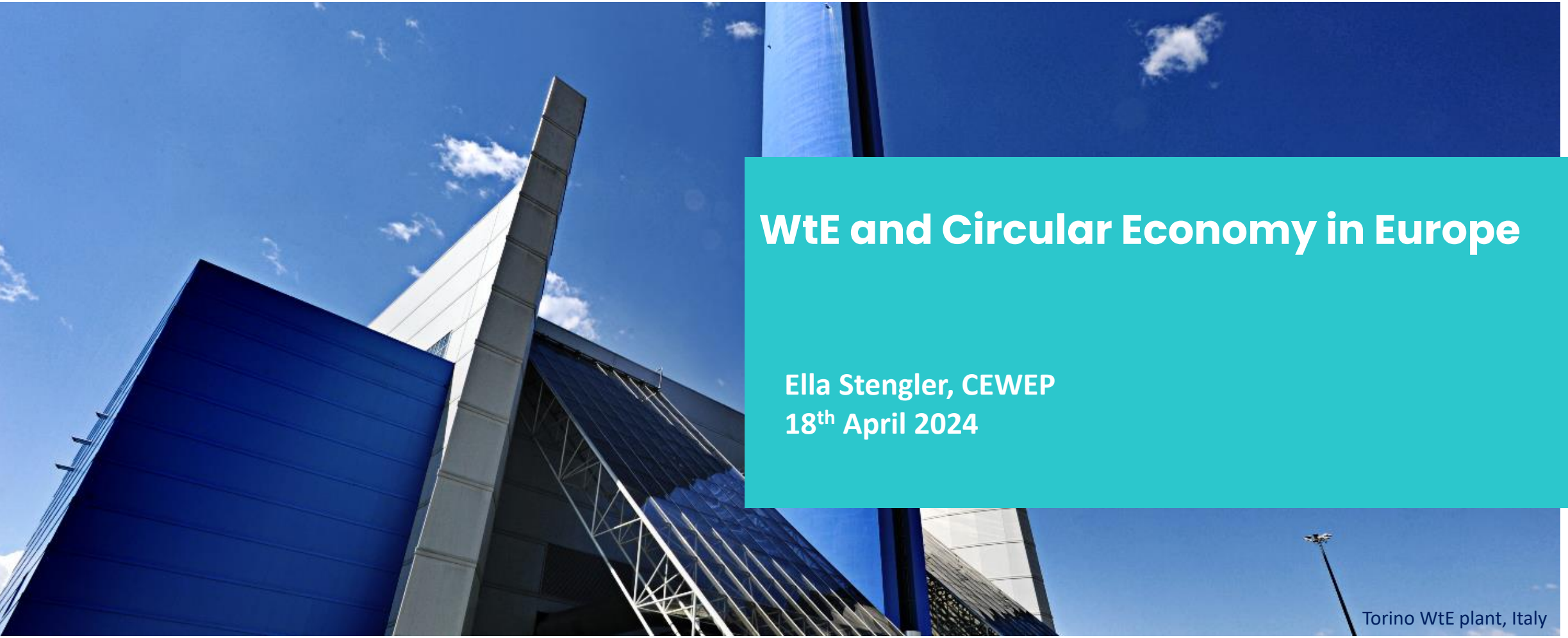
cewep Confederation of European Waste-to-Energy Plants



WtE and Circular Economy in Europe

Ella Stengler, CEWEP

18th April 2024

Torino WtE plant, Italy

Confederation of European WtE Plants

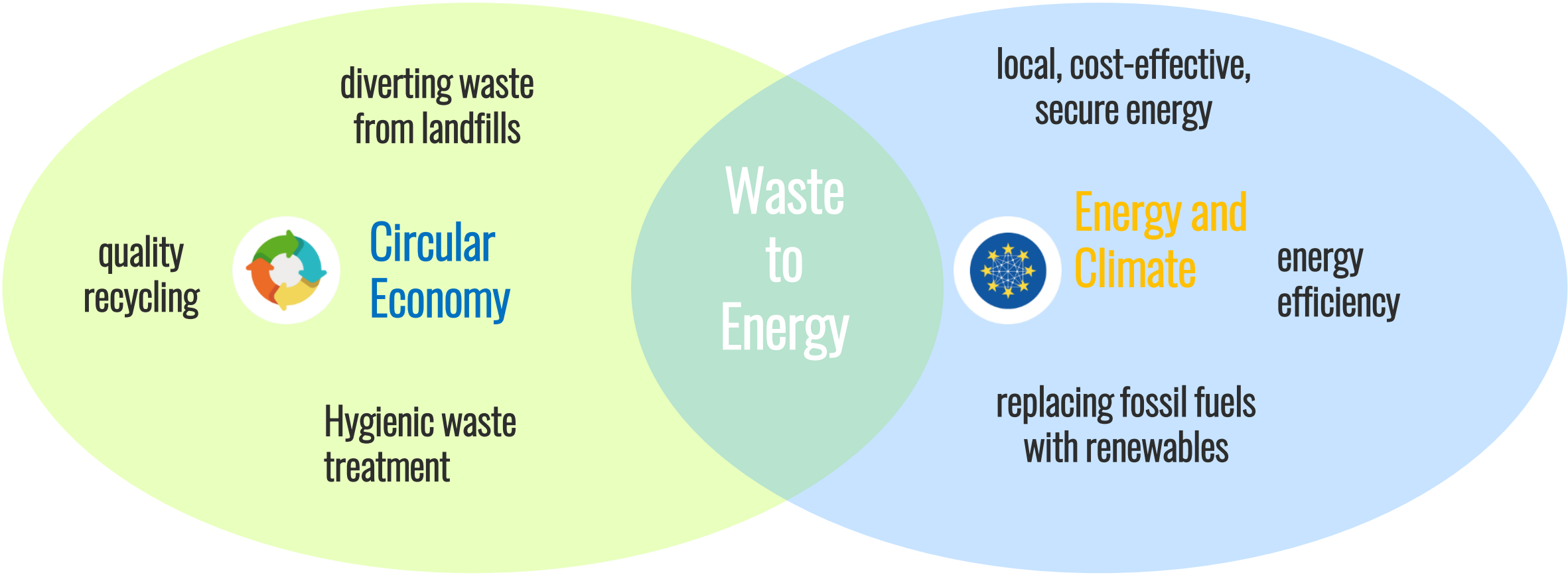
Operators and owners of Waste-to-Energy (WtE) Plants across Europe.

