INCLUDING INCINERATION IN THE EU-ETS: POTENTIAL IMPACT ON LANDFILLING

REPORT FOR ZERO WASTE EUROPE

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Executive Summary

This report assesses the risk that including waste incineration in the EU Emissions Trading System (EU ETS) could lead to an increase in landfilling across the European Union. It finds that such a shift is unlikely under current regulatory and economic conditions, and would be less so were the Landfill Directive to be better articulated, and properly implemented, so as to align with the views of the Court of Justice of the European Union (CJEU).

The inclusion of waste incineration in the EU ETS is intended to address greenhouse gas emissions from the sector by introducing a price on emissions of carbon dioxide (CO_2). Approximately half of the CO_2 emissions from incineration of municipal type waste are fossil-derived, coming from waste materials such as plastics, making the measure relevant for achieving EU climate objectives.

While the EU ETS will add to the cost of incineration, price signals alone are not expected to drive a significant diversion of waste to landfill. Waste management systems in the EU are shaped by policy and law that constrain the degree to which a reversion to landfill is possible, and where competition may be more price sensitive, long-term arrangements of a contractual nature will likely limit the extent to which such a switch can occur.

In many Member States, landfilling of untreated waste is restricted or prohibited. Many countries with such bans and restrictions in place already landfill less than 5% of municipal waste, indicating the extent to which policy successfully limits landfilling. These Member States account for the majority of incineration of municipal waste, and the majority of incineration / co-incineration of all waste.

In many other Member States, there is very little incineration to switch away from. Most of these Member States belong to a group which have so far failed to implement a requirement to treat waste prior to landfilling which aligns the views of the Court of Justice of the European Union (CJEU). Two are Member States who have belatedly implemented such requirements that will take effect in future. In this group of Member States, where taxes on landfill have been absent or low, as well as subject to significant slippage, disposal to landfill has likely remained the cheapest option for managing residual municipal-type waste. Landfill taxes are now being applied at increasing rates in some of these Member States, but treatment requirements are lacking.

Four Member States – Italy, Poland, France and Spain - account for a significant share of incineration of municipal waste, but also still landfill significant proportions of municipal waste (as of 2023). These Member States might be those for which a switch away from incineration to landfill seems, on the face of it, most likely. However, both Italy and Poland have in place policies regarding treatment of waste prior to landfill that reduce this likelihood: Poland's tax on landfill has risen relatively quickly to €95 per tonne in 2025. If France is to meet EU recycling targets, it seems likely that it will need to be incinerating less waste than in 2023, but the principal switch needs to be recycling, not landfill. France has recently increased its landfill tax (to €65 per tonne), as well as increasing the tax applicable to incineration (various rates from €7.50 to €25 per tonne apply for non-hazardous waste), which might support that direction of change. In Spain, significant regional differences persist. In neither France nor Spain is there, to our knowledge, a national stipulation to treat waste prior to landfill that is aligned with the CJEU rulings.

Many Member States – including France and Poland (see above) – have seen recent increases in landfill taxes that are comparable with, and sometimes greater than, the likely increase in costs of incinerating mixed municipal type wastes resulting from the EU-ETS, which we estimate to be of the order €35 per

tonne at current EUA prices. Some examples are given below, indicating that the applied taxes have increased significantly in the past, and that the existing tax differential between landfill and incineration in these Member States is already significant.

Table E-1: Significant Landfill Tax Increases in Recent Years, and Latest Tax Rates on Landfill and Incineration

Member State	Increase (€ per tonne)	Period	Landfill Tax (€ per tonne)	Incineration Tax (€ per tonne)
Czechia	€29 €45	2021 - 2025 2021 - 2029	€61 (2025) €75 (2029)	-
France	€23-€47	2020 - 2025	€65	€7.5-€25
Ireland	€55	2010 - 2023	€85	€10
Latvia	€129	2006 - 2026	€130	€15
Lithuania	€40	2021 - 2023	€50	-
Poland	€66	2021 - 2025	€97	-
Portugal	€28.40	2016 - 2025	€35	€18.7 (D10) €4.4 (R1)
Romania	€26	2019 - 2024	€32	-

Source: see Appendix 2

The impact of the EU ETS will vary according to the fossil carbon content of waste. Beyond the 'mixed' municipal and other wastes, and sorting residues, there are a number of waste streams which are incinerated / coincinerated that have low, or zero, fossil carbon content. The effect of the EU-ETS on the cost of incinerating these wastes will be zero, or close to zero, so no shift to landfill would be expected. The effect of the EU-ETS on costs will be greatest for waste streams with significant fossil carbon content, creating incentives for improved sorting (where relevant) and recycling, and potentially, carbon capture and storage. A share of these wastes will likely already be destined for co-incineration at cement kilns and other facilities which are already within the EU-ETS, so there would be no 'new' effect on these. Although – because of existing landfill bans and treatment requirements – the likelihood of a switch from incineration to landfill is likely to be very small, the wastes for which the price impact of the ERU-ETS are highest are those which would be least likely to degrade in landfills, should they be sent there as a result. It would follow that the potential for detrimental impacts related to greenhouse gas emissions would be minimal (because the price effect would be greatest for the materials least likely to degrade in landfills).

The EU Landfill Directive requires the treatment of waste prior to landfilling. Appendix 1 suggests that Bulgaria, Croatia, Cyprus, Estonia, France, Greece, Hungary, Malta, Portugal, Romania and Spain are yet to introduce national requirements for treatment that align with the ruling of the Court of Justice of the European Union (CJEU), with Czechia and Slovakia having only recently done so. Although some of these Member States have increased taxes on landfill recently (see above), in most cases, the taxes are not especially high (see Appendix 2). Were the treatment requirement to be better articulated in the Landfill Directive, and then, implemented at Member State level, not only would this effectively reduce the greenhouse gas emissions from waste landfilled in future, but the option of cheap disposal to landfill would be closed off. Indeed, in many of the Member States mentioned, the costs of landfilling would increase accordingly, with the levels of increase similar to those that would be implied by including incineration within the EU-ETS. Simply implementing existing law better, therefore, would have the effect of improving the economics of recycling whilst also addressing the problem of methane emissions from any future landfilling of waste.

Overall, the quantity of waste at risk of diversion from incineration to landfill is limited by the effectiveness of existing policies; the geographical concentration of incineration in Member States where those policies are in place; the existence of contractual-style commitments to supply waste to facilities; the fact that the fossil-derived carbon content of wastes sent for incineration / co-incineration is often low or zero; and the fact that there is plenty of scope for further recycling of wastes currently being incinerated. Several Member States are likely to need to scale back incineration in future if they are to meet EU recycling targets. The inclusion of incineration within the EU-ETS can support progress in that direction. In Member States without significant incineration capacity, ensuring that the treatment requirement of the Landfill Directive is effectively implemented can support an upward, not a downward, shift in the waste hierarchy.

E.1.0 Recommendations

The inclusion of waste incineration in the EU ETS is unlikely to result in a significant increase in landfilling. The more likely evolution in the coming period is a switch to recycling, and a freeing up of capacity at incinerators in Member States which account for the majority of incineration today.

Incineration should be included within the EU-ETS as planned.

The difficulties in measuring, on an ongoing basis, diffuse emissions from landfills make including them within the EU-ETS less than straightforward. Because effective treatment of waste prior to landfilling, allied with suitable measure to manage landfilled waste, can significantly reduce the potential for fugitive methane emissions, actively pursuing this route makes the matter of including landfills in the EU-ETS, which would be far from straightforward, less problematic.

The Landfill Directive should be amended so that the definition of 'treatment' is aligned with the CJEU ruling. That would define treatment as a combination of sorting of mixed waste, and stabilisation of the organic fraction so that the respirometric activity falls below 10mg O_2/kg dry matter. The Directive should also be rendered consistent with this definition (for example, by amending references to maximising the amount of landfill gas collected for energy recovery). Either in the Landfill Directive or through the Landfill BREF, the choice of appropriate cover layers and other measures to manage residual methane generation should be elaborated. There should be no criteria restricting what may be landfilled according to its calorific value.

The problem of methane emissions from landfills that received waste in the past will remain. Because some of these will be closed, and because the scope for generating revenue that would be needed to fund the purchase of allowances will in many cases have passed (once a site no longer receives waste), then the scope for including 'old sites' within the EU-ETS is likely to prove problematic. This will become all the more so if no entity can be identified who would carry the associated liabilities (as may be the case for older sites, not to mention illegal dumps).

Consideration could be given to a scheme providing for the generation of methane credits to encourage entrepreneurs to fund activities to reduce future methane emissions from past disposals. This would need to be based on emissions reductions relative to credible counterfactuals, and might be restricted to specific activities. The credits could be given value through their being traded within the EU-ETS.

To give even greater comfort that any switch away from incineration is towards tiers higher in the waste hierarchy, it is proposed to introduce a measure to reduce steadily the quantity of residual municipal waste generated. The merit of such an approach, as a complement to including incineration under the

EU-ETS, and a proper articulation and enforcement of the LFD treatment requirement, is that it emphasises reducing all forms of residual waste management (incineration, co-incineration, landfilling of treated waste (and landfilling of untreated waste whilst it still takes place)).

We propose that an economic instrument to reduce residual municipal waste is introduced.[1]

[1] Dominic Hogg (2025) *Cap-and-trade on residuals: Proposals for a Circular Economy Act* Report for Zero Waste Europe. October 2025. Dominic Hogg (2026) *Marginalising Waste: a Trading Scheme to Reduce Residuals*, Report for Reloop and Zero Waste Europe, February 2026.

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1.0 Introduction

Equanimator Ltd is pleased to present this Final Report to Zero Waste Europe regarding the possible effects of including incineration with the EU-ETS. This is a subject which has been widely discussed since the potential for incineration's inclusion within the EU-ETS was first considered. Some concerns have been expressed as regards the potential for this change to give rise to a switch from incineration to landfill. This paper summarises some of the key arguments as to why this is unlikely, and also, how focusing on proper articulation and enforcement of existing EU law, in the manner we have suggested in previous publications, this would be made still less likely, not to mention, of a lesser concern even if it were, in fact, to occur.

2.0 Why is Incineration Being Included In the EU-ETS?

Waste is made up of a range of different materials and products that are discarded by households, businesses and other organisations. More and more households and businesses across the EU have the opportunity to segregate waste into wastes that can be recycled, and waste which cannot. Variations in the systems provided, and in participants' behaviour, leads to there being more 'leftover mixed waste' (LMW) than is desirable. The materials making up LMW include some that include carbon of fossil-origin (such as plastic packaging and synthetic textiles) as well as some that include carbon of non-fossil origin (such as food waste, paper and cardboard). When these materials are combusted, most of the carbon is released to the atmosphere as carbon dioxide (CO_2).

