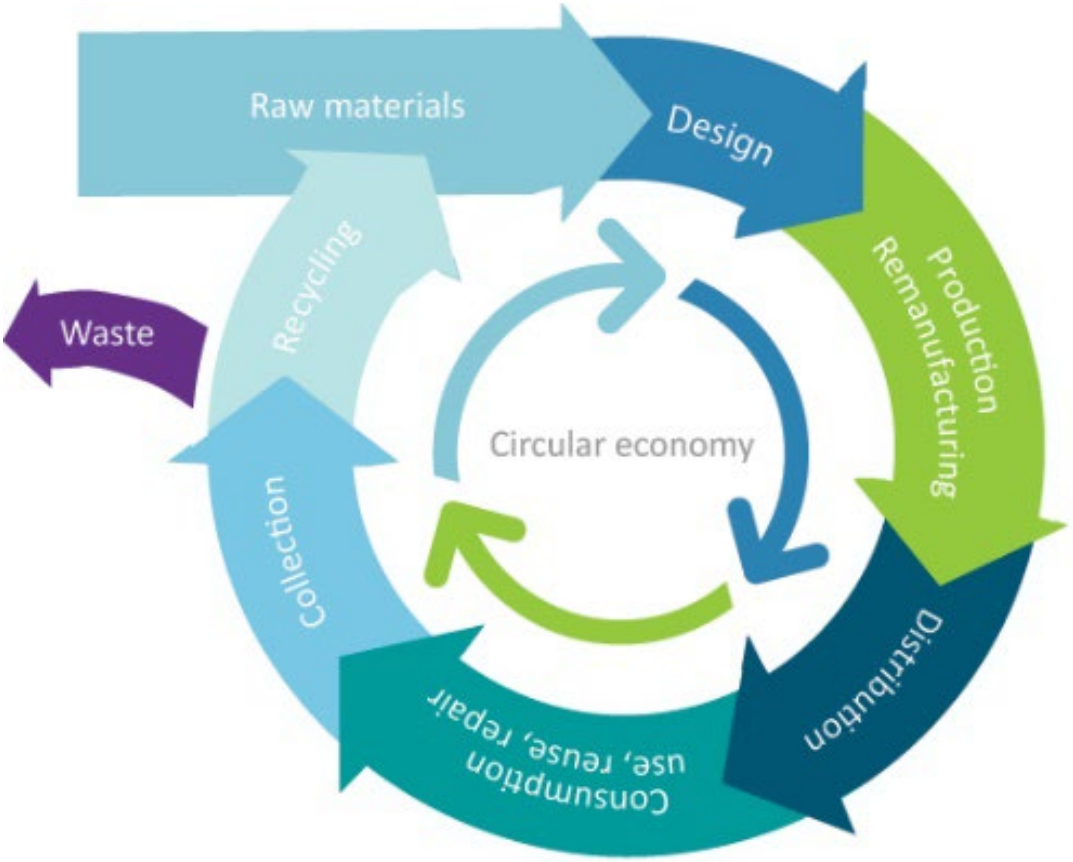
Circular Economy

- The origins of the concept of the circular economy can be traced back to the **British economist David Pearce (1990) as an economic model**.
- Circular economy is understood as a **closed economic cycle**.
  - Environmentally friendly and efficient extraction of primary raw materials
  - Resource-saving use of raw materials in production
  - Long lifespan and intensive use of products
  - Possible forms of reuse and repairability
  - Material recycling of end-of-life (EoL) products
  - Energy recovery when material recycling is not feasible, as well as regulated disposal (landfilling) as a pollutant sink
- Holistic consideration of the product lifecycle



Bildquelle: bearbeitete Dartstellung von Green Tech Cluster (2022): Circular Companies

Circular economy is "more than just a waste "



Sustainable waste management

+ LCA
+ eco design
+ cascadic use
+ more recycling
+ substitution of primary raw material
+ solving ecological problems by installing modern and highly efficient waste treatment plants
+ ...

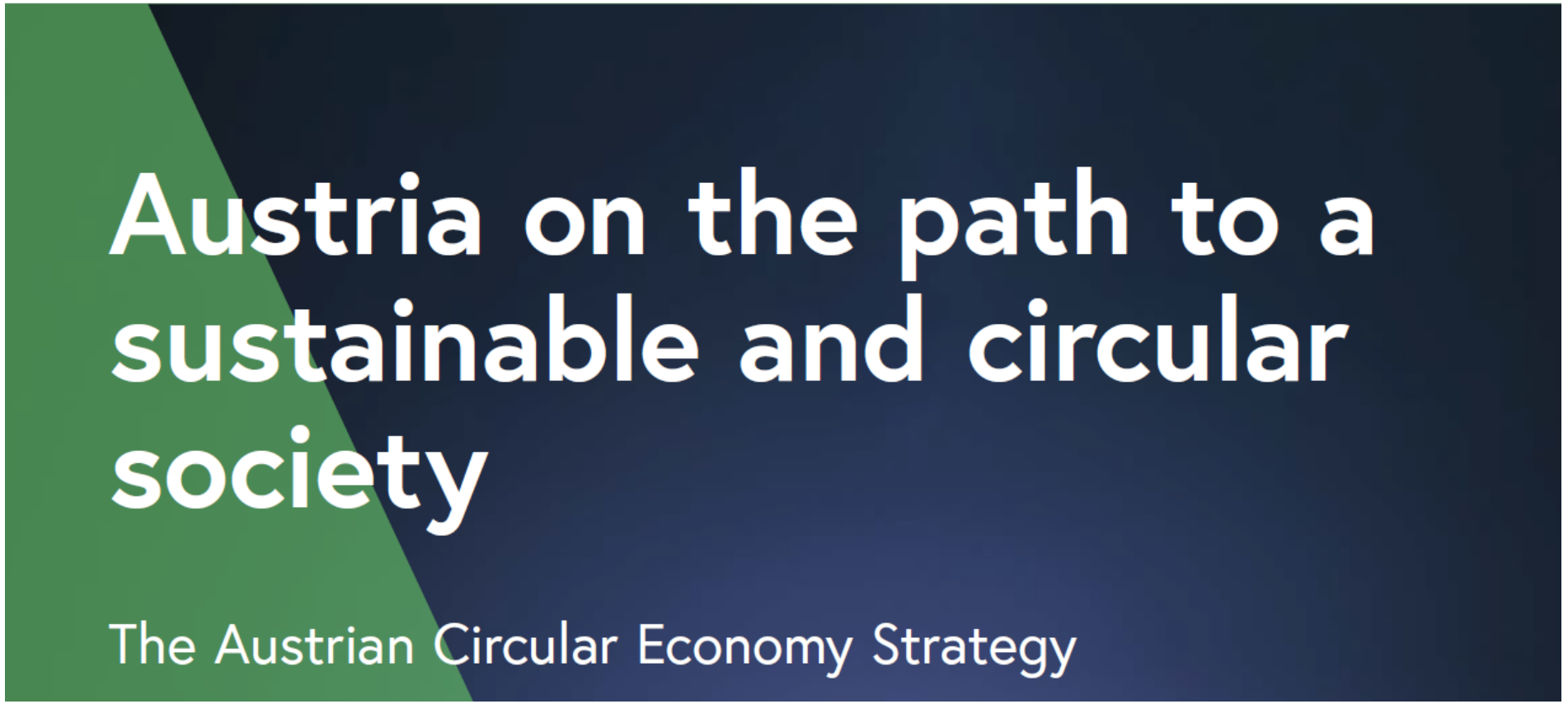
Circular Economy

AVW
Abfallverwertungstechnik & Abfallwirtschaft

Austria‘s Circular Economy Strategy 2022 & Vision

Federal Ministry
Republic of Austria
Climate Action, Environment,
Energy, Mobility,
Innovation and Technology

“The long-term goal of the Austrian federal government is to reform the Austrian economy and society into a comprehensive sustainable circular economy by 2050.”



