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WASTE MANAGEMENT

Volume 8

Waste-to-Energy

TK

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Policies and Strategies

The Impact of New EU Legislation on Waste-to-Energy

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In the last years, policy developments at the European level put the Waste-to-Energy (WtE) sector under the spotlights. The December 2015 Circular Economy package, formally adopted by European Union institutions in the first half of 2018 as well as the Clean Energy Package published in winter 2016 were particularly relevant for WtE, which is a natural link between Circular Economy and Energy Union. In late 2017 and at the beginning of 2018, other communications and legislative proposals at the EU level set some first steps towards new developments for the WtE sector.

In this article, we will summarize the impacts that the new EU legislation will have on the WtE sector in Europe.

1. Waste-to-Energy in the Circular Economy

In December 2017, a final agreement on the 2015 Circular Economy package was found between the European Parliament and the Council of the European Union. This agreement was formally adopted in spring 2018. The European Commission also released a new Circular Economy package in January 2018 which included documents relevant for the future developments of the Waste-to-Energy sector, and took additional initiatives in the framework of the circular economy.

1.1. Circular Economy package

After two years of discussions and negotiations between Parliament, Council and Commission, an agreement was reached on the 2015 Circular Economy package in December 2017. This agreement was formally adopted in the European Parliament

plenary on 18th April 2018, and by the Council of the European Union on 22nd May 2018. The package includes new targets for the landfilling and recycling of municipal waste, new definitions and updated measuring methods.

New targets

The Waste Framework Directive and the Landfill Directive as amended include a higher target for municipal waste recycling, and a new target limiting landfilling. The landfill target was particularly needed, as approximately 60 million tonnes (25 percent) of municipal waste were still landfilled in 2016 according to Eurostat. Eleven Member States landfill half or more of their municipal waste. Four countries even landfill more than 80 percent of their waste [13].

The agreement reached between the institutions leaves more time to Member States to achieve a target less ambitious than the proposal from the Commission.

Compared to the Commission proposal from December 2015, the target to landfill maximum 10 percent of the generated municipal waste has been delayed by 5 years for all Member States – to 2035, and by 5 additional years for the ten Member States that landfilled more than 60 percent in 2013 [10, Article 5 (6)]. This delay will have consequences on the environment. With such long transition times (up to 2040) there is a risk that for the near future not much efforts will be undertaken to invest in waste treatment higher up the hierarchy and that waste would be transported to Member States with higher landfill rates, using legal loopholes. This could lead to a handful of countries becoming the landfills of Europe.

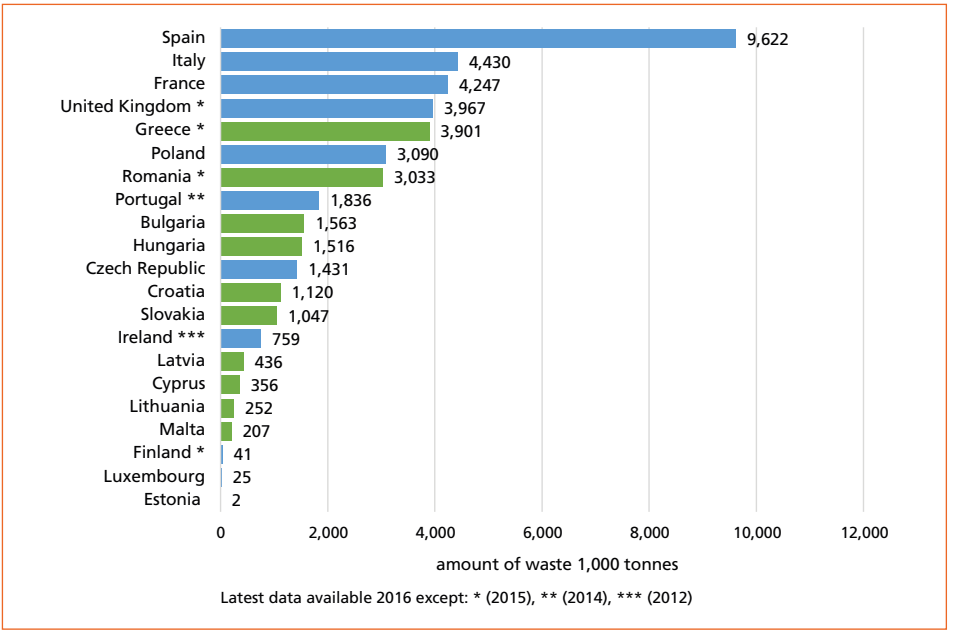


Figure 1: Amount of waste landfilled in 2016 which has to be diverted from landfills by 2035 (2040 for the countries in green) in order to reach the 10 percent target.

