

# What place for incineration in a circular economy

Introduction

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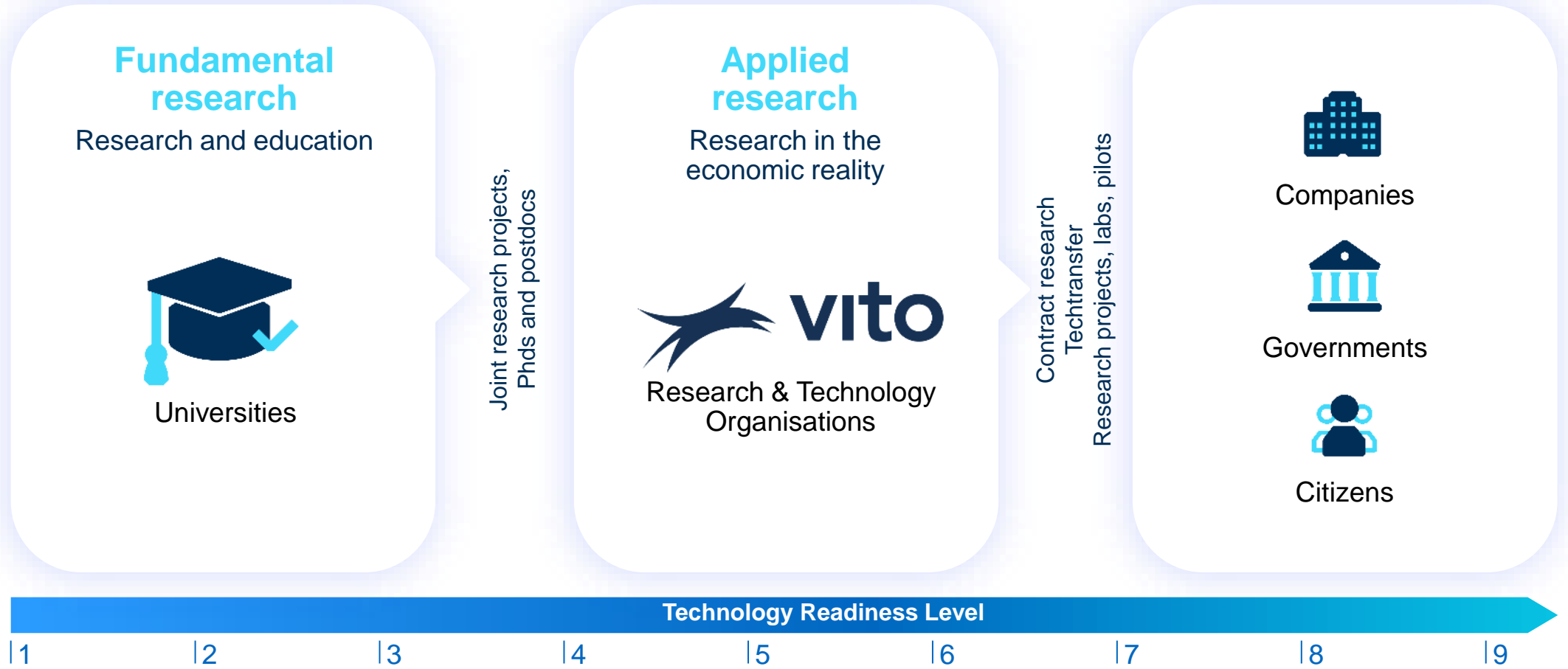
“A futureproof EU Waste Framework Directive” workshop