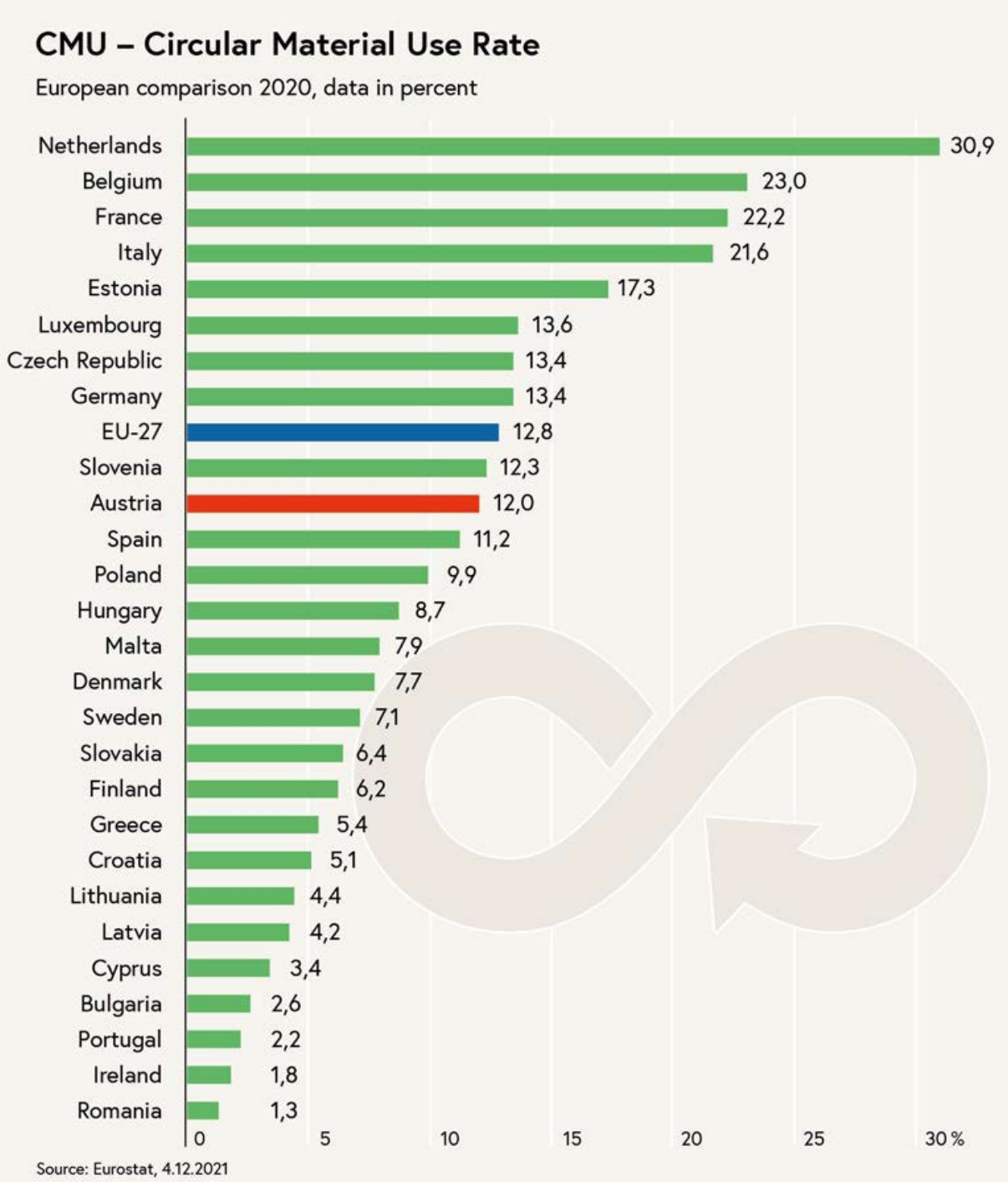
Austria's Circular Economy Strategy 2022

GOALS of the Austria's Circular Economy Strategy 2022

- **GOAL 1. Reduction of domestic resource consumption**
  - Reduce domestic material consumption by 25% by 2030 (to 14 t/cap/a)
  - Achieve sustainable domestic material consumption of 7 t/cap/a by 2050 (80% reduction !)
- **GOAL 2. Increase the resource efficiency of the Austrian economy by 50% by 2030 vs. 2015**
- **GOAL 3. Increasing the circularity rate to 18 % by 2030**
  - CMU rate was 12 % in 2020
  - Reduction of the material use by around 20%
  - Increase of recycling by about 10%
- **GOAL 4. Reduction of the material consumption in private households by 10% by 2030**
  - Reduction of the resulting amounts of waste

