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Waste-to-Energy

An indispensable pillar of waste management and a valuable contribution to the circular economy

Main reasons why Waste-to-Energy (WtE) is a necessary and sustainable component of services of general interest:

- Waste-to-Energy (WtE) is necessary, because there is no more sustainable alternative for dealing with certain waste. At the same time, the use of waste heat, minerals and metals can make a substantial contribution to raw material supply and to reaching the European climate targets.
- WtE offers the opportunity to dispose non-recyclable waste hygienically and safely, while at the same time utilising its energy content.
- WtE plants, together with waste sorting and recycling, are indispensable for avoiding environmentally harmful landfilling, which is still carried out in many EU Member States.
- A steering effect (e.g. through a CO₂ price*) in favour of climate protection has to be initiated by addressing the design and raw materials of the products, i.e. at the beginning of the product life cycle. At the stage of disposal, it is not possible anymore to influence which products are eligible for repairing or recycling.

The thermal treatment of waste is necessary to ensure the proper treatment of municipal and special waste, which is part of the duty of services of general interest. If waste does not only have to be disposed of because of its hazard potential but also has a relevant energy content, energy recovery can even make an additional valuable contribution to sustainability and the circular economy by using the waste heat from incineration. The most advanced national models of waste management in the EU combine a high degree of

recycling with the necessary degree of energy recovery from waste. In this way, waste that cannot be recycled to a high standard can be treated safely and its energy recovered, just like residues from sorting and recycling processes. EU legislation on circular economy, the Waste Framework Directive and the Industrial Emissions Directive, stipulate that energy recovery from waste must be energy-efficient and environmentally friendly.

According to the waste hierarchy, avoidance, reuse and recycling have priority over other forms of recovery and disposal, including energy recovery. Yet, not all types of waste can - for the time being - be avoided, reused or recycled to a high standard. Therefore, energy

Waste-to-Energy is necessary for fulfilling the tasks of services of general interest and for a sustainable and safe circular economy.

recovery from waste must continue to be considered as an eligible part of the waste treatment – respectively in the context of the EU taxonomy and the "Fit for 55" package. Consequently, respective financing options must be safeguarded. Otherwise, a lack of thermal waste treatment would encourage rather than reduce the environmentally damaging landfilling of high-calorific, fossil or even methane-forming biological waste.

Many Member States still rely heavily on uncontrolled or technically inadequate landfills. They need to invest in all stages of the waste hierarchy to become more sustainable. In contrast, in Germany, the landfilling of non-pre-treated and biodegradable municipal waste has been banned since 2005. By 2015, this landfill ban had already led to the avoidance of direct methane emissions from landfills with a climate-damaging effect of around 30 million tonnes of carbon dioxide equivalents per year. This is equivalent to a reduction of 70 to 80 percent compared to the reference year 1990. The waste management sector has thus achieved by far the greatest reduction success of all sectors. This was only possible because the waste that is no longer landfilled is either collected separately, sorted and recycled or when necessary incinerated and its energy recovered.

The Covid-19 pandemic in particular has shown how much hygienically critical waste can be produced that can only be safely treated by incineration. Such waste cannot be recycled and should not be landfilled. At the same time, the use of the resulting waste heat, the extraction of scrap from the incineration ash and the provision of mineral substitute building materials allow for a valuable contribution to the circular economy and environmental protection. Pollutants are destroyed or removed by the extremely complex and effective flue gas treatment.

As waste management companies have no control over the product design, energy recovery at the end of the product life cycle does not lead to an increase in non-recyclable waste. The higher levels of the waste hierarchy can only be promoted by targeting the product design and the waste producer. Yet, waste management companies are responsible for the safe and environmentally sound treatment of waste and must fulfil the waste management obligation in line with the provision of services of general interest. As long as the products are not designed in such a way that they can be repaired or recycled to a high standard, and the consuming companies and households do not (or cannot) consistently avoid non-recyclable energy-rich waste, WtE plants are the only sustainable and safe option for the treatment of this waste.

The European Commission's¹ Joint Research Centre (JRC) has also recognised the importance of WtE plants. According to the JRC, energy recovery from waste has several advantages, such as providing a local source of renewable energy and reducing the

amount of solid waste going to landfills. The JRC points to the associated positive impact on carbon emissions by avoiding methane emissions from landfills and carbon dioxide from primary fossil fuels. On a global scale, the process of converting waste into energy would also play an increasingly important role in the sustainable management of waste as a source of renewable energy.

