

Waste to energy – shift in the EU policies

The Clinic Workshop on waste-to-energy solutions for municipalities

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Content of presentation

- Waste-to-energy – facts and figures
- EU policies
- EU legislation

Facts and figures – 1

Share of municipal waste in electricity and heat generation

The actual share (2019) of municipal waste in electricity generation is very low elsewhere (world 0.28%, OECD 0.61%, USA 0.36%, **EU 1.40%**). The only exception is Switzerland with the share of 3.2%.

The actual share (2019) of municipal waste in heat generation is not negligible, especially in the Northern hemisphere (world 1.89%, OECD 9.1%, USA 2.7%, **EU 9.9%**). The highest share can be seen in Switzerland (59.9%) and Norway (39.4%).



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Facts and figures – 2

Treatment of municipal waste in the EU between 2000 and 2020

<i>Source: Eurostat</i>		2000	2005	2010	2015	2020
<i>Landfill</i>	Mt	112	88	79	57	52
<i>Incineration</i>		36	45	53	57	61
<i>Material recycling</i>		38	46	55	63	67
<i>Composting</i>		23	26	29	33	40
<i>Other</i>		11	16	6	4	5
<i>Total</i>		220	221	222	214	225
<i>Share of incineration</i>	%	16.4	20.4	23.9	26.6	27.1

The share of incineration in municipal waste management in the EU has increased from more than 16% in 2000 to more than 27% in 2020.



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Facts and figures – 3 - The EU Top 5

The “Top 5” list of the EU Member States with the highest share of municipal waste in heat generation in 2017 includes:

- Sweden – 24.8 %
- France – 20.5 %
- The Netherlands – 18.7 %
- Germany – 13.8 %
- Finland – 12.3 %



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Facts and figures – 4 - Waste incineration technologies

Different types of thermal treatments are applied to the different types of waste, however not all treatments are suited to all waste.

The most common technologies applied are:

- grate incinerators,
- rotary kilns,
- fluidised beds (FB),
- pyrolysis and
- gasification systems.

For municipal solid waste (MSW) and Refuse Derived Fuel (RDF) incineration grates are widely applied, while FB, rotary kilns, pyrolysis and gasification are also applied but to a lesser extent.



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Facts and figures – 5

Comparison of investment and operational expenditures for particular waste treatment operations

		Landfill	Composting plant	Anaerobic digestion	Incinerator
Capital expenditure	\$/t	5 – 52 Average 28.5	30 – 400 Average 215	220 – 660 Average 440	190– 1000 Average 595
Operational expenditure	\$/t	7 – 30 Average 18.5	12 – 100 Average 56	22 – 57 Average 39.5	12 – 55 Average 33.5

Source: Decision Maker's Guides for Solid Waste Management Technologies, World Bank 2018

Capital expenditures of waste incineration are higher comparison to other waste treatment options while operational expenditures may be comparable.

Facts and figures – 6

The Spittelau waste incineration plant, Vienna, Austria (50 years old)

Around 50 percent of the energy produced from waste incineration comes from biogenic or renewable sources. The environmentally-friendly heating produced is enough to heat more than 60,000 households in Vienna in a year. 50,000 households can be supplied with electricity every year.



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Facts and figures – 7

North Rhine-Westphalia waste incineration plant Oberhausen, Germany (10 years old)

Oberhausen Waste to energy Plant is a 70.5MW biopower project which generates 430GWh electricity and supplies enough clean energy to power 100,000 households.



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EU policies

As a part of the guiding concept of **Circular Economy**, a **waste to energy initiative** (document **The role of waste-to-energy in the circular economy**) has been adopted in 2017: “**When waste cannot be prevented or recycled, recovering its energy content is usually better than landfilling it**”.

The waste-to-energy operations are acceptable options in waste management in the EU, however not the first choice.

At the Member State level, waste management policy (including waste-to-energy sector) is laid down by national and regional waste management plans.