14/06/2024

Mechelen

# Turning fundamental research into solutions

Creating value and increased competitiveness for companies and governments



Sustainable  
**RESOURCE**  
economy



Sustainable  
**LIVING**



 **vito**  
Sustainability  
impact



**CLIMATE** adaptation  
and mitigation



# We are VITO

In 2023



**1296**  
employees



**61**  
nationalities



**268M€**  
revenues



**25**  
patents/year



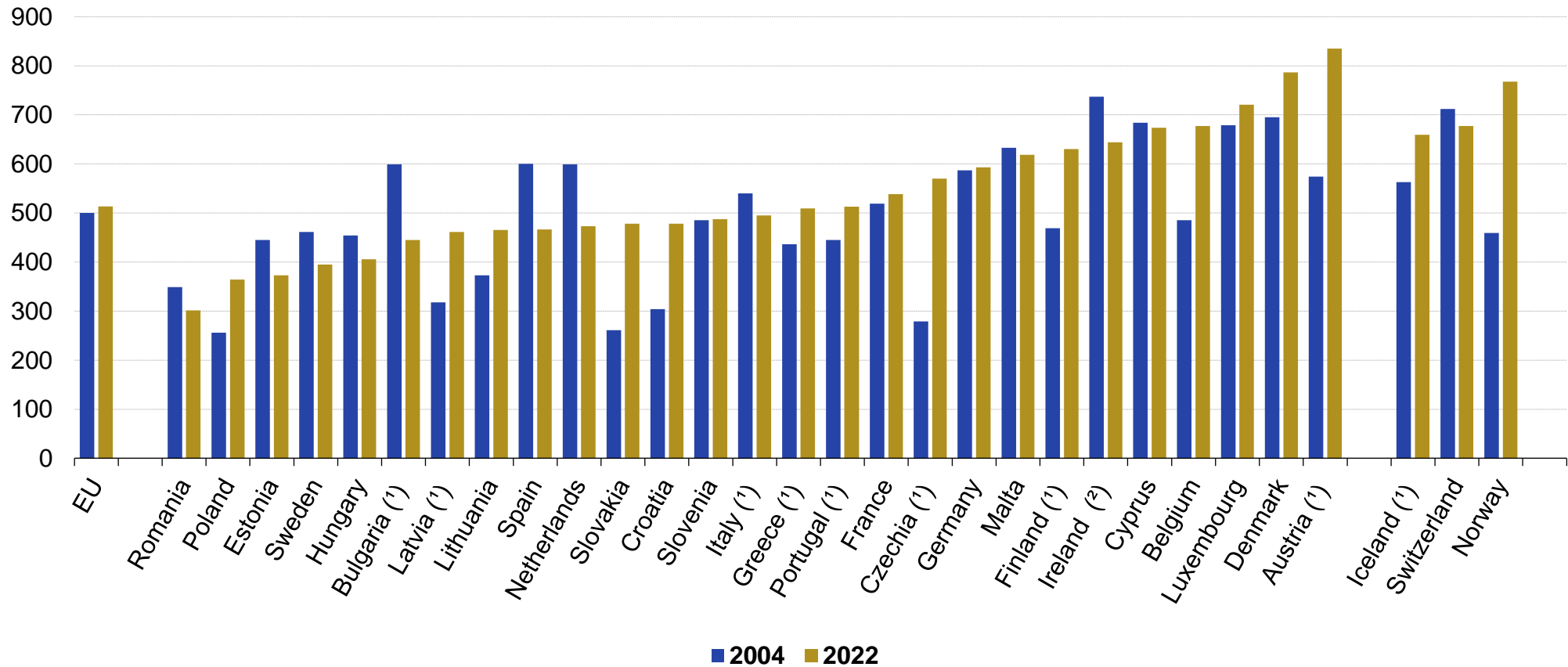
**277**  
publications



**11/3**  
11 sites on  
3 continents

# Municipal waste generated, 2004 and 2022

(kg per capita)



Note: countries are ranked in increasing order by municipal waste generated in 2022.

(1) 2021 data.