Fulfilling the landfill diversion targets would mean for some Member States to divert enormous amounts from landfilling: more than 9 million tonnes for Spain, around 4 million tonnes for Italy, France, the UK and Greece and more than 3 million tonnes in Poland and Romania (Figure 1).

Diverting waste from landfills is an essential step in moving the waste treatment up the waste hierarchy. It is also a low-hanging fruit in reducing the environmental impact of waste treatment. Research indeed shows that landfill diversion would be the biggest contributor to greenhouse gas reduction of the waste management sector [14].

Table 1: Landfill targets for municipal waste, as adopted in the new Landfill Directive

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

Table 2: Recycling targets for municipal waste, as adopted in the new Waste Framework Directive

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

Additionally, countries which recycled less than 20 percent of their waste in 2013 will also be able to apply for a 5 years extension to achieve the recycling targets (Table 2).

The waste hierarchy is clear: waste should be avoided, reused if possible and recycled if any other use is impossible. There is nevertheless always a fraction of waste that is unsuitable for recycling. It can be because it has been recycled several times, it contains substances of concern that should not stay in the cycle, or because recycling would have a high cost.

In this context, Waste-to-Energy will clearly have a role to play in helping the European Union to achieve a sustainable Circular Economy. The waste that cannot or should not be recycled should be treated in Waste-to-Energy plants to recover energy rather than being landfilled as acknowledged in the waste hierarchy. This also allows for a higher quality of recycling by treating the rejects from recycling facilities and keeping the cycle clean, which is key in building a strong recycling market.

The combustion of the material also allows to recover metals which no other process could separate. This is also taken into account in the new Waste Framework Directive [11].

Metals from bottom ash

The new Waste Framework Directive allows Member States to take into account the metals recycled from bottom ash in order to achieve their recycling targets [11].

> *Waste Framework Directive, Article 11a*
>
> *6. For the purposes of calculating whether the targets laid down in Article 11(2)(c) and (d) and Article 11(3) have been achieved, Member States may take into account*

the recycling of metals separated after incineration of municipal waste provided that the recycled metals meet certain quality criteria laid down in the implementing act referred to in paragraph 8 of this Article

This article shows that Waste-to-Energy plants are seen as a partner in achieving high recycling targets. This acknowledgment will inspire Waste-to-Energy plant operators around Europe to improve their existing efforts in metal recovery, and lead to more metal recycling.

A similar provision appears in the reviewed Packaging and Packaging Waste Directive [12, Article 6a (6)]. Metals recovered from incineration will be taken into account for the achievement of the packaging recycling targets in proportion of the share of packaging waste incinerated. The European Commission will adopt an implementing act on this topic by 31st March 2019.

The mineral fraction of the bottom ash, though not explicitly recognized in the Waste Framework Directive as recycling, is also used throughout the EU and intense developments are underway. The Green Deal for bottom ash in the Netherlands is a stepping stone towards the use of the clean mineral fraction of bottom ash as construction material. This agreement concluded between the Dutch authorities and the waste management sector aims to support initiatives towards improving bottom ash quality. The final goal is to make all the bottom ash produced in the Netherlands a freely applicable building material by 2020.

It can be expected that the coming years see more developments in quality recovery solutions for the mineral part of bottom ash, which could help to save valuable raw materials. Sand and gravel, for example, are essential materials in building construction. They are extracted at a very high rate, while it took thousands of years to form them. The United Nations Environment Programme expects that conflicts will arise from dependency on these materials [18].

New accounting methods

Additionally to counting metals recycled from bottom ash, the waste package reviews accounting methods in order to assess in a reliable way the recycling and landfilling targets.

The new rules on the calculation of the landfilling rates will differentiate between incineration with energy recovery (R1) and without (D10). The municipal waste that enters D10 incineration disposal operations in order to be subsequently landfilled shall be reported as landfilled [10, Article 5a]. This is not the case for the waste produced during recycling or other recovery operations (e.g. R1) of municipal waste.

The methodology to assess the recycling rates is also amended by the new Waste Framework Directive [11, Article 11a]. The weight of waste counted as recycled will be measured when entering a recycling operation or at the output of a sorting operation if it is subsequently recycled and the rejects from the sorting operation are not included in the weight reported. In order to guide Member States in accurately measuring

these rejects, the European Commission will adopt by 31st March 2019 a delegated act establishing rules for the calculation of materials or substances removed after a sorting operation, based on average lost rates.

New definitions

The reviewed Waste Framework Directive includes new definitions, and amendments to definitions that are relevant for the Waste-to-Energy sector.

The definition of municipal waste will be wider than the current definition.

