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IW-Policy Paper 9/2018

Two years later: The EU Circular Economy Package

An Update

Adriana Neligan

Köln, 18.04.2018

Table of Contents

Summary **3**

1 Introduction **4**

2 The EU Circular Economy Package **4**

2.1 Legislative part: a slow decision process 6

2.2 Action Plan: a general orientation 7

3 Moving up the waste ladder **8**

3.1 No clear shift to waste avoidance 8

3.2 Slow switch from landfilling to recycling 9

3.3 Recycling targets: Which countries are on track? 9

3.4 New Method: Implicit sharpening of the targets 11

4 Beyond waste management: implications for businesses **12**

4.1 Motivation for businesses 13

4.2 The role of innovation 15

4.3 Costs 17

5 Conclusions **19**

6 Literature **21**

List of Tables **25**

List of Figures **25**

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Summary

The European Commission aims to push forward the concepts of ‘recycle, repair and re-use’ as well as waste avoidance. Two years after adopting the Circular Economy Package, EU institutions finally agreed on new EU waste rules. Despite lower recycling targets as originally envisaged, most countries still have to push recycling to meet the goals. A single method of determining recycling rates was also decided, but an exemption rule will continue to allow for disparate recycling rates.

Only ten countries including Germany are on track with their currently reported recycling rates to achieve the first goal of 55 per cent by 2025, assuming they keep up their recycling efforts of the past decade. Germany is leading the recycling hierarchy with 66 per cent, much more than on EU average. However, according to the new calculation method, Germany’s recycling rate would drop to between 47 and 52 per cent. In this case, the German recycling rate would have to rise between 0.7 and 0.9 percentage points annually until 2035 to achieve 65 per cent. Looking back, Germany only managed 0.5 percentage points annually over the past decade based on the current method. Hence, Germany would have to push recycling and focus on more high-quality recycling. Fortunately, the country is a role model not only for its long recycling tradition and modern waste management, but also for its global leadership in recycling technologies.

To comply with the Package many EU countries will need a completely new waste treatment system, and many companies will need to re-think some established business models. For businesses, the transition to a circular economy will likely include costs and risks, but can also lead to new business opportunities for German companies making and exporting circular economy-relevant products and services.

The recent decision on EU-wide targets is an important step forward to ensure planning and investment security. Otherwise it is difficult for businesses to initiate further necessary investments in recycling technologies and capabilities. In addition, minimal bureaucracy, good access to finance, capacity building and specific expertise are key to not impede relevant activities to a circular economy. There is still untapped potential for more eco-innovations and for the use of digital solutions to speed up the transition towards a circular economy.

1 Introduction

The EU Circular Economy Package pushes forward the concepts of 'recycle, repair and re-use' as well as waste avoidance. The rationale behind a circular economy is to keep resources in use for as long as possible by considering the complete life cycle of a resource – from extraction to product design, production and consumption to waste management. The aim is to minimise both material input and waste generation by resource-saving product design (eco-design) and by recycling and re-using products and materials turning waste into a resource again (see Neligan, 2016 for more detail).

To comply with the Package many EU countries will need a completely new waste treatment system, and many companies will need to re-think some established business models. For businesses, the transition to a circular economy will likely include costs and risks, but can also lead to new business opportunities for companies making and exporting circular economy-relevant products and services.

Two years after adopting the Circular Economy Package, EU institutions finally agreed on a new EU waste regulation. This paper evaluates recent EU policy moves and decisions. It also analyses the status quo of circular economy efforts of Germany and compares them to those of other EU member states. Finally, some of the risks and opportunities for companies are outlined. This paper is an update of a previously published policy paper by Neligan (2016), which discussed the Package after it was presented in late 2016.

2 The EU Circular Economy Package

The EU Circular Economy Package, first published in December 2015, consists of a legislative part and an Action Plan (see Table 2-1 for an overview). The following section will discuss the key elements of both parts of the EU package.