CEWEP Members: 81 M tonnes; 410 plants

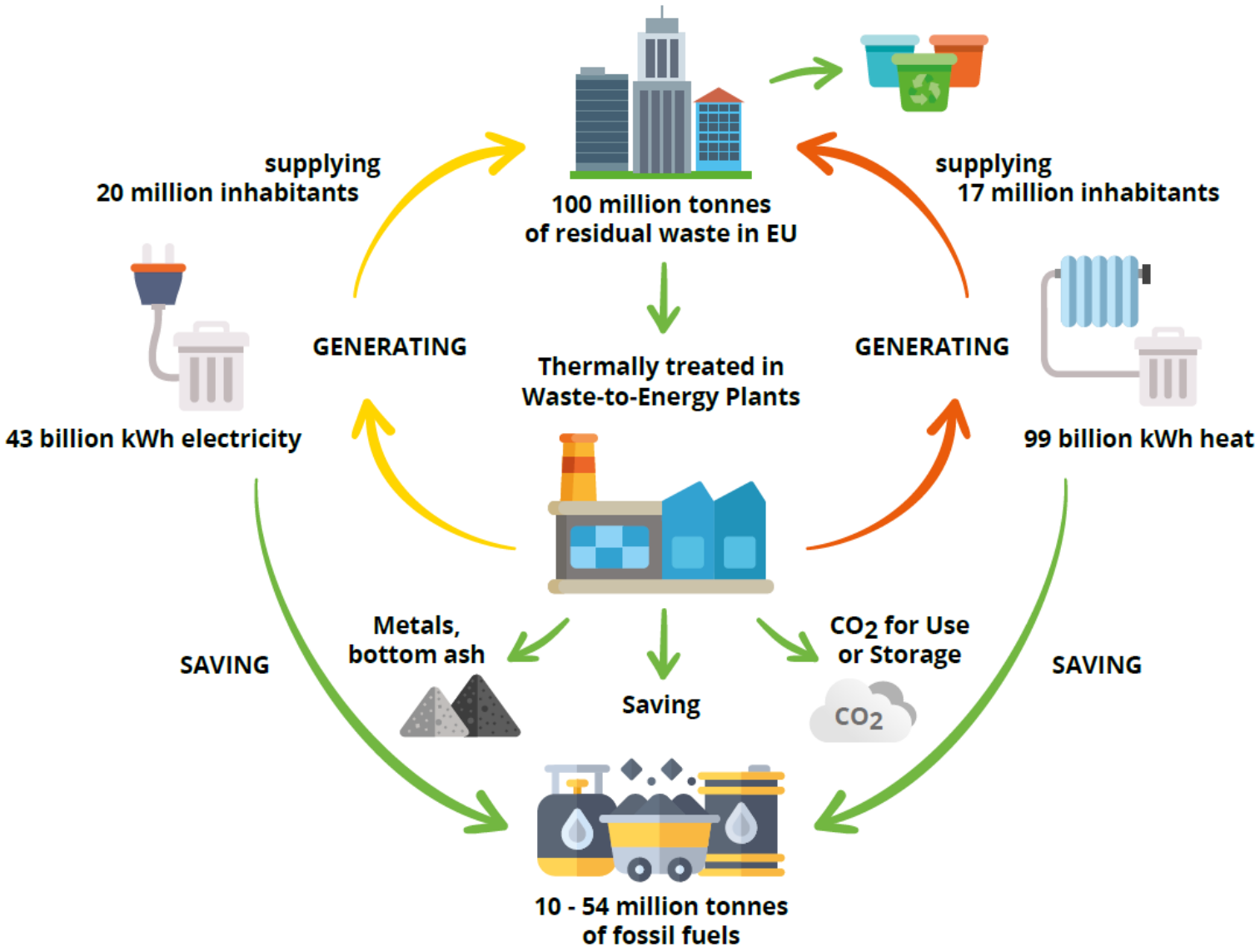
Total plants:

- in EU 27: 81 M tonnes; 402 plants
- in Europe: 101 M tonnes; 504 plants

Where does Waste-to-Energy stand?



WtE's double role: **Sustainable waste management** and **Material&Energy Recovery**



