

Understanding waste management Policy challenges and opportunities

SUMMARY

Five tonnes of waste per capita are generated every year in the European Union (EU), mostly from the construction and mining sectors, with municipal waste accounting for roughly 10% of the total. Although wide differences remain between Member States, recent trends in the treatment of municipal waste show a shift away from landfilling and an increase in the proportion of waste recycled. Management of waste can have adverse effects on the environment, climate and human health.

EU waste policy is built on a thematic strategy, a series of overarching directives, legal acts applying to specific waste streams, legal acts on specific installations, and implementing acts defining when specific materials leave the waste regime after treatment. Various targets set out in EU legislation (in particular as regards recycling of household waste and landfilling of biodegradable waste) are being implemented at varying speed across Member States, regions and municipalities. Regional and local policies have a significant influence on waste recycling rates. Despite this legislation, illegal waste shipments remain a concern.

Waste management requires facing a number of challenging issues, for instance, balancing objectives between promoting recycling and protecting consumers against harmful chemical substances in recycled materials; insufficient data collection; quality aspects related to recycling; energy recovery of waste; and waste prevention. The opportunities relate mainly to a shift towards a more circular economy, with benefits for the environment and human health, as well as the economy.

The European Parliament has consistently called for policies in line with the hierarchy of waste prevention and management options, and moving towards a more circular economy.



Waste sorting

In this briefing:

- Background
- EU waste policy
- Challenges and opportunities
- European Parliament
- Main references

Glossary¹

Municipal waste: (also referred to as 'municipal solid waste') waste from households, as well as other waste which, because of its nature or composition, is similar to waste from households.

Polluter pays principle: the principle requiring the polluter to bear the cost of preventing, controlling and cleaning up pollution, to ensure that these costs are reflected in the cost of goods and services which cause pollution in production and/or consumption.

Waste hierarchy: Priority order set among waste prevention and management options: 1) prevention, 2) preparation for re-use, 3) recycling, 4) (energy) recovery, and 5) disposal.

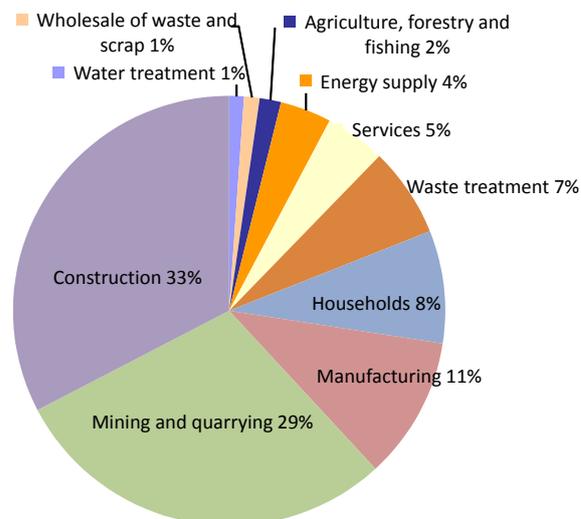
Background

In 2012, 2.5 billion tonnes of waste (or about 5 tonnes per capita) were generated in the European Union. As shown in figure 1, while the greater part came from the construction (33%), mining (29%) and manufacturing (11%) sectors, households represented 8% of the total. The breakdown by type in figure 2 reflects waste sources: 'mineral and solidified waste' (mainly soils, construction and demolition waste) account for 71% of the total waste generated; 'mixed ordinary waste' (mainly household and similar waste) and 'recyclable waste' (mainly metal, wood, paper, glass and plastics) account respectively for 11% and 10% of the total.

Economic production and consumption in the EU appears to have become less waste intensive. According to the [European Environment Agency](#) (EEA), between 2004 and 2012, waste generation from manufacturing and services sectors in the EU-28 and Norway declined by 25% and 23% respectively, despite respective increases of 7% and 13% in sectoral economic output. Meanwhile, total municipal waste generation in [EEA countries](#) declined by 2%, despite a 7% increase in real household expenditure.