The EU-ETS seeks to reduce emissions of some greenhouse gases, mainly CO_2, from various processes, including from energy generation. In reporting emissions of greenhouse gases to the United Nations Framework Convention on Climate Change (UNFCCC), in cases where incineration generates energy (the vast majority of cases in the EU), emissions are reported under the energy segment of the 'Stationary Combustion' chapter of the inventory, not (as is the case with landfills) under the 'Waste' chapter.[2] As other power and energy sources decarbonise, the carbon intensity of these other sources will decline, but without the inclusion of incineration under the EU-ETS, emissions from incineration may not be addressed. In principle, the same could be achieved where Member States have other incentives in place for reducing emissions (such as a tax related to the level of CO_2 emissions on incineration), and where such policies price emissions at a level that is similar to what may be expected under the EU-ETS. Nonetheless, although some Member States

[2] See Chapter 2: Stationary Combustion in IPCC (2007) *2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 2: Energy*, IPCC, Switzerland; Introduction in IPCC (2006) *2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 5: Waste*, IPCC, Switzerland. For a discussion, see Equanimator (2022) *Problems in the Reporting of GHG Emissions from 'Waste': Indicators and Inventories*, February 2022.

have implemented levies on incineration, these are rarely based on the measured emissions from incineration.[3]

As a very basic rule of thumb, combusting mixed waste in an incinerator leads to emission of roughly 1 tonne CO_2 per tonne of waste. Of this, roughly half is of fossil origin. This proportion will vary depending on the original composition of waste, how well businesses and households engage with the collection services on offer, and the *relative* 'accuracy' with which they sort, into recycling, the fossil carbon containing materials and the materials containing non-fossil carbon. The proportion matters since it seems likely that only the CO_2 derived from the materials containing fossil carbon will 'count' under the EU-ETS.[4]

This proportion is not 'fixed'. Importantly, inclusion under the EU-ETS may lead to greater interest in sorting out materials containing fossil carbon prior to incineration using modern sorting systems that can extract plastics and some other materials for recycling from LMW.[5] This may have the added benefit of additional CO_2 savings that may result from recycling of plastics. There is also interest in capturing CO_2 from the incinerator flue gas as a means to reduce the need to acquire EU allowances. In terms of the amount of waste incinerated, however, the two approaches have different outcomes, with the sorting approach reducing the amount ultimately left for incineration. Furthermore, by reducing the calorific value of the remaining waste, the capacity of the incinerator which is subsequently freed up is likely to exceed the weight of material sorted for recycling.

It is important to recognise, therefore, that a key route to reducing fossil-derived CO_2 emissions from incineration will reduce the amount of waste incinerated. This reduction will not be a result of waste moving from incineration to landfill: it will move from incineration and into recycling.

3.0 Will Including Incineration in the EU-ETS Increase Landfilling?

This concern is presented largely in terms of the way that the EU-ETS would affect the price of incineration, and in particular, its price relative to landfilling. Currently, EU Allowances (EUAs) are trading at around €70 per tonne CO_2. Based on our 'rule of thumb', that would leave a need to purchase EUAs for half a tonne of CO_2 for each tonne of waste incinerated (if not subject to prior LMWS). That would increase costs by around €35 per tonne of waste. Most analysts forecast rising

[3] There are also other sound reasons for taxing incineration. For example, as regards emissions of oxides of nitrogen (NOx), limit values under the IED have remained unchanged for the last quarter of a century, even though abatement techniques exist to further reduce emissions. A facility complying with a permit may be emitting close to 1kg of NOx per tonne of waste combusted. Given that the EEA estimates externalities from NOx of the order €13.35 – €42.95 per kg in €2021 (or €18.06-€50.53 in €2025), then given the relatively low levies applied (only Netherlands and Denmark apply taxes above €18 per tonne of waste), these might be exceeded by the NOx related externalities alone in many situations, depending on the limit values applied, and the location of the emitting facility (see European Environment Agency (2024) *Estimating the external costs of industrial air pollution - Trends 2012-2021: Technical note on the methodology and additional results from the EEA briefing 24/2023*, 29/04/2024).

[4] For various reasons, we have argued that this logic is flawed, and a more sensible approach would be to account for all CO_2 emissions at the point where they arise (rather than, as happens now, by deducting the stock of carbon that is harvested from the Forestry and Other Land Use chapter, and implicitly assuming all carbon in harvested wood products will be emitted as CO_2 at a later stage, the timing of which supposedly does not matter).

[5] See D Hogg (2024) *Materials or Gases? How to Capture Carbon*, Report for Zero Waste Europe, January 2024.

EUA values, though futures markets seem, currently, to be pricing in only minor increases over the next two years. Evidently, if ongoing economic disruption is sustained, this risks depressing economic activity, and with it, demand for energy, lowering demand for, and hence, prices of, EUAs. Nonetheless, there is a prospect of this cost rising in future.

A key part of the answer to the above question rests on the fact that, to an increasing extent, the choice between incineration and landfill is no longer based on price-based competition.

3.1 Contractual Commitments May Limit the Likelihood of Waste Moving from Incinerators to Landfills

First, the magnitude of the capital investments made in incineration are such that they are somewhat risky investments. They are substantially de-risked where there are contracts in place between the operating company and an entity, such as a municipality or groupings of municipalities, which is / are responsible for ensuring that waste under their control is properly managed. These contracts are typically of a term of the order 20 years, and sometimes longer. In some cases, the municipality is engaged in operating the facility, so the nature of any contractual arrangement may be different. In both these cases, however, the likelihood of the municipality switching away from incineration and into landfill is extremely limited (and may be penalised under the terms of contracts where they are in place).

The possibility of switching is more relevant in cases where incinerators compete for waste on 'the spot market' to fill any 'uncontracted' capacity (i.e. capacity for which there is not a contracted flow of waste). In this case, incinerators may compete as much with each other as they do with other landfills: this depends on the policies in place at a Member State level.

Note that contractual rigidities might not only prevent a switch from incineration to landfill: they may imply a lack of incentive for further recycling if a party to a contract seeks to reduce residual waste below a level which it may be obliged to pay the operator for. These 'put-or-pay' causes can imply that by making further reductions in residual waste, not only does the party pay for the activity to reduce residual waste, but it must still pay gate fees to the incinerator operator for waste it no longer wishes to provide. Such circumstances can trigger contract renegotiations, but parties generally enter such renegotiations from stronger and weaker positions. One possible upside to the EU-ETS might be that it triggers renegotiations that could allow a contracting party to seek revision of the put or pay clause, or to require investment in mixed waste sorting, in exchange for agreeing to revise the price paid as a result of the need to purchase EUAs.

3.2 Many Member States Already Ban / Restrict Landfilling of Wastes Suitable for Combustion

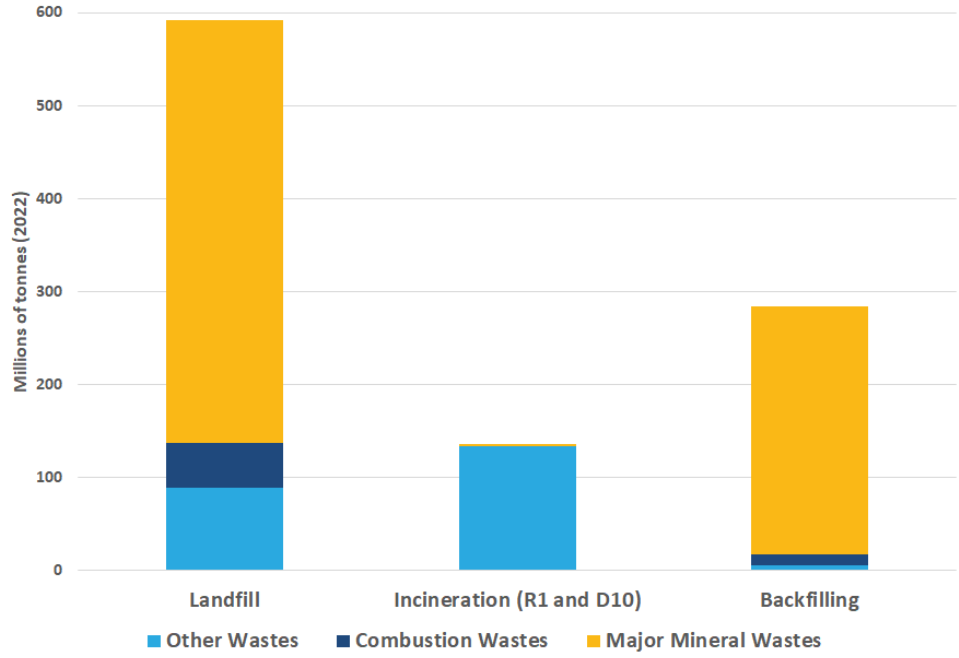
Where an entity responsible for the waste has the responsibility of determining where waste is to be, in theory, they could be sensitive to price movements (in practice, contracts may limit this -see above). Their ability to do that, however, will be affected by the fact that several Member States have sought to ban the landfilling of some wastes, or restrict landfilling of wastes unless they meet specific criteria. There are two approaches generally taken:

- Bans, usually expressed as covering specific types of waste, such as 'combustible waste' or 'municipal waste', or 'biodegradable waste', or sometimes, specified in much more detail (as in the Netherlands, for example);
- Restrictions, typically expressed in terms of a form of acceptance criterion that prevents some wastes from being landfilled (in practice, that may also be how some bans are enforced). This may be set using a metric intended to reflect the potential for waste to

generate gas once landfilled: the landfilled waste must be treated before landfilling. In some Member States, the restriction can be met through forms of biological treatment, whilst in others, the choice of metric is made such that for most 'mixed' type wastes, the waste cannot be landfilled without first being incinerated. Some Member States also limit the calorific value of what can be landfilled.[6]

A summary of the situation in different Member States is given in Appendix 1. It should be noted that the bans and restrictions tend not to extend to, or affect in the same way, the major mineral wastes (MMW) and combustion wastes (see Figure 1). These wastes are of a nature that makes thermal treatment such as incineration non-viable. Landfill, as well as backfilling, remain important options, therefore, for these wastes, even in Member States with 'bans on landfilling' in place.

Figure 1: Wastes Sent to Landfill, Incineration and Backfilling (MMW, Combustion Wastes and Other, EU-27, 2022, million tonnes)



Source: Eurostat

So, for example, in 2022, Germany reported that of 50.6 million tonnes of *municipal* waste treated in the country, only 0.4 million tonnes was landfilled. In the same year, 59.6 million tonnes of MMW and combustion wastes were landfilled in Germany, and 90.9 million tonnes were backfilled. For the

[6] This is an apparent hangover from a period where the energetic value of waste was deemed to be a key determinant of the benefit of incinerating waste: as long as energy generated from waste was 'displacing' fossil-derived sources of energy (especially coal), it was deemed beneficial to use such waste for energy recovery. As the sources of energy change, however, and as the 'displaced' sources shift towards renewables and nuclear, so the wisdom of some of these criteria bears closer scrutiny. Limiting the landfilling of waste above a given calorific value led to materials containing a significant quantity of plastics being sent for combustion. Viewed from the perspective of climate change, this no longer looks sensible: material with a high fossil carbon content per unit of energy content are being sent for combustion when that material could be, at worst, sequestered in a landfill, or better still, targeted for separation for recycling.

same reason, it would be a mistake to imagine that a climate change-based measure is about to cause the demise of all landfilling (since MMW do not biodegrade when landfilled[7]).

