cewep Confederation of European Waste-to-Energy Plants

Lighea Speziale

The role of Waste-to-Energy in the Circular Economy – The European Perspective

"A Valorização Energética de Resíduos no contexto da Transição Energética e da Economia Circular. Contributos para os Decisores"

CEWEP – Confederation of European WtE Plants

Krakow WtE plant, Poland

Under one umbrella

CEWEP is the umbrella association of the operators of Waste-to-Energy (WtE) Plants across Europe.

They thermally treat household and similar commercial & industrial waste that remains after waste prevention, reuse and recycling and generate energy out of it.

2017 - CEWEP Members: 80 M tonnes; 410 plants
- EU 28: 88 M tonnes; 441 plants
- Europe: 96 M tonnes; 492 plants

Waste-to-Energy in Europe in 2017

- WtE Plants operating in Europe (not including hazardous waste incineration plants) : **492**
- Waste thermally treated in WtE plants (in million tonnes): **96**

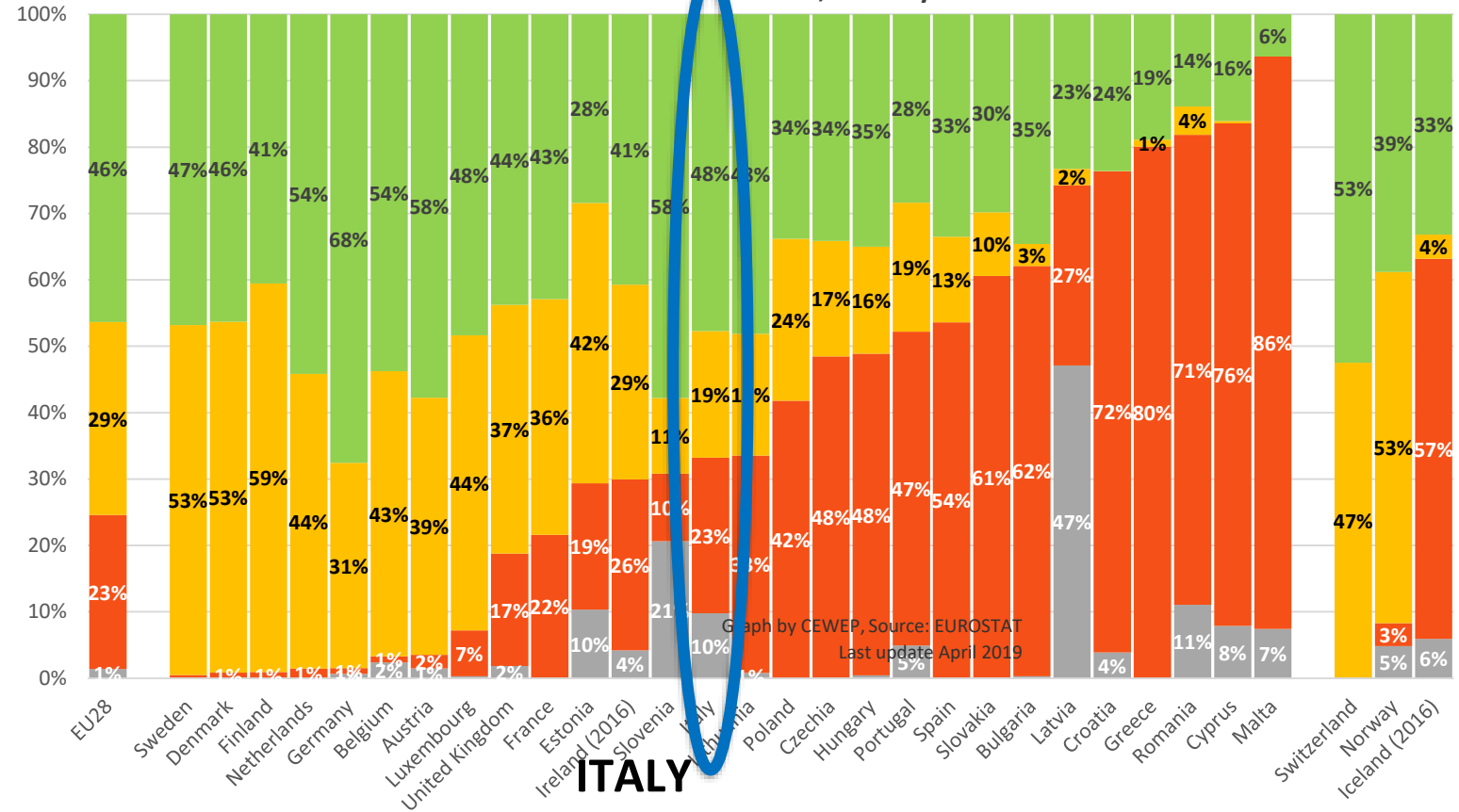
Data supplied by CEWEP members and national sources

