European Environment Agency

Waste management

The case for increasing recycling: Estimating the potential for recycling in Europe

EU legislation includes recycling targets for municipal, construction and demolition, and electronic waste. This briefing shows that there is significant potential to increase recycling from all of these streams. However, to fully exploit this potential, current barriers need to be overcome, e.g. price competition from virgin resource alternatives, infrastructure capacity and the complexity of certain waste products. This also requires strong implementation of targeted regulations to increase separate collection. Implementing new policy measures, some of which are already included in Europe's 2020 circular economy action plan, can both directly and indirectly exploit the potential for increased recycling.

Key messages

There is significant potential to increase the material collected for recycling in Europe's construction and demolition, municipal, and electronic waste streams. The municipal and electronic waste streams have the potential to double the amounts recycled, and recycling of construction and demolition waste has the potential to increase by 30 %.

The most important barrier to increasing recycling of these waste streams is the low market price of natural resources/virgin raw materials. Next is the mixed and complex composition of some waste products, which makes the recovery and reuse of materials from waste challenging.

Regulations requiring more frequent and higher quality separate collections, extended producer responsibility schemes and selective demolition practices can effectively exploit the potential for further increasing recycling. Such initiatives should be coupled with measures to improve the economics of recycling, remove hazardous substances from products and apply design-for-recycling concepts.

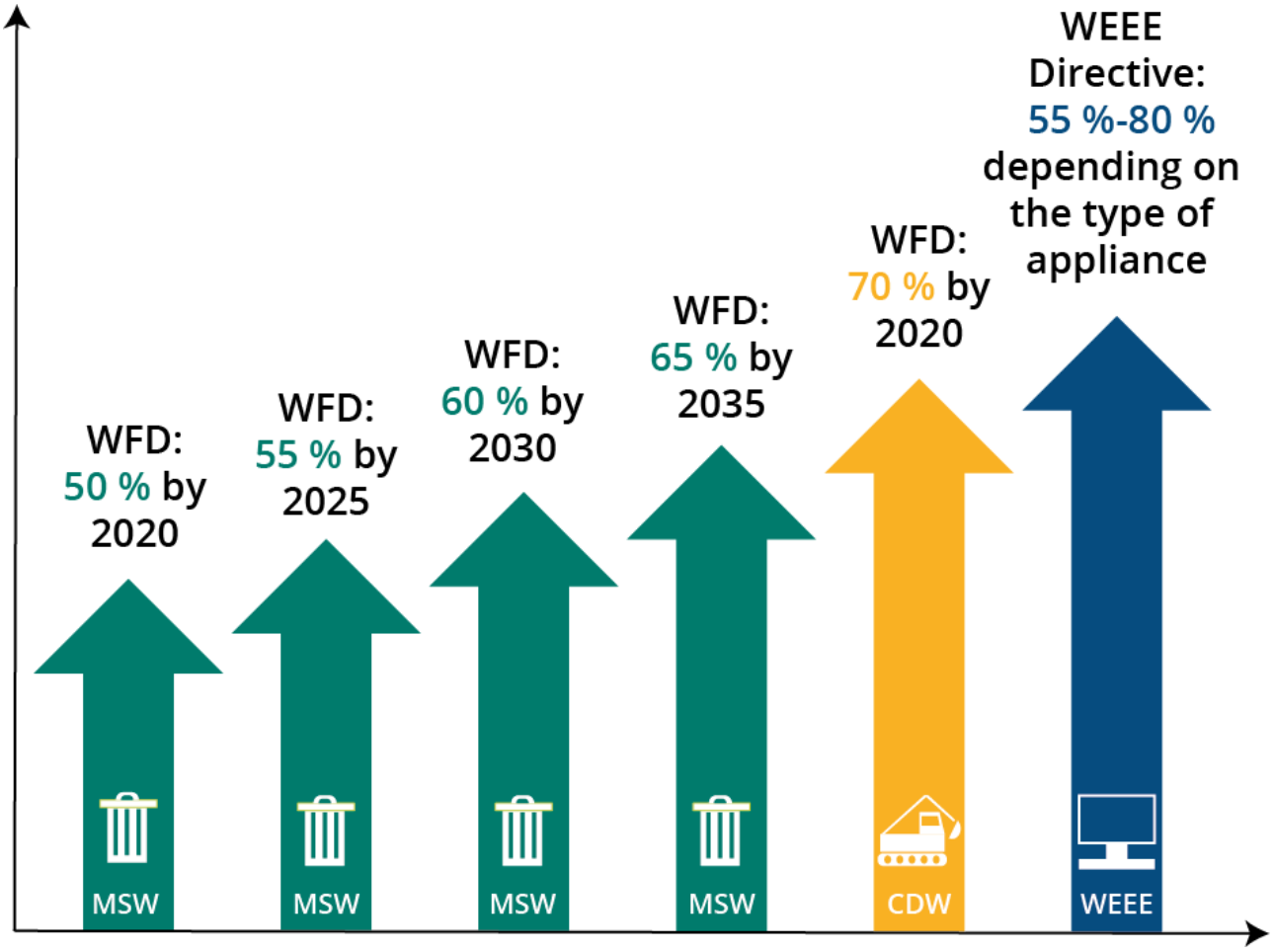
Existing targets in EU legislation already set a high standard, as they aim to harness much of the currently untapped recycling potential. For example, the existing recycling targets for municipal waste up to 2035 aim to exploit most of the potential for recycling of this waste stream.

