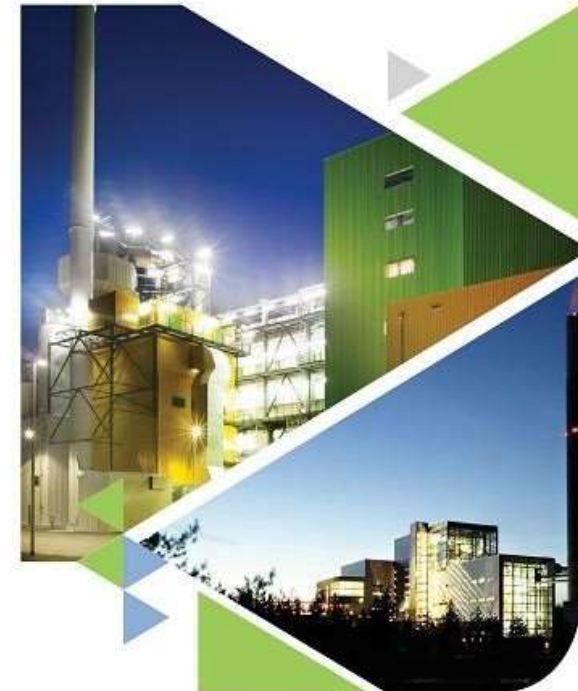




4ο ΕΠΕΝΔΥΤΙΚΟ – ΕΠΙΣΤΗΜΟΝΙΚΟ FORUM ΕΝΕΡΓΕΙΑΚΗ ΑΞΙΟΠΟΙΗΣΗ ΑΠΟΒΛΗΤΩΝ ΒΙΟΜΑΖΑ ΒΙΟΜΕΘΑΝΙΟ 2026

Χαρούλα Μέλλιου, Αναπληρώτρια Γενική Γραμματέας ESWET

15 Μαΐου 2026, Αθήνα



