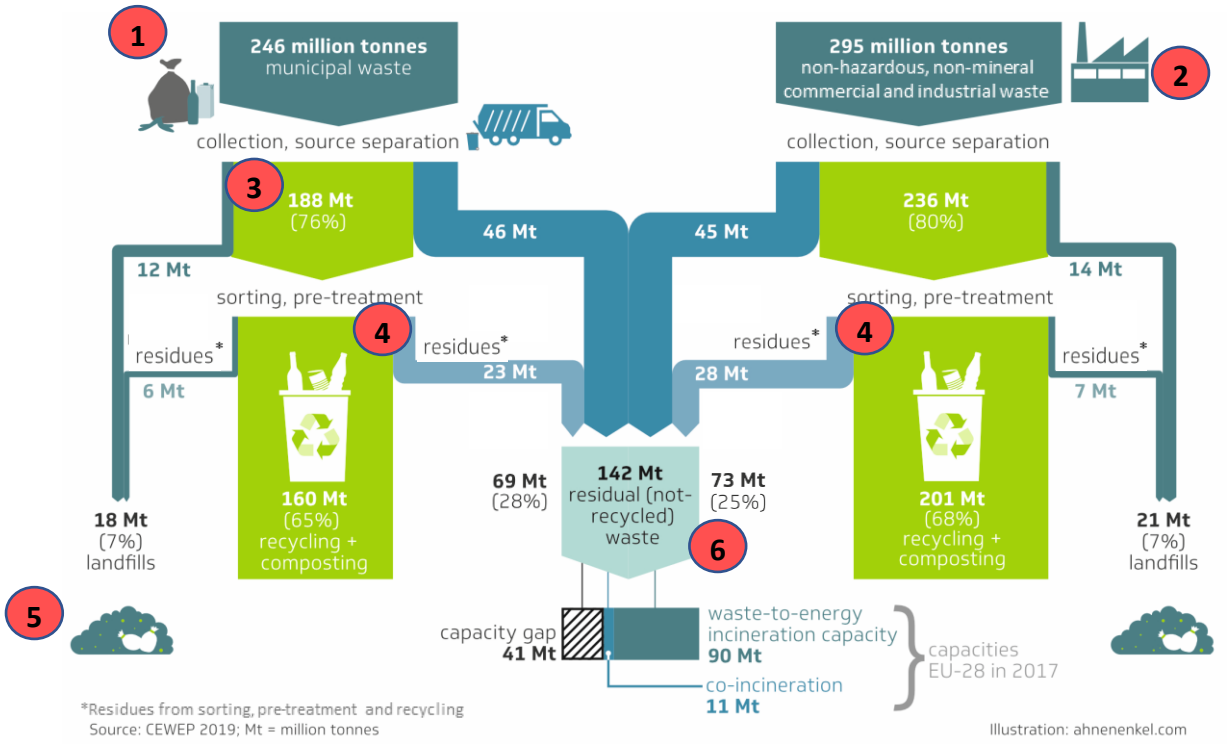
CEWEP calculation on residual waste in 2035



The aim of this calculation is to get an estimation of the need for residual waste treatment (e.g. energy recovery) once the Circular Economy targets for 2035 are fulfilled. It should allow for a basic understanding on waste weight shifts between recycling/composting, landfilling and thermal treatment according to the targets set by the new EU Waste Framework Directive (WFD) and EU Landfill Directive (LD) for 2035, 65% recycling and maximum 10% landfilling of municipal waste.

1) Municipal waste amount:

The baseline scenario for the generated amount of municipal waste (MW) is taken from the EUROSTAT statistics on municipal waste from 2016. We used the same number for 2035, with the assumption that the Member States' (MS) efforts on waste prevention (for which no legally binding EU targets exist) would be successful, balancing out the effect of population and GDP growth on the waste generated. In the CEWEP calculation tool, additional waste prevention and/or a different model for population growth can be implemented to see their impact on the resulting residual waste.

2) Commercial and industrial waste amount:

For commercial and industrial waste (C/IW) it is difficult to get accurate data. We took the amount from EUROSTAT statistics on (all) waste generated in 2016. In order to select the relevant type of C/IW, we discarded from all waste streams the hazardous waste and mineral waste and we subtracted the municipal waste to avoid double counting. The resulting value (295 million tonnes) has been then double-checked with the information on C/IW provided by some of the countries which have national waste reports publicly available. The same amount was used for 2035, with the assumption that MS efforts on waste prevention would be successful, balancing out the effect of the expected GDP growth (in reality, the total amount of waste had a 10% growth since 2004). In the CEWEP tool, additional

waste prevention and/or a different model for GDP growth can be implemented to see their impact on the calculation of the residual waste.