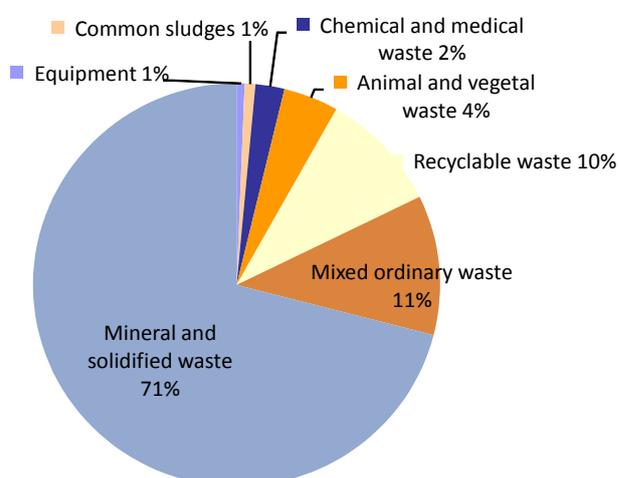
Improvements have been recorded in the treatment of **EU municipal waste** (generated mainly by households, and to a lesser extent by small businesses and public bodies such as schools and hospitals), which represents around 10% of the total waste generated in Europe. Municipal waste per capita in the EU decreased slightly from 523 kg per person in 2007 to 481 kg per person in

Figure 1 – Waste generation in EU-28 by sector (2012)



Data source: Eurostat ([env_wasgen](#)), 2015.

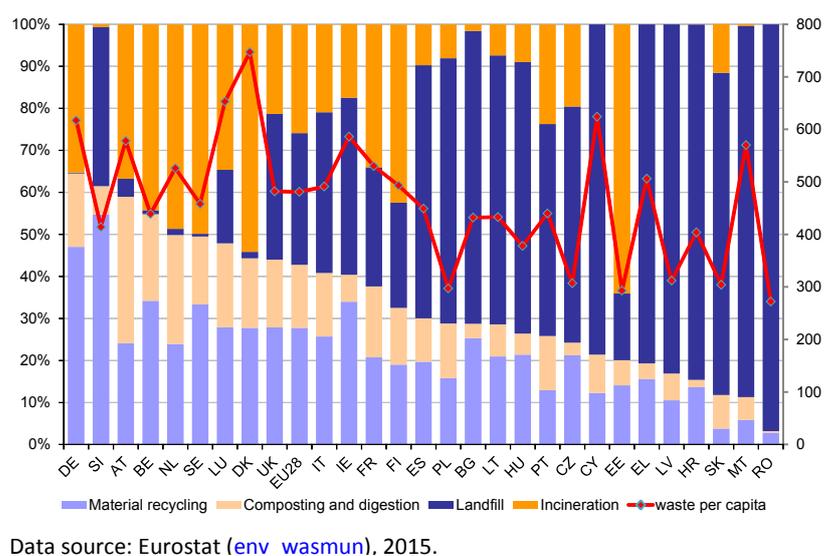
Figure 2 – Waste generation in EU-28 by type (2012)



Data source: Eurostat ([env_wasgen](#)), 2015.

2013, in part as a result of the economic downturn. According to the [EEA](#), trends in the past decade show a shift away from landfilling; an increase in the proportion of waste recycled, mainly due to materials recycling (bio-waste recycling performs less well); and a 56% drop in greenhouse-gas emissions from municipal waste management between 2001 and 2010. Eurostat data indicate that the share of recycled or composted municipal waste in the EU-28

Figure 3 – Municipal waste treatment methods and waste per capita in EU-28 (2013)



increased from 31% in 2004 to 43% in 2013. However, wide differences still exist between Member States, as shown in figure 3: while recycling and composting reaches 65% in Germany, it is as low as 3% in Romania; on the other hand, municipal waste per capita ranges from 747 kg in Denmark to 272 kg in Romania. Figures on waste management, including on municipal waste, ought to be treated with caution however, especially as regards comparison between Member States, because of varying data collection methods, the wide spectrum of waste types, and the complexity of waste-treatment streams.

Waste management methods can have adverse effects on the **environment** (in particular biodiversity and ecosystems), the **climate**, and **human health**. Among the impacts on the environment are: landfills, which, depending on the way they are built, may contaminate soil and water with chemicals contained in waste; littering can have severe consequences for wild animals, especially through ingestion of microplastics;² more generally, if waste is not recycled or recovered, the raw materials extracted and transformed to produce a product are lost. Waste management also affects the climate, as landfills release methane, a powerful greenhouse gas. Human health is affected primarily by air pollutants released in the atmosphere and by the possible contamination of freshwater sources and agricultural soils.