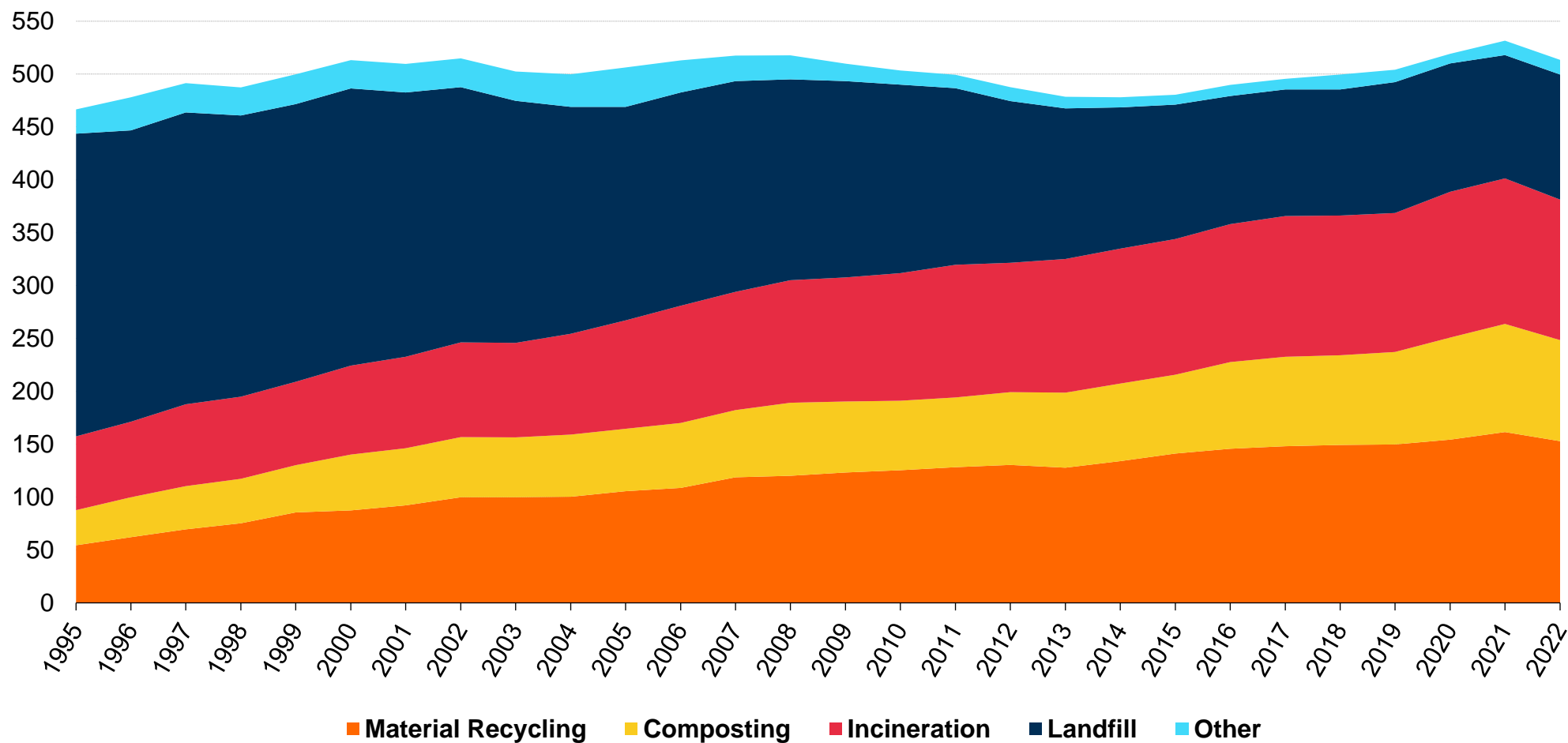
(2) 2020 data.