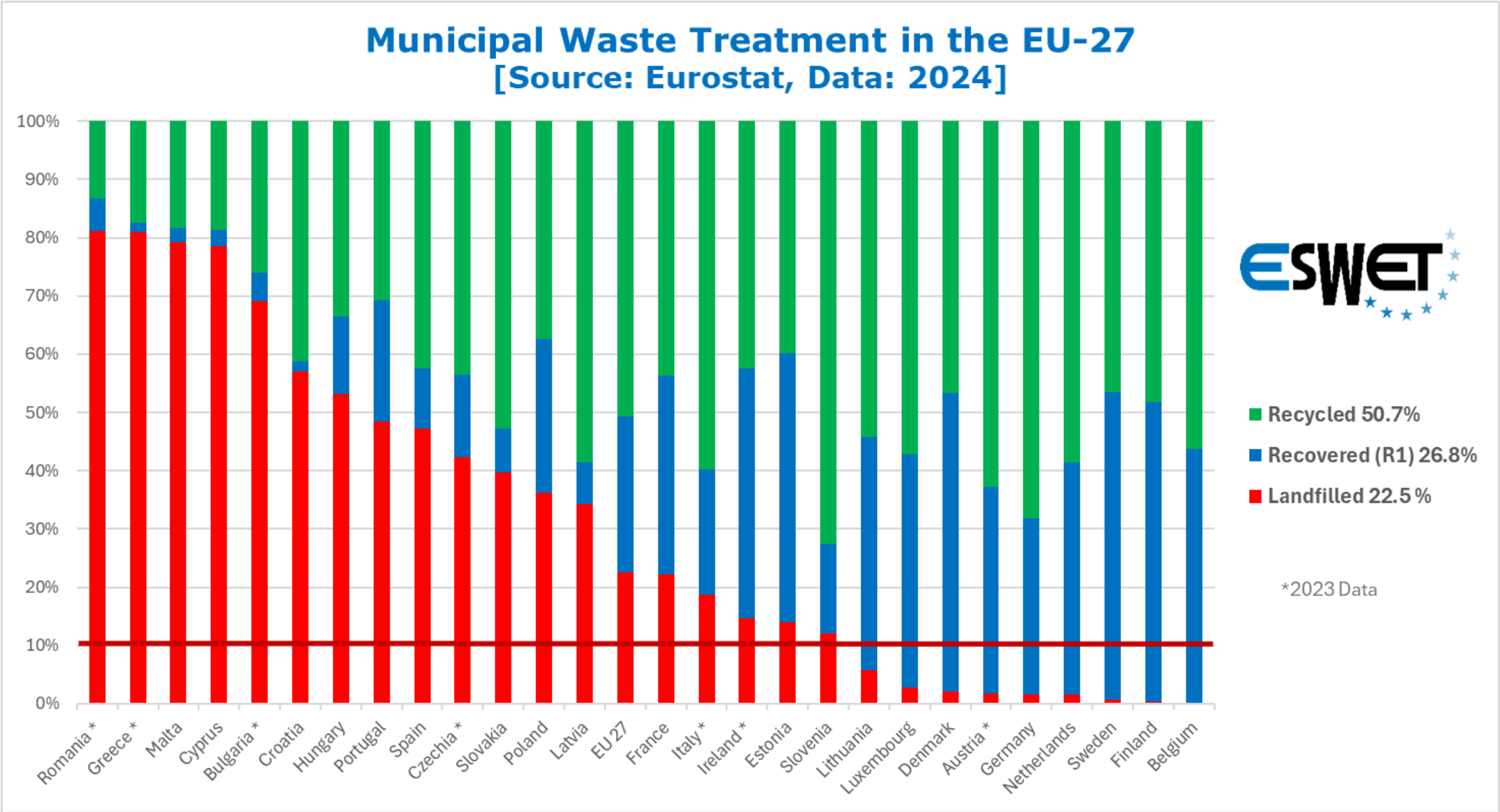
ESWET members



Reflections on residual waste management



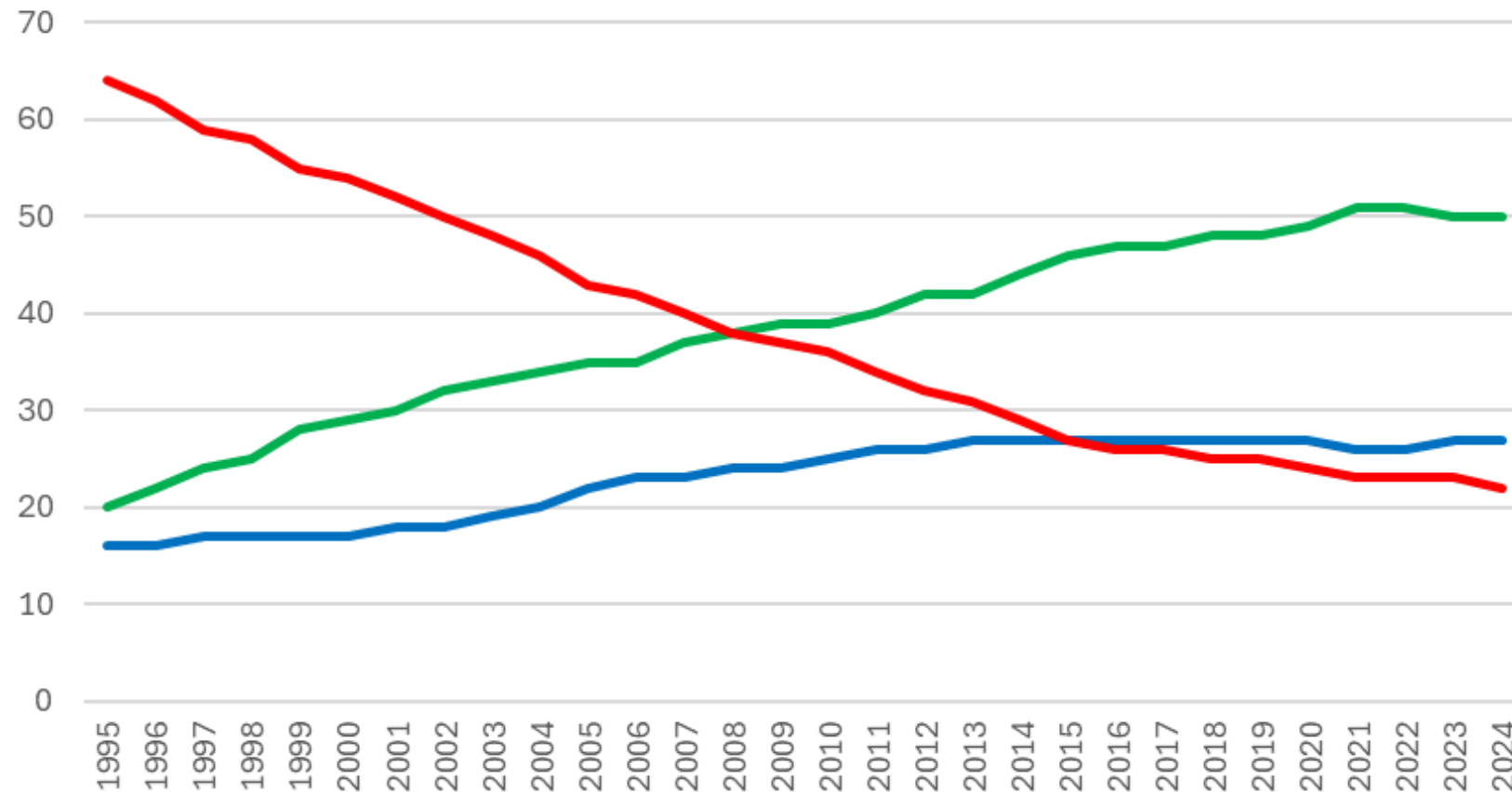
Many Member States still rely heavily on landfills