The newly introduced definition of material recovery covers also backfilling. The definition of backfilling, introduced in this review, takes into account a recent ruling from the European Court of Justice [9]:

> *Waste Framework Directive, Article 3*
>
> *17b. "backfilling" means any recovery operation where suitable non-hazardous waste is used for purposes of reclamation in excavated areas or for engineering purposes in landscaping. Waste used for backfilling must substitute non-waste materials, be suitable for the afore-mentioned purposes, and be limited to the amount strictly necessary to achieve those purposes;*

This ruling was interpreted by some Member States as classifying hazardous waste (such as fly ashes from Waste-to-Energy plants) shipped to aboveground or underground mines as disposal operation, rather than recovery. It needs to be checked if the newly introduced definition of backfilling applies to aboveground quarries (as it was the case in the above mentioned European Court Decision) only or also to underground mines, e.g. disused salt mines for which specific environmental requirements apply.

A previous ruling from the European Court of Justice [8] about the use of hazardous waste in underground mines states that the hazardousness of the waste used to fill underground cavities is not relevant in order to assess if such an operation should be classified as disposal or recovery.

The authors are of the opinion that, according to the definition of recovery in the EU Waste Framework Directive, the use of waste, no matter if it is of hazardous or non-hazardous nature, in underground mines can be a recovery operation if:

- the mine operator is legally obliged to re-fill the disused mine and would have used other materials if the waste was not available,
- the environmental impact assessment is proven on a long-term basis, and
- the waste used for the filling is suitable for this purpose (this is the case for e.g. fly ashes from waste incineration).

These requirements are set, for instance, in a German regulation (Versatzverordnung [compare 16])

Guidelines regarding the definition of backfilling and the definition of municipal waste will be developed by the European Commission [11, Article 38 (2)].

1.2. Circular Economy Package II (January 2018)

In January 2018, the European Commission published a new package on Circular Economy, which included a strategy on Plastic in a Circular Economy, and a Communication on the interface between chemicals, products and waste legislation.

Strategy on plastic

In this communication, the Commission sets quantitative goals for plastic reuse and recycling in the EU. It includes targets for 2030 such as 100 percent reusable or recyclable plastic packaging on the European market and over 50 percent recycling of plastic waste. The Commission also aims to increase the demand for recycled plastic wastes in order to strengthen the recycling market [4].

The cycle however has to stay clean. Not all plastic waste is recyclable, and it can contain substances that should not stay in the material cycle. This aspect of the issue is tackled in another communication from the Commission that was published at the same time.

Interface between chemicals, products and waste

The Communication on the interface between chemicals, product and waste legislation acknowledges a potential conflict between two objectives of the circular economy: recycling as much as possible, and reducing the presence of substances of concern in the material cycle [5].

Rather than focusing on the quantitative aspect of achieving a circular economy, this communication takes a qualitative approach. In a study carried out in preparation for this document, the lack of qualitative vision in the legislation is even highlighted: *Collection and recycling targets focus on increasing the amounts of recycled materials, not on their quality regarding the absence of toxic substances. […] legislation does not incentivise activities to decontaminate waste/recycled materials.* [17].

Waste collected separately can indeed contain substances that are no longer allowed in new products. In some cases, these substances of very high concern should not be recycled. Following the waste hierarchy, Waste-to-Energy will help closing the circle by treating this waste in an environmentally sound way. This was emphasised by the Environment Commissioner Karmenu Vella in a speech at the Dutch Parliament in April 2016, *The first objective of the circular economy package is to avoid waste in the first place. But you can never eliminate it all, and you can never recycle it all of it. However you can still gain by recovering energy from the non-recyclable materials* [19].

1.3. Commission proposal on single-use plastics

On 28th May 2018, the European Commission published a new legislative proposal on the reduction of the impact of certain plastic products on the environment [6].

The proposal targets 10 single-use plastic items most commonly found on the European beaches and seas as well as abandoned fishing gear which together constitute around 70 percent of all marine litter items. Different measures are proposed for different products such as a plastic ban when alternatives are readily available and affordable, collection targets for plastic drink bottles, labelling requirements.

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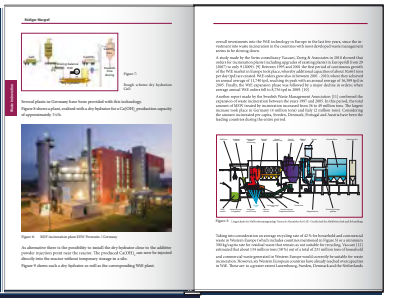
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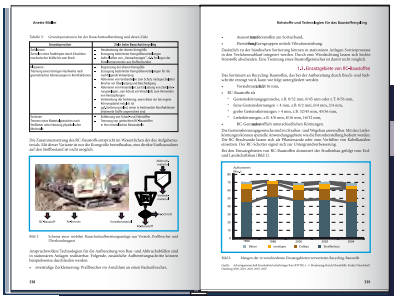
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2. Clean Energy package

In winter 2016, the European Commission published a Clean Energy package, which included the review of the Renewable Energy Directive, a key piece of legislation for the Waste-to-Energy sector and its future developments.