Few data are available on the **cost of waste management** at EU level. Data from the French Ministry for Ecology estimate that, in 2010, the total cost of waste management in France was €377/tonne. In spite of its small share in weight, municipal waste accounted for 60% of the treatment costs. [Data](#) from the French agency for environment and energy efficiency (ADEME) show varying average net costs of treatment depending on treatment method: €180/tonne to landfill residual municipal waste; €203/tonne to incinerate residual municipal waste; €343/tonne to treat recyclable waste (except glass); and €62/tonne to treat glass. The EEA estimated in a 2011 [report](#) that the turnover of seven key recycling sectors³ was €60 billion in 2008.

Waste crisis in Campania (Italy)

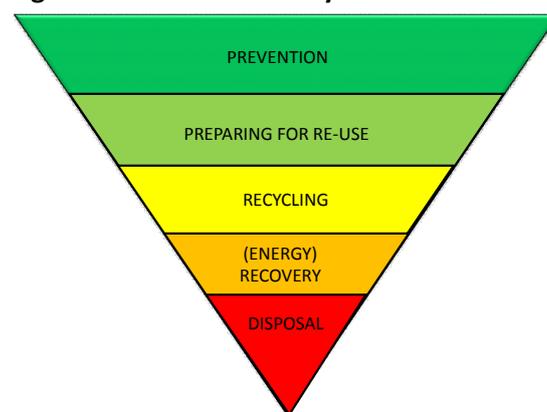
The Campania region in southern Italy is affected by a long running waste crisis. A 2015 [report](#) indicates that, in addition to organised crime infiltrating legal waste management operations, hazardous waste coming mainly from other regions is being illegally dumped or burnt in an area north of Naples dubbed the 'land of fires'. A 2014 anti-corruption [report](#) by the European Commission lists waste management among the sectors 'most prone to corruption at local level', sometimes associated with the participation of organised crime groups. In 2011, the European Parliament adopted a [resolution](#) on the waste crisis in Campania.

EU waste policy

Policy and legislation

The 2005 [Thematic strategy on waste](#) sets out the **general policy framework**: modernising legislation, introducing an approach based on product life cycles, preventing waste production and promoting recycling. The 2011 [Roadmap to a resource-efficient Europe](#) deals, inter alia, with waste management with the aim to 'manage waste as a resource' by 2020. The [Seventh Environment Action Programme, 'Living well, within the limits of our planet'](#) also addresses waste management in its priority objective, aiming 'to turn the Union into a resource-efficient, green and competitive low-carbon economy.'

Figure 4 – Waste hierarchy



Source: [European Commission](#).

The 2008 [Waste Framework Directive](#) (2008/98/EC) sets the **overarching legislative framework**. It defines the main concepts linked to waste management, including the 'polluter pays principle'; the 'waste hierarchy' and the 'end-of-waste status' (i.e. when waste ceases to be waste after recovery). It lists disposal and recovery operations for waste, and properties rendering waste hazardous. The Directive sets binding targets to be achieved by 2020: preparing for re-use and recycling of 50% of certain waste materials from households and similar sources, and preparing for re-use, recycling and other recovery of 70% of construction and demolition waste. It also requires Member States to draw up [waste-management plans](#) at national, regional and local level (if applicable), and to subsequently notify the European Commission.

Two other legal acts set out the remaining general framework:

- The 1999 [Directive on the landfill of waste](#) bans landfilling of untreated waste and sets objectives for the reduction of biodegradable waste which can be landfilled. Compared to 1995, the base year, the share of biodegradable municipal waste going to landfills may not be greater than 75% in 2006, 50% in 2009 and 35% in 2016, with derogations granted to 16 Member States.⁴
- The 2006 [Regulation on shipments of waste](#) sets information and prior notification procedures for transboundary waste transport, and implements the [Basel Convention](#) banning exports of hazardous waste to non-OECD countries. An [amending Regulation](#) from 2014 strengthens inspection systems and mandates Member States to establish inspection plans covering their entire territory by 1 January 2017.

In addition to the above, several legal acts apply to **specific waste streams**:⁵

- [Directive on packaging and packaging waste](#);
- [Directive on waste electrical and electronic equipment \(WEEE\)](#);
- [Directive on batteries and accumulators and waste batteries and accumulators](#);
- [Directive on end-of-life vehicles](#);
- [Regulation on ship recycling](#);
- [Directive on waste from extractive industries](#);
- [Directive on the disposal of PCB and PCT](#);
- [Directive on sewage sludge in agriculture](#);
- [Directive on radioactive waste](#).