[https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Municipal\\_waste\\_statistics](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Municipal_waste_statistics)

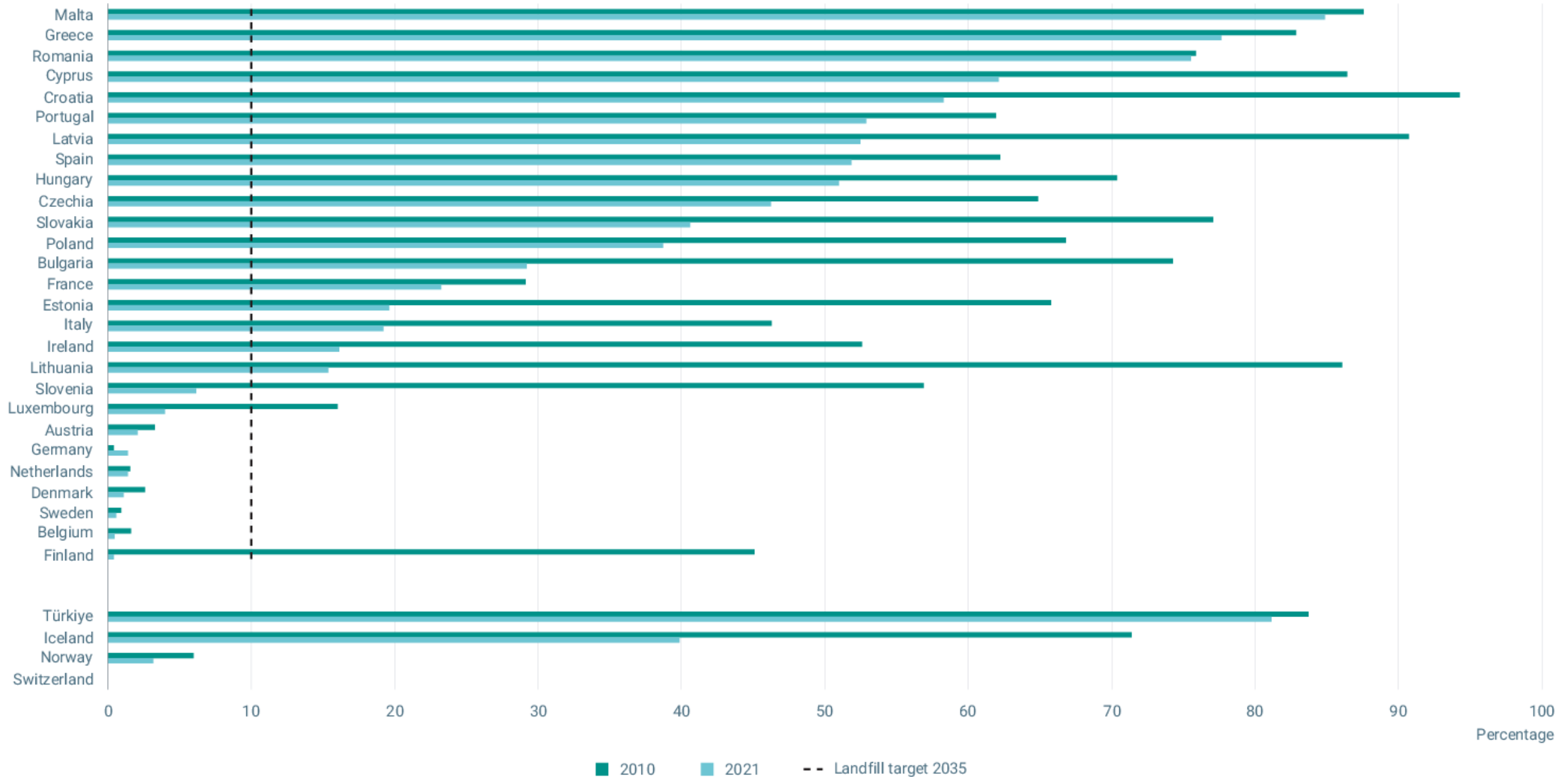
## Waste hierarchy



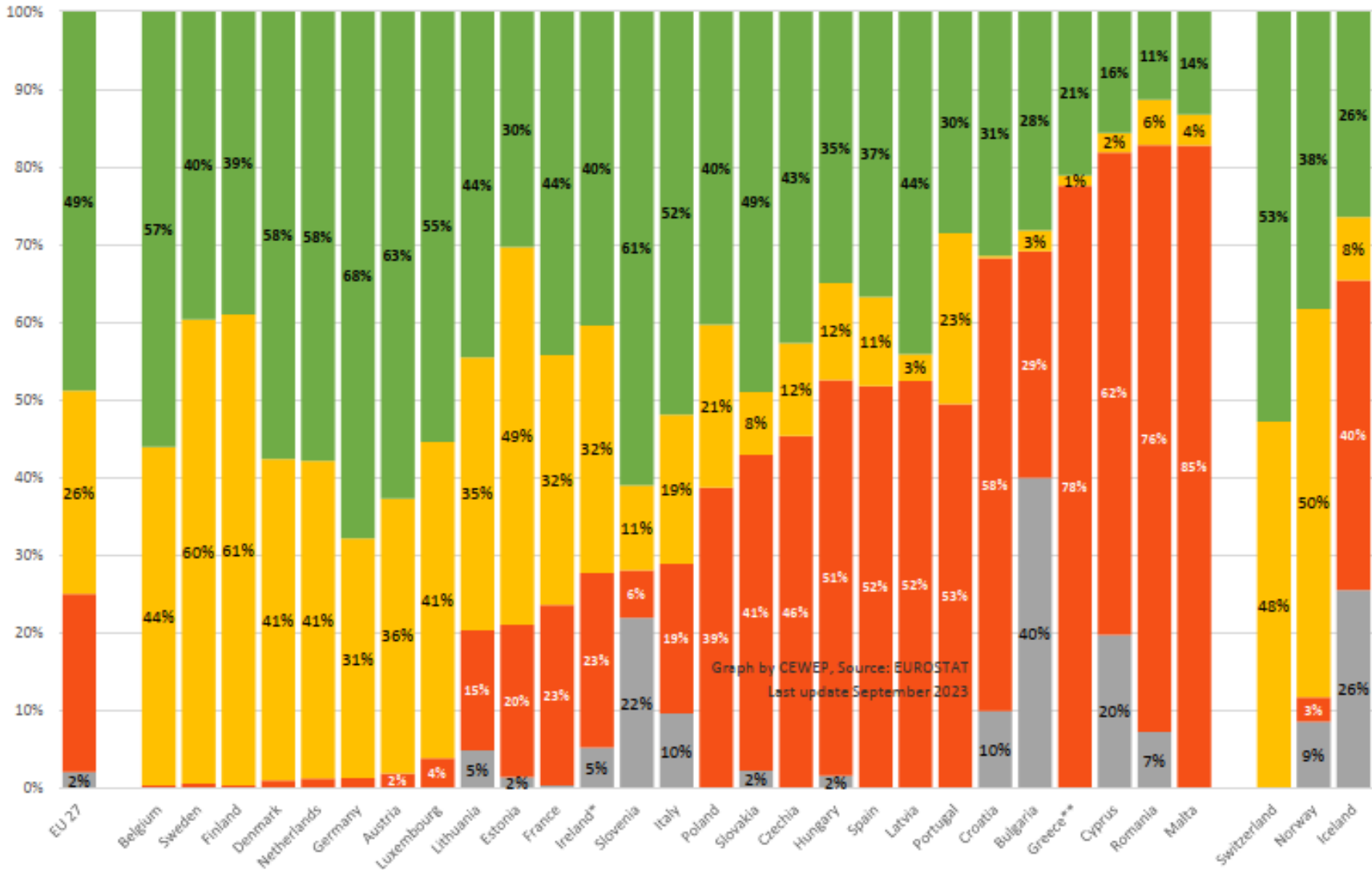
## Municipal waste treatment, EU, 1995-2021 (kg per capita)