Table 2-1: The Circular Economy Package

Brief overview

	Legislative Part	Action Plan
Aim	Harmonisation of the EU legislative framework on waste	Measures to "close the loop" by intending to tackle all phases in the life cycle of a product
Contents	Amendment of six pieces of waste legislation: Waste Framework Directive, Packaging Waste Directive, Landfill Directive, Directive on electrical and electronic waste, Directive on end-of-life vehicles, Directive on batteries and accumulators and waste batteries and accumulators	The action plan complements the legislative proposal and includes an action timeline and a plan for a monitoring framework for the circular economy.
Key elements		
	Clearer definitions of key waste concepts and harmonised calculation methods for recycling and re-use rates	Eco-design working plan for 2016-2019 to promote durability, reparability, upgradeability, design for disassembly, recyclability and re-usability of products, in addition to energy efficiency
	New binding EU target by 2035 for recycling and re-use 65% (2025: 55%, 2030: 60%) of municipal waste / by 2030 70% of packaging waste (65% by 2025)[1]	Strategy on plastics in the circular economy, addressing avoidance, recyclability, biodegradability and microplastics
	Binding cap on landfilling to 10% of municipal waste by 2035[2]	Quality standards for secondary raw materials to increase the confidence of operators in the single market
	Stricter requirements for the separate collection of waste, reinforced implementation of the waste hierarchy through economic instruments and additional measures for member states to prevent waste generation; minimum requirements for extended producer responsibility schemes	Report on Critical Raw Materials, actions to reduce food waste, monitoring framework of a circular economy, options to address the interface between chemical, product and waste legislation, revised regulation on fertilisers, series of actions on water re-use

Source: Own compilation based on EU Environment Council (2016), European Commission (2017), Council of the European Union (2017a), European Commission (2018c), UK Parliament (2018)

1 A time derogation of five years will be allowed member states which recycled less than 20 per cent or landfilled more than 60 per cent in 2013.

2 A time derogation of five years will be allowed member states which sent over 60 per cent of waste to landfill in 2013.

2.1 Legislative part: a slow decision process

European waste legislation is currently being revised considerably to get away from a linear economy of extracting, using and dumping raw materials. The key elements of the revised legislation include (European Parliament, 2017):

- introducing new waste-management targets regarding re-use, recycling and landfilling;
- harmonising calculation methods for targets;
- strengthening provisions on waste prevention and extended producer responsibility; and
- streamlining definitions and reporting obligations.

In December 2017 a provisional agreement on the four legislative proposals on waste, revising six pieces of EU legislation, was reached in a final Trilogue meeting between the European Council, Commission and Parliament. The revised legislation will now be subject to a final vote in the EU parliament in mid-April 2018 and then finally adopted by the EU Council. Since the draft has already been informally agreed with the Council of Ministers, it is unlikely that additional changes will be made (European Parliament, 2018).

The main points of discussion were the actual EU-wide targets as well as the appropriate calculation method:

- **Targets:** The EU Commission originally proposed a recycling target of 65 per cent of municipal waste by 2030 – the European Parliament called for 70 per cent and the European Council 60 per cent. As a compromise, binding recycling targets for municipal waste have now been agreed on at 55 per cent by 2025, 60 per cent by 2030 and 65 per cent by 2035.
- **New method:** Another aim of the EU Commission has been to harmonise the measurement of recycling and re-use rates in the European Union as the methodology of determining recycling rates has varied across Europe. With four methods currently available, agreeing on a single method, which records the input into the final recycling process, is an important decision. Since many countries use the weight of material from collection (or the first sort) as measurement point, this will imply adjustments of their recycling rates (also see Section 3.4 for implications). The now-reached agreement, however, only goes part of the way toward measuring real recycling. An exemption rule allows member states to declare materials as recycled even after an early waste sorting stage by estimating the losses occurring after first sorting operations that will be deducted. However, such average loss rates should only be used in cases where no other data, for example in the context of shipment and export of waste, are available (EC, 2018a). Nonetheless, this will continue to allow for disparate recycling between the member states as the exemption rule relies on agreeing on ‘average loss rates’ for materials in sorting and processing (Messenger, 2018; Morawski, 2018).