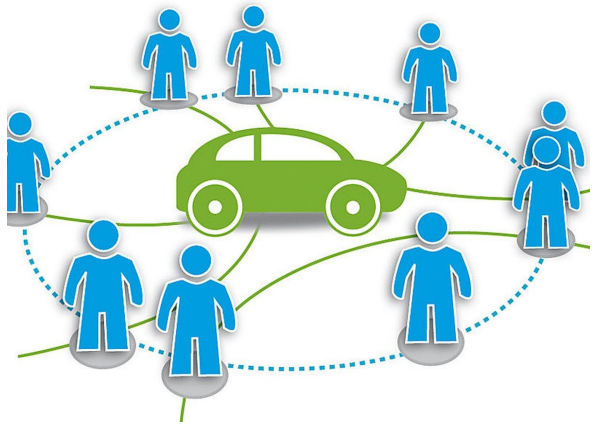
CIRCULAR MATERIAL USE RATE

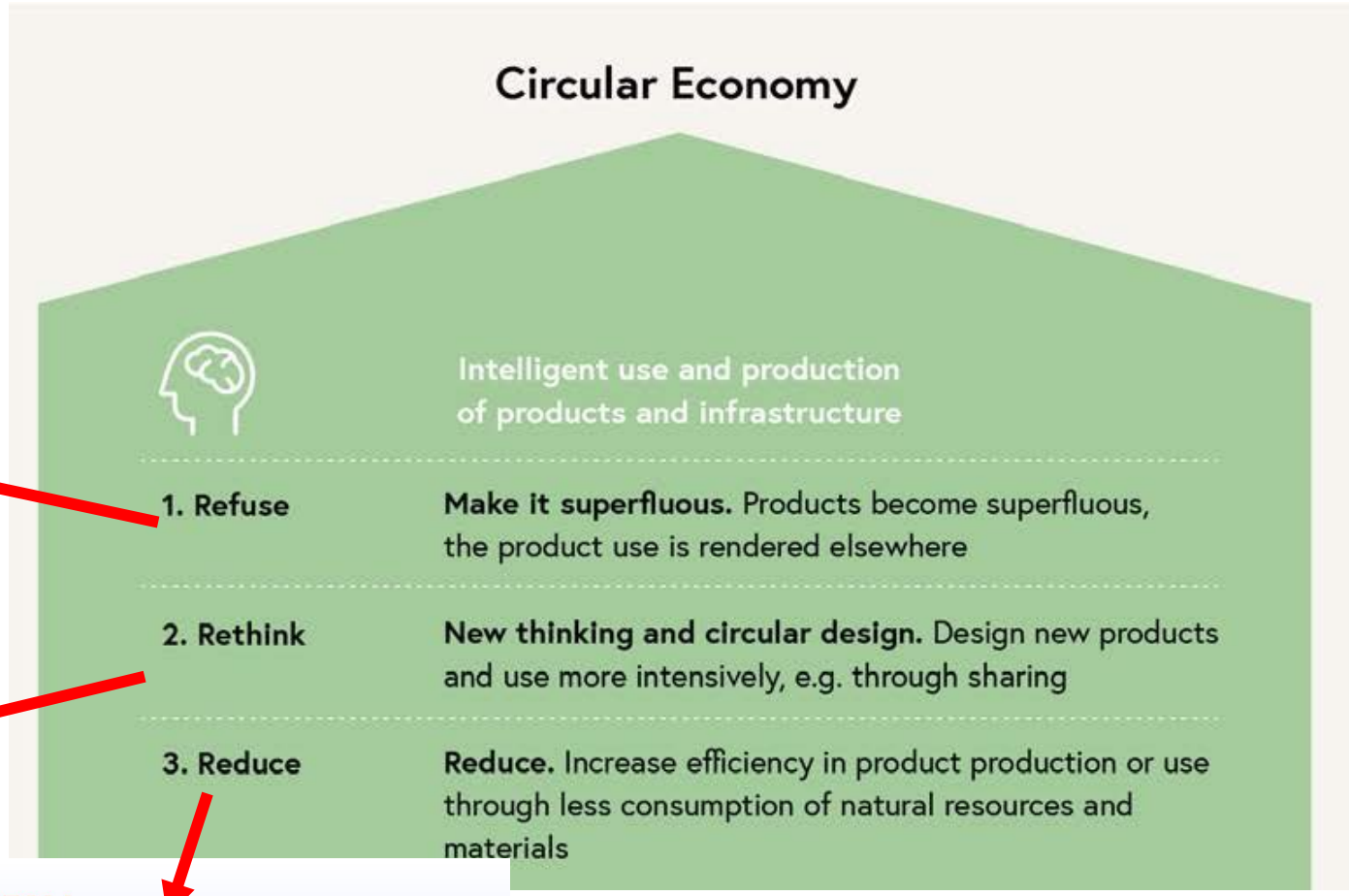
- **GOAL 3. Increasing the circularity rate to 18 % by 2030**
- **DE: 13,4%**
- **EU27: 12,8**
- **SI: 12,3%**
- **AT: 12,0 %**
- **HR: 5,1%**



The 10 principles of the Circular Economy

- **Intelligent USE & PRODUCTION OF PRODUCTS and INFRASTRUCTURE**





...

The 10 principles of the Circular Economy

- **EXTENDED LIFE of PRODUCTS, COMPONENTS & INFRASTRUCTURE**

Increasing circularity

Extended life of products, components and infrastructure

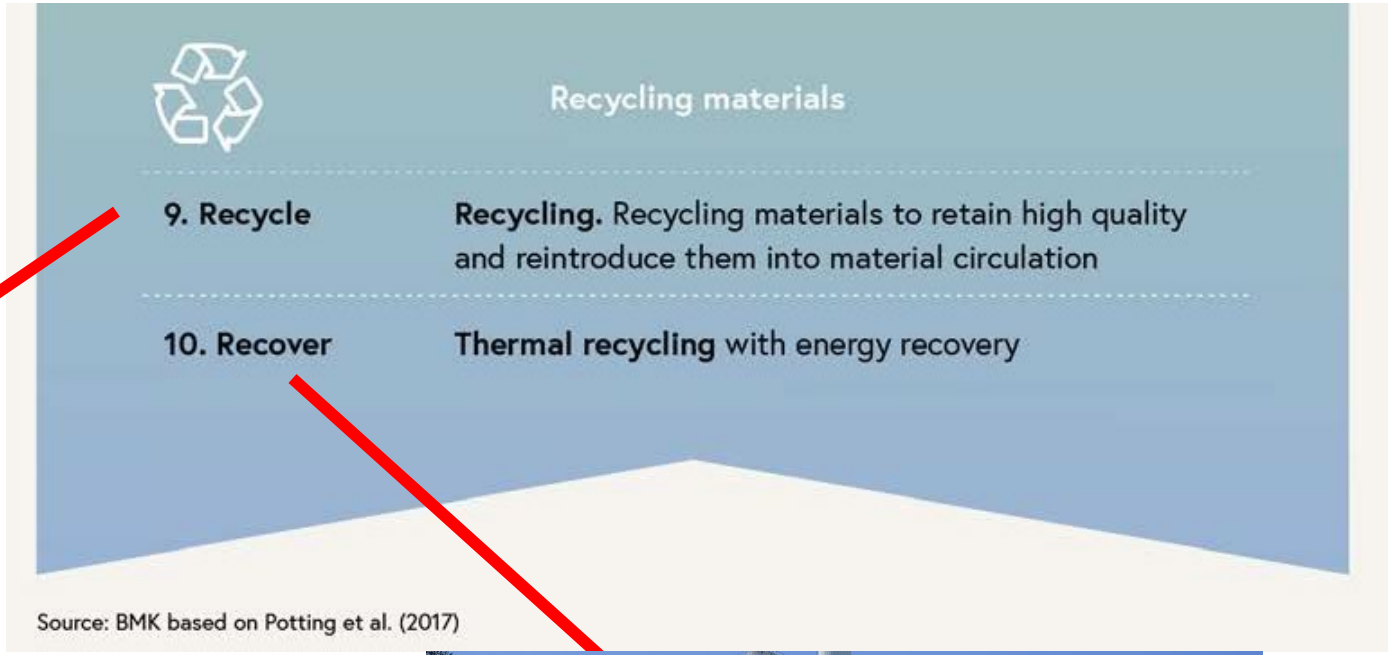
4. Reuse	**Reuse.** Reuse functional products
5. Repair	**Repair.** Maintaining products and continued use through repair
6. Refurbish	**Improve.** Refurbish old products and bring up to the newest status
7. Remanufacture	**Reprocessing.** Using parts from defective products for new products that fulfil the same functions
8. Repurpose	**Use for something different.** Using parts from defective products for new products that fulfil different functions

...