The role of WtE in landfill diversion



Municipal waste treatment, EU, 1995 - 2024, in %
[Eurostat data]



Waste-to-Energy is **complementary to recycling**, as it safely treats non-recyclable waste.

- Incineration (R1 + D10)
- Material Recycling + Biological Treatment
- Landfill



Development of landfill emissions

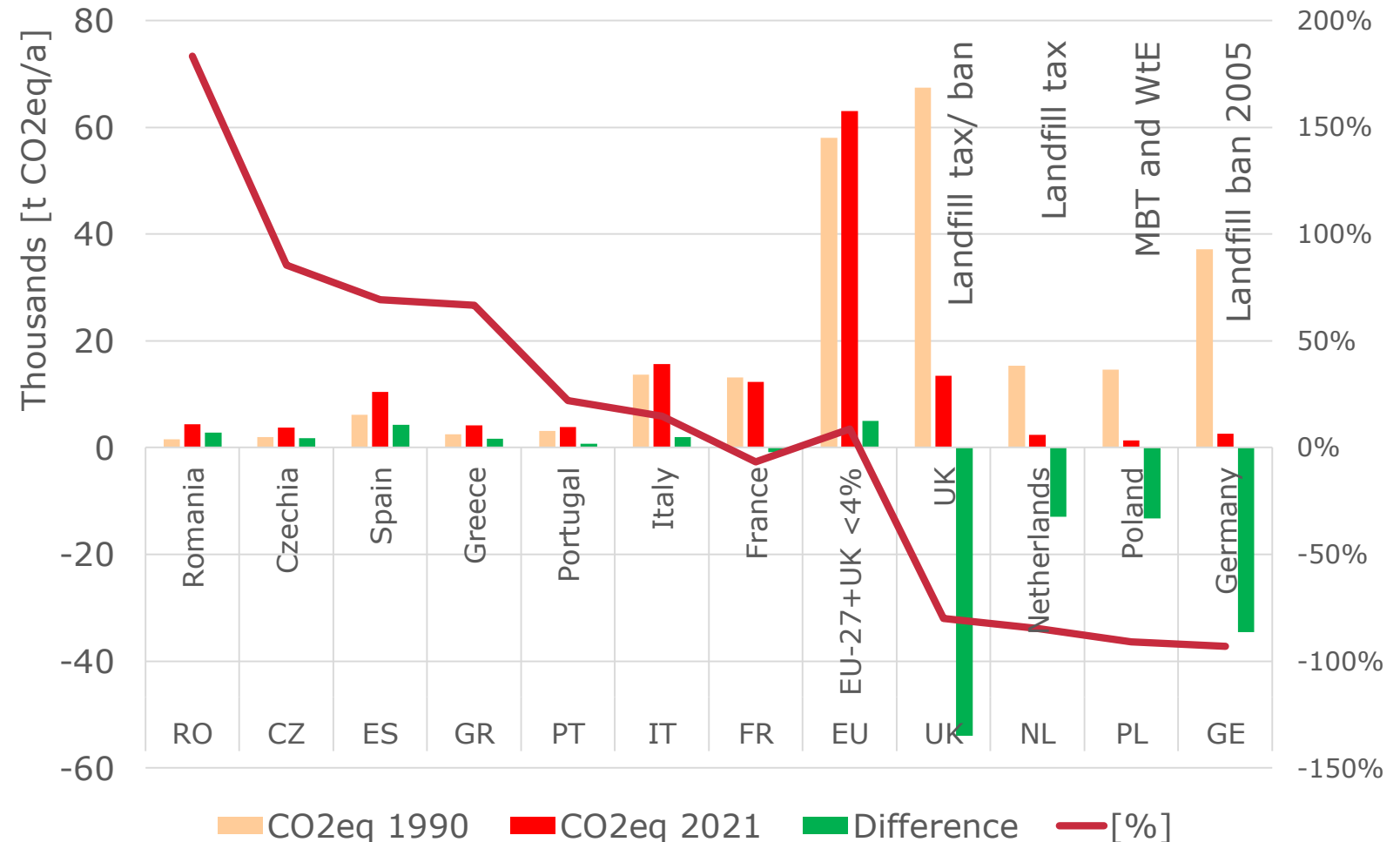
1990-2021:

Landfill GHG reduced
where there is more WtE

Landfills: despite
capturing, leaks remain

Do we really want to
continue landfilling
biogenic MSW fractions?

Methane emissions from landfills in selected countries
(NIR >4% share EU 27+UK in 1990 or 2021) in [kt CO₂eq/ a]

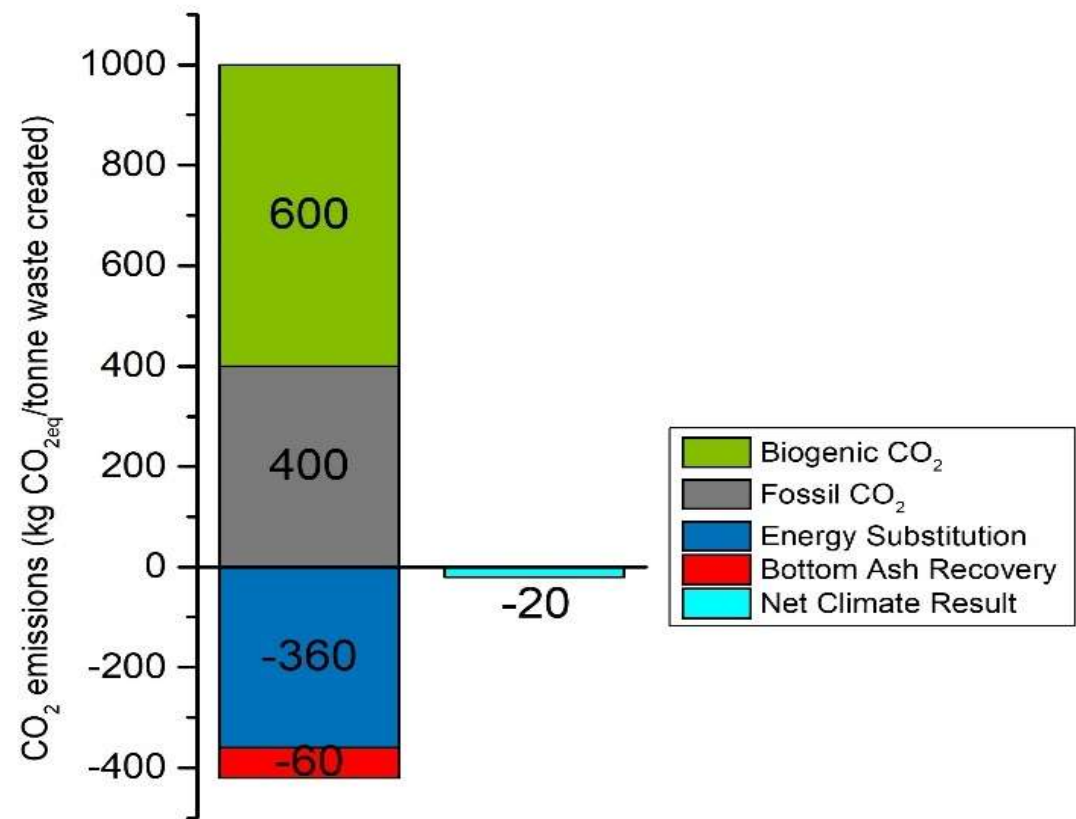


From climate neutral to climate negative

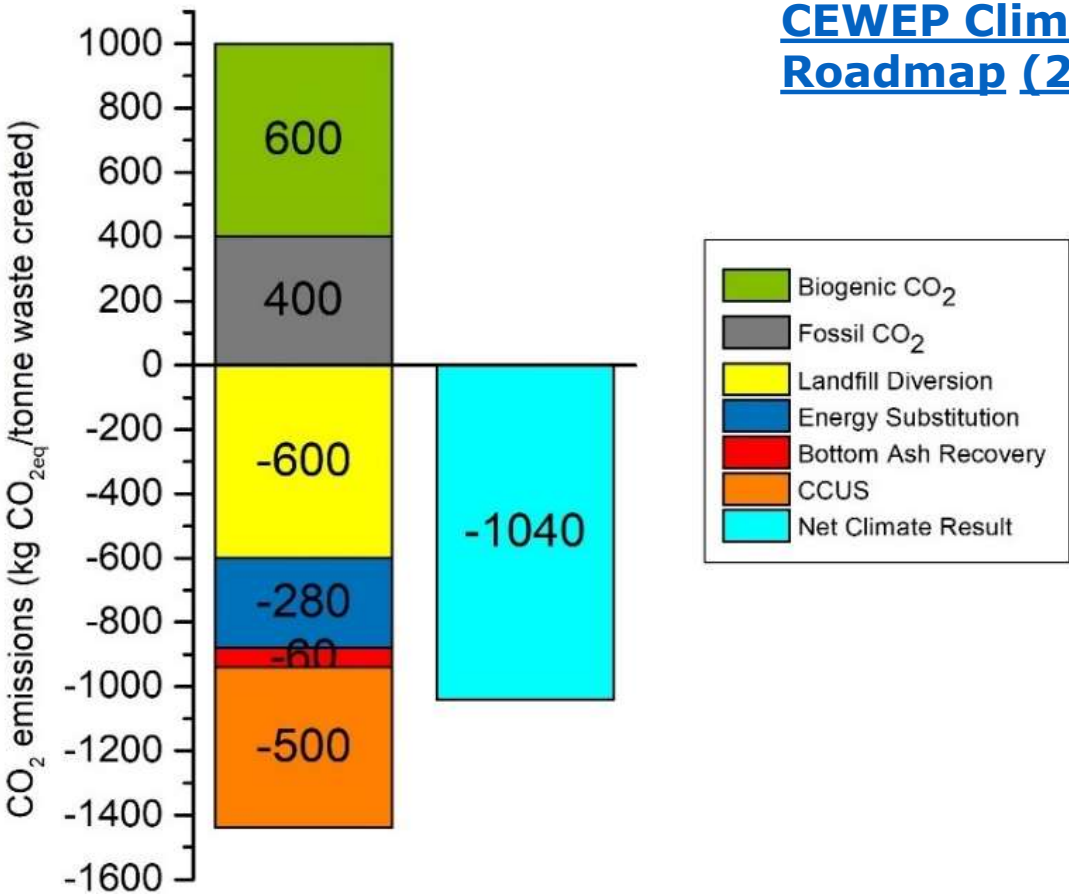


Source:

[CEWEP Climate Roadmap \(2022\)](#)



Net climate effect of treating one tonne of residual waste via Waste-to-Energy (WtE). Data source: CEWEP Climate Roadmap, 2022. Graphic source: ESWET.



Net climate effect of treating one tonne of residual waste via WtE, taking into consideration also landfill diversion and CCUS. Data source: CEWEP Climate Roadmap, 2022. Graphic source: ESWET.