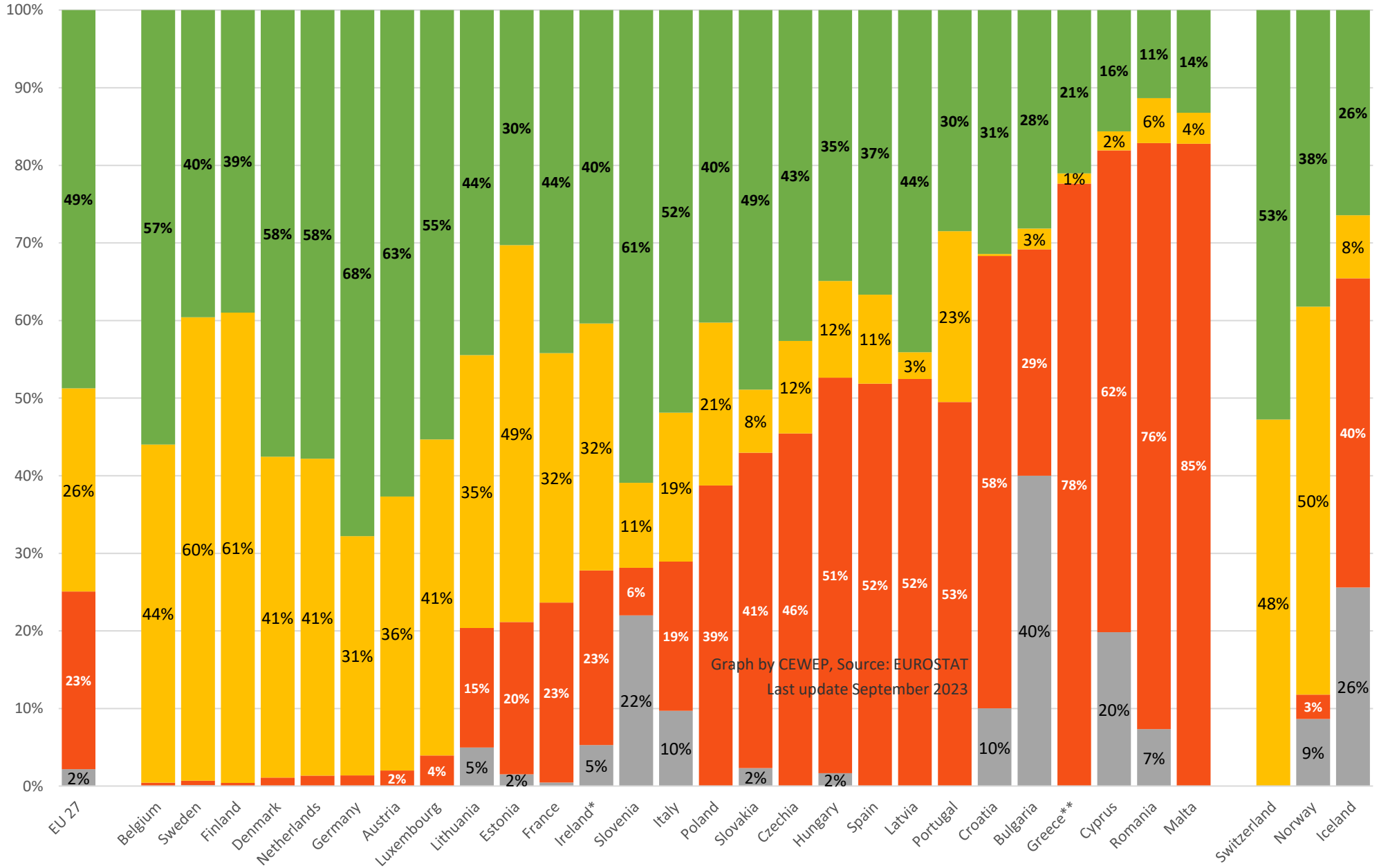
- WtE provides a **hygienic service**
- Generates energy, recovers materials from bottom ash

WtE substitutes fossil fuels and reduces dependence on imports

Some Key WtE facts

- More than **60%** of WtE plants in Europe are **CHP** plants.
- **Ca.10%** of Europe's district heating energy comes from WtE.

Municipal waste treatment in 2021



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

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

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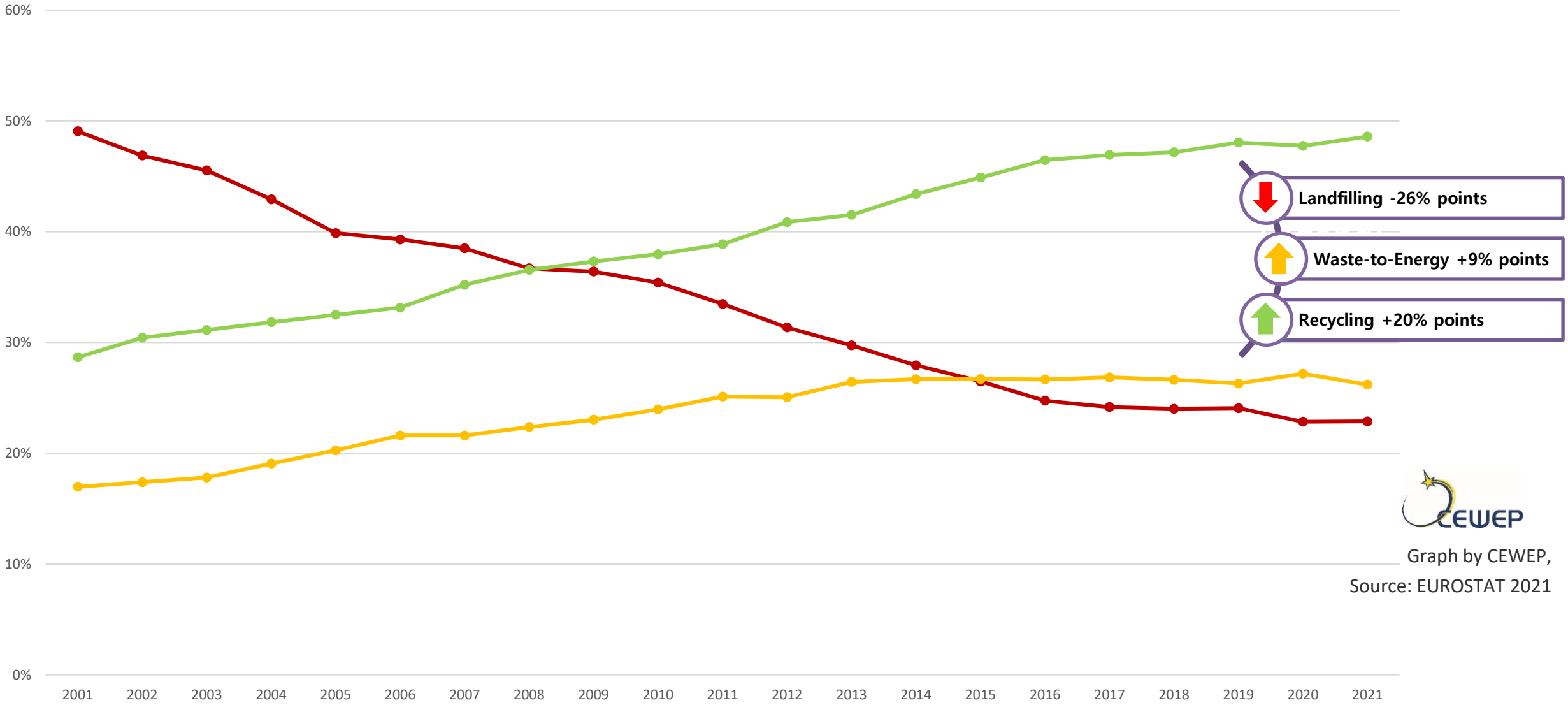
Municipal waste treatment 2001 - 2021