EU waste management hierarchy

THE WASTE HIERARCHY



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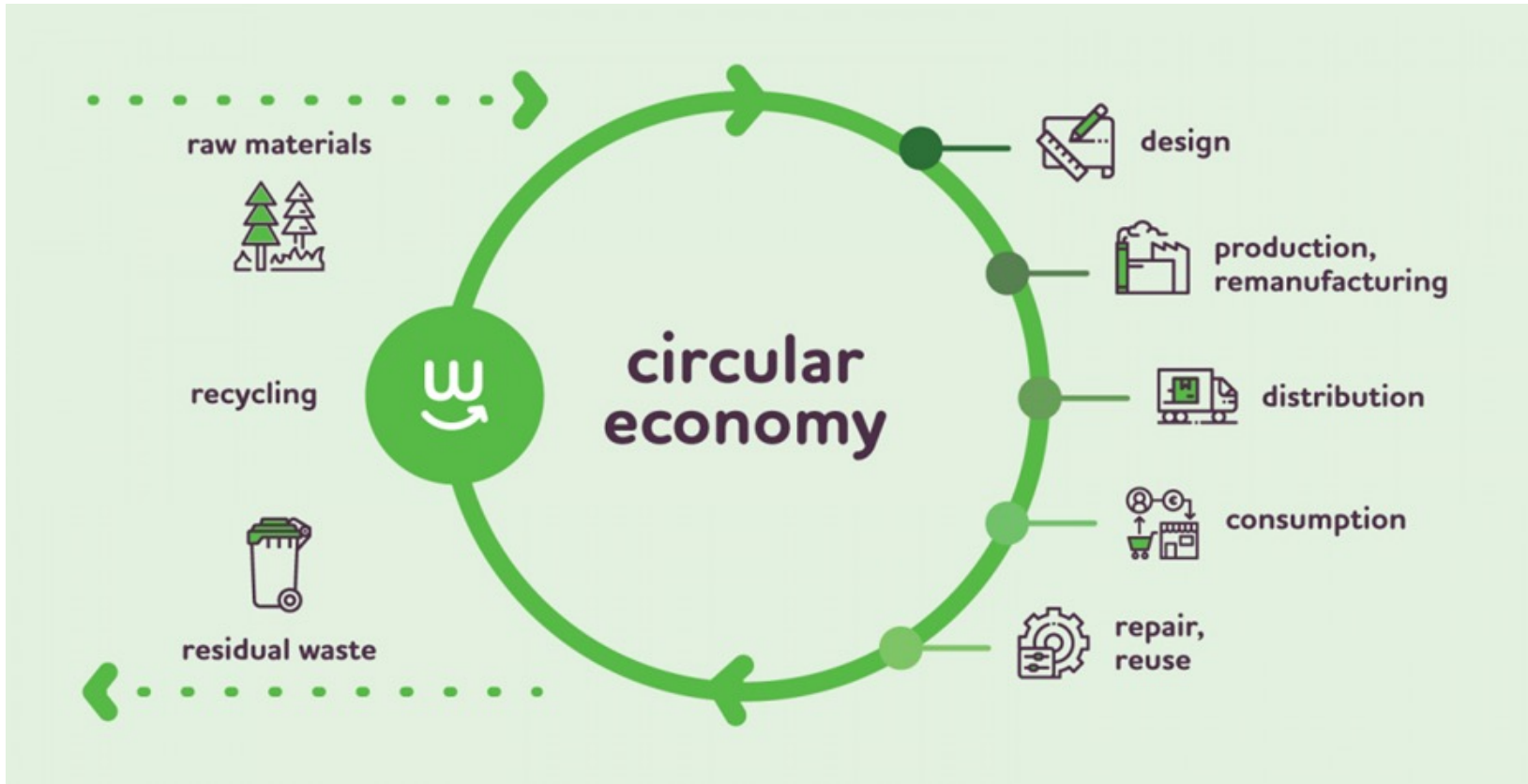
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EU circular economy concept



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EU legislation – 1

The Waste Framework Directive (Directive 2008/98/EC on waste), as amended in 2018, considers waste incineration either as disposal technique (D10 – Incineration on land) or a **recovery technique (R1 - Use principally as a fuel or other means to generate energy)**. In such a case, **requirement on minimum energy efficiency** is laid down.

Article 10.4: „Member States shall take measures to ensure that waste that has been separately collected for preparing for re-use and recycling is not incinerated, with **the exception of waste resulting from subsequent treatment operations of the separately collected waste for which incineration delivers the best environmental outcome.**“

Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources, Article 3.3: „Member States shall grant no support for renewable energy produced from the incineration of waste if the separate collection obligations laid down in the Waste Framework Directive (Art. 10.4) have not been complied with“.