* Includes plant in Andorra and SAICA plant

CEWEP Confederation of European Waste-to-Energy Plants

Municipal waste treatment in 2017

EU 28 + Switzerland, Norway and Iceland



Landfill

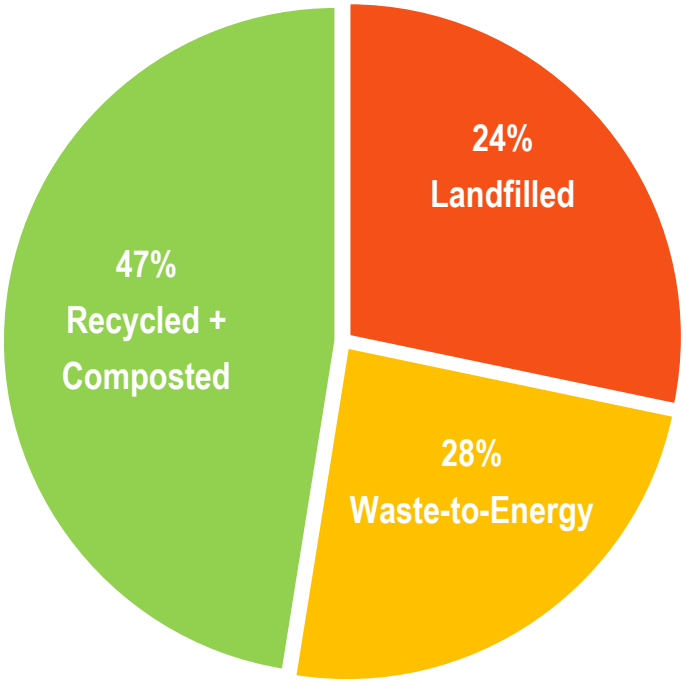
Waste-to-Energy

Recycling +Composting

Missing data

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

Municipal waste treatment in 2017 in EU28



Waste is a Resource.

However 24% of municipal waste across the EU28 is still landfilled although landfill gases (methane) contribute significantly to global warming.

Municipal waste treatment in 2016 in EU28

Wasted Resource

57.6 million tonnes of municipal waste landfilled per year in EU 28

0.8 – 1.2 m^3 per tonne

Wembley Stadium: 1,120,000 m^3

Each <u>week</u> in EU 28, we landfill the volume of Wembley Stadium.

Note: Municipal waste represents 10% of the total waste generated in the EU 28. In 2016, around 900 million tonnes of waste were landfilled in the EU 28.

Waste-to-Energy makes the Circular Economy happen

Waste-to-Energy fulfils a double role:

- Transforming non recyclable waste in an environmentally safe way
  - into energy (heat and electricity)
  - into valuable raw materials (metal recycling + use for construction works)
- keeping the circle clean
  - act as a pollutant sink; fulfilling a hygienic task for the society
  - deal with unwanted components in the material cycle

Circular Economy targets

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, 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, Romania and Slovakia

Circular Economy review clauses

31st Dec 2023

Feasibility of targets on **food waste** (to be met by 2030)

31st Dec 2024

Review of municipal waste landfilling target (consider per capita landfill and restrictions for other than municipal waste)

Potential targets on:

- Waste prevention
- C & I waste
- Preparing for reuse
- Disposal operations

31st Dec 2028

Review of municipal waste recycling target

Review of the calculation method (single measurement point) on the **inclusion of minerals from co-incineration** in the recycling targets

But what do we do with residual waste?