EU 27, based on Eurostat 2023



Graph by CEWEP,
Source: EUROSTAT 2021

Circular Economy targets for municipal waste

Landfill targets

	2035	2040
Without extension	10%	
With 5 years extension	25%	10 %

Criteria: landfilled > 60% in 2013

Extension possible for:

Bulgaria, Croatia, Cyprus, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Romania and Slovakia

Recycling targets

	2025	2030	2035
Without extension	55%	60 %	65 %
With 5 years extension	50%	55%	60 %

Criteria: landfilled > 60% or recycled < 20 % } in 2013

Extension possible for:

Bulgaria, Croatia, Cyprus, Estonia, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Romania and Slovakia

Waste management in the Circular Economy

The waste concept remains important, also within the CE

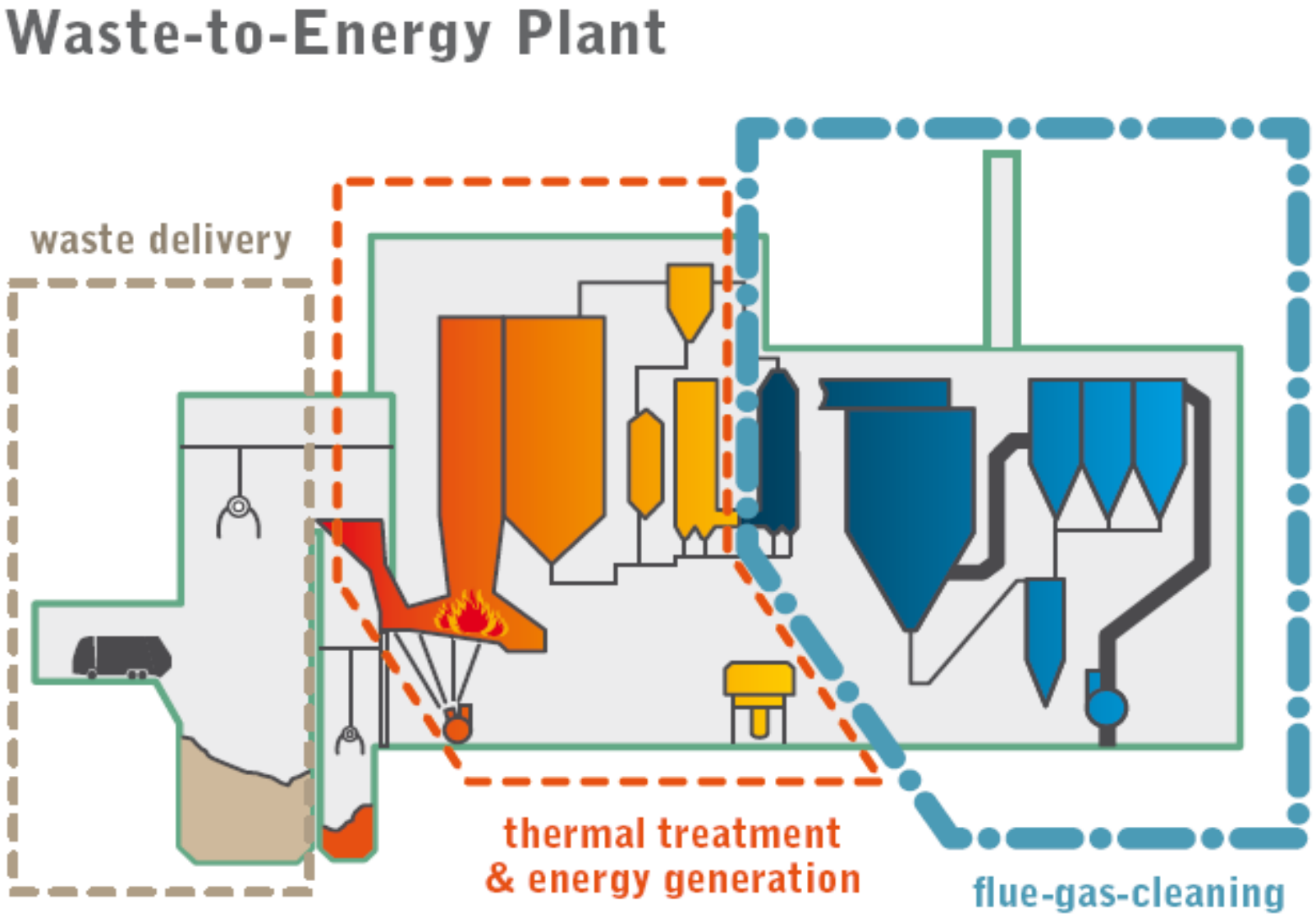
- Residues, used goods, objects without any (subjective) value for the holder should be taken care of
- Waste regulation needs to assure that those materials will not be spread in the environment and will be recovered/used as much as possible

=> waste will also exist within the CE

Waste-to-Energy - Enabler of Circular Economy

- Turns non-recyclable waste in an environmentally safe way into secure energy and valuable raw materials;
- Keeps the circle clean by dealing with unwanted organic components in the material cycles (act as a pollutant sink, fulfilling a hygienic task for the society).

Sophisticated flue-gas cleaning devices guarantee low emissions



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EU WtE plants comply with one of the most stringent regulations for pollution prevention and control

Since 2019 an even more ambitious set of limits for dioxins and furans has been put in place with the publication of Waste Incineration BAT Conclusions*

*Commission implementing decision (EU) 2019/2010 of 12 November 2019

Krakow WtE plant, Poland

Health studies

Lisbon University's Institute of Preventive Medicine: waste incineration *"does not impact on dioxin blood levels of nearby residents"* of Waste-to-Energy plants
http://www.sciencedirect.com/science/article/pii/S0045653506016158

UK Committee of Carcinogenity:
"any potential risk of cancer due to residency near to municipal solid waste incinerators was exceedingly low, and probably not measurable by the most modern epidemiological techniques"
http://www.advisorybodies.doh.gov.uk/Coc/munipwst.htm

A Spanish study concluded that the Tarragona Waste-to-Energy plant *"does not produce additional health risks for the population living nearby."* It presents results from monitoring of the Tarragona (Catalonia, Spain) Waste-to-Energy plant regarding dioxins and furans (PCDD/Fs) levels in soil, vegetation, and air samples collected in the period 2009–2010. The concentrations of PCDD/Fs in the surroundings of the Tarragona plant were monitored over the last 15 years.
http://wmr.sagepub.com/content/30/9/908.full.pdf+html

Dioxins and Waste-to-Energy Plants: The State of the Art

Historically the WtE sector has been associated with dioxin emissions. However, contemporary WtE plants are equipped with complex and very efficient flue gas cleaning systems rendering their emissions negligible*.