This briefing summarises the key findings of a technical report commissioned by the EEA.

Setting the scene

Waste policies at EU level follow principles designed to achieve a gradual, but steady, increase in the level of recycling of a waste stream compared with the amount generated. The Waste Framework Directive (WFD) and Waste Electrical and Electronic Equipment (WEEE) Directive are based on the premise of increasing recycling rates for municipal and construction and demolition waste as well as for electronic waste. In addition, Europe's circular economy agenda calls for keeping materials in the economy for as long as possible and their value as high as possible.

Figure 1. Recycling targets set out in EU legislation for municipal (MSW), construction and demolition (CDW), and electronic (WEEE) waste streams



Source: EEA

Technical, economic and social issues often hinder achieving more ambitious levels of recycling, beyond the targets set. Examples include, respectively:

- the presence of technically non-recyclable materials and products in waste streams;
- the increasing cost of separate collection as more materials are collected;
- consumers' difficulty in distinguishing and correctly separating materials in complex products.

Against this background, the underlying question emerges: 'What is the potential for recycling, and what are the maximum recycling levels Europe can achieve under currently implemented EU waste legislation?

This briefing provides estimates of the untapped potential for separate collection for recycling (see Box 1) in three waste streams and puts future developments in policymaking in perspective. It examines the municipal, construction and demolition (mineral part only), and electronic waste streams. Together, these comprise a significant part of total waste generation in Europe.

The estimates presented are based on the latest available data and the current status of implementation of EU waste legislation. This means that the measures in the latest circular economy action plan of the European Green Deal and some of the most recent amendments to EU waste directives are not taken into account. These might have a profound effect on the levels of separate collection that could be achieved.

Please note that the calculations of the untapped potential for collection for recycling also might change once waste prevention measures are further implemented. This is because both the amount of waste generated and the material recyclability will be affected by, for example, the phasing out of hazardous substances in products.

Box 1. Collection for recycling and final recycling

The recycling value chain starts with the separate collection of materials in waste bins for a single material or a group of waste materials. This is followed by sorting and compaction before the recyclables are delivered to recycling plants. Our analysis focuses on estimating the limits on recycling at the collection point, defined as the amount of waste collected for recycling for each waste stream, compared with the amount generated.