The cities, districts and municipalities, their municipal waste management companies and their private partners in the waste and circular economy point out that Waste-to-Energy - taking into account the waste hierarchy and Best Available Techniques - will remain a pillar of waste management for the foreseeable future. There is, of course, no doubt that waste prevention takes precedence over all that. At the same time, we point out that WtE is of great importance not only for the circular economy, but also for the energy transition and for climate protection. This holds especially for heating, through the recovery of energy from waste heat or innovative hydrogen production. Therefore, energy-efficient Waste-to-Energy should be considered sustainable in the taxonomy as well as in the "Fit for 55" package and in upcoming new or revised legislative proposals.

In the following, practical examples show why Waste-to-Energy is both sustainable and essential for providing services of general interest.

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Berlin has set itself the goal of becoming climate-neutral by 2045. An important field of action is the supply of heat. In addition to that, Berlin intends to reduce the volume of municipal waste by 20 percent by 2030. The framework for this is provided by international and European requirements, not least the European Green Deal, with which the EU aims to play a leading role worldwide in the circular economy and in clean technologies, as well as the Berlin Waste Management Concept and the Berlin Energy Transition law. In order to ensure the long-term security of waste treatment in the state of Berlin, those waste volumes that can neither be avoided nor recycled and are energy-rich must continue to be used energetically in the future. Therefore, thermal treatment plays an important role in the climate strategies and laws of the state, at least for the medium term (at least until 2040).

Example: Berlin Climate Protection and Energy Transition law (2021): Operators of heating networks will be obliged to draw up decarbonisation roadmaps. Aligned with the goal of a climate-neutral heat supply, the operators are to demonstrate that from 2030 onwards at least 30 percent of the heat transported in the heat supply networks they operate will come from renewable energies or unavoidable waste heat.

¹ Scarlat, N., Fahl, F. & Dallemand, JF. Status and Opportunities for Energy Recovery from Municipal Solid Waste in Europe. *Waste Biomass Valor* **10**, 2425–2444 (2019). <https://doi.org/10.1007/s12649-018-0297-7>

Example: Feasibility study *Making Berlin Paris-compliant* (2021): For the use of heat from the Ruhleben waste incineration plant (facility of **Berliner Stadtreinigung** (BSR)), the study assumes that the plant will be available as a CO₂-free heat resource on an expanded scale by 2040. (...)The heat from waste incineration, which should be taken into account until 2040, is continuously used as a base load.

Background: In total, BSR is responsible for annual CO₂ emissions of around 370,000 tonnes (as of 2018). BSR has been voluntarily committed to reducing its CO₂ emissions since 2005. From 2007 to 2017, the local public utility has already reduced its CO₂ emissions by a total of 237,000 tonnes. In the current climate protection agreement, BSR commits to reducing its CO₂ emissions by a further 67,000 tonnes by 2025. When it comes to clean and climate-friendly thermal waste treatment, BSR's Waste-to-Energy plant is considered a pioneer throughout Germany. The energy efficiency and thus the climate benefits of the Waste-to-Energy plant are constantly being increased through adjustments and upgrades. The net climate benefit of the plant is currently around 320,000 tonnes of CO₂ per year. And, BSR is constantly working on further optimisations.

This shows that waste treatment safety and climate protection go hand in hand in Berlin. At least for the time being and as laid down in current strategies and legislation, thermal waste treatment is assigned an essential role in Berlin.

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In order to be prepared for the structural change in rural areas and the energy transition and to create a more sustainable future, WtE plants are a core element of an innovative future strategy for **Helmstedt** (Lower Saxony). In Helmstedt, **EEW Energy from Waste** generates around 331,000 megawatt hours of electricity from waste. This corresponds to the electricity needs of around 95,000 households in the region. Thanks to the good transport links, up to 525,000 tonnes of waste a year are not only delivered quickly and without disruption, but also recycled safely and with low emissions, thus ensuring waste treatment security for the former Helmstedt lignite mining region and the neighbouring counties. Building on the hydrogen strategy of the state of Lower Saxony, a green energy hub for the production of green methanol from CO₂ and green hydrogen is now to be established.

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Today and in the future, Waste-to-Energy plants minimise the input of pollutants into the environment, reduce methane emissions from landfills, introduce recyclable materials into markets for secondary raw materials and use waste heat. The main factors influencing the volume of waste are population development, economic development and the distribution of the population between rural areas and metropolitan regions. Most of the waste recycled in **Mannheim** at a thermal treatment plant operated by **MVV** comes

from municipal waste in the densely populated Rhine-Neckar metropolitan region and neighbouring municipalities and districts. Most of the commercial waste also comes from the region. The energy contained in the residual waste is in turn utilised for the region in the form of heat, process steam and electricity. MVV's district heating network extends to **Mannheim, Schwetzingen, Brühl, Kettsch and Heidelberg**, thus supporting the municipal and regional climate-friendly energy supply. The waste heat from the waste treatment plant in Mannheim currently covers around 30 percent of the heating requirements of the district heating network in Mannheim and the surrounding municipalities and supplies 165,000 households in Mannheim and neighbouring regions. The heat output amounts to 2.2 - 2.9 terawatt hours (TWh) per year. In the municipality of Brühl, for example, around 620 households and businesses are supplied with low-cost and climate-friendly district heating, covering the community's heating needs of over 9,000 kilowatts.