The 10 principles of the Circular Economy

- **RECYCLING MATERIALS**

  & Thermal recycling with energy recovery



New WtE plant for pre-treated waste for high efficient energy production Norske Skog, Bruck/Mur, AT

Recyclability

- **“Is the ability of a product to be recycled after separate collection and/or waste processing.”**

- Recyclability is a **key to more environmentally friendly products** and a **more circular economy.**

- Attention to **THEORETICAL, TECHNICAL AND REAL RECYCLABILITY** !!!

- **There are so many stupid products on the market that are not recyclable !**

Pomberger (2020):
https://link.springer.com/article/10.1007/s00506-020-00721-5

Efficiency model of Recyclability

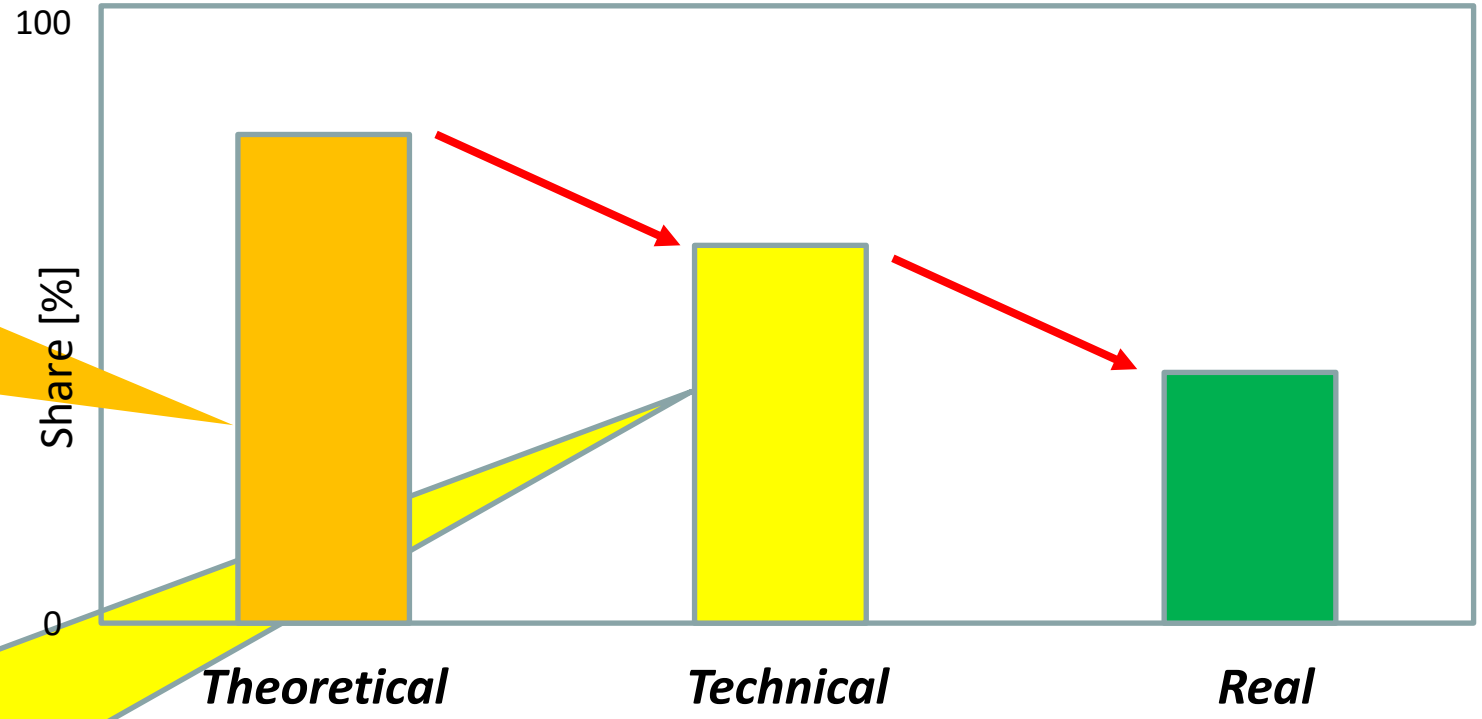
Pomberger (2020):
https://link.springer.com/article/10.1007/s00506-020-00721-5

Material related

Original condition of the products without any dirt

Without tests

Regardless of the region



Additionally:

Tested detectability

Sortability test

Can be sorted

Recycling process available

Based on tests

Regardless of the region

RECYCLABILITY

Additionally:

In certain region

Really collected

Really sorted

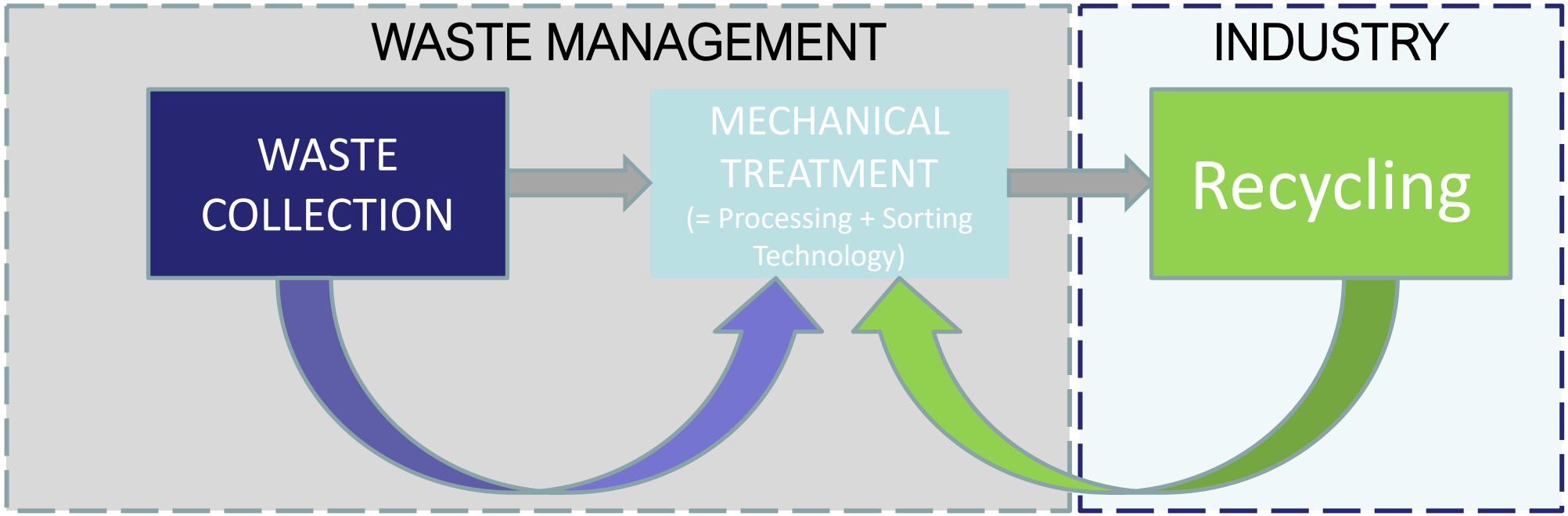
Really marketed

Really recovered as secondary raw material

4 Basic laws of (waste management) RECYCLING

- what is not in waste, can not be sorted
- what has not been collected, can not be sorted
- what is not detectable, can not be sorted & recycled
- if there is no market, then no one needs it