3) Collection and source separation

After source separation and collection, the majority of the waste is directed to sorting, pre-treatment and recycling plants - in the baseline assumption, 76% for MW and 80% for C/IW. This number for MW is calculated backwards considering that 65% of the waste must be recycled (WFD target) and that 15% of the waste directed to sorting, pre-treatment and recycling plants is rejected (because the quality is not good enough for recycling). For C/IW, the assumption is that 80% of the waste will be directed to sorting, pre-treatment and recycling plants, with the same assumption for residues at 15%. In the CEWEP calculation tool, a different amount of C/IW source separated and directed to sorting, pre-treatment and recycling can be set.

4) Residues that accumulate from sorting, pre-treatment and recycling are assumed to be 15% in weight. This is a very conservative number, taken with the hypothesis that these processes will improve their efficiency (also due to eco-design). Currently the share of residues from sorting, pre-treatment and recycling processes is much higher: according to a Deloitte study (p.23), for plastics, even when the collection rate is very high the recycling rate does not exceed 42%:

Deloitte Sustainability | Plastics packaging recycling chain in the EU

Table 9: Collection schemes in France, Germany, UK, Spain and Italy and their performances on the collection and recycling of polyolefin and PET plastics

Country	Type of collection scheme	Collection rate	Recycling rate
France	Separate collection on HH bottles and flasks, and ongoing extension to all packaging	44%	21%
Germany	Deposit scheme for PET bottles and "yellow bins" for all others and separation by colour	76%	36%
UK	Significant non-collected amount of household containers	38%	22%
Spain	A separate collection scheme is in place but high amounts of plastic waste is collected from residual waste	41%	31%
Italy	A good level of separate collection in place	55%	42%

Even for paper, which is one of the easiest streams to recycle, the European paper recycling council in its monitoring report states: *"A strong step towards the 2020 target of 74% [recycling] has already been taken. We are however starting to reach the maximum potential, as about 22% of paper consumption cannot be collected or recycled."*. In the CEWEP tool, the amount of rejects from sorting, pre-treatment and recycling can be changed for both Municipal and Commercial and Industrial waste.

5) Landfill cap

The circular economy targets set a national binding limit of maximum 10% for landfilling municipal waste in 2035. Some countries already landfill less than 10% of their MW (e.g. Austria, Belgium, Denmark, Germany, Sweden). We assumed that these countries will not increase their share of

landfilling, while all the others will reach the 10% target (minimum requirement). With these assumptions, the average share of landfilled waste will be 7.2%.

In order to make the calculation more ambitious, we took the same value for C/IW, even if at the moment no landfilling targets are set for these streams on the EU level.

In the CEWEP tool, there is an option to allow Member States to use the 5 years extension to reach the recycling and landfilling targets for municipal waste[1]. The option assumes that all MS that fit the criteria have used this possibility for both targets. In this case, the targets will be fulfilled in 2040 only and in 2035 the average landfill rate will be 15% (and the average recycling rate 62%). The CEWEP calculation tool will also allow to change the landfill rate for C/IW.

6) Results

The results, with the baseline assumptions, foresee a total amount of residual waste (non-recycled, non-landfilled) of around 142 million tonnes in 2035. Currently the EU 28 capacity of Waste-to-Energy incineration and co-incineration[2] is around 101 million tonnes. This leaves a gap of 41 million tonnes. The entire calculation has been peer-reviewed by Prognos, an independent consultancy.

Conclusions:

Several conclusions can be taken from the results of the calculation above:

1. In 2035 despite the circular economy efforts there will be a considerable amount of residual non-recyclable combustible waste and that will need reliable treatment capacities which are not in place for the moment and are partially subject to increasing political pressure such as incineration with energy recovery. Closing the gap, or at least trying to narrow it, could be to a certain extent done with additional strong policies on waste prevention.

However, for both municipal and commercial/industrial waste, under the assumption that all the targets would be complied with, it would be necessary to reach 30% waste reduction (almost 160 million tonnes) to reach a residual waste amount equal to the current capacity of Waste-to-Energy incineration and co-incineration.

2. It must be stressed that this gap is obviously unevenly distributed in Europe and would mostly affect the countries without existing capacity for residual waste treatment.

One example is the case of Rome, where on 1st July 2019 the situation reached a point where "Ordine dei Medici" (the association of doctors) wrote an official letter regarding the problems of management and disposal of urban waste stating:

"Hence the new invitation to the institutions to address, responsibly and jointly, the situation before it becomes really serious and we move from the hygienic emergency to the health emergency, with the risk of spreading diseases.