3.2.1 Municipal Solid Waste (MSW)

The effectiveness of the bans and restrictions that have been in place for the longest period of time is clear from the treatment shares for municipal waste in the different Member States. In these Member States, very little municipal waste is landfilled. There are eight Member States (Belgium, Denmark, Germany, Estonia, Netherlands, Austria, Finland and Sweden) for whom landfilling accounted for less than 5% of the amount of residual municipal waste managed in 2023 (see Table 1).

Table 1: Shares of Residual Municipal Waste Incinerated and Landfilled, 2023

	Incineration	Landfill
Belgium	99.7%	0.3%
Finland	99.1%	0.9%
Estonia	98.6%	1.4%
Sweden	98.1%	1.9%
Germany	97.0%	3.0%
Netherlands	96.7%	3.3%
Denmark	96.6%	3.4%
Austria	95.3%	4.7%
Luxembourg	93.3%	6.7%
Lithuania	83.8%	16.2%
Ireland	74.8%	25.2%
France	60.7%	39.3%
Slovenia	58.8%	41.2%
Italy	54.6%	45.4%
Poland	40.6%	59.4%
Czechia	25.1%	74.9%
Portugal	24.4%	75.6%
Hungary	18.5%	81.5%
Spain	18.1%	81.9%
Slovakia	16.6%	83.4%
Romania	7.4%	92.6%
Bulgaria	6.7%	93.3%
Cyprus	4.0%	96.0%
Latvia	4.0%	96.0%
Malta	3.5%	96.5%
Croatia	3.1%	96.9%
Greece	2.0%	98.0%

Source: Eurostat, with missing data for Ireland sourced from Irish EPA, and for Latvia, from the EEA.

[7] Some of the wastes concerned may have the potential to generate methane, but the proportion of such wastes is likely to be relatively low.

These same eight Member States accounted for more than half (54%) of all (59 million tonnes) incineration of MSW in the EU in 2023. Because of the effectiveness of the existing policy in these Member States, it seems unlikely that an increase in the price of incineration would lead to an easy switch to landfilling: that choice has been largely closed off in these Member States as a result of policy.

Four other Member States – France, Italy, Spain and Poland – account for the bulk of the remaining incineration of municipal waste (39% of total in 2023). These are given further consideration below.

Both Lithuania and Ireland also have relatively low shares of landfilling in their residual municipal waste management. Ireland has a treatment requirement in place that allows for landfilling of stabilised waste under an exemption from the landfill levy, which has risen over time (to €85 per tonne in 2026), thereby offering an incentive to stabilise waste prior to landfilling.[8] Lithuania also requires waste to be treated, and has recently increased its landfill tax rate to €50 per tonne. Neither Member States needs further incineration capacity if it is to achieve the recycling targets under the Waste Framework Directive.

In most of the other Member States, there is not much incineration to be switching away from (the 13 remaining Member States account for 6% (3.5 million tonnes) of the total MSW incinerated in the EU-27). In at least some of these Member States, the absence of much incineration may be considered a reflection of the fact that the option of landfilling, at relatively low cost, still exists. In these Member States, where there are incinerators operating, it seems especially likely that contractual or other arrangements (such as those discussed above) would be in place to ensure that waste could not simply be diverted to lower cost options (precisely because the existing situation is one where there are lower cost options available).

Most of these Member States belong to a group which have so far failed to implement a requirement to treat waste prior to landfilling which aligns the views of the Court of Justice of the European Union (CJEU). Indeed, a review of infringement cases at various decision stages between the start of 2023 and the time of writing (2026) indicates that Bulgaria, Cyprus, Czechia, Greece, Hungary, Malta, Slovakia, Portugal, Romania and Spain were subject to either letters of formal notice, reasoned opinions, or referral to the Court of Justice for infringements related to the Landfill Directive regarding the absence of treatment, or illegal operation of landfills.[9] Policy in Czechia and Slovakia is being aligned with the requirements to treat waste prior to landfilling, though not until 2027 in Slovakia, and 2030 in Czechia.

Appendix 1 suggests that Bulgaria, Croatia, Cyprus, France, Greece, Hungary, Malta, Portugal, Romania and Spain are yet to introduce national requirements for treatment that align with the ruling of the Court of Justice of the European Union (CJEU). In these Member States, the existing price differential between landfilling and incineration would be largely closed were the treatment requirements of the Landfill Directive to be more coherently articulated and properly enforced (see below). Indeed, the change in the cost of managing residual waste, and the form of the residues from treatment, might lead to an increase in the share of residual waste sent to incineration relative to the situation where the treatment requirement is not adequately enforced, though the absolute quantity might not change greatly if recycling targets are met (see below).

[8] The exemption for stabilised waste has now been superseded with stabilised waste sent to landfill subject to the same 'recovery levy' as incineration (€10 per tonne).

[9] Other Member States (including Belgium, France, Italy, Germany) were also subject to some form of proceedings related to the Directive, though not linked to the absence of treatment.

To the extent that there are concerns, therefore, they might appear to lie principally in France, Spain, Italy and Poland. France has recently announced an increase in its landfill tax to €65 per tonne, and this increase will imply, even if waste is landfilled without treatment, an increase in landfill costs not dissimilar to that which could be expected under the EU-ETS.[10] Nonetheless, it is not clear that the treatment requirement of the Landfill Directive is being implemented in a manner consistent with the CJEU ruling. Note that should France meet Waste Framework Directive recycling targets it may need to scale back the amount of MSW sent for incineration. A reduction in incineration might be necessary, therefore, but the switch would need to be into recycling, and not landfill.

In Spain, some regions have implemented their own treatment requirements or plans: Spain sets a national tax rate of €40 per tonne for landfills, with autonomous regions free to choose higher rates at their discretion. Spain devolves significant decision-making power to Regions. This has led to inconsistencies, with regions adopting different approaches, and showing varied performance, as regards waste management. As far as we are aware, there is no nationwide requirement to treat waste prior to landfilling. Nonetheless, where incinerators operate, they are frequently linked to regional strategies, and likely with commitments in place to limit the extent of switching to landfill.

In Poland, there are relevant policies are in place, and some landfilling will be of waste that has been subject to biological stabilisation (see below). There is already a landfill tax in place, this having risen rapidly, now standing at €97 per tonne, and landfill has been reducing as incineration plants have been constructed. There is also significant MBT capacity. Waste that has been stabilised is subject to a lower rate of tax at 25% the level for untreated waste, so the differential provides an incentive for treatment through stabilisation prior to landfilling.

In Italy, following the CJEU ruling, virtually no waste should be landfilled without effective treatment. Treatment may be thermal, or biological, with treated waste required to be stabilised such that the Dynamic Respiration Index (DRI) < 1,000 mg O_2/kg volatile solids /hr. Costs for treatment through the biological route are reported to be of the order €120-€160 per tonne. Some regions have codified exemptions from the need for biological treatment where it can be shown that the extent of putrescible waste in residual waste is especially low. Italy considered, for some time, restricting landfilling waste with a Calorific Value greater than 13 MJ/kg. At the time, this presented issues for the best performing districts as regards separation of food waste, where the calorific value of residual waste occasionally exceeded 15 MJ/kg. The law was never implemented and was finally repealed in 2015. Italy also increased exports of refuse derived fuel over the period from 2011 to 2019 from less than 0.1 million tonnes to 0.8 million tonnes. Some of the prices paid for export are as high as €200 per tonne. The treatment requirement limits the extent to which price competition takes effect. Landfill tax is set regionally within boundaries set by national law. The tax cannot be less than €5.17 per tonne and cannot exceed €25.82 per tonne. Some regions offer lower tax rates for municipalities that exceed a 65% recycling rate. Some also used to set lower rates for landfilling of treated waste, but since all waste now has to be treated, this has become less relevant. In Italy, therefore, for the most part, existing policy and law seem unlikely to lead to a switch away from landfilling and into incineration.

3.2.1.1 Landfill Taxes / Levies

It should also be considered that most Member States have implemented landfill levies / taxes, or other forms of economic instrument designed to incentivise meeting recycling targets. At first

[10] Given that the previous rates for authorized landfills were €25-€42 per tonne (depending on the landfill category), the increase is likely to be of the same order that an incinerator might need to pay under the EU-ETS.

glance, it may seem surprising that this includes many of the Member States with bans / restrictions on landfilling in place (why tax something that is banned?). In these cases, however, taxes / levies can serve to underpin the restrictions and bans by eliminating incentives for actors to seek exemptions on the basis of there being insufficient treatment capacity. Austria's approach was particularly worthy of consideration with taxes on landfilled waste set much higher for waste which had not undergone treatment than for waste which was treated before landfilling. Similarly, albeit later than desirable, Czechia's linking of taxes to a declining schedule of residual waste per inhabitant may prove an interesting model.

Aside from the Member States with bans / restrictions in place, a significant number of Member States have announced changes to tax rates over recent years (see Appendix 2). Some of the more significant increases are shown in Table 2, these being comparable with, and sometimes greater than, the likely increase in costs of incinerating mixed municipal-type wastes resulting from the EU-ETS (which we estimated to be of the order €35 per tonne at current EUA prices). The tax differentials between those applied to landfill and incineration in these Member States is significant.

Table 2: Significant Landfill Tax Increases in Recent Years, and Latest Tax Rates on Landfill and Incineration

Member State	Increase (€ per tonne)	Period	Landfill Tax (€ per tonne)	Incineration Tax (€ per tonne)
Czechia	€29 €45	2021 - 2025 2021 - 2029	€61 (2025) €75 (2029)	-
France	€23-€47	2020 - 2025	€65	€7.5-€25
Ireland	€55	2010 - 2023	€85	€10
Latvia	€129	2006 - 2026	€130	€15
Lithuania	€40	2021 - 2023	€50	-
Poland	€66	2021 - 2025	€97	-
Portugal	€28.40	2016 - 2025	€35	€18.7 (D10) €4.4 (R1)
Romania	€26	2019 - 2024	€32	-

Source: see Appendix 2

Member States which have announced treatment requirements, but which do not support those requirements with economic instruments may well find that treatment capacity does not arrive either at the speed, or in the quantity, hoped for. Germany is one of few Member States whose landfill restriction is not supported by a levy on landfilling, demonstrating that this can be done, but well-developed regulatory institutions are likely to be required in such circumstances.

In summary:

1. **As regards MSW, therefore, the majority of incineration takes place in Member States with effective bans / restrictions in place, making it unlikely that there will be a move to landfill as a result.**
2. **Much of the remainder of the incineration currently taking place happens in a relatively small number of Member States, some of which have similar restrictions in place and some of which have instigated increases in landfill tax recently.**
3. **In the remaining Member States, the situation has been characterised by:**
   - **an interpretation of the Landfill Directive's requirement to treat waste prior to landfilling which is not aligned with the authoritative ruling of the Court of Justice of the European Union (see below); and**
   - **landfill taxes which have either not been in place until recently (e.g. Cyprus) or which were set at such a low rate that they fail to incentivise anything other than landfilling**

of residual waste without any stabilisation of the waste to reduce its potential to generate methane when landfilled. In some Member States, however, tax rates have increased significantly in recent years.