In addition, the legislative part of the Package includes strengthened provisions around extended producer responsibility (EPR), which implies that a producer's responsibility for a product is extended to the post-consumer stage of a product's life cycle (Organisation for Economic Co-operating Development definition). It makes the manufacturer of a product responsible for the entire life cycle of the product and especially for the collection, take-back, sorting, recycling and final disposal. This approach incentivises producers to design products that last longer and can be recycled or re-used more easily after their original use (eco-design) by internalizing treatment and disposal costs. Such a responsibility for waste management may be merely financial but can be organisational as well (EC, 2014). The EU Waste Directive, which already implemented this concept in 2008, is revised to offer some long-overdue clarification regarding the 'rules of the game' for producers subject to national EPR laws (Morawski, 2016). Since the effectiveness and performance of EPR schemes differ significantly between EU member states, the revised legislation will set minimum requirements for extended producer responsibility schemes. Producers of products under these schemes must bear responsibility for the management of the waste stage of their products. Producers will be required to pay a financial contribution calculated on the basis of the treatment costs. In addition, mandatory EPR schemes for all packaging by 2024 have also been in introduced in EU legislation (EC, 2018a, EC, 2018b, Council of the European Union, 2018).

2.2 Action Plan: a general orientation

The Action Plan with its 54 measures integrates different policy areas, such as waste and product policy, by looking at the entire product life cycle and does not only concentrate on the waste aspect. By factoring in recycling and re-use concepts in the production phase and the product itself, recycling of products shall be made easier.

This wide approach does not only affect the waste disposal and recycling industries. It also makes other sectors more responsible for their waste, as the two interconnected concepts of eco-design and extended producer responsibilities become more prevalent:

- **Eco-design:** Since up to 80 per cent of the environmental effects of a product can already be specified during the design phase, the European Commission wants companies to consider waste avoidance during the development of a product. Eco-design takes into account the environmental impact of products throughout their whole life cycle in the design phase. It aims to design products requiring the sustainable and minimal use of resources and maintaining the utility and hence the value of products, their components and materials within material cycles for as long as possible. Eco-design facilitates high-quality recycling of materials at the end of a product's life by considering concepts of sharing, repairing, remanufacturing, refurbishing and recycling at the design phase. In addition, cleaner material cycles can be achieved by substituting hazardous substances in products and processes (EEA, 2016). The Circular Economy Package intends to use existing instruments better, for instance the Eco-design Directive, instead of introducing further instruments. To date the EU Eco-

design Directive only focuses on energy efficiency and excludes reparability, durability and recycling of products. The long-awaited Eco-design Working Plan 2016-2019 was finally published in November 2016, which expands the focus of future eco-design measures beyond energy efficiency to possible circular product requirements such as reparability, upgradeability, design for disassembly, information and ease of re-use and recycling (EC, 2017a).

- **Targeted activities:** In addition, there are targeted activities for food, construction, industrial and mining waste and for secondary raw materials. In January 2018 several new strategies were presented, including an EU strategy for plastics; an assessment of an improved interface between chemicals, product and waste legislation; a monitoring framework for the circular economy; and a report on critical raw materials and the circular economy (EC, 2018d). In the case of plastics, for example, with its first EU-wide strategy for plastics the European Union aims at reducing the leakage of plastic in the environment by transforming the way products are designed, manufactured, used and recycled. By 2030 all plastics packaging shall be recyclable.

3 Moving up the waste ladder

Some EU member states are better prepared for this shift of paradigm than others, but there is no recognised way of measuring how effectively different countries will undergo the transition (EEA, 2016). This section aims to help close this gap by looking at recent trends in waste treatment and the attainability of the EU targets at the different levels of the waste hierarchy.

Prior to the 2015 Package, existing EU waste policies have already contributed to moving towards a circular economy. There are policy measures favouring recycling and some circular economy-relevant concepts have been established (EEA, 2016). The Waste Framework Directive (2008/98/EC) sets out the basic concepts and definitions related to waste management, such as definitions of waste, recycling and recovery. It also included two recycling and recovery targets for 2020: 50 per cent of municipal waste and 70 per cent of construction and demolition waste. In addition, the waste management hierarchy became a priority for waste legislation and policy in the EU member states (EC, 2015). As a first priority, waste should be avoided. Strictly speaking, this is not a waste policy since it has more to do with improving manufacturing methods and influencing consumer demand for greener products and less packaging. The EU Commission acknowledges this by extending its approach in the Action Plan to other policy areas. After waste avoidance, waste management should follow the cascade of first re-using and then recycling waste. If this is not an option waste should be used for energy recovery. As a final resort waste should be disposed of. To get EU member states to move up the waste hierarchy, the EU Circular Economy Package is going to set binding recycling and landfilling targets (also see Table 2-1).