With the further development of the thermal treatment plant, the local public utility also offers a sustainable utilisation of municipal sewage sludge, which is produced during the process of treating wastewater. The phosphorus it contains is indispensable for plant growth and is converted into ash by the thermal treatment of the pre-dried sewage sludge, from which phosphorus can be obtained as a high-quality fertiliser.

Furthermore, **MVV**'s TREA Leuna plant provides reliable and sustainable waste treatment services for **counties and municipalities in Saxony-Anhalt, Thuringia and Saxony**, sometimes in rural areas, as well as for regional and national commercial customers. In addition to electrical energy, TREA Leuna also generates process steam, which meets 50 percent of the demand of the neighbouring chemical park and, thanks to the connection to the district heating network of the neighbouring city of Merseburg, also the district heating demand of its 35,000 inhabitants.

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These are German examples indicating why WtE plants are sustainable and play an integral part in providing services of general interest on the ground. Numerous other examples can be found at national as well as European level. They show how important it is that Waste-to-Energy is positively considered in the design of the EU taxonomy, the "Fit for 55" package and other related EU legislation. In order to further allow for the necessary investments for the efficient use of unavoidable waste heat to be promoted.

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* For matters of simplification, „CO₂“ serves as an equivalent for all Greenhouse gas emissions.

VKU – The German Association of Local Public Utilities „Verband kommunaler Unternehmen“ (VKU) represents around 1,500 local public utilities in Germany, operating in the sectors of energy, water/waste water, waste management and telecommunication.

DStGB – The German Association of Towns and Municipalities is a German central organisation of the municipal self-government which represents the interests of 11.000 towns and municipalities.

Deutscher Landkreistag – The German County Association (“Deutscher Landkreistag”) is the leading association of the 294 German federal administrative districts (Landkreise). The Landkreis sector covers around 96 per cent of the surface area of the Federal Republic of Germany and represents three quarters of the local authorities, who in turn represent 55 million inhabitants or 68 per cent of the German population.

Deutscher Städetag – The Association of German Cities (Deutscher Städetag) represents the interests of all autonomous cities and most county-affiliated cities. Around 3,200 cities and municipalities with around 53 million inhabitants have joined forces.

ITAD – The Interest group of thermal waste treatment plants in Germany (ITAD e.V.) represents well over 90 % of the incineration capacity nationwide. As an association, we lead the way in forward-looking energy and climate projects and support member companies in achieving their goals.

BDE – The BDE Bundesverband der Deutschen Entsorgungs-, Wasser- und Rohstoffwirtschaft e. V. (Federal Association of the German Waste Management, Water and Raw Materials Industries), with its headquarters in Berlin and an EU office in Brussels, is the largest association of the German private waste management, raw materials, recycling and water industries with around 750 member companies. Europe-wide, it is the largest association in these sectors.

VÖWG – The Austrian Association of Public Enterprises and the Public Sector - VÖWG - represents the interests of the public sector, especially in the area of services of general interest.

MWE – Municipal Waste Europe is the European umbrella association representing public responsibility for waste. The members are national public waste associations and similar national, regional associations or municipalities. They are committed to sustainable waste management that minimises the impact of waste on the environment and promotes resource efficiency, taking into account local conditions.

FEAD – FEAD is the European Waste Management Association that represents the private waste management and resource industry across Europe. Our members are national waste management associations covering 20 EU and EFTA countries. They represent about 3,000 companies with activities in all forms of waste management.

CEWEP – CEWEP (Confederation of European Waste-to-Energy Plants) is the umbrella association of the operators of Waste-to-Energy plants across Europe. CEWEP’s members are committed to ensuring high environmental standards, achieving low emissions and maintaining state of the art energy production from remaining waste that cannot be recycled in a sustainable way.

CEDEC – CEDEC represents the interests of 1500+ local energy companies in electricity, gas and district heating, active in every part of the value chain, enjoying the trust of 85 million energy consumers. These companies support the cost-efficient transition to a climate-neutral economy and society, striving for an integrated energy system that is maximising the potential of local resources, sustainable and affordable.