Specific installations are also subject to legal acts:

- The [Directive on port facilities for ship-generated waste](#) regulates facilities where waste from ships and residues from cargo material can be transferred;
- The [Industrial Emissions Directive](#) sets rules applicable inter alia to waste incinerators and installations producing titanium dioxide;
- The [Regulation on animal by-products](#) lays down rules on the disposal of animal by-products, mainly from slaughterhouses.

Under the Waste Framework Directive, **implementing acts** have defined **end-of-waste criteria** for the following materials: [metal](#), [glass](#) and [copper](#).

The Commission is expected to present, by the end of 2015, a proposal amending several waste-related legislative acts.⁶

Extended producer responsibility (EPR)

Extended producer responsibility schemes imply that producers take over the financial and/or organisational responsibility for collecting or taking back used goods, as well as sorting and treatment for their recycling. They provide an incentive for producers to take into account environmental considerations from the design phase to the end-of-life of their products, and support the implementation of the waste hierarchy.

The Waste Framework Directive sets principles regarding the implementation of EPR schemes in Member States. Three stream-specific directives (end-of-life vehicles, batteries and accumulators, and waste electrical and electronic goods) introduce EPR as a policy approach. It is also used for packaging and other waste streams at varying levels in Member States. Although EPR is in theory an individual obligation, in practice producers often exert this responsibility collectively through 'producer responsibility organisations' (PROs). A [report](#) published in 2014 by the European Commission looks at differences in performance between PROs across Member States and six waste streams. It concludes that, in most cases, the best performing schemes are not the most expensive ones, and that no single EPR model emerges as the best performing and the most cost-effective.

Implementation

Progress towards the **target to recycle 50% of household waste by 2020** set in the Waste Framework Directive has been uneven. The European Environment Agency's 2013 [report](#) indicates that, while five Member States have already achieved the target and another six will achieve it if they continue to improve their recycling rate at the current pace, the majority of Member States would need to make an extraordinary effort in order to achieve the target of 50% recycling by 2020.⁷ The overall increase in the recycling rate appears to be mainly driven by materials such as glass,

paper/cardboard, metals, plastic and textiles. In contrast, increases in bio-waste recycling are much more modest.

The **reduction of biodegradable waste going to landfills** mandated in the Landfilling Directive is progressing, albeit at varying speeds. The above-mentioned [report](#) by the European Environment Agency indicates that, while almost all of the 12 Member States without a derogation are on track to meet the 2016 targets, just seven of the 16 Member States with derogations are estimated to have achieved the 2010 target. The report cites significant increases in the generation of municipal waste as an important factor explaining slow progress in some countries, since reduction targets are set compared to the total amount of municipal waste generated in 1995.

Illegal waste shipments remain a serious concern. In 2013, the European Commission [estimated](#) that 25% of waste shipments do not comply with the Waste Shipment Regulation. A 2015 [case study](#) on illegal e-waste exports from the EU identifies several factors hindering implementation, inter alia, insufficient exchange of information within and between Member States; weaknesses in the registration and reporting of inspections, infringements and sanctions; the existence of two different waste-classification systems; and major differences among Member States regarding the prosecution and penalties applicable to environmental crimes.

A '[fitness check](#)' exercise on five **waste-stream directives** (sewage sludge, packaging, PCB/PCT, end-of-life vehicles, batteries and accumulators), the [conclusions](#) of which were published by the European Commission in 2014, indicates that there are no major implementation problems with four of the directives. However, the 2010 deadline for the complete decontamination and disposal set by the PCB/PCT Directive has not been met by most Member States, although significant progress was noted.

Regional and local policies have a significant influence on municipal waste recycling rates. The European Environment Agency [points out](#) that in most of the Member States where regional recycling data are available; there are substantial variations between regions. The EEA concludes that while European and national targets are the overall drivers of better municipal waste management, regional and local implementation is crucial for achieving positive results. It also suggests that regions with high recycling rates could serve as good practice examples and become knowledge-sharing platforms for other regions, nationally and across Europe.

Overview of municipal waste collection and treatment methods

[Municipal waste collection practices](#) vary across the EU. They include door-to-door collection of mixed waste (most often once a week or once every two weeks, except in inner cities); collection of separated waste (e.g. paper, packaging, glass, metal) usually with a mix of door-to-door collection and drop-off points; collection possibilities for bulky waste, such as furniture or large appliances (on which special rules may apply); and staffed or unstaffed recycling centres accepting a wide range of waste. Differentiated pricing for mixed and separated waste is often used as an incentive to sort waste.