2.1. Review of the Renewable Energy Directive

Despite the best efforts of source separation, there will always remain some polluted residual waste from industrial, commercial or municipal origin. A fraction of this waste is biodegradable and is not suitable for recycling or composting – e.g. dirty cardboard.

In order to provide an incentive to support the production of renewable energy from this fraction, the Renewable Energy Directive integrates the biodegradable part of waste in its definition of *biomass*. This allows Member States to include energy produced from biodegradable waste in their national targets and their support schemes for energy from renewable sources.

This status is kept in the new version of the Renewable Energy Directive, which is being discussed between the European Parliament, the EU Council and the European Commission [2]. Waste-to-Energy will be able to continue to contribute to the EU targets on renewable energy while complying with the waste hierarchy.

One of the objective of the new Renewable Energy Directive is to increase the share of renewables used in district heating – the original proposal was to raise it by one percentage point every year in each Member State. As stated by Dominique Ristori, Director-General for Energy at the European Commission, heating and cooling represent 50 percent of the EU's energy consumption and are fuelled at 75 percent by oil, gas and coal. Therefore, switching to renewables would reinforce the EU's energy independence and reduce the consequences of oil price fluctuation [3].

In many cities, Waste-to-Energy plants already help to achieve high renewable energy rates by contributing to the district heating network. This is not only the case for Scandinavian cities, but also in cities like Paris, Vienna, Milan, Brescia or Rotterdam. In Barcelona, a Waste-to-Energy plant supplies hot water to the district heating system during winter, and provides district cooling during summer. These networks are connected to hospitals, public buildings and to some housing complex.

2.2. Further ideas towards a better Waste-to-Energy production

Many innovative ideas were put in practice in the Waste-to-Energy sector in Europe these last years, and pave the way to further developments in the near future.

As presented in a previous article [15, p. 8], Waste-to-Energy plants can provide heat to both citizens and industry. This now also includes the use of heat for farming. In 2017, a Waste-to-Energy plant near Toulouse (France) started to provide heat to a nearby greenhouse, producing 6,000 tonnes of tomatoes while reducing the need for fossil fuels. This demonstrates the ability of the sector to adapt its production to the energy needs of a plant's surroundings.

The sector is also focusing on improving its energy efficiency. In order to improve the efficiency of their Waste-to-Energy plant, the municipality-owned SWM (Städtische Werke Magdeburg) started to operate a hot water storage facility in November 2016. This facility helps to store surplus heat and allows the plant to increase electricity production during peak demand.

In order to treat waste in the most sustainable way possible, Waste-to-Energy plants are also embracing new technologies such as Carbon capture and usage (CCU). The Twence Waste-to-Energy plant in the Netherlands took part in an EU-funded CCU test project in 2011. After three years of a positive experience with the technology, the plant decided to fully integrate a CCU unit. Fully operational since 2016, the unit produces sodium bicarbonate from the capture of CO_2. The sodium bicarbonate is then used in the plant's flue gas cleaning system, thereby saving raw materials while reducing carbon emissions.

The Dutch Waste-to-Energy company AVR announced on 31st May 2018 that they would start the construction of a full-scale CO_2 capture system in their Duiven plant. The 60,000 tonnes of captured CO_2 will be transported to greenhouses and help reduce the use of fossil fuels. For the company, this would be a test case in order to potentially build a similar installation in their Rozenburg (Rotterdam) plant, where it could capture 800,000 tonnes of CO_2 per year [1].

3. Conclusions

The new Waste Framework Directive, Landfill Directive and Packaging Waste Directive will offer further opportunities for the Waste-to-Energy sector to demonstrate its key role in a Circular Economy.

Firstly, for non-recyclable waste Waste-to-Energy is the only sustainable alternative to landfill as it helps to keep the material cycle clean. Secondly, the possibility to count metals recovered from bottom ash as part of the recycling targets, both for municipal and for packaging waste, will highlight that bottom ash contributes to resource efficiency. The latest initiatives from the European Commission, published in 2018, switch the emphasis on the quality of the recycled materials, in particular with the communication on the interface between chemicals, products and waste legislation. This will allow Waste-to-Energy to shine as a sustainable way to treat waste that is contaminated with substances that should not be recycled.

In order to explore the whole potential of sustainable waste management, it would be important that EU waste legislation will, after setting targets for landfill diversion and recycling for municipal waste, also have a look at other waste streams like commercial and industrial waste.

On the energy side, the energy produced by the biogenic part of the waste will still be acknowledged as renewable. Thanks to this, the sector will contribute to the EU goals on increasing the share of renewable energies in the energy mix and in the heating and cooling sector. Many examples around Europe show that the sector is reaching

for innovative approaches in providing energy fitting to specific needs, improving energy efficiency of the plants, and is working on reducing its carbon footprint with advanced technology.

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