CCUS projects

- ✓ There are over 60 CCUS in WtE projects in planning or construction.
- ✓ The AVR Duiven plant in the Netherlands captures approximately **60,000 tonnes of CO₂ per year**.
- ✓ Twence has a CO₂ capture capacity of up to **100,000 tonnes per year**.
- ✓ Klemetsrud WtE facility (operated by Hafslund Celsio) is the first one to **sell carbon removal credits**.
- ✓ Moving forward, it is likely that CCS in WtE plants will see **capture rates** at an excess of 95%.
- ✓ 2 WtE and CC projects — Öresundskraft AB's Innozero CCS project in Sweden (EUR 54 million funding) and Herambiente Ferrara WtE Plant in Italy (EUR 24 million funding) — have been selected under the **EU Innovation Fund** in 2024.



Source: Duiven plant with carbon capture unit, AVR.

INTEGRATED RESOURCE RECOVERY FACILITY



Contributing to energy security

Waste-to-Energy produces **baseload, reliable energy**:



76 billion kWh **heat**



39 billion kWh **electricity**

Approximately **70%** of WtE plants in Europe are **combined heat and power** plants.

Around **10%** of energy provided to European district heating & cooling networks comes from WtE.



For instance, the Royal Greenhouses in Brussels are heated by the local WtE plant.

Material recovery from EU WtE plants



- **Incineration Bottom Ash (IBA)** is normally composed of:
 - 80 to 85% of minerals,
 - 10 to 12% of ferrous metals (e.g., iron, steel), and
 - 2 to 5% of non-ferrous metals (e.g., aluminium, copper, zinc, lead)
- **Scale of the Opportunity**
 - **~500 WtE plants** generate **>20 Mt of IBA each year**
 - **2.4 Mt ferrous metals** recovered annually **> €2 billion** yearly market for recovered metals
 - **Up to 0.7 Mt aluminium** could be recovered-if no landfill → **≈ 11% of EU aluminium imports**
 - However, only about 1/3 of metals in this ash is recovered by recycling.
- **The Hidden “Urban Ore”**
 - IBA contains precious metals at levels far above natural ores: +930× Ag, +7,800× Au, +275× Pt, +27× Pd
 - Recovery is far less energy- and impact-intensive than mining.
 - Metals occur consistently year-round, ensuring stable recovery yields.

Material recovery from EU WtE plants

Once treated, the **mineral** fraction of IBA can be reused in construction, via industrial aggregates (e.g., cement clinker, gravel, and sands) for the building industry.

- **Climate benefits of material recovery:**

- EU-wide potential from metal recovery: avoiding **~14.5 MtCO_{2eq}** emissions/year (reducing virgin extraction/production, processing, transport).
- With systematic implementation of current technologies, **up to an additional 50-60 kg of CO_{2eq}** can be saved per tonne of treated waste!
- **CO₂ sequestration potential** → natural carbonation captures **30-65 kg CO₂/t ash**

roughly equivalent to
**taking 7 million cars
off European roads
for a year!**

Zinc, lead, copper, and cadmium can be also recovered from **fly ashes** in advanced EU plants.



The current EU legislative landscape for WtE



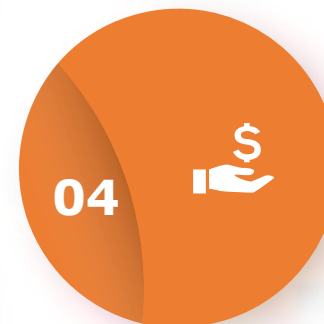
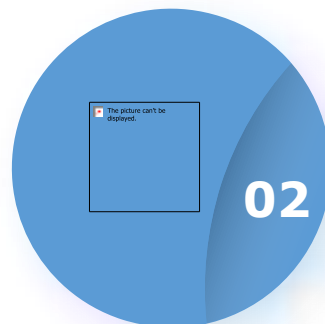
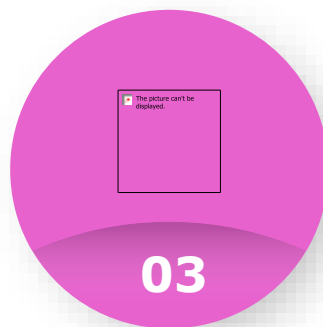
Waste-to-Energy Policy Framework