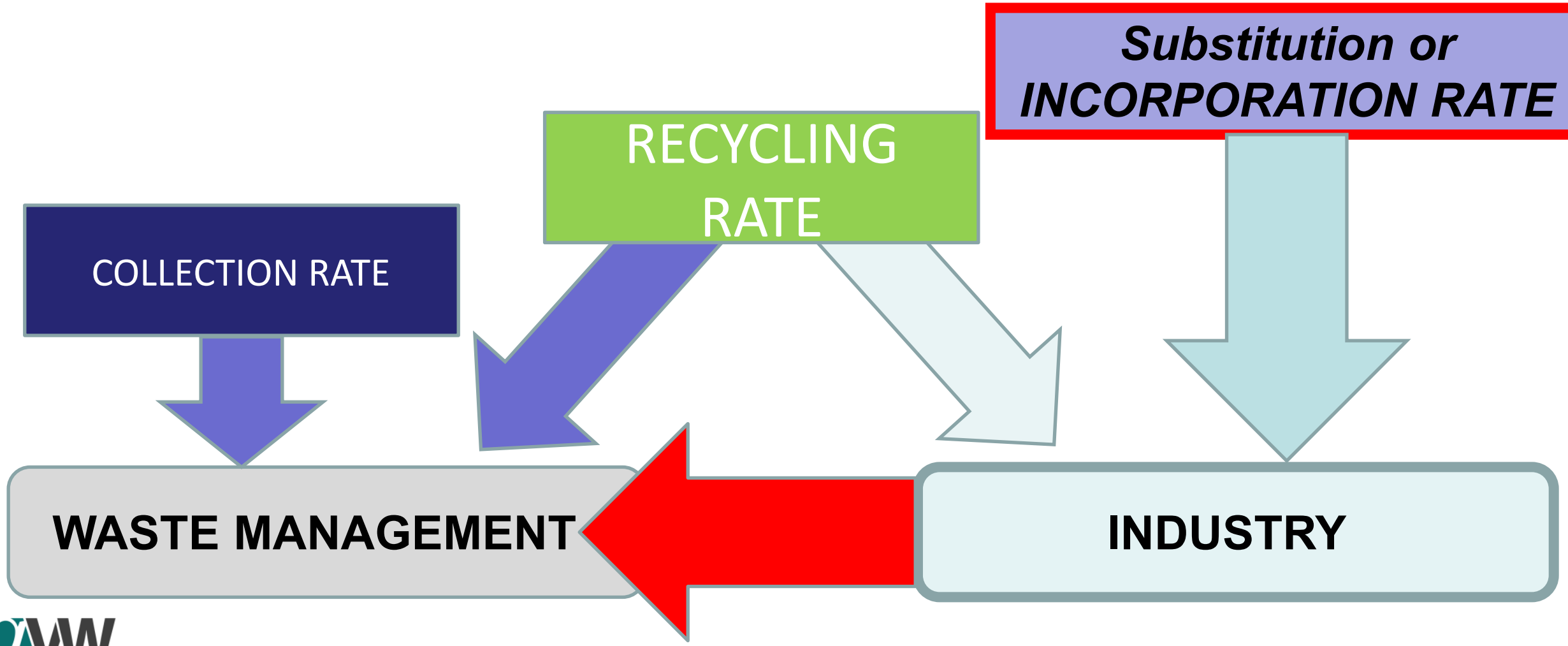
Processing and Sorting technology as a link between waste collection and Recycling



Available quantities
Quality
Pollution/Dirt
Potential of recoverable fractions

(Secondary) Raw Material Market
Raw Material Prices
Quality Requirements

Quotas in Waste Sector & Industry => DRIVERS for development & cooperation



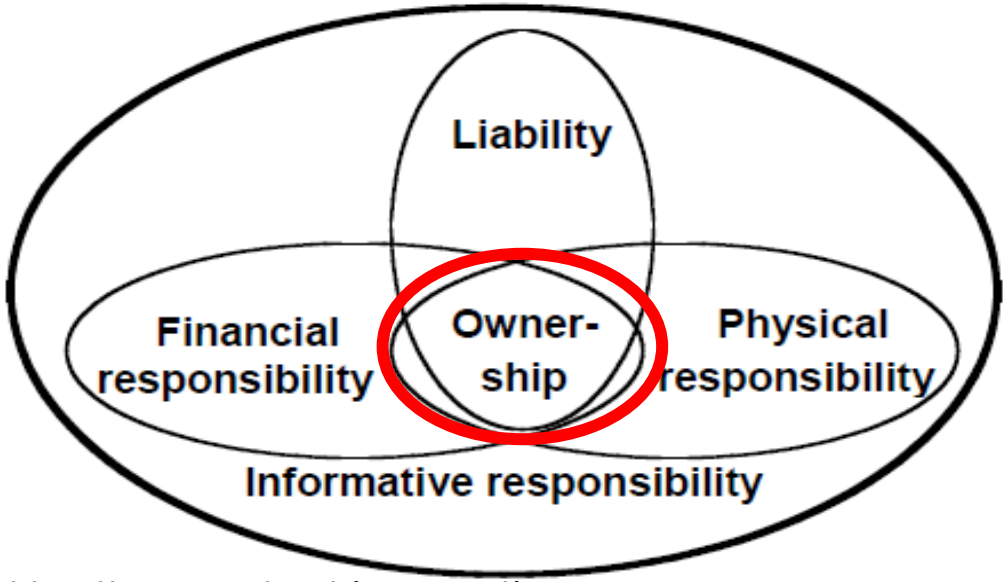
Quality Requirements…

Circular Economy – "brought to the point"

As much (raw) material as possible
as long as possible
to keep in VALUE CIRCLE!