* CEWEP dioxin report https://www.cewep.eu/dioxins-wte-state-of-the-art/

Data collected by the E-PRTR* shows that dioxin emissions from WtE account for less than 0.2% of the total industrial dioxin emissions in the EU

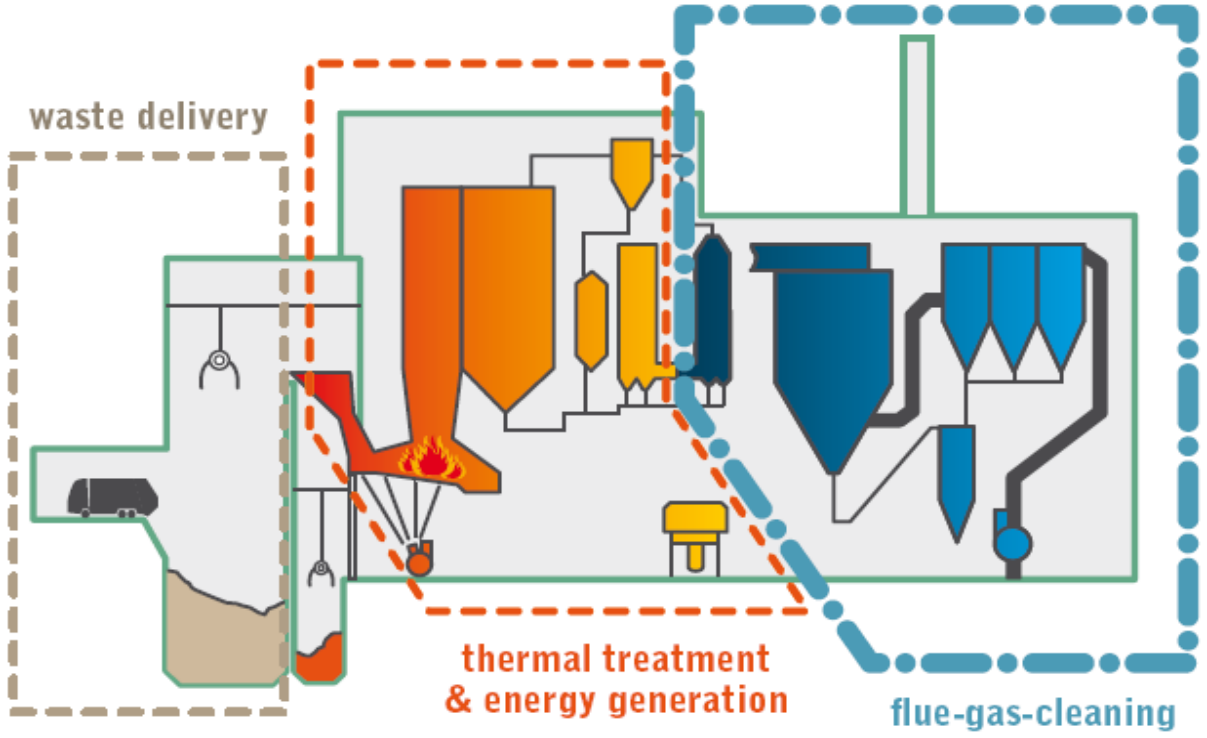
It should be noted that the register does not include transport emissions; if that was to be the case, the contribution of WtE sector would be even lower.

*European Pollutant Release and Transfer Register, https://industry.eea.europa.eu/

What is waste incineration's contribution to industrial pollution?

E-PRTR (European Pollutant Release and Transfer Register) dataset for 2019

- **PCDDF (Dioxins) 0.15%**
- Particulate matter (PM) **0.02%**
- Sulphur Dioxide (SO2) **0.01%**
- Nitrogen Oxide (NOx) **1.47%**
- Lead **0.01%**
- Carbon Oxide (CO) **0.004%**
- Arsenic **0.41%**
- Cadmium **1.13%**
- Nickel **0.52%**
- Polycyclic Aromatic Hydrocarbons (PAH) **0.37%**



EU WtE Plants have sophisticated flue-gas cleaning lines that guarantee very low emissions

- **Strict EU Regulations for waste incineration**: Industrial Emissions Directive + BREF Waste Incineration (last in 2019)
- **POLLUTANT SINK**: Waste Incineration deals with the pollutants embedded in the waste (**sanitary task**)

Bottom Ash recycling

1 tonne of bottom ash contains between **10-12% metals**

1 tonne of recycled metals from bottom ash saves **2 tonnes** of **CO_{2equ} emissions**

Minerals can be used as secondary aggregates (**road construction** or in **building products**)

WtE in the EU ETS?

Milano WtE plant, Italy

EU ETS Revision

Binding Impact Assessment:

- the Commission will assess and report by 31 July 2026 on the feasibility of including WtE in the EU ETS from 2028.

- It will also assess the potential need for a possibility for a Member State to opt WtE out until 31 December 2030.

Additional key element:

- **Holistic impact assessment**: The impact assessment should also evaluate the possibility of including other waste management processes, such as landfills.

EU ETS - Timeline

End of 2023

Monitoring Plan to be submitted to Competent Authority

1/1/2024

Start monitoring CO2-emissions (without surrendering allowances obligations and without any free allocation)

April 2025

1st time : submission of verified annual emissions report (report of emissions for the year 2024)

July 2026

EU Commission presents **IMPACT ASSESSMENT on feasibility of including WtE** (and other waste managment processes).