Separate collection for municipal waste and for construction and demolition waste means collecting non-hazardous recyclables separately from residual waste. In the case of electronic waste, collection for recycling means collecting electronic waste separately from other waste streams.

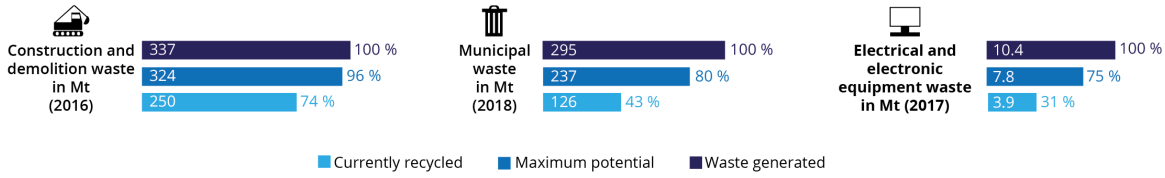
The final amounts of waste entering recycling plants are lower than the amounts collected for recycling. Separately collected materials are often contaminated (e.g. paper labels on plastic bottles) or are collected as mixed materials requiring further mechanical or chemical separation (e.g. Tetra Pak milk cartons). This process normally happens in sorting plants, which separate recyclables from rejects. The average difference between amounts collected and amounts entering recycling plants has been estimated for a number of waste materials.

The methodology for estimating the potential increase in separate collection for each of the selected waste streams is based on:

- either reports in the literature estimating theoretical upper limit values for separate collection of specific materials, or
- benchmarks of separate collection achieved in specific areas and specific waste management system configurations.

A detailed description of the methodology can be found in the technical report.

Figure 2. Potential for increasing separate collection for recycling and current (based on latest available data) generation and recycling for construction and demolition, municipal and electronic waste



Note: Data for construction and demolition waste are from the EU-28, Iceland and Norway (2016). Data for municipal waste are from the EU-28, Iceland, Norway, Switzerland and Turkey (2018). Data for electronic waste are from the EU-28, Iceland, Lichtenstein and Norway (2017).

Source: Eurostat, EEA.

Construction and demolition waste

Although the latest data available (2016) show that the current levels of recycling of construction and demolition waste are already high (Figure 2), the nature of this waste stream's material fractions may enable even higher separate collection rates.

In 2016, most of the non-recycled waste was used for 'backfilling' operations, e.g. using waste material to fill excavated holes. However, backfilling is not considered recycling and it is not the most environmentally sound waste treatment option.

Taking account of the material composition of this waste stream, the maximum potential for separately collecting each material fraction was estimated. By combining these estimates per material, a potential separate collection rate for the entire stream was calculated at 96 % or 76 million tonnes more separate collection than the 2016 level of around 250 million tonnes. This potential is mainly based on increasing separate collection of masonry, concrete and asphalt wastes. The calculations account for only the mineral part of construction and demolition waste for both waste generation and recycling.

The target for 2020 stands at 70 % recovery (all waste, not just the mineral part), so there is room for potentially increasing the target in the future, especially by upgrading waste currently used in backfilling to recycled waste.

Municipal waste

Separate collection of municipal waste, stimulated by ambitious EU legislation, is steadily increasing over time. New, higher recycling targets were introduced in the amended Waste Framework Directive in 2018, which indicates even higher separate collection in the future.

An estimate for this stream shows that the potential for increased separate collection of waste is above the future EU targets. If all the potential is harnessed, separate collection rates of around 80 % can be achieved (Figure 2). This means that 111 million tonnes more material could be separately collected (in 2018, recycling stood at 126 million tonnes), based on waste generation in 2018. This untapped potential is mainly linked to food and plastic but also garden and textile wastes.

The amended 2018 Directive introduced a target for recycling of 65 % by 2035. This is particularly ambitious, compared with the estimated maximum potential of 80 %. The target refers to final recycled amounts, not to amounts of waste collected for recycling. The latter includes amounts of non-recyclable materials or contaminants, which are removed during waste processing, so the 80 % potential for separate collection corresponds to lower levels of final recycling.