= as long as possible
TO BE USED

EPR acc. to Lindhqvist 1990s



Thomas Lindhquist, sometimes referred to as the father of EPR, has identified **five basic types of producer responsibility**:

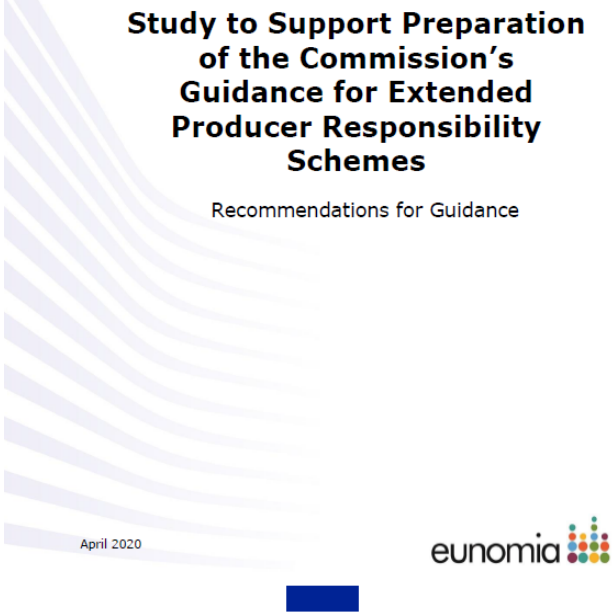
- **Liability** - producer is responsible for **environmental damage** caused by the product in question
- **Economic responsibility** - producer **covers all or part of costs** for collection, recycling or final disposal of products he manufacturers, and may charge a special fee
- **Physical responsibility** - manufacturer is involved in **physical management of the products** or of the effect of the products. This can range from merely developing the necessary technology, to managing the **total "take back"** system for collecting or disposing of products he has manufactured for which he may charge a fee
- **Ownership** - producers assumes both physical and economic responsibility
- **Informative responsibility** - producer is responsible for providing information on the product or its effects at various stages of its life cycle

CIRCULAR ECONOMY needs Extended Producer Responibility (EPR)

- **Study elaborated for the European Commission:**

„Waste Management Costs to be Covered by the EPR Schemes“

https://op.europa.eu/en/publication-detail/-/publication/08a892b7-9330-11ea-aac4-01aa75ed71a1/language-en



…Producers should bear the operational costs of collecting and managing the material they place on the market so that this material can be recycled…

PRAVILNIK O AMBALAŽI I OTPADNOJ AMBALAŽI, PLASTIČNIM PROIZVODIMA ZA JEDNOKRATNU UPORABU I RIBOLOVNOM ALATU KOJI SADRŽAVA PLASTIKU (11.2023.)

SUSTAV PROŠIRENE ODGOVORNOSTI PROIZVOĐAČA KOJIM UPRAVLJA FOND

Članak 25.

(1) Fond upravlja gospodarenjem otpadnom ambalažom koja je neopasni otpad i ako se ispuni uvjet iz članka 11. stavka 2. ovog Pravilnika i otpadnom ambalažom koja je sukladno ovom Pravilniku opasni otpad.

(2) Fond je dužan ispuniti ciljeve u svezi ambalaže i u tu svrhu raspolaže otpadnom ambalažom, uključujući i otpadnu ambalažu koja je sakupljena u reciklabilnom komunalnom otpadu, provodi poslove za koje sukladno članku 105. Zakona osigurava nadoknadu troškova, te upravlja i osigurava funkcioniranje i učinkovitost sustava gospodarenja otpadnom ambalažom.


Ref. Ares(2023)2428990 - 04/04/2023

EUROPEAN COMMISSION
EUROSTAT

Directorate E: Sectoral and regional statistics
Unit E-2: Environmental statistics and accounts; sustainable development

Guidance for the compilation and reporting of data on packaging and packaging waste according to Decision 2005/270/EC

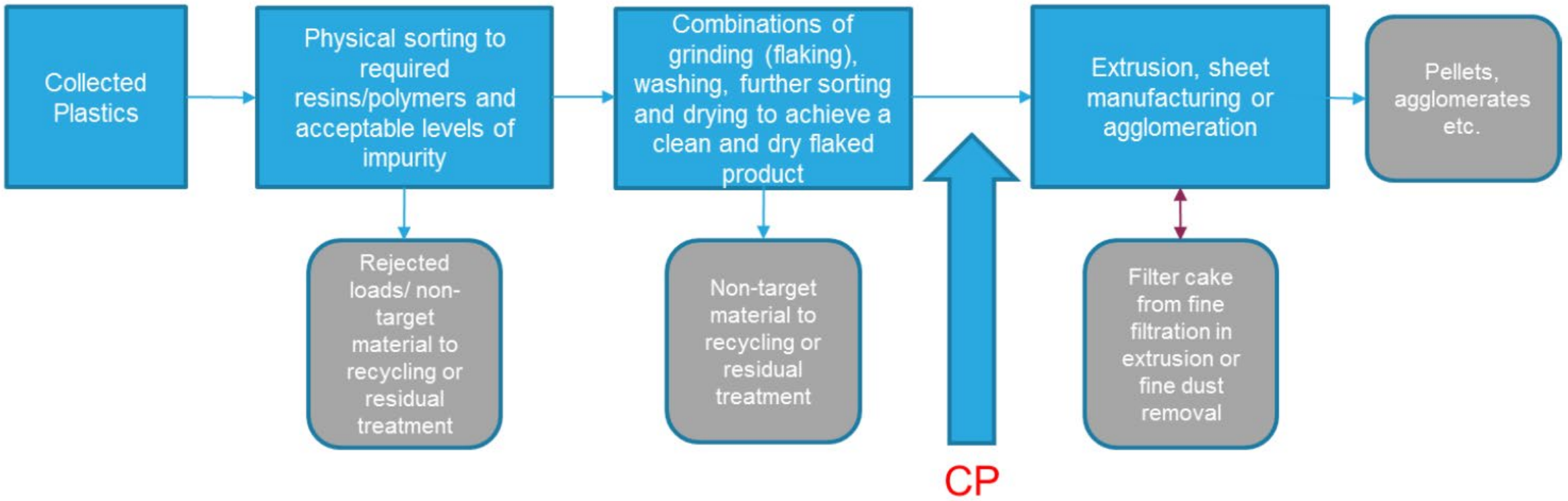
(Note: The Commission Delegated Decision on average loss rates is currently being finalised, future versions of this guidance will contain further details on the published legal act.)