These Member States also struggle to achieve high recycling rates. Those who generate waste can be motivated to recycle if the avoided costs, at the margin, of either landfill or incineration are high. Where they are low, the avoided costs of landfill are typically lower than the cost of recycling.

3.2.2 Other (non-MSW) Wastes

It seems likely that similar comments might apply regarding other wastes which are not defined as 'municipal waste', but which are neither MMW nor combustion wastes (unless they are unsuitable for incineration). Analysis of Eurostat data shows that of the 135 million tonnes of waste incinerated or co-incinerated, 60% was treated in the eight Member States with bans / restrictions in place over many years. Note that some of the 135 million tonnes – to the extent that it is coincinerated – is likely to be already included under the EU-ETS. The extent of this is unclear, but could be of the order 20-40 million tonnes.

Further analysis shows that of all types of waste sent for incineration / co-incineration, the categories that dominate are **household and similar wastes**, **sorting residues**, **mixed and undifferentiated materials** and **wood wastes.** Most municipal waste incinerated will fall under the first three categories. Beyond these, of the 135 million tonnes or so of waste sent to incineration or coincineration in 2022, the main categories of waste incinerated, and the shares that are recycled, the share of residual which is incinerated (as opposed to landfilled) are shown in Table 3.

The final column in Table 3 also makes an estimate at the number of EUAs required to cover the incineration of each tonne of the type of waste in each row. It is an important column since it shows that large quantities of these wastes which are incinerated will likely carry no liability for EUAs (since the carbon is of non-fossil origin). It follows that as far as these wastes are concerned, there is no effect on the costs of incineration. Note that a priori, some of these wastes (faeces and manure, for example) are those might give rise to concerns if they were to be landfilled without treatment, given the potential for methane generation. On the other hand, these materials are a) largely recycled, and b) barely landfilled. Even if it were the case that the costs of incinerating them were to rise, there is at least as good a prospect that if they were moved away from incineration, that they would be recycled, and not landfilled.

Table 3: Wastes Contributing Significantly to Total Amounts Incinerated

	Treatment	Recovery - recycling	Recycling Rate	Incineration (R1 and D10)	Disposal - landfill and other (D1-D7, D12)	R1/D10 as Share of Residual	Required EUAs per tonne
Wood wastes	41,430,000	19,860,000	48%	21,500,000	70,000	100%	Close to 0 (depending on treatment)
Chemical wastes	8,630,000	3,870,000	45%	3,060,000	1,650,000	65%	Variable
Common sludges	10,920,000	7,060,000	65%	2,950,000	900,000	77%	Variable
Plastic wastes	12,460,000	9,370,000	75%	2,510,000	580,000	81%	2-3 depending on polymer mix / moisture
Industrial effluent sludges	6,210,000	2,140,000	34%	2,230,000	1,840,000	55%	Variable
Vegetal wastes	43,240,000	40,610,000	94%	2,060,000	560,000	79%	0
Animal and mixed food waste	19,820,000	17,880,000	90%	1,760,000	180,000	91%	0
Animal faeces, urine and manure	12,290,000	10,710,000	87%	1,540,000	50,000	97%	0
Health care and biological wastes	1,360,000	20,000	u1%	1,270,000	70,000	95%	Variable
Sludges and liquid wastes from waste treatment	2,830,000	1,030,000	36%	410,000	1,290,000	24%	Variable
Total of Above	**159,190,000**	**112,550,000**	**71%**	**39,290,000**	**7,190,000**	**85%**	

The opposite, of course, applies to plastics. Here, the treatment shares for the EU-27 show that 75% of what is generated under this waste code is recycled. Of the remainder, more than 80% is incinerated. This is likely to reflect coincineration and incineration of plastics that have been sorted, but cannot be recycled. The relatively high fossil carbon content of conventional fossil-derived plastics means that for each tonne combusted, there may be an EUAs liability. For coincineration (e.g. at cement kilns), this liability may not be new: cement kilns are already included under the EU-ETS. In Member States where there are bans / restrictions in place, then especially where there are limits expressed in terms of calorific value, there will likely be no switch to landfilling. That leaves open the possibility that there are plastic wastes from other Member States being incinerated / coincinerated in situations where landfill costs remain low. For coincineration facilities, such as cement kilns, the use of plastics has in the past helped reduce the need to purchase fuels such as petcoke. Continued use of petcoke or plastics as the kilns themselves are exposed to progressively tightening caps under the EU-ETS becomes more costly over time. Yet as with many of the other wastes in Table 3, the potential for increasing recycling may be no less likely than a switch to landfill. Finally, it should be noted that if plastics are genuinely unrecyclable, there is every reason to believe that from the perspective of greenhouse gas emissions, the principal concern of the EU-ETS, it would be better to sequester the fossil carbon in a landfill rather than combusting it.

For some of the other materials, the heterogeneity of wastes within the category makes it difficult to estimate how many EUAs would be required to cover each tonne incinerated. The extreme situations above, however – of the non-fossil carbon, and the fossil carbon materials – highlight some key considerations. The lower the fossil carbon content off the specific load of waste, the smaller any price impact will be, so the likelihood of switching to landfill (or, indeed, recycling) will be limited. The higher is the fossil carbon content, the greater the price impact will be. This would likely mean that in most Member States with bans / restrictions in place, no switch to landfilling could occur: rather, the effect might be to increase the likelihood of an increase in recycling, where this is possible. Outside the Member States with bans in place, there may be an incentive to seek alternatives. Even if there was some increase in landfilling of these materials, they would be, by definition, materials with a lower likelihood of generating methane when landfilled. That prospect would be further diminished if the Member States concerned were required to implement the treatment requirements of the Landfill Directive.

The final column implies that of the 39.3 million tonnes incinerated, only 8.3 million tonnes (21%) might carry significant liability for EUAs (for some sub-streams of each of the waste types, the liability will be zero, or close to it). Given the nature of the bans and restrictions already in place, and the fact that around 60% of waste incinerated / co-incinerated in the EU-27 in 2022 was treated in these Member States, it would be reasonable to suggest that a fairly extreme upper end ‘at risk’ (i.e. affected by price in circumstances where bans are not in place) quantity would be of the order 40%*8.3 million tonnes, or around 3.3 million tonnes. As indicated above, some of this ‘at risk’ amount might be treated at facilities already within the EU-ETS, some might not actually carry such a price risk (they may have a low fossil carbon content), where the fossil carbon content was high, the price-effect might be to increase recycling, rather than landfilling; and the option of landfilling might not be suitable for some wastes, not least where they are of a hazardous and / or liquid nature.

Finally, it should be noted that for some of the categories in Table 3 – notably Chemical Wastes, and Sludges and liquid wastes from waste treatment – the treatment shares accounted for by incineration / co-incineration are much higher for those wastes classified as hazardous.

In summary:

- **Of the wastes contributing most to the total amount incinerated / co-incinerated in the EU-27, many are materials which are non-fossil in origin (notably, wood wastes).**
- **Wastes such as Plastic wastes will need to be covered by purchases of EUAs. Some plastic wastes are likely co-incinerated at facilities already within the EU-ETS, such as cement**

kilns. In many of the Member States with bans / restrictions in place, especially those forbidding landfilling of wastes whose calorific value exceeds a given threshold, or where the ban relates in part to combustible wastes, the switch to landfill is not an option.

- **Other wastes that may be partially of fossil origin might, like plastics, be recycled rather than landfilled.**
- **In those instances where some wastes could switch to landfill from incineration, if this is price-driven, it would follow that the fossil carbon content of those wastes would likely be relatively high. That, in turn, would imply that the wastes were unlikely to degrade rapidly in a landfill, even if not treated.**
- **The likelihood of any switch to landfilling, and the impact thereof, would be further diminished if Member States were required to implement the treatment requirement of the Landfill Directive as per the Court of Justice of the European Union's interpretation.**

3.3 How Will EU Policy Affect Matters

It stands to reason that in Member States where the vast majority of residual MSW is incinerated, then unless the Member States concerned are already meeting the necessary recycling targets set out in existing policy, the amount of MSW incinerated will need to fall. On the other hand, in some other Member States, there will be a need for additional treatment if recycling targets are to be met.

Based on 2023 Eurostat data, a reduction in incineration of the municipal waste generated in Member States with bans / restrictions in place would need to be of the order 7.4 million tonnes (in Belgium, Denmark, Germany, Estonia, Netherlands, Austria, Finland and Sweden, as well as Estonia, Ireland, France, Lithuania and Luxembourg). In the remaining Member States, the share of MSW undergoing treatment would need to be increased by 11.5 million tonnes would be needed, implying a net increase in capacity requirement of the order 4.1 million tonnes across the whole EU. The net capacity requirement falls to zero if the overall EU recycling rate reaches 66.7%: in 2023, Germany reported a rate of 69%. This capacity requirement might be further closed if existing R1 and D10 capacity was better utilised: the R1 and D10 capacity reported by Eurostat is 50% greater than the amount of waste treated at such installations. Note also that facilities may already have been constructed since 2023 (or capacity for coincineration may have been consented) to reduce the requirement for additional capacity.

The situation as regards MSW does, however, highlight the spatially uneven distribution of incineration capacity across the EU-27. Facilities in Member States that implemented landfill bans and restrictions when recycling rates were well below 65% will inevitably find that capacity is freed up as recycling rates increase. In this situation, operators of facilities where capacity is freed will potentially seek to import waste from other Member States. In order for that to take place, the terms on which waste is transported to such facilities will need to be attractive to the exporting entity. To the extent that this waste might be of municipal nature, the need to purchase EUAs will arise. The EU-ETS, therefore, will reduce profits to be derived from imports because the pricing of capacity will need to remain competitive, but inclusive of the value of EUAs. It may be that this is what lies behind the concern of incumbent operators: the amount of waste available for incineration is set to decline in their own territory, and as a result, they will seek to access sources of waste from elsewhere.