1/1/2028

Eventual inclusion of WtE plants in EU ETS (**FULL SCOPE**: monitoring, reporting, verification + obligation to surrender allowances)

End of 2030

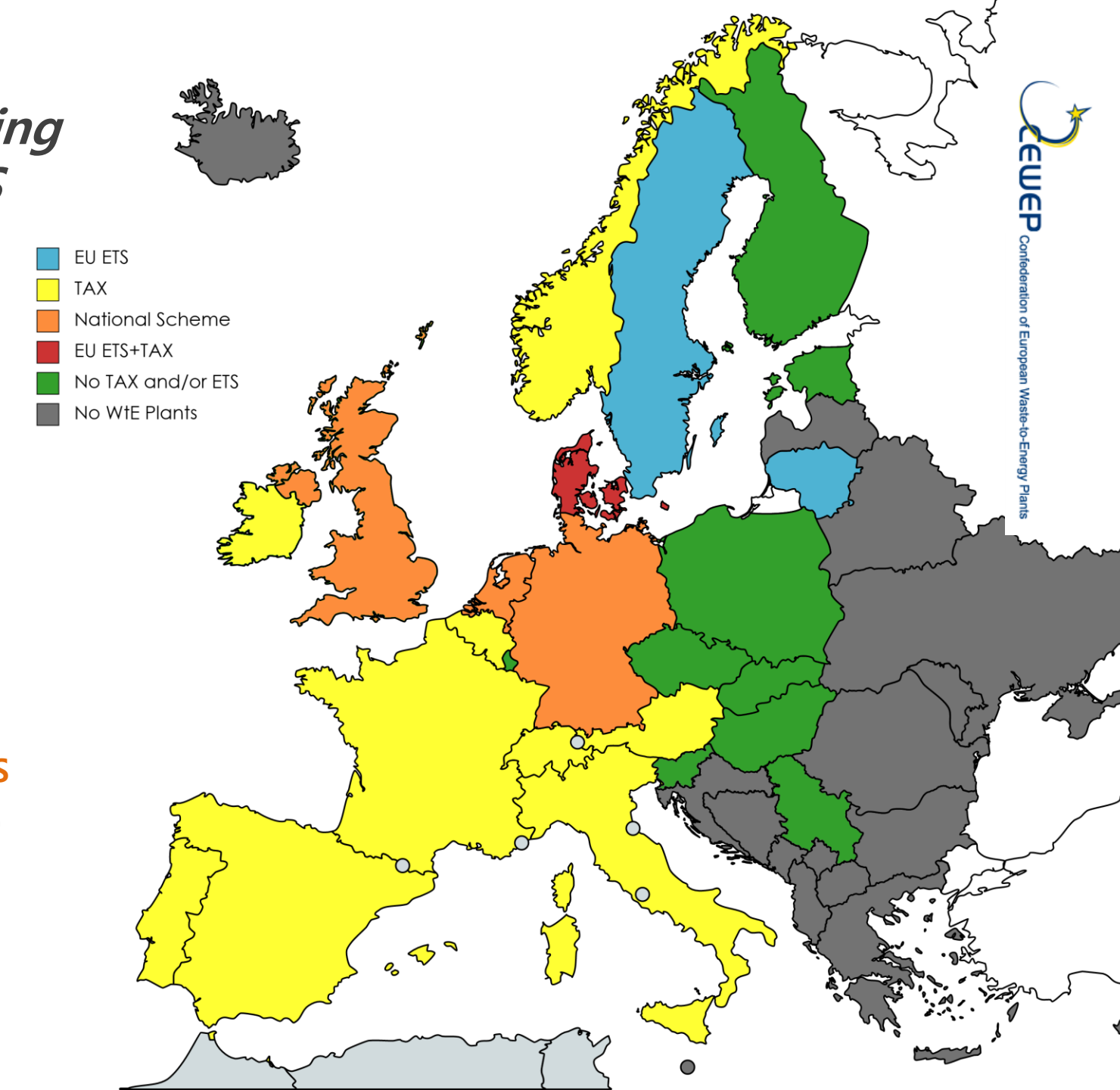
Possibility for a Member State to **OPT OUT**

CEWEP Overview:
Interaction and possible overlapping between National Taxes & EU ETS

Out of the 24 European Countries (EU 27+ CH, NO, UK, RS) <u>with WtE plants</u>:

- **2/24 inside the EU ETS** *(Sweden, Lithuania)*
- **1/24 with EU ETS and TAX** *(Denmark)*
- **9/24 with incineration and/or CO2 TAX** *(Austria, Belgium, France, Ireland, Italy, Norway, Portugal, Spain, Switzerland)*
- **3/24 with a national scheme similar to EU ETS** *(Netherlands, Germany and UK under proposal)*

Version: Mar24



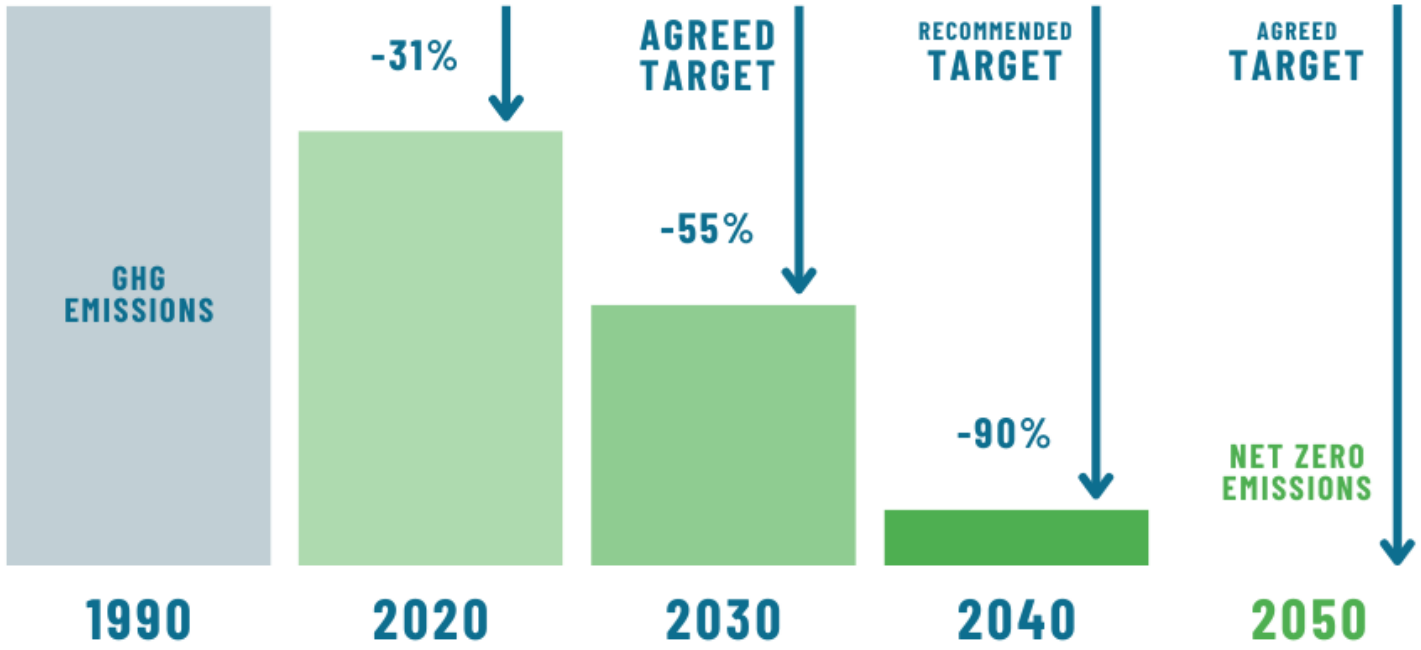
A driver for carbon capture?