3.1 No clear shift to waste avoidance

The highest priority in the waste hierarchy is to reduce the amount of waste generated at source and to reduce the hazardous content of waste. However, over the past decade, empirically no

clear shift to producing less municipal waste can be observed in the EU. Between 2005 and 2016 the total amount of municipal waste in the European Union decreased by only 4 per cent – in Germany it rose by 11 per cent. Yet, both the EU and Germany have been able to reduce the waste intensity − the total volume of municipal waste per Euro gross domestic product − over the past decade. The European Union as a whole, as well as Germany to a smaller extent, have therefore been able to decouple the generation of waste from economic growth partly due to improved material efficiency. Nonetheless, countries with high GDP per capita, such as Germany but also Denmark and Ireland, still tend to produce more municipal waste per head than countries with low level per-capita GDP.

Within the EU-28 municipal waste generation varied considerably in 2016, ranging from 261 kg per capita in Romania to 777 kg per capita in Denmark, reflecting differences in consumption patterns and economic wealth, but also in municipal waste collection and management. Since 2005, 17 EU countries have been able to reduce municipal waste per head, while it has increased in Germany. On average, Germany generated 626 kg of municipal waste per person in 2016. Within the European Union (482 kg per head) only Denmark (777 kg), Cyprus (688 kg) and Malta (623 kg) threw away more (Eurostat, 2018). In comparison to these figures and the EU average of 482 kg per-head, municipal waste generation in the United States is relatively high at 735 kg (2014) (OECD, 2018).

3.2 Slow switch from landfilling to recycling

The envisaged recycling targets are ambitious, but they are a key impulse to move all EU member states towards more recycling. Since only a few countries are on track to meet the goals yet, strict targets are a way to enforce the needed change in the waste management infrastructure in many EU countries. Landfilling of municipal waste clearly dropped in the EU-27 states, from 43 per cent in 2005 to 24 per cent in 2016. Yet, 10 member states still transport more than half of their municipal waste to landfills. Only seven member states already meet the 2035 target of 10 per cent landfill waste as they dump at most one-tenth of their municipal waste on rubbish tips. In parallel, incineration – mostly for energy recovery − rose from 19 per cent to 28 per cent over the same period (Eurostat, 2018).

Recycling has become more important in the European Union: EU recycling rates increased from 32 per cent to 46 per cent between 2005 and 2016. Yet, more progress is needed to reach the target of 65 per cent by 2035 (Eurostat, 2018). By comparison, the United States increased its recycling rate from 31 per cent in 2005 to 35 per cent in 2014 (OECD, 2018).