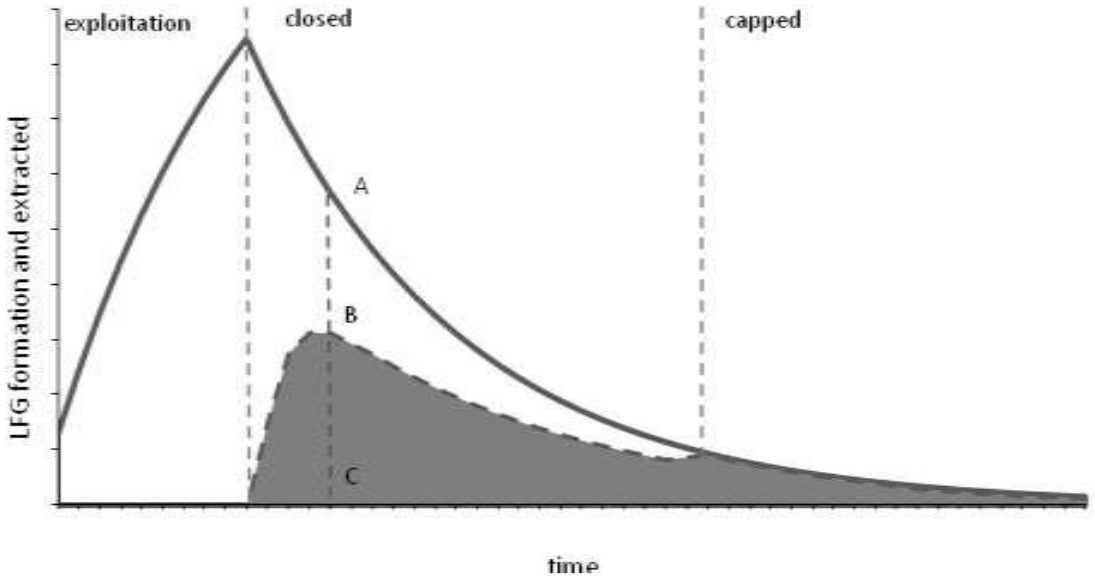
4.0 Don't Landfills Also Emit Greenhouse Gases?

Landfills emit greenhouse gases. In the absence of any prior treatment, much of the material containing non-fossil carbon is degraded in the conditions of a landfill, leading to generation of a gas containing both carbon dioxide (CO_2) and methane (CH_4).

Some of this gas can be collected from the body of the landfill with a view to using its methane content as an energy source. However, whilst some studies claim high rates of 'methane capture', others indicate there are likely to be limits to the efficiency of collection.[11] A key issue in this regard is that different materials degrade at different rates, and that the process of gas generation takes place over an extended time period. Since effective gas collection from a landfill relies on parts of it being 'capped', the fact that some fast degrading materials (food waste, for example) emit methane whilst the cell is being filled (prior to it being capped) means that a non-trivial share of methane is generated before capture becomes effective (see Figure 2 for a basic representation). For this reason, where waste is not treated prior to landfilling, it might be difficult (even with adaptations to the scheme represented below) for the share of methane captured to exceed 50% over the period when gas is generated.

Of the uncaptured methane, some can be oxidised (and converted from CH_4 to CO_2) as the gas escapes through the cap. The extent of this depends, amongst other things, on the nature of the capping material, the extent to which the cap unintentionally allows easy escape of the gas (through fissures, for example) and the rate at which gas passes through the capped surface (the flux of methane). The Intergovernmental Panel on Climate Change defaults to a figure of 10%. That figure would imply that approximately 45% of the methane generated still escapes as fugitive methane even where gas capture is reasonably effective.

Figure 2: Landfill Gas Generation and Extraction in Time at a Typical Landfill



Source: D. Hogg, A. Ballinger and H. Oonk (2011) Inventory Improvement Project – UK Landfill Methane Emissions Model, Final Report to Defra and DECC, January 2011.

[11] See Golder Associates (2014) Review of Landfill Methane Emissions Modelling, Defra Research Study WR1908, November 2014; Max Krause et al. (2023) *Quantifying Methane Emissions from Landfilled Food Waste*, U.S. Environmental Protection Agency, October 2023.

Methane exhibits different behaviour to carbon dioxide as regards its contribution to global warming. Relative to carbon dioxide, methane makes a large contribution over a couple of decades, but it does not reside in the atmosphere for a very long period. Carbon dioxide, on the other hand, does not exhibit such a strong radiative forcing effect in the short-term, but it does reside in the atmosphere for a very long period of time. In the short-term, the contribution of landfilling waste to climate change is dominated by methane emissions, but in the long-term, the effect of CO_2 emissions dominate. To avoid the 'peaky' contribution of methane to climate change, it makes sense to ensure that as little as possible of the degraded carbon is released into the atmosphere as methane.

In principle, EU policy and law is already equipped to minimise methane releases from landfills. The above description assumes that LMW is not treated prior to being landfilled. On the other hand, Article 6 of the Landfill Directive requires the treatment of waste prior to landfilling.[12] Unfortunately, the Directive gave insufficient clarity as to what was meant by 'treatment', so different Member States interpreted this term in very different ways.[13] The CJEU, however, gave its authoritative interpretation of the treatment requirement, indicating that both sorting of waste, and the stabilisation of the degradable organic fraction, were required.[14] Although the CJEU did not define the term, stabilisation of the organic fraction implies rendering waste to make it far less able to emit methane when landfilled, thereby ensuring that any residual methane generation could be effectively managed at well operated sites using appropriate capping materials and other means as necessary.

Although the Court's ruling clarified matters somewhat, the ruling still leaves matters insufficiently specified, and indeed, parts of the Landfill Directive (not least, those parts indicating the desirability of recovering gas for energy recovery) can appear contradictory in the light of the ruling of the Court. Nonetheless, various Member States either are, or have been, subject to infringement decisions on the basis of the inadequacy of their treatment or the insufficient capacity thereof. A review of infringement cases at various decision stages between the start of 2023 and the time of writing (2026) indicates that Bulgaria, Cyprus, Czechia, Greece, Hungary, Malta, Slovakia, Portugal, Romania and Spain were subject to either letters of formal notice, reasoned opinions, or referral to the Court of Justice for infringements related to the Landfill Directive regarding the absence of treatment, or illegal operation of landfills.[15] Some of these Member States (e.g. Slovakia) have, in response, introduced laws that will require suitable treatment in future (see below).

We have made the point elsewhere that it would help considerably if the Landfill Directive were updated to:

- Clearly define 'treatment', in a manner which is aligned with the CJEU ruling, including through specifying a suitable respirometric threshold such that it was clear to Member States what treatment was required prior to landfilling.
- It could also help if the requirements for cover materials for sites containing treated waste were specified with a view to minimising fugitive emissions.

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[12] Council Directive 1999/31/EC on the landfill of waste amended by Directive (EU) 2024/1785 of the European Parliament and of the Council.

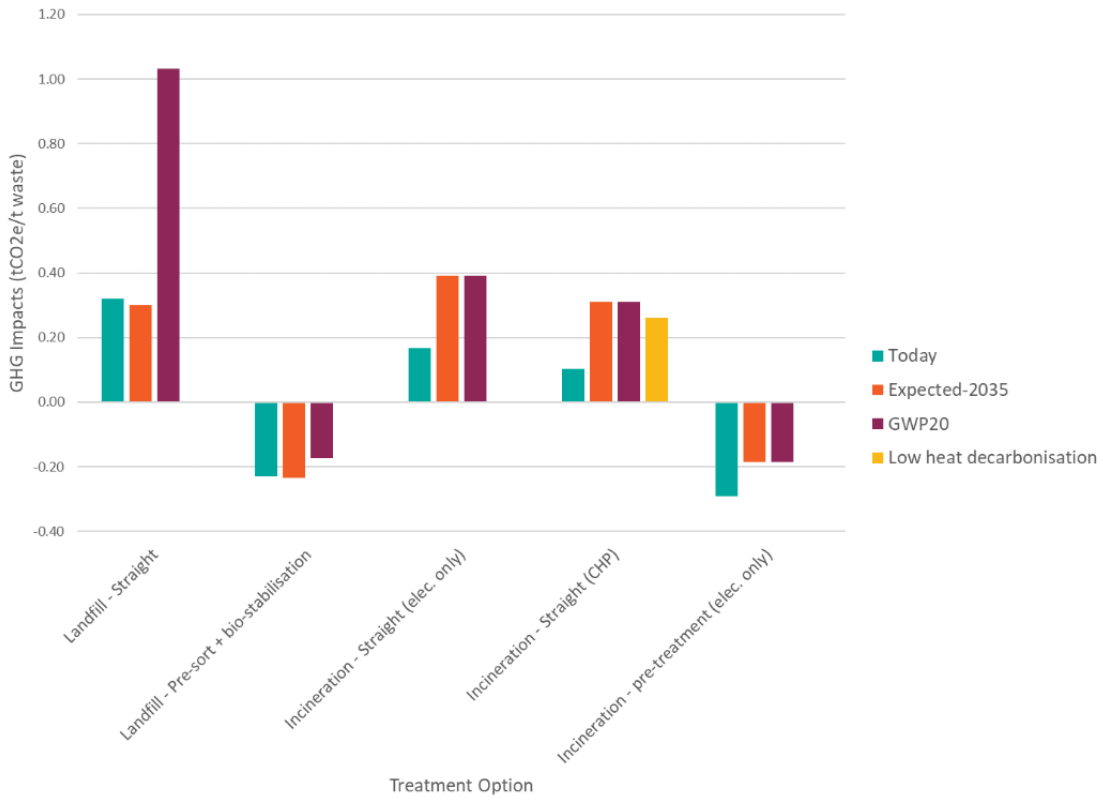
[13] See Milieu and Ricardo (2017) *Study to assess the implementation by EU Member States of certain provisions of Directive 1999/31/EC on the landfill of waste*, Final Report to European Commission, March 2017.

[14] the CJEU ruling Case C-323/13, European Commission v. Italian Republic. http://curia.europa.eu/juris/liste.jsf?language=en&num=C-323/13 (sometimes referred to as the Malagrotta ruling).

[15] Other Member States (including Belgium, France, Italy, Germany) were also subject to some form of proceedings related to the Directive, though not linked to the absence of treatment. The infringement cases were reviewed here.

If that were to occur, emissions of methane from the landfilling of waste in future years would be eliminated to a large extent, with the degradable carbon in waste emitted largely as CO_2, not CH_4. Since that CO_2 would be of non-fossil origin, then it would not be considered relevant for the purposes of the EU-ETS. It follows that, for waste yet to be landfilled, better elaboration and implementation of the existing law, allied to timely enforcement, would make the inclusion of landfill under the EU-ETS largely unnecessary, at least as regards waste yet to be landfilled. Note that it would also follow, as regards the externalities from GHG emissions, that a switch from incineration to landfill was not necessarily a worse outcome. Figure 3 below shows that under current circumstances, the GHG emissions from landfilling untreated waste are worse than those of incinerating waste, whether the facility generates electricity only, or operates in combined heat and power mode. The picture changes completely where residual waste is subject to sorting and stabilisation of the organic fraction prior to landfilling, as per the CJEU ruling.

Figure 3: GHG Impacts of Residual Waste Management Approaches under Different Scenarios (tonnes CO_2 equivalent / tonne waste managed)



Source: Eunomia (2020) Greenhouse Gas and Air Quality Impacts of Incineration and Landfill, Report for Client Earth, December 2020.

This finding is broadly supported It is further supported by the figures proposed by Prognos in work funded by ESWET, under which '*1.0 million tonnes CO_2e (GWP 100) methane will be produced by 2130 from the 15.4 million tonnes of MBT waste deposited between 2022 and 2050*', equivalent to 65kg CO_2e per tonne of MBT waste landfilled. It is unclear how much waste Prognos deemed to be landfilled per tonne of waste treated, but given that the figure would be unlikely to be higher than 700kg, the emissions would be of the order 46kg CO_2 e per tonne treated, though this excludes emissions from the biological treatment itself. In the absence of significant removal of the fossil carbon in waste to be incinerated, it will be difficult for an incinerator to achieve such a low level of

emission. Ricardo found similar.[16] Note that neither Ricardo nor Prognos gave much consideration to the ability of suitable cover layers to increase the extent of oxidation from landfills receiving treated waste.