Kaunas WtE plant, Lithuania

EU 2040 Climate Target

- On 6th Feb 2024 the EC published its vision for the European Union 2040 climate target

the **EC recommends 90% net GHG emission reduction by 2040** compared to 1990 levels



- **Carbon Removals**: scope unclear

"EU CCUS Strategy"

- 6th Feb 2024: **Communication on Industrial Carbon Management**

- **CO_2 capture is seen as an *indispensable element*** for net zero.

→ **3 Key targets**: EC estimates that the EU will need to be ready to capture yearly:

I. 50 M tonnes of CO_2 by 2030

II. 280 M tonnes of CO_2 by 2040

III. 450 M tonnes of CO_2 by 2050

- **Relevance for WtE – BECCS (Bioenergy + storage).**

The EC:

→ will assess by 2026 the possibility of **integrating carbon removals into the EU ETS**
→ possible definition of **separate targets for carbon removals**

CCUS: Carbon Capture Utilisation and Storage

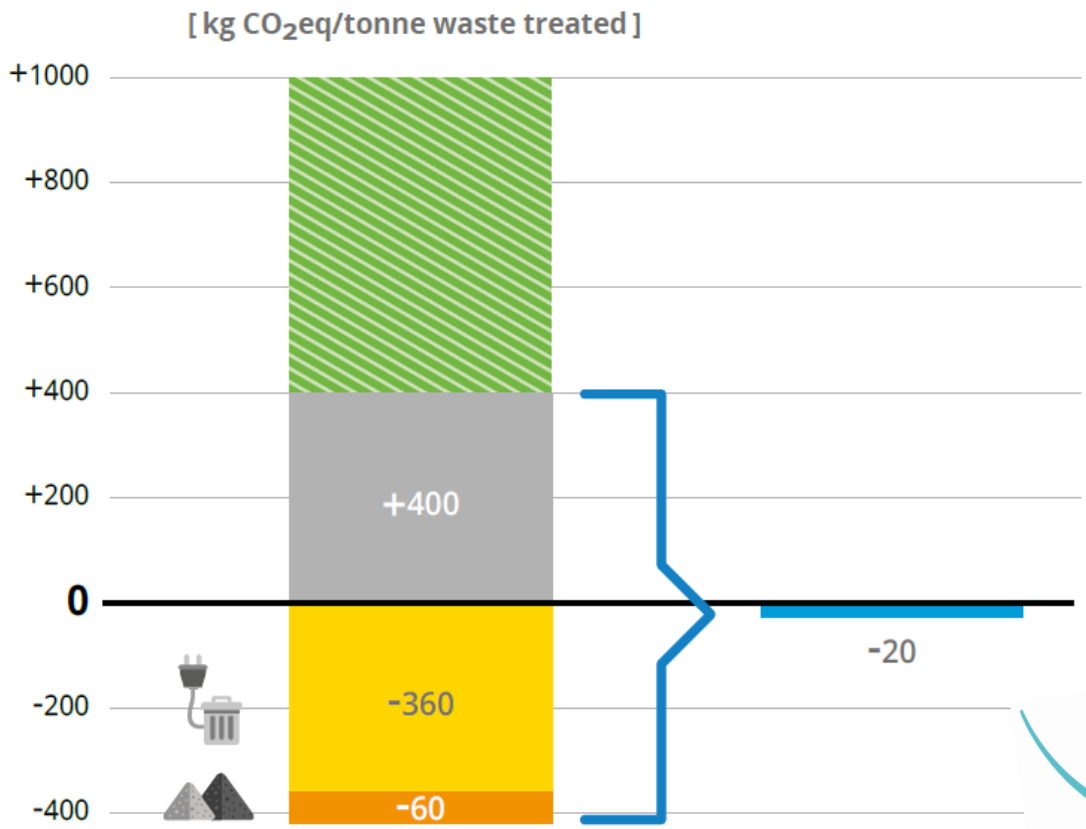
"The integration of WtE and carbon capture and storage (CCS) could enable waste to be a net zero or even net negative emissions energy source."