What about:

- Dirty, contaminated materials?
- Mixed materials?
- Degraded materials after multiple times of recycling?
- Materials containing substances of high concern?

The only options are…

Recovery e.g. Waste-to-Energy

Disposal e.g. Landfilling

CEWEP calculations on the Circular Economy Targets

Objective: The aim of this calculation is to allow for a basic understanding on waste weight shifts between recycling/composting, landfilling and thermal treatment according to the targets set by the new EU Waste Framework Directive (WFD) and EU Landfill Directive (LD) for **2035**.

2 main waste streams:

- Municipal waste
- Commercial & Industrial waste

Excluded:

- Mineral waste
- Hazardous waste

Main assumptions for Municipal waste

Based on eurostat

1. Recycling targets: 65% for 2035 (WFD);
2. Landfill target: 10% maximum for 2035 (LD)*;
3. 15% residues from sorting, pre-treatment and recycling process;
4. No extension for reaching the recycling / landfill targets;
5. Same population as in 2016 (which leads to the same amount of municipal waste generated as in 2016)**.

*Which in practice means 7.2%, since several MS already landfill well below 10%.

**The assumption has been made considering that the growth in municipal waste generation due to the expected population growth would be balanced by the successful waste prevention efforts from MS

Main assumptions for Commercial & Industrial waste

Based on eurostat

1. 80% input to recycling;
2. 7.2% maximum landfilling (as for municipal waste);
3. 15% residues from sorting, pre-treatment and recycling process);
4. No GDP growth (which leads to the same amount of commercial and industrial waste generated as in 2016*).

*The assumption has been made considering that the effect of expected GDP growth on commercial waste generation would be balanced by the successful waste prevention efforts from MS.

Residues that accumulate from sorting, pre-treatment and recycling

- **Assumption: 15% in weight.**

This is a very conservative number, with the hypothesis that these processes will improve their efficiency

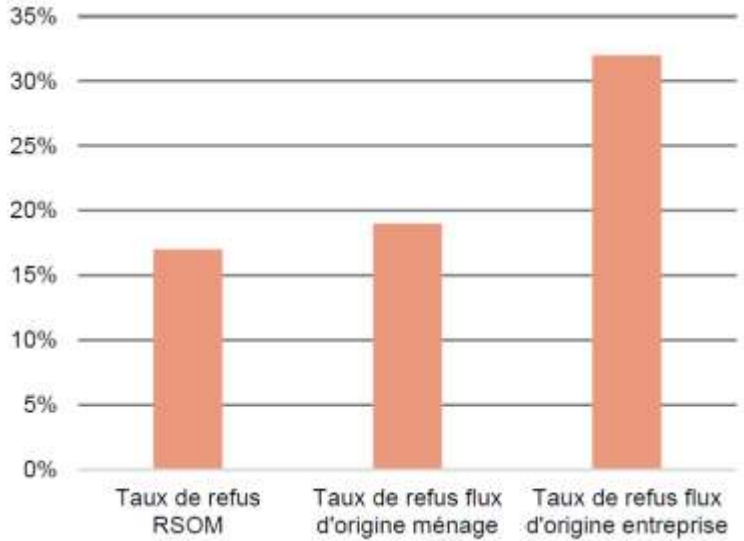
Currently the share of residues from sorting, pretreatment and recycling processes is much higher: according to a Deloitte study, for plastics, even when the collection rate is very high the recycling rate does not exceed 42%