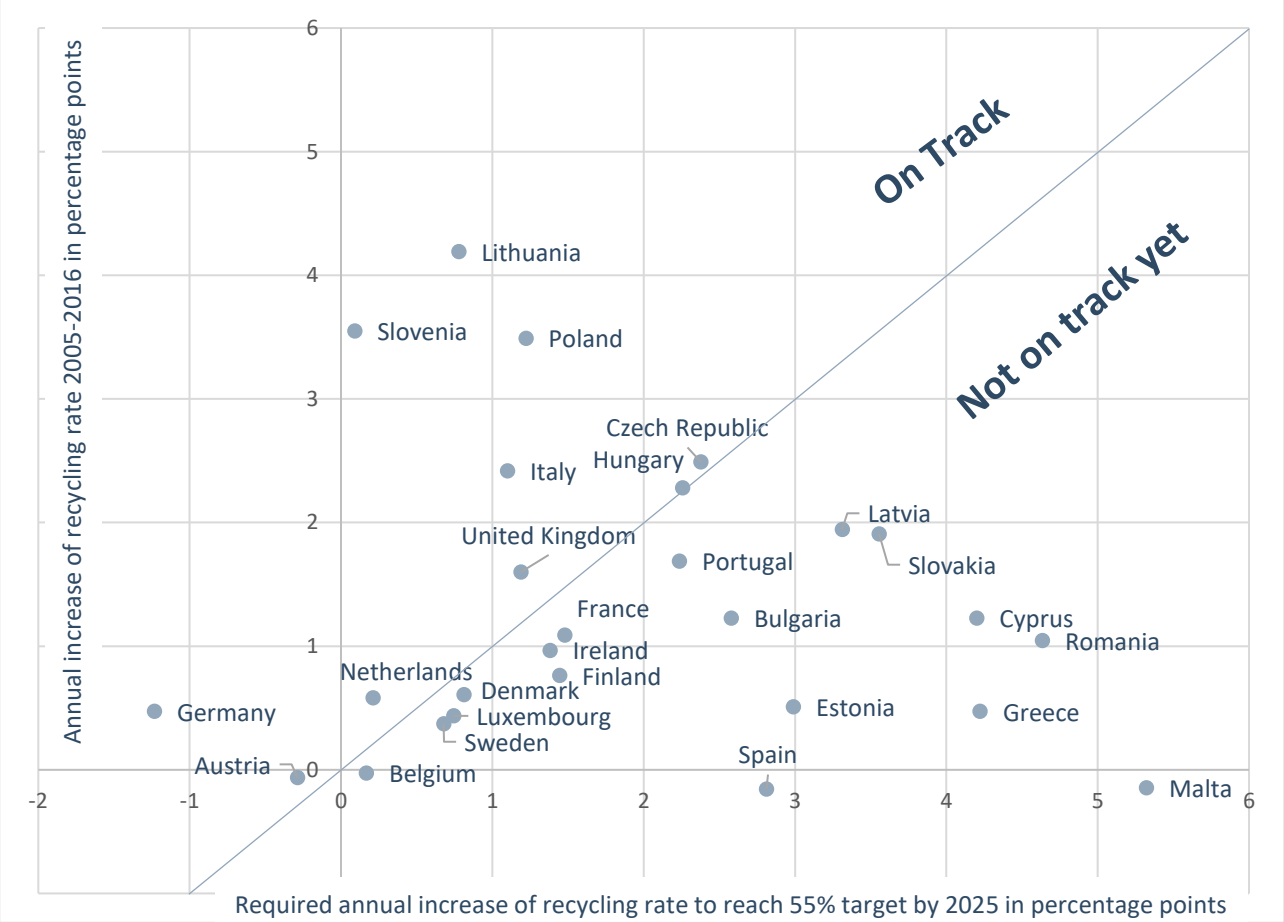
3.3 Recycling targets: Which countries are on track?

The EU member states can be classified according to their recycling rate in 2016 and the increase in the recycling rate between 2005 and 2016 if compared to the respective EU averages. In addition, an analysis reveals that only ten countries including Germany are on track to achieve the first recycling goal of 55 per cent by 2025, assuming they keep up their recycling efforts of the

past decade (Figure 3-1).The figure plots the member states' average annual increases in recycling between 2005 and 2016 and the annual increases required by 2025 to reach the goal. All other countries will have to increase their recycling rate at a faster pace than in the past decade. Since EU waste data is not harmonised yet, some of the data on recycling might include rejects from sorting and processing. Given the four different measurement methods within the EU a cross-country comparison can therefore only be performed on a limited basis.

Figure 3-1: Recycling target for 2025 in many cases far away

In percentage points



On track: recycling rate can grow slower than in the past decade to reach the 2025 target.

Not on track yet: recycling rate has to grow faster than in the past decade to reach the 2025 target.