UN Intergovernmental Panel on Climate Change (IPCC), *AR6 WGIII, Mitigation of Climate Change, April 2022*

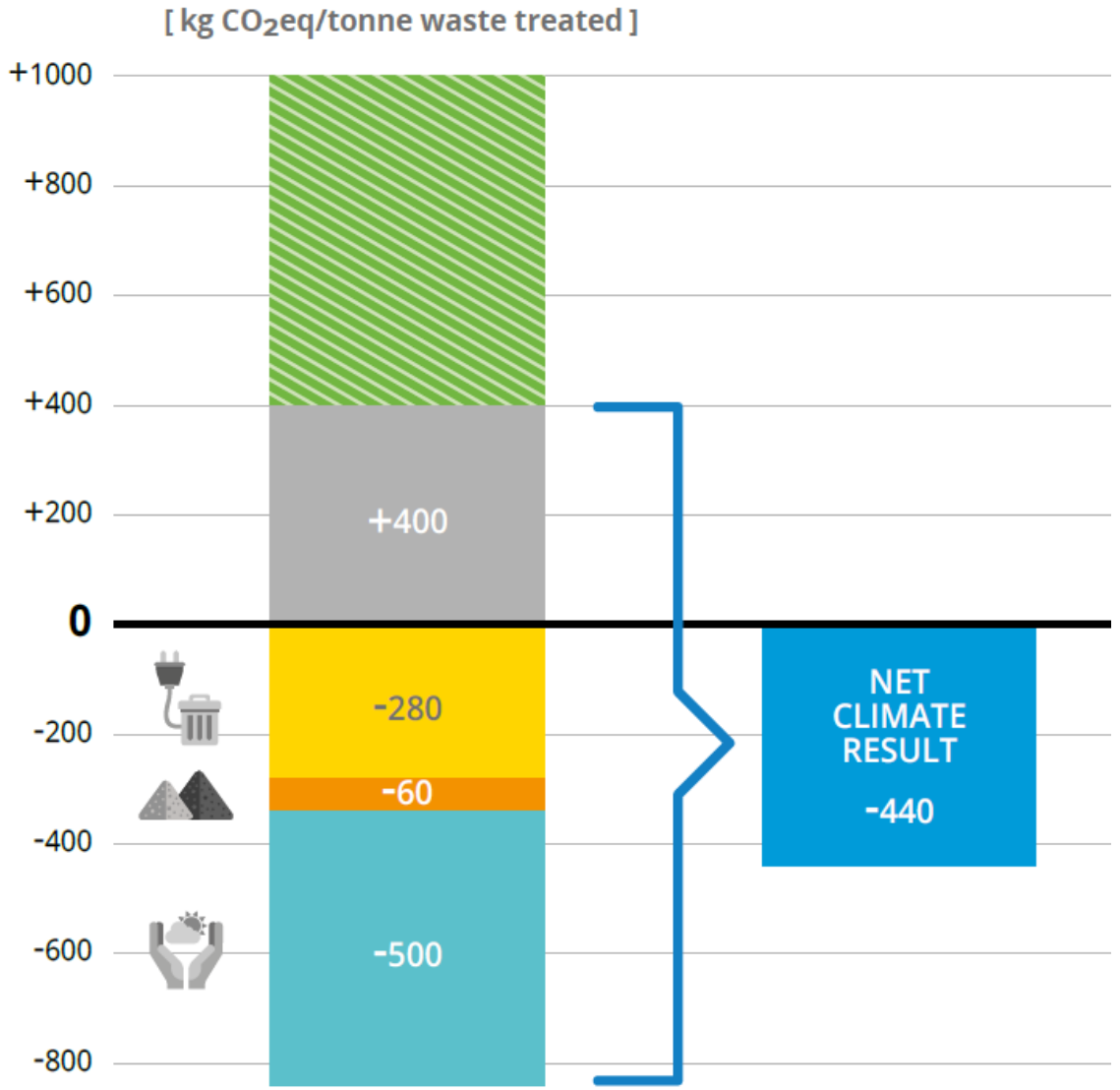
Source and credits: AVR

CEWEP Climate Roadmap

From Carbon Neutral Today



to Carbon Negative Tomorrow

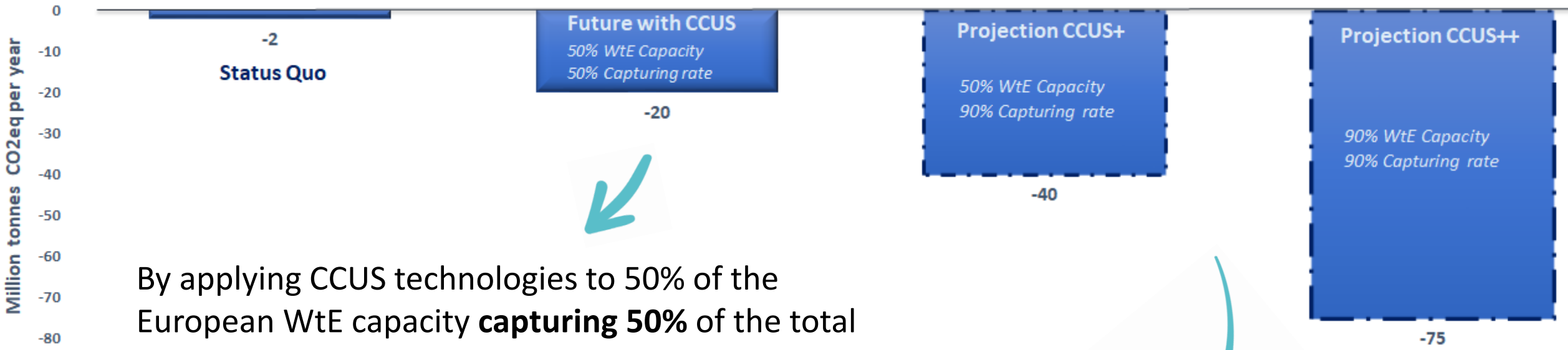


Considering also **Landfill Diversion** the climate savings would be much higher!

CO2eq Reduction Potentials

WtE saves every year ca. **2 million tonnes of CO2eq**

*Future projections will only be possible with **adequate policy support** and a **business model** on the EU and national levels*



By applying CCUS technologies to 50% of the European WtE capacity **capturing 50%** of the total CO2 emissions, **20 Ml tonnes of CO2eq** every year could be saved.

Increasing ambition: With a broader integration of carbon capture equipment, greater reduction potentials can be foreseen once CCUS technologies will reach **full commercial maturity**.

New WtE Climate Roadmap

WASTE-TO-ENERGY CLIMATE ROADMAP

The path to carbon negative

www.cewep.eu

Any questions?

Contact: ella.stengler@cewep.eu

Returkraft WtE plant, Norway