Performances on collection and recycling of polyolefin and PET plastics

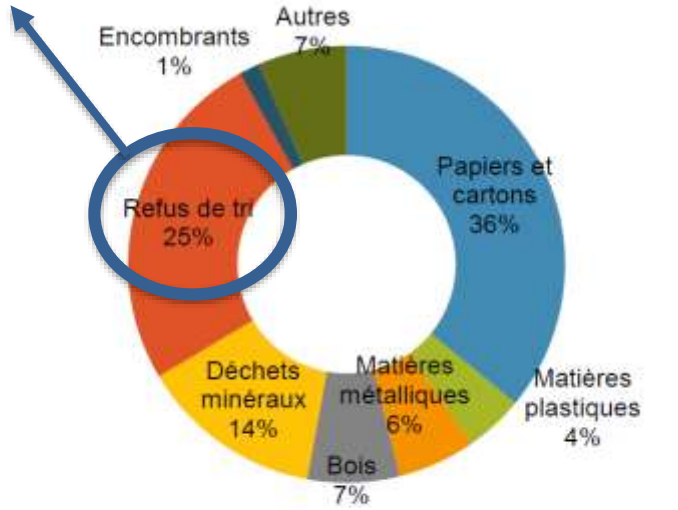
Country	Collection rate	Recycling rate
France	44%	21%
Germany	76%	36%
UK	38%	22%
Spain	41%	31%
Italy	55%	42%