None of the above necessarily addresses the management of landfills where waste has already been accepted, and where there is still the potential for release of methane into the atmosphere. Unfortunately, the period since the Landfill Directive was concluded in 1999 has seen significant quantities of waste landfilled without biological (or other) stabilisation, and these wastes (as well as those landfilled in prior years) will still be generating methane, albeit, in many cases, at a diminishing (over time) rate, and they will continue to emit for many years to come. In these cases, there are techniques that could be used to reduce releases of methane, these varying depending on the age of the site.

This could be addressed through the ongoing BREF process, though the effectiveness of that may be limited where the operator has limited (or no) potential to generate revenue from tipping fees / gate fees if the site has closed. In principle, the inclusion of such landfills within the EU-ETS could help provide funding for abatement, but this would rely upon (amongst other things) the fugitive emissions of methane being amenable to measurement in a cost-effective manner, and with sufficient accuracy to enable the abatement achieved to be accurately quantified. This would be somewhat demanding since any level of abatement would have to be measured relative to a counterfactual extending years into the future.

4.1 Where Biological Treatment is Necessary Prior to Landfilling, What is the Effect on the Cost of Managing Residual Waste?

There are several elements that contribute to the costs of landfilling, but where waste is landfilled without treatment, then the costs of the landfill itself, the operations, and (under typical approaches) the costs of gas collection, net of revenues from sale of captured biogas, or the energy derived from it (typically generated by gas engines). Many Member States make use of taxes on landfill, or other incentive mechanisms, to support movement of waste away from landfill, though these taxes exist at quite varied rates across the Member States. Taxes are often set at different rates for different types of waste, with MMW, for example, subject to lower rates than for the municipal type wastes (or none at all).

In the case of waste that is biologically treated before landfilling, the waste must first be subject to mechanical and biological processes, with the overall schematic typically designed to achieve (as shaped by prevailing regulations):

- Extraction of wastes for recycling;
- Sorting / preparation of a proportion of the waste for biological treatment;
- Sorting / preparation of a proportion of the waste for recovery at incineration / co-incineration facilities.

There is an enormous range of possible variants in these schematics, with mechanical processes being applied pre-, or post-, biological treatment, or often, both. Furthermore, whilst the focus of more traditional mechanical biological treatment facilities has been towards ii) and iii) above, the

[16] See Ricardo (2022) *Alternative Residual Waste Treatment: Biostabilisation*. Report for Zero Waste Scotland by Ricardo, October 2022, https://www.zerowastescotland.org.uk/resources/biostabilisation-report-2022

technical capabilities of sorting facilities is leading to a re-balancing towards i) above, not least as regards plastics. That would be supported also by the logic of the CJEU ruling.[17]

These processes are not without cost. Equally, depending on the scale of the facility, its technical sophistication, and the composition of the waste received, there may be revenues to be derived from selling materials extracted for recycling.

The biological treatment process leads to the biogenic wastes being 'consumed' by micro-organisms in the process, and in many cases, moisture will be lost as a result of the processing. The quantity of waste that remains to be landfilled, therefore, will be less than the quantity entering the treatment facility: there is a loss of mass in the form of recyclables, degraded biomass, and moisture. If some wastes are separated for incineration / co-incineration, the mass sent to landfill will be smaller still.

If, for the sake of illustration, we consider that no waste is sent for incineration / co-incineration, then the resulting mass of waste to be landfilled at the end of the treatment process might be of the order 0.55 tonnes

That would imply that the cost of the treatment process and the landfilling of the residue would be calculated from:

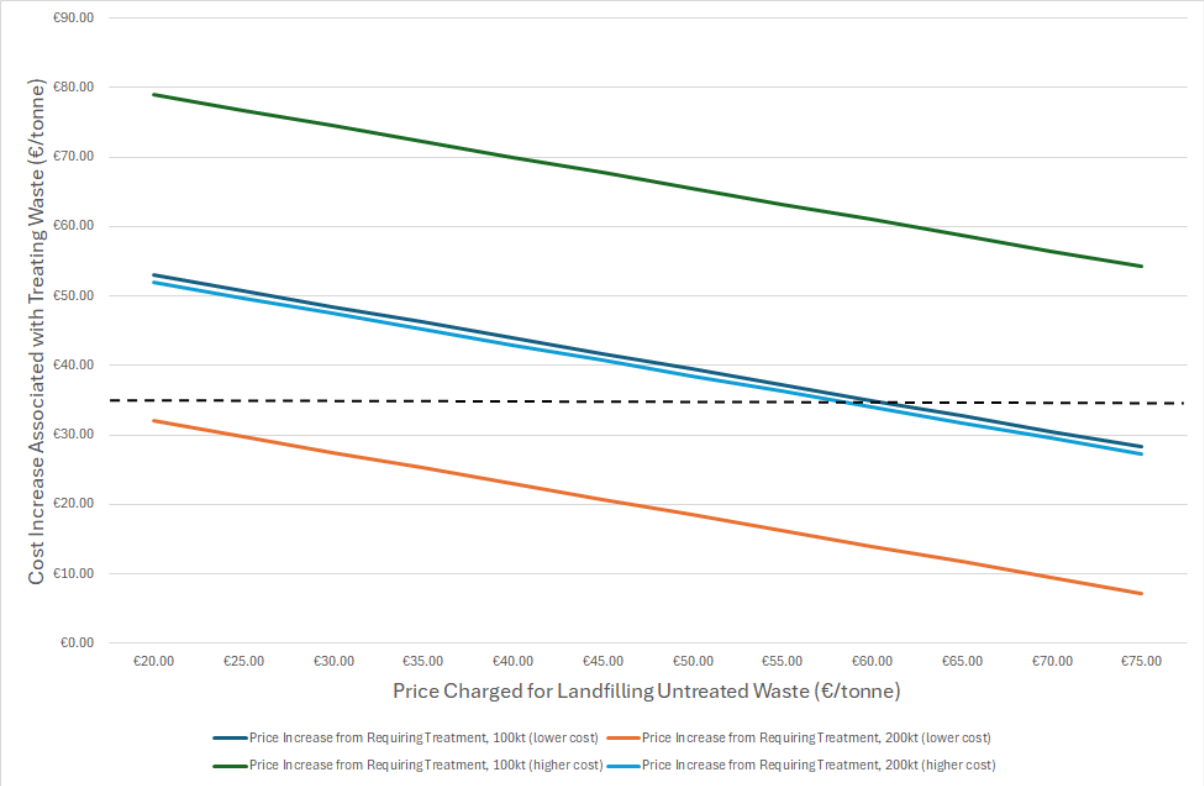
Cost of MWS (1 tonne) + cost of biological treatment (approx. 0.8 tonnes) + cost of landfilling (0.55 tonnes) – revenue from sale of recyclables extracted through MWS.

We calculated this for a 100,000 tonne facility and for a 200,000 tonne facility, based on previous work.[18] We then calculated this for varying levels of cost of landfilling, assuming that the unit cost for landfilling the treated waste was the same as for the untreated waste. To highlight the uplift in costs of residual waste treatment, we then plotted the 'cost increase' implied by a requirement to treat waste (y-axis), against the cost of landfilling untreated waste. The relationship is plotted in Figure 4 for 'low' and 'high' cost treatment situations, and for facilities of 100kt and 200kt scale. This shows that only the low cost 200kt scale treatment facility would incur cost increases, relative to landfill, that lie below those that may be expected from including incineration within the EU-ETS (estimated here at €35/tonne of waste). At the higher end, the 200kt facility implies increases greater than €35 per tonne, unless the existing cost of landfilling is greater than €60 per tonne. For the 100kt facility, the cost increases are above those expected for incineration other than where the costs of treatment are low, and the existing cost of landfilling is greater than €60 per tonne.

[17] The Court, in its interpretation of the term 'treatment', considered the intent of the Waste Framework Directive (Article 1), noting that:
the treatment of waste destined for landfills must, in addition to modifying the characteristics of the waste in order to reduce its volume or danger and to facilitate its handling or recovery, also have the effect of avoiding or reducing as far as possible the risks to human health and the harmful effects on the environment. Thus, since there is a treatment that will make it possible to achieve a better overall result for the protection of human health and the environment, in particular by managing to stabilise the organic fractions of the waste, Member States would be obliged to adopt this treatment.
It would seem to follow that any mechanical treatment ought to be conceived with the intent in mind of achieving the best (within reason) result.

[18] Dominic Hogg and Dinkar Suri (2023) *Nothing left behind: Modelling MRBT to maximise recovery of resources and minimise contributions to climate change*, Report for Zero Waste Europe, April 2023.=

Figure 4: Cost Increases Implied by Requirement to Treat Waste Prior to Landfilling



We expect most of the Member States without CJEU-consistent treatment requirements to have, or to have had (until recently), relative low landfill costs, thereby explaining the high shares of landfilling and the associated infringement cases. It might follow, therefore, that other than in the most favourable cases (regarding treatment scale and cost), enforcing a requirement to treat waste would have the effect of increasing the costs and performance of residual waste management, with the likely effect of increasing incentives for additional recycling. Figure 4 also shows why increasing levies / taxes on landfill can encourage additional treatment. Note, however, that a sensible application of levies – aligned with the GHG performance indicated above – would be to differentiate the levies applicable to landfilling according to whether the waste has been subject to treatment or not, as was the case in Austria. This helps signal, through use of market-based incentives, the case for introducing additional treatment infrastructure.

If the treatment requirement in the Landfill Directive, as interpreted by the Court of Justice, were unambiguously specified in the Directive itself, and if that requirement was properly enforced, the costs of residual waste management would be higher than it has recently been in many Member States. The environmental impacts of landfilling would also be significantly reduced. Note that the Member States to whom these comments apply currently make far more limited use of incineration to manage waste.

5.0 Accompanying Measures

There are reasons to cast doubt on the extent to which the inclusion of incineration within the EU-ETS will lead to a significant switch in waste from incineration to landfill.

Meeting EU recycling targets will imply that the quantity of waste incinerated in those Member States with long-standing landfill bans in place will need to fall. The UK has been a significant exporter of waste for incineration and co-incineration to EU Member States and Norway, but exports have fallen by more than 2 million tonnes since 2017. There will be competition to import waste for incineration from Member States without adequate treatment capacity in years to come. The balance of the availability of capacity for incineration, set against the nature of the policy-induced demand to avoid landfilling untreated waste, will determine the prices that can be commanded in the market.

The small possibility of additional waste being landfilled as a result of incineration's inclusion under the EU-ETS is greatest in those limited cases where there is genuine price competition for waste, where the waste streams concerned are significantly affected by the EU-ETS (there is a reasonable share of fossil derived CO_2), and where the fate of the wastes concerned is not coincineration at facilities already included under the EU-ETS. We have already highlighted the role of better articulation and enforcement of the treatment requirement in Article 6 of the Landfill Directive as a means to reduce the effect of the EU-ETS in this regard.