The most common municipal waste treatment methods in the EU are landfilling, recycling and incineration (mostly with energy recovery). [Composting](#) and [anaerobic digestion](#) are used to treat organic waste. Other methods are [mechanical biological treatment](#), [pyrolysis](#) and [gasification](#).

Challenges and opportunities

Challenges

One of the main challenges related to waste management is seen as promoting **recycling** while making sure consumers are protected from **toxic substances** which can be found in waste. While the Waste Framework Directive promotes recycling through the waste hierarchy and binding targets, the [REACH Regulation](#) regulates chemicals contained in products, with the aim of protecting consumer health and the environment. Although the REACH Regulation does not apply to waste, it applies to materials leaving the waste regime after recycling (reaching 'end-of-waste' status), with some exemptions from registration granted to recyclers.⁸

Recyclers have to determine whether the substances present in products they manufacture (including any impurities) have hazardous properties. They also need to search for relevant existing information and evaluate it. This requires carrying out checks and controls at various stages of the recycling process, as well as getting information about the raw material products, which may not be public or easily available. The need to meet these requirements may drive up recycling costs, push recycling operations and use of secondary raw materials outside the EU, and prevent higher recycling rates.

Possible solutions have been put forward to address this issue in the long term. A presentation by the European Commission's Joint Research Centre outlines three possible strategies: ensure widespread information about the presence of substances of concern in products; reduce and substitute substances of concern; and improve management of substances of concern which cannot be substituted. A 2014 European Commission [report](#) suggests modifying the REACH Regulation to cover a wider range of toxic chemicals, which might limit reuse and recycling, and to strengthen obligations related to the provision of information which may be relevant when recycling a product. It is expected that the Commission will address this issue in its new proposal on a circular economy.

Other challenges in waste management include:

- Because of varying data collection and reporting methods on waste, **statistics** can be unreliable, both in terms of quality and comparability. Unclear or inconsistent definitions across the relevant directives, and consequent divergences in Member State interpretations, also cause difficulties.
- **Weaker norms outside the EU** create incentives for economic operators to export waste for treatment, especially to Asia. Illegal shipments are also a concern.
- Recycling is not only about quantity, but also about quality. **Downcycling**, i.e. recycling waste into products of inferior quality and reduced functionality, is widespread, for instance as a treatment method for construction and demolition material (often used as backfilling) or plastics (e.g. food packaging turned into plastic bags or plant pots).

Stakeholder views

EEF, the [UK manufacturers' association](#) calls for the introduction of the concept of 'repair as produced' (whereby spare parts have to be available for all products placed on the market) in the REACH Regulation and for the creation of better conditions for remanufacturing.

A [coalition of NGOs](#) advocates inter alia removing problematic substances at the design stage; making sure recycled products are fully compliant with chemicals legislation when receiving end-of-waste status; and the labelling of recycled materials containing authorised or temporarily exempted hazardous substances.

- **Energy recovery of waste** (also called '[waste-to-energy](#)') can in some cases compete with recycling as a waste treatment method. Waste-to-energy is generally preferable to landfilling and enables the generation of heat and electricity. However, recycling can be a better option, including in terms of energy generated and saved, provided that material quality is maintained.
- Although **waste prevention** is at the top of the waste hierarchy, a 2014 [report](#) by the European Environment Agency finds that most Member States lack effective waste-prevention measures. Because of its cross-cutting character, waste prevention relates to many areas beyond the realm of waste management (such as the design, production and consumption of goods). Lack of appropriate data also makes it difficult to track progress.

Opportunities

The main opportunities in waste management relate to a shift towards a more [circular economy](#), where products and the materials they contain are valued highly, unlike in the traditional linear economic model based on a 'take-make-consume-throw away' pattern. This shift entails such measures as curbing landfilling and promoting recycling, reuse and remanufacturing.

A waste-management policy aiming at more circularity could deliver **benefits for the environment and human health**. Reduced amounts of waste and higher recycling rates could contribute to the following environmental effects: limiting air, soil and water pollution (including marine litter); reducing greenhouse gas emissions (especially methane); and protecting ecosystems and biodiversity. Human health would in turn benefit from better environmental conditions, especially as regards improved air, water and soil quality.