Version of 30 March 2023

GUIDANCE of the EC: CALCULATION POINT: PLASTICS

- **50 % (2025) & 55% (2030)**

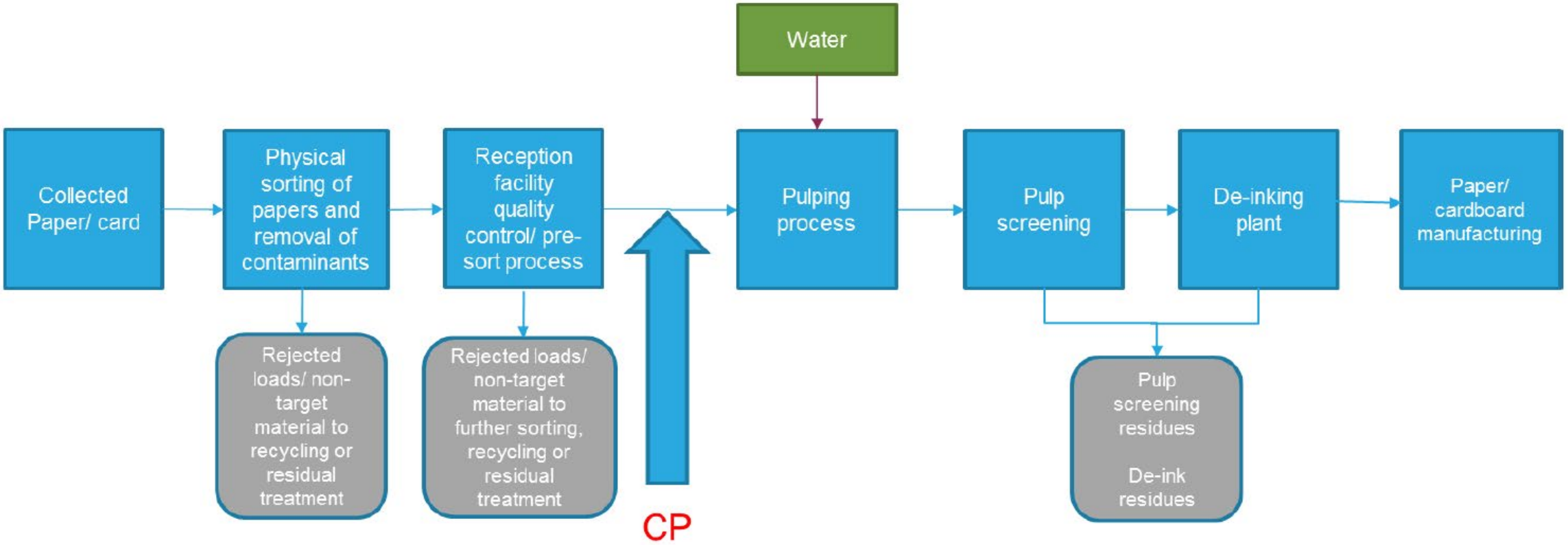
Figure A 1: Plastics calculation point



GUIDANCE of the EC: CALCULATION POINT: PAPER & C.

- **75 % (2025) & 85% (2030)**

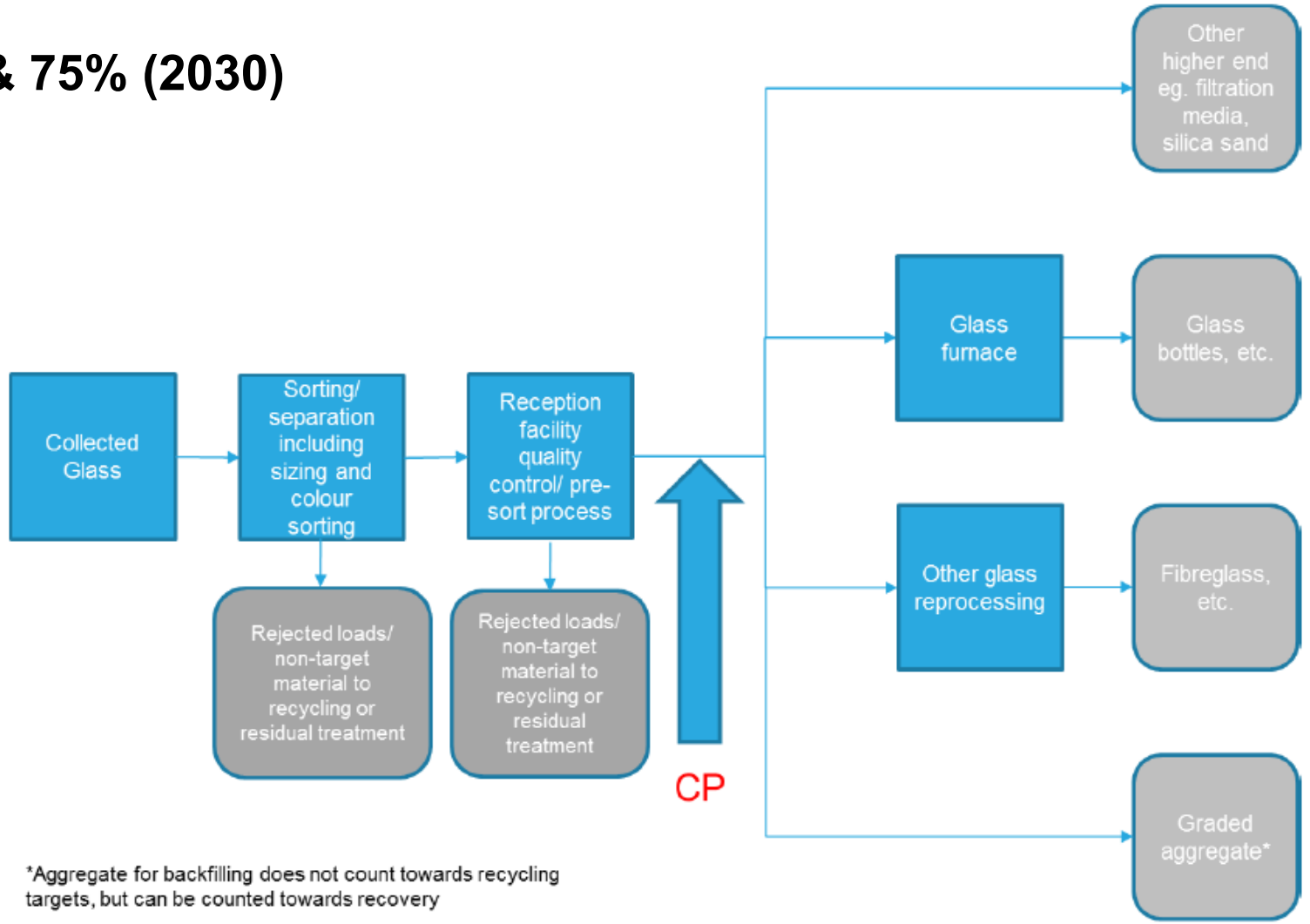
Figure A 2: Paper / cardboard calculation point



GUIDANCE of the EC: CALCULATION POINT: GLASS

- **70 % (2025) & 75% (2030)**

Figure A 3: Glass packaging calculation point



*Aggregate for backfilling does not count towards recycling targets, but can be counted towards recovery