# Municipal waste landfilled, EU, 2010-2021 (%)



# Municipal waste treatment in 2021



- Landfill
- Waste-to-Energy
- Recycling + Composting
- Missing data



Percentages are calculated based on the municipal waste reported as generated in the country





































































































































































































\*: last available data 2020  
\*\*: last available data 2021

Graph by CEWEP, Source: EUROSTAT  
Last update September 2023

<https://www.cewep.eu/wp-content/uploads/2023/09/EU-Waste-treatment-2021.pdf>



Table 1. Recycling, landfill and incineration rates for municipal waste and key policy instruments used

	 Recycling rate 2020	 Landfill rate 2020	 Incineration rate 2020	 Landfill tax/ban	 Incineration tax	 PAYT coverage and type	 Bio-waste – high coverage with high-convenience collection	
Germany	70% 	1% 	30% 					Germany
Austria	62% 	2% 	36% 					Austria
Slovenia	59% 	7% 	13% 					Slovenia
Netherlands	57% 	1% 	42% 					Netherlands
Luxembourg	53% 	4% 	43% 					Luxembourg
Italy	51% 	20% 	19% 					Italy
Belgium	51% 	1% 	49% 					Belgium
Denmark	46% 	1% 	53% 					Denmark
Slovakia	45% 	46% 	7% 					Slovakia
Lithuania	45% 	16% 	26% 					Lithuania
Finland	42% 	1% 	57% 					Finland
France	42% 	26% 	32% 					France
Ireland	41% 	16% 	42% 					Ireland
Czechia	40% 	48% 	13% 					Czechia
Latvia	40% 	53% 	3% 					Latvia
Poland	39% 	40% 	22% 					Poland
Sweden	38% 	0% 	60% 					Sweden
Spain	38% 	51% 	11% 					Spain
Bulgaria	35% 	62% 	3% 					Bulgaria
Hungary	32% 	54% 	12% 					Hungary
Croatia	29% 	60% 	0% 					Croatia
Estonia	29% 	15% 	43% 					Estonia
Portugal	27% 	57% 	21% 					Portugal
Greece	21% 	78% 	1% 					Greece
Cyprus	17% 	67% 	1% 					Cyprus
Romania	12% 	74% 	5% 					Romania
Malta	11% 	83% 	0% 					Malta

-  Strong design of the instrument
-  Medium-level design of the instrument
-  Weak design of the instrument, not applied, or no information
-  Not applicable (no incineration plants)

# Waste management versus circular economy



A circular economy aims to maintain the value of products, materials and resources for as long as possible by returning them into the product cycle at the end of their use, while minimising the generation of waste. The fewer products we discard, the less materials we extract, the better for our environment.

[https://environment.ec.europa.eu/topics/waste-and-recycling/waste-framework-directive\\_en](https://environment.ec.europa.eu/topics/waste-and-recycling/waste-framework-directive_en)

<https://ec.europa.eu/eurostat/web/circular-economy>

from

## WASTE MANAGEMENT IN A LINEAR ECONOMY



AFVAL MANAGER

- 1 Create value: from an end-of-pipe perspective
- 2 Dispose waste: incineration & landfills