Such a waste management policy could also deliver **economic benefits**. A 2013 [study](#) on the socioeconomic impacts of higher recycling rates in the Netherlands by consultancy CE Delft concludes that, in spite of increased waste sorting, collecting and recycling costs, the overall economic impact is positive. Increased security of supply in raw materials could be beneficial for the EU, which imports, in raw material equivalents, about half the resources it consumes. The European Commission [estimates](#) that meeting the resource productivity target in its initial circular economy proposal, tabled in July 2014, would create 2 million additional jobs. The Ellen MacArthur Foundation [estimates](#) that circularity could bring EU companies annual net material cost savings ranging from €250 billion to €465 billion – or from 12% to 23% of their material costs, depending on the magnitude of the shift.

European Parliament

In its resolution of 24 May 2012 on a [Resource-efficient Europe](#), Parliament urged the Commission and Member States to remove obstacles to a functioning European market in recycling and reuse, and called on the Commission to streamline waste legislation, taking into account the waste hierarchy and the need to bring residual waste close to zero. Parliament also took the view that European industry ought increasingly to rely on domestic materials.

On 10 December 2013, Parliament vetoed the adoption of an implementing act put forward by the Commission on [end-of-waste criteria for paper](#). Parliament took the view that the proposed Council regulation would grant end-of-waste status to paper before it had been properly recycled – when it still contains very high levels of

impurities compared to relevant product standards. Parliament estimated that this would lead to adverse environmental impacts and would seriously undermine the achievement of higher recycling rates in the EU.

In its resolution of 14 January 2014 on a [European strategy on plastic waste in the environment](#), Parliament called for a revision of EU legislation on plastic waste along lines strengthening the implementation of the waste hierarchy, and also advocated phasing out those most dangerous plastics proven to disrupt human health and the environment.

For the [review of the Waste Shipment Regulation](#) adopted on 17 April 2014, Parliament introduced wording strengthening the proposal and insisted that waste inspection plans include details of the 'objectives and priorities' for inspections, inspector training, and arrangements for cooperation between authorities.

Main references

[Valorisation énergétique des déchets: opportunités et défis](#), EPRS briefing, 2015.

[Turning waste into a resource: Moving towards a 'circular economy'](#), EPRS briefing, 2014.

[Resource-efficiency and waste: implementation appraisal](#), EPRS briefing, 2014.

Gestion des déchets: aide-mémoire, Jean-Michel Balet, Éditions Dunod, 2014.

[Managing municipal solid waste: A review of achievements in 32 European countries](#), European Environment Agency, 2013.

Endnotes

¹ Main sources for definitions are the [Landfilling Directive](#); [OECD Recommendation on guiding principles concerning international economic aspects of environmental policies](#); [Waste Framework Directive](#).

² For more information on the specific impact of plastic waste: [Plastic waste: ecological and human health impacts report](#), published in 2011 by the European Commission.

³ Iron and steel; copper, aluminium and nickel; paper and cardboard; precious metals; other metals; plastic; glass.

⁴ Twelve Member States (Bulgaria, Cyprus, Czech Republic, Estonia, Greece, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, United Kingdom) have been given a four-year derogation, meaning that they must meet their targets by 2010, 2013 and 2020. A further four Member States have been given specific derogations: Ireland has to meet the 2006 and 2009 targets by 2010 and 2013; Portugal has to meet the 2009 and 2016 targets by 2013 and 2020; Slovenia has to meet the 2016 target by 2020; Croatia must meet the targets by 2013, 2016 and 2020.

⁵ Waste waters are excluded from the scope of the Waste Framework Directive. The treatment of waste waters is regulated under the [Directive on urban waste-water treatment](#), which is part of EU water policy.

⁶ On 2 July 2014, the European Commission put forward, within the circular economy package, a first legislative [proposal](#) amending the Waste Framework Directive, the Landfilling Directive and four directives related to specific waste streams. However, the proposal was withdrawn in February 2015.

⁷ Nine Member States would need to increase their recycling rate yearly by 2-4 percentage points until 2020, a rate that only three Member States achieved between 2001 and 2010. A further seven Member States would need to achieve an unprecedented increase of more than four percentage points annually up to 2020.

⁸ Under the REACH Regulation, a recycler does not need to register a substance if a) the recycler has its headquarters or performs the recycling in the EU; b) the recovered substance is the same as a registered substance; and c) the recycler has information available about the registered substance.

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