EU-27 (without Croatia), Ireland and Portugal: 2014; Slovenia: 2015

Sources: Eurostat (2018), own calculations

The results of the analysis are the following:

- **A few with a recycling tradition on track**: Germany is leading the EU recycling hierarchy with 66 per cent of its municipal waste being recycled, much more than on EU average (46 per cent). It is the only country that has already achieved the 2035 target of 65 per cent according to the current method. Other countries with traditionally high recycling rates are Austria, Belgium and the Netherlands with rates lying above 50 per cent. Luxembourg, Sweden and Denmark have rates greater than 45 per cent. Except for Germany, Austria and the Netherlands, all other countries with traditionally high recycling rates have to raise their rate faster until 2025 than the minor increases observed during the past decade to reach 55 per cent.

- **More with recent recycling efforts on track:** Several countries had large rises in their recycling rates in the past decade. Slovenia stands out as a newcomer (2015: 54 per cent). Lithuania is also catching up due to a recent major rise of the rate (48 per cent). According to latest Eurostat estimates the recycling rate in Lithuania rose from 33 to 48 per cent between 2015 and 2016, mainly due to a doubling of waste for composting. Apart from possible methodological changes one explication could be that the ongoing national strategic waste management plan 2014-2040 aiming at reducing the amount of biodegradable waste going to landfilling and increasing the recovery of municipal waste by 2020 is showing its first results. But there are also upcoming recycling countries like Italy, Poland and the United Kingdom which are just below the EU average. Hungary and the Czech Republic still have lower recycling rates (35 per cent) but started from a very low level in 2005. Slovenia, Lithuania, Italy, Poland and the United Kingdom but also Hungary and the Czech Republic should be on track to reach all targets until 2035, provided they keep up the fast pace of the past decade.

- **No low-level recycling country on track:** An EU-wide move towards more recycling is only realistic if low-level recycling countries install new waste management infrastructure to comply with strict targets. This is especially critical for countries such as Malta, Romania, Greece and Cyprus which have recycling rates below 20 per cent, but also to Estonia and Spain which have rates just below 30 per cent. Other countries with moderate recycling rates between 30 and 40 per cent, such as Bulgaria, Ireland, France and Finland, are moving only slowly towards the EU average. None of the low-level recycling countries are currently on track to achieve any of the EU targets from 2025.

3.4 New Method: Implicit sharpening of the targets

Moving the point of measurement for recycled materials to what is effectively recycled is key to develop better-functioning markets for secondary raw materials. Measuring in future what is effectively recycled will implicitly make it harder – also for Germany – to reach the targets.

The planned change of the measurement point for recycled materials will have implications on the recycling rates. Some EU countries, including Germany, currently use the ‘input’ in the recycling process (e.g. tonnage of waste collected) as the measurement point, at which recycling is counted. Instead of the reported 66 per cent recycling rate the rate would drop to between 47

per cent and 52 per cent (Obermeier/Lehmann, 2017). Hence, the German rate would have to increase between 0.7 to 0.9 percentage points annually until 2035 to reach 65 per cent. Looking back, Germany only managed 0.5 percentage points annually over the past decade based on the current method.

Yet, a recent ranking of the Top-10 world's leading recycling nations shows that Germany remains top of the list even if the recycling rate is adjusted – in this case to 56 per cent. Other countries, such as the Netherlands and Slovenia, would fall below the 50 per cent level as there are major corrections needed. Belgium, Italy and Austria would also have lower recycling rates, but adjustments are not as substantial (Eunomia/EEB, 2017).

However, it still remains to be seen how the exemption rule for using average loss rates will be implemented to determine future recycling rates. For Germany to maintain EU recycling leadership in future, further increases in efficiency and in recycling quality are required and existing successful recycling processes and related infrastructure should be preserved.

4 Beyond waste management: implications for businesses

A circular economy is much more than managing waste since it is also concerned with how much material is brought into the system and used. The main ways of enhancing a circular economy are:

- **To reduce material input:** Better eco-design, more efficient production processes, using new materials and technologies or developing new business models are ways to improve material efficiency. Between 2000 and 2016 resource productivity, measured by GDP divided by domestic material consumption, increased steadily (+41 per cent) in the European Union (with the exception of a dip in 2011) from 1.47 Euro/kg to 2.07 Euro/kg. Germany shows a similar trend (+37 per cent) albeit at a higher level of productivity from 1.62 to 2.22 Euro/kg (Eurostat, 2017a).