[1] The WFD foresees that EU Member States that prepared for re-use and recycled less than 20 % or landfilled more than 60 % of its municipal waste generated in 2013 can ask for additional five-year extension to reach the targets, i.e. until 2040; The Landfill Directive allows for EU Member States which landfilled 60 % or more of their municipal waste in 2013 to ask for additional five-year extension to reach the targets, i.e. 2040.
[2] The capacity of co-incineration in cement kilns include both hazardous and non-hazardous waste.

But in addition to the hygienic and health risk […] there is also the risk of open fires that would release substances very toxic for the health of citizens."

3. According to the EC Communication on Waste-to-Energy:

"*When reviewing national waste management plans and assessing the need for additional waste-to-energy capacity for the treatment of non-recyclable waste (e.g. incineration), Member States should take a long-term perspective and carefully assess the following factors:*

− the impact of existing and proposed separate collection obligations and recycling targets on the availability of feedstock to sustain the operation of new incineration plants over their lifespan (20 - 30 years);
− the available capacity for co-incineration in combustion plants and in cement and lime kilns or in other suitable industrial processes; and
− planned or existing capacity in neighbouring countries."

Regarding the co-incineration in Cement kilns, a recent press release from Cembureau states: *"The association said that Europe's cement industry currently covers on average 44 per cent of its fuel needs with alternative, waste-based sources. "However, there is no technological barrier that would keep the cement sector from reaching a co-processing* ***rate of 60 per cent by 2030 and then it could process 15.7 million tonnes of waste****,".* Even reaching 80% substitution (as suggested in a previous Ecofys study), would lead to a maximum 20 million tonnes of waste co-incinerated. A significant part of these waste-based sources used by cement kilns are coming from hazardous waste and so would not be counted for reducing the gap to treat residual MW and C/IW. Furthermore, it is not clear to which extent society can rely on waste treatment capacities in cement kilns as this depends on the market for cement production which does not take into account the needs of the waste sector. In some countries (e.g. Spain, Italy), cement kilns are closing or running at lower capacity due to low cement demand and increasing operational cost[3]. Therefore, the long-term waste treatment capacity in co-incineration is difficult to predict.

There is also a small amount of RDF/SRF which is co-incinerated in power plants. However, there are technical difficulties related to dealing with the corrosion of the equipment and the specific emissions requirements when incinerating waste.

For what regards the possibility to ship the residual waste to other European countries, it is hard to see it as a solution as the Waste-to-Energy plants in Europe are currently running at full capacity and cannot take additional waste.

4. EuRIC, the European umbrella association of the recycling sector, recently raised concerns about lacking capacities to treat rejects from recycling facilities. They state that due to this problem *"some recycling companies have been forced to stop their entire mechanical recycling operations, permanently or temporary".* The situation, according to them, is caused, inter alia, by*:*

[3] https://www.europapress.es/economia/noticia-cementeras-auguran-mas-cierres-fabricas-cemex-si-no-recupera-sector-20190305121417.html

- **High recycling targets in Europe [...]** which equally result in larger volumes of residual waste
- **Uneven capacity of waste incineration facilities with or without energy recovery in Europe**

In their recommendations, they say: "*EuRIC urges public authorities to ease the access to waste to energy or disposal facilities for ultimate residual waste from industrial and commercial waste, WEEE or ELVs such as to prevent extreme situations where recycling facilities have to stop operating because of the absence of foreseeable outlets*. "

If there is no outlet for residual waste, the materials cycle runs the risk of contamination with pollutants ending up in products, on uncontrolled landfills or open fires (appearing more frequently since China and other Asian countries restricted their policy on waste import); causing immeasurable damage to human health and the environment.

5. Of course, as it is stated in the EC Communication on Waste-to-Energy: *"Where waste-to-energy processes are opted for, there is a need to ensure that the most efficient techniques are used: this maximises their contribution to the EU's climate and energy objectives."* Waste-to-Energy plants are able to provide clean and reliable energy to the grid, in form of electricity and heat (to both district heating and industries), saving CO_2 which would be otherwise emitted for producing it. One good case example is the recently opened industrial steam network at the port of Antwerp, ECLUSE: the Waste-to-Energy plant generates process steam and distributes it to five chemical companies, avoiding as much as 100'000 tonnes of CO2 per year.

Moreover, recently adopted Best Available Techniques Conclusions on Waste Incineration set new additional strict legally binding requirements on emission control and energy efficiency for Waste-to-Energy plants in Europe. Plants will need to have the best available techniques and operate them in the best way in order to achieve the strict requirements. In some cases, investments will be needed to guarantee these levels.

For all these reasons, keeping in mind that achieving higher levels of prevention, reuse and recycling should be the priority, it is necessary to ensure that EU policy and the framework for sustainable finance and investment does not prevent necessary investments in residual waste treatment which closes the loop for an integrated and sustainable waste management system.

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