GUIDANCE of the EC: CALCULATION POINT: Fe & Al

Figure A 4: Steel calculation point

- **70 % (2025) & 80% (2030)**

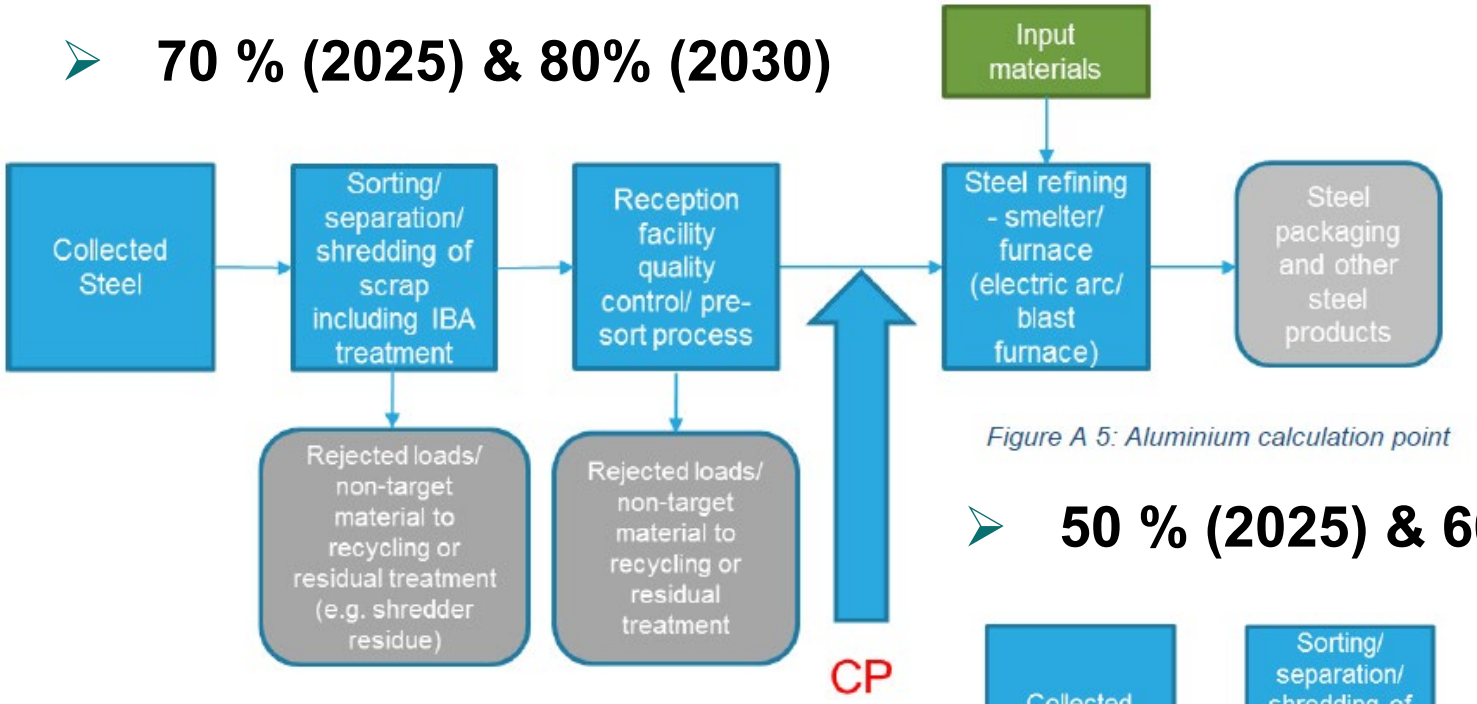
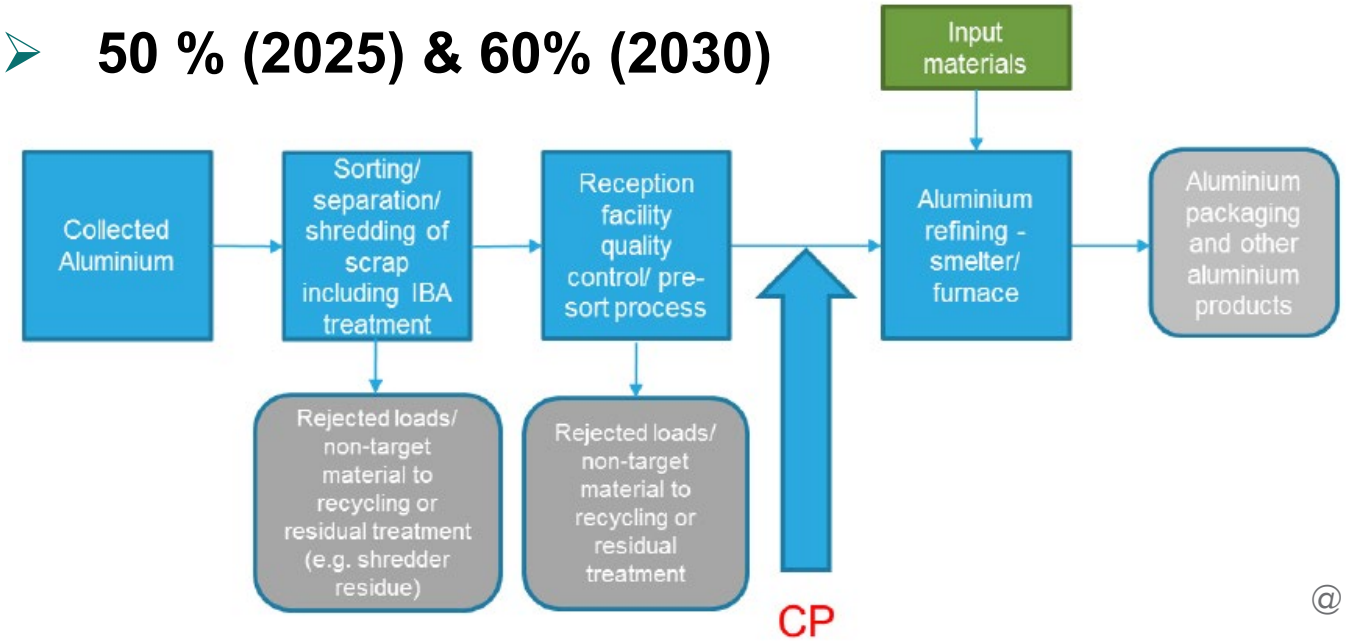


Figure A 5: Aluminium calculation point

- **50 % (2025) & 60% (2030)**



Abfallverwertungstechnik & Abfallwirtschaft

3 important contributions of WM to the CE & Climate protection

LANDFILL BAN

+ reduction of GHG emissions
+ diversion of resources in waste treatment plants

https://www.vecernji.hr/vijesti/iznad-cakovca-gusti-crni-dim-gori-odlagaliste-otpada-u-totovcu-1321696

TRANSFORMATION OF WASTE TO SECONDARY RESSOURCES

Waste Management ensures raw materials for local and sustainable production

MORE QUALITY RECYCLING

Substitution of primary by secondary materials
=> results in saving of energy and GHG-emissions

ENERGY RECOVERY substitutes primary fossil fuels

- RDF/SRF in cement industry and high-efficient WtE
- Waste in Incineration plants with efficient CHP production

+ biogenic C-content is GHG-neutral

Circular Economy requires intensive COOPERATION

of all stakeholders along the value chain of

every single product that will become waste

(it is just a question of time) !

Thank You & Hvala !

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