to

## MATERIAL STOCKS MANAGEMENT IN A CIRCULAR ECONOMY

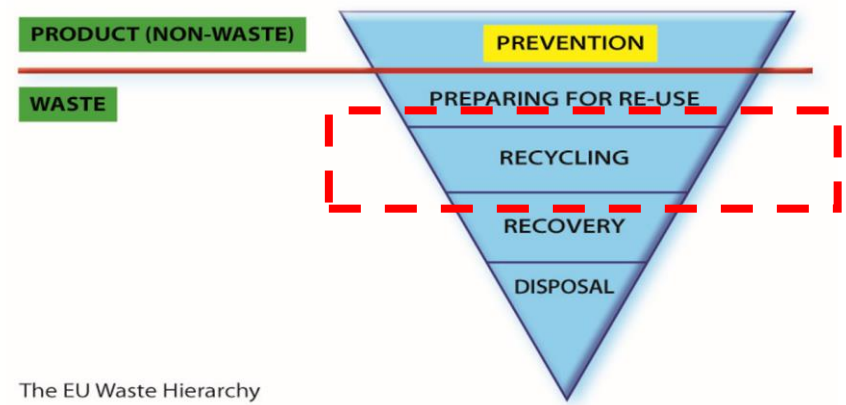


- 1 Secondary materials
- 2 Production waste
- 3 Product design
- 4 Repair & remanufacturing
- 5 Waste treatment: incineration & safe sink



# Illustration for recycling

## Waste management perspective

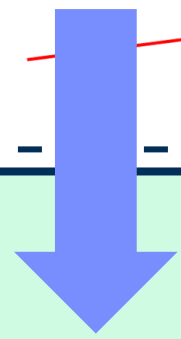


The EU Waste Hierarchy

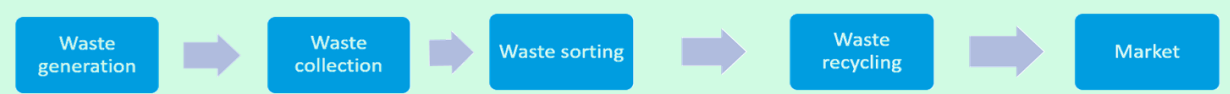
### Waste push



Efficiency  
Quantity/yield

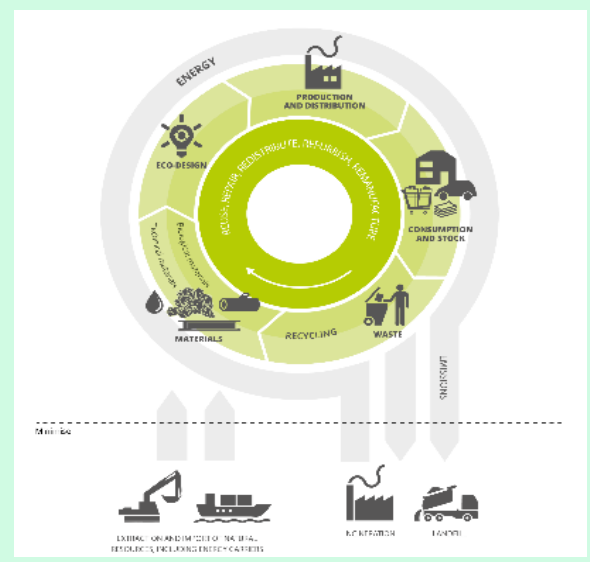


### Market pull



Effectiveness  
Quality/purity

## Circular Economy Perspective



# Linear economy + recycling = circular economy?

## *Linear or recycling economy*

- Raw materials
  - **Flows**
- Adding value to materials
  - **Waste management**
    - Efficiency
  - **Material composition**
- Life cycle optimization
  - **Energy & resource use minimization**
- Mining, harvesting, production stages impacts
  - **WM driven by environmental concerns, volume based targets, material value**
    - Design for recycling

## *Circular economy*

- Products – components – alloys - materials
- **Stocks**
- Preserving value of products – comp. – mat.
- **Safe sink provision**
- Performance & effectiveness
- **Product mineralogy and architecture**
- Life time extension
- **Avoidance of dilution and diffusion (entropy)**
- Collection & sorting stages impact
- **WM also driven by resource scarcity and security of supply**
- Design for maintenance, repair, remanufacturing, reuse

## Topics/questions

1. Incineration of waste = solution from the past or solution for the future?
2. Mixed municipal waste = waste or fuel?
3. How to go from landfill/disposal to recycling (and skip incineration)?
4. Allocate CO<sub>2</sub> of incineration to the incinerator or to the waste producer?

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