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EU legislation – 2

At the EU level, only large waste incinerators and co-incinerators are regulated. **Industrial Emissions Directive (IED** – Directive 2010/75/EU on industrial emissions) applies for the disposal or recovery of waste in waste incineration plants or in waste co-incineration plants:

- **for non-hazardous waste with a capacity exceeding 3 tonnes per hour;**
- **for hazardous waste with a capacity exceeding 10 tonnes per day.**

Operators of installations within the scope of the IED must obtain integrated environmental permit which requires **introduction of Best Available Techniques (BAT)** and **compliance with BAT associated quantified parameters (emission levels, energy efficiency levels).**

BATs for particular sectors including waste incineration are being established by **BAT Conclusions** (by-laws under IED).

EU legislation – 3

BAT Conclusions for waste incineration (WI) were published on 3 December 2019. All requirements established therein must be complied with by all existing installations before 3 December 2023.

BAT Conclusions for waste incineration establish 37 particular BATs:

- Environmental management system (BAT 1)
- Monitoring of emissions and other relevant parameters (BAT 2 – BAT 8)
- General environmental and combustion performance (BAT 9 – BAT 18)
- Energy efficiency (BAT 19 – BAT 20)
- Emissions to air (BAT 21 – BAT 31)
- Emissions to water (BAT 32 – 34)
- Material efficiency (BAT 35 – 36)
- Noise (BAT 37)



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EU legislation – 4

Wherever relevant, **BAT associated quantified parameters** are laid down, obviously as **a range of values and separately for new and existing plants**:

BAT-associated emission levels (BAT-AELs) - air

- BAT-AELs for channelled emissions to air of dust, metals and metalloids (Cd + Tl, Sb + As + Pb + Cr + Co + Cu + Mn + Ni + V) from the incineration of waste
- BAT-AELs for channelled dust emissions to air from the enclosed treatment of slags and bottom ashes with extraction of air
- BAT-AELs for channelled emissions of NO_x, CO, HCl, HF, SO₂, mercury, TVOC, PCDD/F and dioxin like PCBs to air from the incineration of waste and for channelled NH₃ emissions to air from the use of SNCR and/or SCR



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EU legislation – 5

According to BAT 9, determination of the types of waste that can be incinerated is based on:

- the characteristics of the incineration plant,
- identification of the types of waste which can be incinerated in terms of, for example, the physical state, the chemical characteristics, the hazardous properties, and the acceptable ranges of calorific value, humidity, ash content and size.

Obviously, the list of types of waste acceptable for incineration or co-incineration is laid down as a part of integrated environmental permit.

EU legislation – 6

Characteristics of waste suitable for incineration proposed by WHO:

- Low heating value: above 2000 kcal/kg (8370 kJ/kg) for single-chamber incinerators, and above 3500 kcal/kg (14640 kJ/kg) for pyrolytic double-chamber incinerators.
- Content of combustible matter above 60%.
- Content of non-combustible solids below 5%.
- Content of non-combustible material fines below 20%.
- Moisture content below 30%.

EU legislation – Taxonomy Regulation (2020)

Article 17 (Significant harm to environmental objectives)

1. For the purposes of point (b) of Article 3, taking into account the life cycle of the products and services provided by an economic activity, including evidence from existing life-cycle assessments, that economic activity shall be considered to significantly harm:

(d) the circular economy, including waste prevention and recycling, where:

(ii) that activity leads to a significant increase in the generation, incineration or disposal of waste, **with the exception of the incineration of non-recyclable hazardous waste;**



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EU legislation – Public financing

Communication from the (*European*) Commission: Guidelines on State aid for climate, environmental protection and energy 2022

81. Aid for energy generation from waste may be found compatible to the extent it is limited to **waste that falls under the definition of renewable energy sources.**

86. Aid for energy generation from waste may be found compatible to the extent it is limited to **waste used to fuel installations that fall under the definition of high-efficiency cogeneration.**

224. **Aid for energy generation from waste will be assessed under the conditions applicable to aid for the reduction of greenhouse gas emissions.** Where it is related to investments in district heating and cooling systems or for their operation, **aid for the production of energy or heat from waste will be assessed under the conditions applicable to aid for district heating or cooling.**



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Thank you!



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