Waste from electrical and electronic equipment

This is the smallest waste stream, in terms of mass, examined in this briefing. Electronic waste, however, contains valuable resources (e.g. metals and critical raw materials). It is also the waste stream with the lowest recycling rate, mainly because of failures in separately collecting this type of waste (see Box 2). As electronic waste is composed mainly of metals, plastic and glass, which are routinely recycled (unless they contain hazardous substances), there is a significant opportunity to increase recycling.

The estimation of the maximum collection rate for recycling, unlike the other waste streams, is not based on the stream's material composition, as the separate collection of this waste is not designed per material but per product category. Therefore, based on the latest official data for maximum recycling achieved per waste product category, the potential for separate collection of

electronic waste for recycling stands at 4 million tonnes of additional separate collection, or a 75 % separate collection rate (Figure 2).

Box 2. The special case of electronic waste

Waste from electrical and electronic equipment is somewhat different from the other waste streams examined in this briefing. The main issues that waste management systems face are collecting electronic waste separately from other streams and avoiding illegal exports and recycling under non-compliant conditions.

Another issue is that many waste materials and products are contaminated with hazardous substances, such as flame retardants, making recycling difficult or impossible, as these substances cannot be recirculated into the economy for health reasons.

The circular economy agenda is particularly relevant to electronic waste as it calls for a reduction in hazardous substances in products to improve their recyclability and for measures such as the ‘right to repair’ and incentives to design-for-recycling. Therefore, implementing circular economy-related measures for this type of waste would enable us to realise much of the untapped potential for recycling.

A separate recent EEA briefing provides additional information on this waste stream.

Barriers and enablers

The barriers to increasing separate collection of waste for recycling can be common to all three waste streams or waste stream specific.

Of the common barriers, the markets for recyclables often underperform. The price differential between recycled materials and virgin material alternatives is normally unfavourable. Moreover, the consequently relatively low revenues from recyclables strain the economics underpinning separate collection systems.

Another issue is that the quality of materials collected for recycling can vary, meaning that recycling plants cannot count on streamlined inputs of materials with a specific quality. Recyclers cannot count either on pan-European end-of-waste criteria for all recyclables. The combination of these factors explains the weak demand for some recyclables from processing and recycling plants.

Barriers of a more technical nature include the lack of recycling infrastructures in Europe, especially for emerging recyclables such as plastics. This means that increasing quantities of materials collected for recycling cannot be accommodated in European plants and are often exported for further processing. Another technical barrier is the very nature of waste materials and products: some materials are technically non-recyclable or are composed of mixed materials that are hard to separate.

To overcome these barriers, Europe needs strong and effective regulation in combination with effective implementation and enforcement. More specifically, regulations on the following could lead to significantly more separately collected waste:

- mandatory separate collection (municipal waste);
- effective extended producer responsibility schemes regulated by fees (electronic waste);
- selective demolition (construction and demolition waste).

Furthermore, in the unfavourable secondary material markets, the use of taxes and subsidies might be further explored to promote the uptake of recyclables and assist the transition to a more circular economy. Phasing out hazardous substances in products and developing standards for recyclables would increase products' recyclability and lead to a stronger demand in the secondary material markets.

The 2020 circular economy action plan addresses many of the barriers hindering significant increases in recycling and also introduces measures that can be taken at product design and use stages. The wide uptake of measures such as phasing out hazardous substances in products, design-for-recycling or design-for-disassembly, and the 'right to repair' initiative would make more material available for separate collection and therefore recycling.

The action plan also proposes harmonising separate collection systems, which would increase their efficiency and lead to more recyclables being captured in separate collection schemes. Circular economy measures may also increase the potential for recycling, as estimated in this briefing, by enabling the recycling of currently non-recyclable materials and products.

Resource efficiency and waste

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