Residues that accumulate from sorting, pre-treatment and recycling

- Example: ADEME study (2014) for France

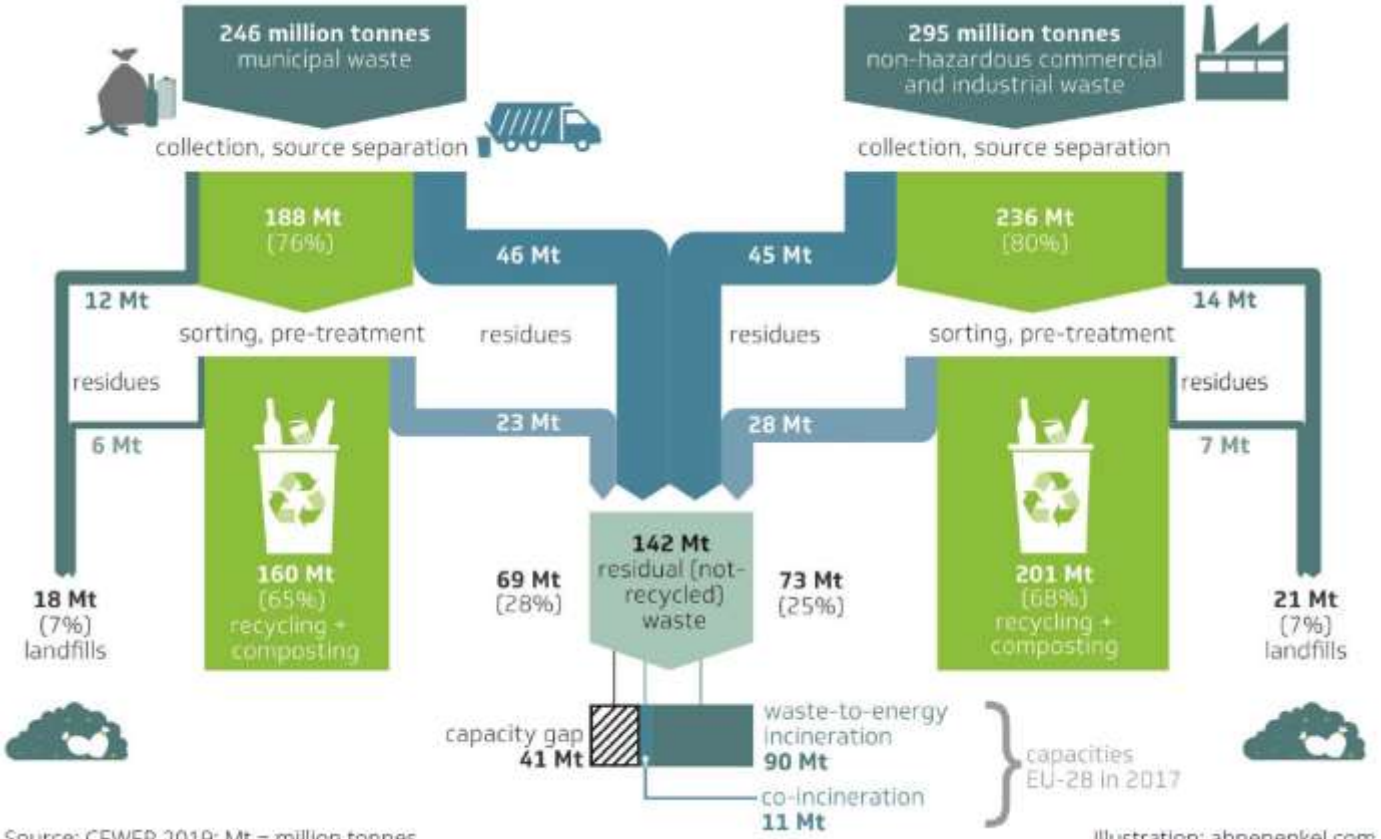


Residues from sorting plants: 25%



TYPOLOGIE DES FLUX SORTANT DES CENTRES DE TRI ITOM

Residual waste treatment in 2035



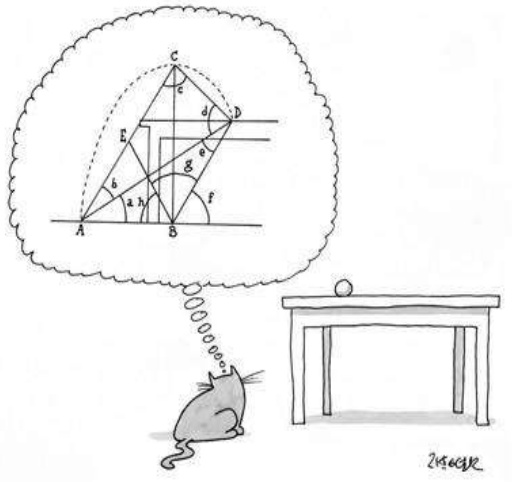
Source: CEWEP 2019; Mt = million tonnes

Illustration: ahnenenkel.com

BUT WHAT IF....

- MS do more (or less) prevention?
- Residues from recycling are more (or less) than 15%?
- Population growth is underestimated?
- Landfilling will still be higher than 7% (in average)?

CEWEP developed an online tool for the calculation of different scenarios



When there is not enough residual waste treatment capacity…

Scotland to send millions of tonnes of waste to English landfills

8 November 2018 by Conor McGlone

Scottish infrastructure 'not ready' for landfill ban

24 April 2019 by Luke Walsh

Scotland pushes landfill ban back to 2025

23 September 2019 by James Agyepong-Parsons

Doctors warn Rome trash crisis poses serious health risk

May 2018, Zgierz, 50 000 tonnes of waste from Germany, Switzerland and Italy:

Fires in waste facilities in Poland
More than 20 fires in 2 months (summer/spring 2018)

If this residual waste would be safely treated in Waste-to-Energy plants:

Energy Production scenario

131'166 GWh of heat

Enough for supplying heat to 22'117'000 inhabitants

The entire population of Denmark, Estonia, Finland and Sweden

56'476 GWh of electricity

Enough for supplying power to 27'795'300 inhabitants

The entire population of Denmark, Estonia, Finland, Iceland and Sweden

CO_{2eq} Saving scenario

WtE could lead to a saving of **115'048'730** tonnes of CO_{2eq}

By diverting waste from landfills and substituting energy from fossil fuels

119% of the Belgian CO_{2eq} emissions from fossil fuel

CEWEP

If this residual waste would be safely treated in Waste-to-Energy plants:

CO_{2eq} Saving scenario

Fossil CO_{2eq} directly emitted from WtE: **357** kg/tonne of waste

CO_{2eq} saved by energy substitution: **430** kg/tonne of waste

CO_{2eq} saved by landfill diversion: **805** kg/tonne of waste

By diverting waste from landfills and substituting energy from fossil fuels WtE could lead to a saving of **115 million** tonnes of CO_{2eq}

119% of the Belgian CO_{2eq} emissions from fossil fuel

In EU28, around 175 million tonnes of non-mineral waste are still landfilled (in 2016) leading to emissions of **more than 140 million tonnes of CO_{2eq}**

Calculations based on German UBA: The Climate Change Mitigation potential of the waste sector – 2015

Thank you for your attention!

Questions?

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