In addition, we have proposed approaches to limiting the amount municipal waste that Member States can manage as 'residual waste'.[19] This approach is designed to limit the amount of waste sent for incineration, coincineration or landfill (following treatment). The merit of such an approach, as a complement to including incineration under the EU-ETS, and a proper articulation and enforcement of the LFD treatment requirement, is that it emphasises reducing all forms of residual waste management (incineration, co-incineration, landfilling of treated waste (and landfilling of untreated waste whilst it still takes place)). It would, therefore, seek to underpin the aims of preventing waste, and increasing recycling, and further limit any likelihood of municipal waste switching from incineration to landfill.

6.0 Recommendations

The inclusion of waste incineration in the EU ETS is unlikely to result in a significant increase in landfilling.

Incineration should be included within the EU-ETS as planned.

The difficulties in measuring, on an ongoing basis, diffuse emissions from landfills make including them within the EU-ETS less than straightforward. Because effective treatment of waste prior to landfilling, allied with suitable measure to manage landfilled waste, can significantly reduce the potential for fugitive methane emissions, actively pursuing this route makes the matter of including landfills in the EU-ETS, which would be far from straightforward, less problematic.

The Landfill Directive should be amended so that the definition of 'treatment' is aligned with the CJEU ruling. That would define treatment as a combination of sorting of mixed waste, and stabilisation of the organic fraction so that the respirometric activity falls below 10mg O_2/kg dry matter. The Directive should also be rendered consistent with this definition (for example, by amending references to maximising the amount of landfill gas collected for energy recovery). Either in the Landfill Directive or through the Landfill BREF, the choice of appropriate cover layers and

[19] Dominic Hogg (2025) *Cap-and-trade on residuals: Proposals for a Circular Economy Act* Report for Zero Waste Europe. October 2025. Dominic Hogg (2026) *Marginalising Waste: a Trading Scheme to Reduce Residuals*, Report for Reloop and Zero Waste Europe, February 2026.

other measures to manage residual methane generation should be elaborated. There should be no criteria restricting what may be landfilled according to its calorific value.

The problem of methane emissions from landfills that received waste in the past will remain. Because some of these will be closed, and because the scope for generating revenue that would be needed to fund the purchase of allowances will in many cases have passed (once a site no longer receives waste), then the scope for including 'old sites' within the EU-ETS is likely to prove problematic. This will become all the more so if no entity can be identified who would carry the associated liabilities (as may be the case for older sites, not to mention illegal dumps).

Consideration could be given to a scheme providing for the generation of methane credits to encourage entrepreneurs to fund activities to reduce future methane emissions from past disposals. This would need to be based on emissions reductions relative to credible counterfactuals, and might be restricted to specific activities. The credits could be given value through their being traded within the EU-ETS.

To give even greater comfort that any switch away from incineration is towards tiers higher in the waste hierarchy, it is proposed to introduce a measure to reduce steadily the quantity of residual municipal waste generated. The merit of such an approach, as a complement to including incineration under the EU-ETS, and a proper articulation and enforcement of the LFD treatment requirement, is that it emphasises reducing all forms of residual waste management (incineration, co-incineration, landfilling of treated waste (and landfilling of untreated waste whilst it still takes place)).

We propose that an economic instrument to reduce residual municipal waste is introduced.[20]

[20] Dominic Hogg (2025) *Cap-and-trade on residuals: Proposals for a Circular Economy Act* Report for Zero Waste Europe. October 2025. Dominic Hogg (2026) *Marginalising Waste: a Trading Scheme to Reduce Residuals*, Report for Reloop and Zero Waste Europe, February 2026.

A.1.0 Appendix 1: Landfill Restrictions and Bans

There is a range of bans and restrictions on landfilling in place in Member States. Some of these follow unambiguously from transposition of the Landfill Directive into Member State law (these are set out at Article 5(3)). The emphasis below is on the restrictions / bans that have sought to give effect to the more ambiguous requirement set out in Article 6 (taking measures in order that "*only waste that has been subject to treatment is landfilled*", with "treatment" defined as "*the physical, thermal, chemical or biological processes, including sorting, that change the characteristics of the waste in order to reduce its volume or hazardous nature, facilitate its handling or enhance recovery*"). The Table draws on the synthesis in a report by the EEA (and when referencing the EEA in the Table, it is this report to which we refer)[21] supplemented by our own research and prior knowledge.

When Milieu conducted an assessment of compliance with various aspects of the Landfill Directive in 2017, it suggested that treatment requirements had not been implemented in Bulgaria, Croatia, Cyprus, Czechia, Greece, Portugal, Romania, Slovakia, Spain.[22] Of these Member States, Czechia and Slovakia now appear to have introduced requirements that align with the CJEU ruling which will need to be respected in future.

Milieu also suggested some outstanding issues in relation to Estonia, Finland, France, Hungary, Ireland, Italy, Malta.[23] Of these, Estonia, France, Hungary and Malta seem to have no CJEU-compliant treatment requirement, but Finland, Ireland and Italy seem to have compliant definitions in law. We were unable to properly verify the situation in Lithuania, though Milieu's study noted that in practice, infrastructure in Lithuania seemed consistent with implementation of the treatment requirement.

Member State	Restriction
Austria	Ban on landfilling of waste with Total Organic Carbon (TOC) > 5% with exceptions for: - waste from mechanical-biological treatment with a calorific value <6,600 kJ/kg dry matter and with respirometric activity meeting one of the following criteria: AT_4<7mgO_2/g dry matter; GS_{21} < 20 Nl /kg dry matter; or GB_{21} < 20 Nl / kg dry matter. - mechanically treated waste with calorific value < 6,600 kJ/kg dry matter and TOC < 8%
Belgium	**Flanders** - Since 1998, ban on separately collected waste. - Since 2000, ban on combustible waste (TOC > 6 % and LOI > 10 %); – Since 2007, ban on biodegradable waste. **Wallonia**

[21] European Environment Agency (EEA) (2023) Technical note accompanying the EEA briefing 'Economic instruments and separate collection – key instruments to increase recycling', June 2023.
[22] Milieu and Ricardo (2017) *Study to assess the implementation by EU Member States of certain provisions of Directive 1999/31/EC on the landfill of waste*, Final Report to European Commission, March 2017.
[23] Ibid.

Member State	Restriction
	- Since 2004, ban on combustible waste (TOC > 6 %) - Since 2007, ban on biodegradable waste.
Bulgaria	No CJEU-compliant requirement, as far as we are aware.
Croatia	No CJEU-compliant requirement, as far as we are aware.
Cyprus	No CJEU-compliant requirement, as far as we are aware.
Czechia	Landfill restriction to be introduced in 2030 for waste whose net calorific value (NCV) exceeds 6.5 MJ/kg dry matter, and waste which exceeds a threshold value for the biological stability parameter AT_4 10 mg O_2/g dry matter.
Denmark	Since 1997, ban on landfilling combustible waste (3% TOC in 2011).
Estonia	Our interpretation of the Waste Act, however, is that there is no CJEU-compliant requirement for treatment specified in law. The EEA references the restriction on landfilling biodegradable municipal waste, and suggests that stabilisation of such waste prior to landfilling is necessary, but this does not seem to be codified in law, rather, it seems that Guidelines in relation to Waste Acceptance Criteria hinted that outputs from MBT would probably need to be stabilised prior to landfill, with this assessed through reference to AT_4 values.
Finland	Ban on landfilling organic / biodegradable waste (TOC > 15 %) in application since 1st January 2016. The restriction was tightened to TOC > 10% as of 1st January 2020.
France	France allows the landfilling of “ultimate waste”. This is defined as waste which can no longer be re-used or recovered under the current technical and economic conditions by extracting recoverable parts or reducing its polluting or otherwise hazardous characteristics. In practice, there is no specific requirement that waste must be stabilised before landfilling.
Germany	Administrative regulation (TASi) introduced in 1993 on untreated waste with TOC > 3 %, full implementation since 1.6.2005. There are exceptions for: - mechanical-biological treated waste with a calorific value < 6600 kJ/kg with AT_4 < 5 mg O_2/g dry matter - mechanically treated waste with a calorific value < 6600 kJ/kg and TOC < 8%
Greece	No CJEU-compliant requirement, as far as we are aware.
Hungary	No CJEU-compliant requirement, as far as we are aware.
Ireland	Exemption from landfill levy for waste which displays a proven respiration activity after four days (AT_4) of less than 7 mg O_2/g dry matter thereafter.
Italy	Treatment may be thermal, or biological: biologically treated waste has to be stabilised such that the Dynamic Respiration Index (DRI) < 1,000 mg O_2/kg volatile solids /hr.
Latvia	In Latvia, there is a ban on landfilling MSW with TOC >5%.
Lithuania	By law, the landfilling of untreated waste was to have ended by 2013. At the time, however, insufficient treatment capacity had been implemented. It is suggested that the development of mechanical biological treatment in the subsequent period has enabled

Member State	Restriction
	the requirement to be met. It is unclear to us how any treatment requirement has been codified in law (for example, whether a threshold for stability was set).
Luxembourg	Ban on untreated MSW and organic waste with TOC > 5%.
Malta	No CJEU-compliant requirement, as far as we are aware.
Netherlands	Restriction since 1995 on 35 waste streams (increased to 60 in 2018), including combustible and biodegradable waste (TOC > 5%).
Poland	Since 2016, ban on landfilling of combustible waste with TOC > 5 %, LOI >8%, and calorific value > 6MJ/kg. The ban does not apply to stabilised waste from MBT as long as AT_4 <10 mg O_2/g dry matter, LOI < 35%, and TOC < 20% dry matter.
Portugal	No CJEU-compliant requirement, as far as we are aware.
Romania	No CJEU-compliant requirement, as far as we are aware.
Slovakia	As of 2027, only the output from the treatment of mixed waste, and bulky waste, may be landfilled, provided that its calorific value does not exceed 6.5 MJ/kg dry matter and with respirometric activity meeting one of the following criteria: AT_4<10mgO_2/g dry matter; GS_{21} < 20 l per kg dry matter.
Slovenia	Since 2011, no waste with a calorific value > 6 MJ/kg of dry matter, TOC > 5% (18% by weight), AT_4 > 10mg O_2 / g dry matter. This restriction also includes mixed municipal waste and separately collected waste.
Spain	No national treatment requirement that aligns with EUCJ rulings, though some regions have implemented restrictions on landfilling of waste
Sweden	Bans on landfilling combustible waste and organic waste for more than 20 years with some exemptions (<10% TOC).

A.2.0 Appendix 2: Taxes on Landfill

The following Table seeks to present the taxes on landfilling of leftover municipal type waste. In Member States with relatively long-standing bans on landfilling, these now display a degree of redundancy, though some Member States whose treatment criteria allow landfilling of biologically stabilised waste apply a lower rate for waste that has been so treated.