Waste Management

- Waste Framework Directive
- Circular Economy Act
- Landfill Directive
- Packaging & Packaging Waste Regulation

- Critical Raw Materials Act
- Waste Shipments
- End-of-Waste criteria
- *Legislation on specific waste streams*



Decarbonisation

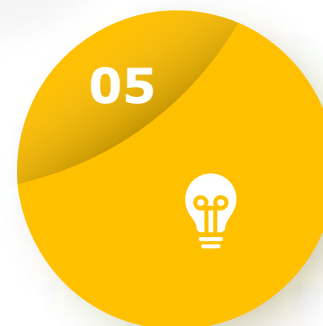
- EU Climate Law & Targets
- Industrial Carbon Management Strategy
- Carbon pricing (EU ETS, taxes)
- Carbon removals & carbon credits
- MRV of CO₂ emissions

Finance

- EU Taxonomy for Sustainable Finance
- Net Zero Industry Act
- State Aid
- Innovation Fund & Modernisation Fund
- Carbon Contracts for Difference
- Other specific funding schemes

Environmental Protection & Pollution prevention

- Industrial Emissions Directive
- Waste Incineration, Landfill & Waste Treatment BREFs
- Zero Pollution Action Plan
- REACH, Legislation on PFAS, POPs, and other chemicals
- Other: Waste Water Treatment Directive / Air Quality Directive / Microplastics / etc.



Energy

- Renewable Energy
- Energy Efficiency
- Heat Recovery (renewable & waste heat)
- District Heating & Cooling
- RePowerEU
- Gas Directive
- Legislation on Renewable and Low-Carbon Fuels

EU ETS and WtE?

- The **EU Emissions Trading System (EU ETS)** is Europe's main carbon pricing tool.
- The **2023 revision of the ETS Directive** introduces, for the first time, a path toward including **WtE plants** under its scope.
- Until today, WtE and the entire waste sector are covered by the Effort Sharing Regulation.



Breakdown of the revised EU ETS for WtE and latest developments:

- ✓ Prior & conditional **impact assessment** (IA) on WtE inclusion in the ETS – EC report by July 2026
- ✓ **Monitoring and Reporting of emissions (MRV rules) in WtE plants from 2024 onwards**
- ✓ Feasibility assessment of the inclusion of other waste management options, especially landfills, in the ETS
- ✓ inclusion will follow from the end of **2030!**

EU ETS and WtE? Impacts and Key Considerations



Potential risks and unintended consequences:

- 1) **Higher costs** for Municipalities, businesses, and society
- 2) **Higher costs** for all the waste management chain → **domino effect**
- 3) **Less/Changed Waste Acceptance**
- 4) **Increased landfilling** with all its adverse impacts
- 5) **Waste leakage** (legal/illegal exports) & **Growth of illicit waste management activities**
- 6) **Market distortions** (no CO₂eq price for methane emissions from landfills)
- 7) **Double or triple burden** for the sector (if combined with incineration tax, or other levies)
- 8) **No incentive** to recover materials and energy from waste

A fair and effective EU climate policy for the waste sector must ensure:

- 1) **Sector-appropriate Monitoring, Reporting & Verification (MRV) rules for CO₂ emissions**
- 2) **Integrity of waste management hierarchy**
- 3) **Support for CCUS for WtE, to enable further emission reductions & negative emissions.**

EU carbon pricing



EU carbon
permits:

EUR 74.150

Mid-May
2026



Circular Economy Act (CEA)

The legislative proposal for the CEA is expected in Q3 2026.

Aims to create a **single market for waste, secondary raw materials (SRMs), and reusable materials** by addressing current market fragmentation.

The Act will support the transition to a circular economy through:

- Harmonised end-of-waste criteria
- Market incentives for secondary raw materials
- Common environmental tax rules
- Updates to waste classification



Why Waste-to-Energy for residual waste?

- **Offering a hygienic service to society, through pollution prevention and control**
 - **Supplying local, partly renewable, baseload energy**
 - **Supporting decarbonisation**
 - **Serving the circular economy**
- **Supporting energy & raw material security in Europe**
- **Maximising the potential of non-recyclable waste**





European Suppliers of Waste-to-Energy Technology

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