Several Member States which are, or have until recently been, landfilling significant shares of municipal waste have recently made significant adjustments to the rates of landfill tax they apply. Member States which have done this already include: Bulgaria, France, Ireland, Latvia, Lithuania, Poland and Portugal. Member States planning to do so (it remains to be seen if the announced rates will materialise as planned) include: Cyprus, Czechia and Malta.

The Table draws on the synthesis in a report by the EEA (and when referencing the EEA in the Table, it is this report to which we refer)[24] supplemented by our own research and prior knowledge.

Member State	Tax Rate
Austria	Austria has a landfill tax that differentiated between waste that was landfilled without treatment (€87 per tonne), and waste landfilled following biological pre-treatment (€29.80 per tonne). The former rate is more or less irrelevant given that waste has to be treated prior to landfilling. Landfill of residues from incineration and co-incineration plants are exempted from the landfill tax: those waste streams are already taxed via a tax on the input in incineration (€8 per tonne).
Belgium	There are no relevant landfills in the Brussels region. In Flanders, the tax is €107.87 per tonne for combustible waste and €59.33 per tonne for non-combustible waste. In Wallonia, the tax is €119.59 per tonne for general waste; and €66.37 per tonne for non-combustible waste. In both Flanders and Wallonia, these taxes support the existing bans.
Bulgaria	A landfill tax was introduced in Bulgaria in 2011. The EEA reports that the tax was planned to increase to BGN 95 (€50) per tonne by 2020. However, planned increases were delayed. It was then decided to increase stepwise from 69 BG/t (€35) in 2020, to 82 BG/t (€42) in 2021 and to 95 BGN/t (€50) in 2022 and onwards.
Croatia	Croatia postponed the implementation of a disposal fee envisaged in the Waste Management Act. A municipal waste charge has been in place, which is HRK 12 (corresponding to around €1.6 in 2021) per tonne of municipal waste disposed. Local authorities are also included within an incentive scheme which amounts to a non-compliance fee, the fee being linked to the extent of non-compliance with targets on separate collection of mixed municipal waste.

[24] European Environment Agency (EEA) (2023) Technical note accompanying the EEA briefing 'Economic instruments and separate collection – key instruments to increase recycling', June 2023.

Member State	Tax Rate
Cyprus	A landfill tax was planned to be introduced at €35 per tonne, but the initial rate was recently reduced to €10 per tonne, with plans to increase the rate by €5 per tonne from 2028 to a maximum of €70 per tonne by 2039.
Czechia	Landfill tax has increased from CZK 800 (€32) per tonne in 2021, CZK 900 (€36) per tonne in 2022, CZK 1000 (€40) in 2023, €1,500 (approx. €61) in 2025 and planned to increase to CZK 1850 (approx. €75) per tonne in 2029 for 'recoverable waste'. There is a tax exemption for municipalities who do not have to pay for landfilling of *recoverable* waste if a specified quota is not exceeded. In 2021 the quota amounted to 200 kg of municipal waste per inhabitant, falling to 190 kg per inhabitant in 2022, and falling further thereafter. Recoverable waste includes waste whose calorific value exceeds 6.5 MJ/kg dry matter, and whose stability exceeds AT_4 = 10 mg O_2/g dry matter.
Denmark	Denmark has had a landfill tax in place since 1987. It lies at 475 DKK per tonne (about €63.3 per tonne).
Estonia	The landfill tax for hazardous and non-hazardous waste is currently €29.84 per tonne. Increases have been proposed. In addition, Estonia has a non-compliance fee applied where landfilled quantities are greater than permitted (at 5 times the prevailing tax rate).
Finland	A tax on landfilling of municipal solid waste and residual waste from mechanical treatment of waste was increased to €70 per tonne as of 1 January 2016, and has remained at that level for some years.
France	In France, the general tax on polluting activities is applied to landfilling. As of 2020 a range of different rates for different types of landfills were applied: - €152 EUR/t for non-authorized landfills or non-authorized waste in authorized landfills (A); (1). The maximum fee is intended to penalize the illegal operation of an unauthorized waste disposal site. - €25 per tonne in authorized landfills with 75 % energy recovery from captured biogas (B); - €35 per tonne in authorized bioreactor landfill cells with biogas recovery (C); - €18 per tonne for bioreactor landfills with 75 % energy recovery from captured biogas (D); - and €42 per tonne for other authorized landfills. Recent increases have revised rates (B-D) to €65 per tonne in 2025 (and for category A landfills the rate will be €175 per tonne).
Germany	No tax
Greece	The EEA reports that a fee has been established: '*The level of the fee will be EUR 20 per tonne in 2022 and it is to be increased annually by EUR 5 up to EUR 35 per tonne. From the beginning of 2026, the fee will be set at EUR 45 per tonne and in 2027 increased to EUR 55 per tonne, after which it shall remain constant.*' The status of this, however, seems unclear since there has been substantial push-back by municipalities, and past experience includes non-implementation of previously-announced taxes.[25]

[25] An ECA report noted: 'From 2026, the tax will range from €35 to €45 per tonne, depending on the number of waste management centres in operation in each region. Specific rules apply for regions where such centres are not yet in place. As the infrastructure for treating waste is limited, more than half of Greek municipalities (164) challenged the law as unconstitutional in the Council of State. The municipalities aim to withhold a part of the tax and invest it in waste infrastructure in their region. The final judgment was still pending in May 2025' (see ECA (2025) Municipal waste management, *Special Report 23/2025*, Luxembourg: European Court of Auditors).

<table>
<tr><th>Member State</th><th>Tax Rate</th></tr>
<tr><td>Hungary</td><td>Hungary has been collecting a landfill levy since 2013. The EEA reports that the levy started at HUF 3 000 per tonne in 2013 (approx. €7.56 per tonne), and was planned to increase by HUF 3 000 per year to reach HUF 12 000 per tonne in 2016 (approx. €30.25 per tonne in June 2022), but the levy has been frozen since 2014 at HUF 6 000 per tonne.</td></tr>
<tr><td>Ireland</td><td>The landfill levy is applied (2025) at a rate of €85 per tonne for untreated waste; the rate is €10 per tonne for waste falling below the stability criterion set out in the Table above.</td></tr>
<tr><td>Italy</td><td>Landfill tax is set regionally within boundaries set by national law. The tax cannot be less than €5.17 per tonne and cannot exceed €25.82 per tonne. Some regions apply discounts for municipalities that exceed the 65% recycling target.</td></tr>
<tr><td>Latvia</td><td>Latvia's tax on landfill is named the natural resources tax. The tax rate has escalated rapidly from just over €1 per tonne in 2006 to €110 per tonne in 2024, and planned to rise towards €130 per tonne by 2026.</td></tr>
<tr><td>Lithuania</td><td>A tax of €10 per tonne in 2021 was in place for the disposal of non-hazardous waste at landfills. The tax covers also outputs of MBT plants that are landfilled. The landfill tax was increased to €50 per tonne from the year of 2023.</td></tr>
<tr><td>Malta</td><td>Malta has no landfill tax but the Deposit of wastes and rubble (fees) Regulations establish at Schedule C that the fee for landfilling of 'Mixed waste deposited for landfilling in any public facility and, or private facilities contracted to provide such public service, which in either case are intended to provide services of this nature' should be increased as per the Table below. The exact nature of these fees (cost recovery, or tax) is not clear to us, with the fees seemingly a hybrid.
<table>
<tr><td>2023</td><td>2024</td><td>2025</td><td>2026</td><td>2027</td></tr>
<tr><td>€40 per tonne</td><td>€60 per tonne</td><td>€80 per tonne</td><td>€100 per tonne</td><td>€120 per tonne</td></tr>
</table>
</td></tr>
<tr><td>Luxembourg</td><td>No tax</td></tr>
<tr><td>Netherlands</td><td>The waste disposal tax is the same for landfill and incineration. In 2020 this tax was €32.63 per tonne, in 2021 this was €33.15 per tonne, and currently (2022) the tax is set at €33.58 per tonne of waste. For 2023, the waste disposal tax is €35.70 per tonne.</td></tr>
<tr><td>Poland</td><td>The landfill levy was increased annually, being PLN 140 per tonne (corresponding to around €31 per tonne in June 2021) in 2018, PLN 170 per tonne (corresponding to around €38 per tonne) in 2019, and PLN 270 per tonne (approx. €60 per tonne) in 2020. The ECA reports a figure of €97 per tonne in 2025.[26] The unit rate is indexed to the inflation index annually. For stabilised waste meeting the treatment criteria, the fee is reduced to 25 % of the total rate (approx. €15 per tonne).</td></tr>
<tr><td>Portugal</td><td>In 2007 a landfill tax was introduced in Portugal. The tax increased steadily from €6.60 per tonne in 2016 to €22 per tonne in 2021. Further increases are planned, namely to €25 per tonne in 2023, to €30 per tonne in 2024 and €35 per tonne in 2025.</td></tr>
</table>

[26] ECA (2025) Municipal waste management, *Special Report 23/2025*, Luxembourg: European Court of Auditors.

<table>
<tr><th>Member State</th><th>Tax Rate</th></tr>
<tr><td>Romania</td><td>In 2019, the tax was 30 lei per tonne waste (approx. €6 per tonne) and increased in 2020 to 80 lei per tonne waste (approx. €16 per tonne). The ECA reports that in 2024, the tax per tonne was doubled to 160 lei (around €32 per tonne).[27]</td></tr>
<tr><td>Slovakia</td><td>Tax is linked to performance in recycling:
<table><tr><th>Sorting level x (in percentage)</th><th>from 2021
(€ per tonne)</th></tr><tr><td>x ≤ 10</td><td>33</td></tr><tr><td>10 ≤ x ≤ 20</td><td>30</td></tr><tr><td>20 ≤ x ≤ 30</td><td>27</td></tr><tr><td>30 ≤ x ≤ 40</td><td>22</td></tr><tr><td>40 ≤ x ≤ 50</td><td>18</td></tr><tr><td>50 ≤ x ≤ 60</td><td>15</td></tr><tr><td>x > 60</td><td>11</td></tr></table></td></tr>
<tr><td>Slovenia</td><td>Tax of €11 per tonne for non-hazardous waste.</td></tr>
<tr><td>Spain</td><td>The tax set at the national level establishes the minimum baseline, regional authorities (autonomous communities) can opt to increase this landfill tax in their respective regions. The tax distinguishes municipal solid waste (MSW) (€40 per tonne) and rejects from treatment of MSW (€30 per tonne).</td></tr>
<tr><td>Sweden</td><td>The landfill tax stood at 725 SEK (approx. €64) per tonne in 2024.</td></tr>
</table>

[27] ECA (2025) Municipal waste management, *Special Report 23/2025*, Luxembourg: European Court of Auditors.

Acknowledgements

Zero Waste Europe (ZWE) is the European network of communities, local leaders, experts, and change agents working towards a better use of resources and the elimination of waste in our society. We advocate for sustainable systems; for the redesign of our relationship with resources; and for a global shift towards environmental justice, accelerating a just transition towards zero waste for the benefit of people and the planet.

www.zerowasteeurope.eu

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