- **To use material more than once:** A higher amount of secondary materials substituting for primary raw materials avoids extraction of primary materials. There are many examples where metal recycling rates are already very high: steel and base metals such as copper and lead (Hagelüken et al., 2016). Both in the European Union and in Germany the cyclical use rate, which measures the contribution of recycled materials to overall materials demand, was 11 per cent in 2014. Yet, it varies substantially in the member states, ranging from 1 per cent in Greece to 27 per cent in the Netherlands (Eurostat, 2017b).

Improving data availability is another target, which has been addressed now with the recently published monitoring framework. It consists of a set of ten key indicators to cover each product phase as well as economic aspects. Yet, our knowledge base is still fragmented, in particular in

relation to the minimisation of losses, which is a main feature of a circular economy (EEA, 2016; EC, 2017b).

The Action Plan integrates other relevant aspects by looking at the entire product life cycle:

- An important factor is the recyclability of materials, which can be factored in when designing the product (eco-design), but should not be over-regulated by specific product requirements.
- The European Commission is also planning to set quality standards to reduce the lack of information on the quality of recycled materials. The intention is to increase confidence amongst the secondary users that the materials sourced from recycling perform just as well as the original materials.
- Low prices for primary raw materials have made recycled materials less attractive than virgin raw materials. Yet, there are clear benefits of using recycled materials instead of primary materials as it can improve the security of raw material supplies. A central element in the Package are metals, including Critical Raw Materials, as they are eternally recyclable and secondary metals do not face down-cycling or quality issues. However, there is still more potential for many other non-ferrous metals, in particular precious and specialty metals, which could be recovered more effectively from industrial residue streams and end-of life consumer goods considering technical and economical limits (Hagelüken et al., 2016).

If the European Union wants to become a circular economy, the Action Plan must be concretised to unlock the potential towards more resource efficiency and recyclability and to remove obstacles for developing secondary raw materials markets. The following sub-sections analyse the role of the private sector in this transformation process.

4.1 Motivation for businesses

A circular economy can only be implemented with the involvement of all state and non-state parties alike, in particular of the private sector. Especially the industrial sector plays a key role as a source of investments, as a driver of technological development and innovation that makes better and more careful use of natural resources. Since a thriftier use of materials can both save costs and reduce the dependence on imports, companies also have a self-interest to increase material efficiency (Neligan, 2017).

There are different reasons for businesses to move towards a circular economy:

- **Anticipating regulation:** Businesses getting ahead of upcoming policy changes, regulation, pricing of externalities and demands of external stakeholders by incorporating the circular economy into their business models can take a leading role here. Being an early-mover not

only offers competitive advantages but can also serve as proof points for policy makers. In addition, the traditional 'take-make-waste' model might also not be in line with long-term corporate sustainability strategies anymore. Circular economy measures can also help companies to fulfil their goals in accordance with the Paris Climate Agreement and the UN Sustainable Development Goals (BCG, 2018).

- **Stakeholder pressures:** External stakeholders often also play a key role in pushing the circular economy to the top of the business agenda. On the one hand government agencies and regulators are setting requirements. In the case of the EU Circular Economy Package the responsibility requirements do not only affect the waste management sector but also other sectors with the broadening of the eco-design criteria, enforced extended producer responsibilities and targeted measures for food, construction, industrial, mining waste and secondary raw materials. On the other hand customers, NGOs, local communities and investors might increasingly embrace sustainability issues, which also needs to be addressed by firms (Neligan, 2016; BCG, 2018; Business Europe, 2015).

- **Business model disruption:** Moving from the tradition 'take-make-dispose' economic model to a circular economy that is regenerative by design will change the way business is conducted and it can disrupt current business models and even whole industries. A circular economy is a new way of looking at the relationships between markets, customers and natural resources. Businesses have to evaluate how the circular economy transition could play out in their industries and need a perspective on how to prosper in a circular market and what circular opportunities are available. In addition, company leaders assume accountability to their shareholders for how they design the business toward more resource independence and resilience to address risks of resource scarcity and fluctuating commodity prices (BCG, 2018; Ellen McArthur Foundation, 2016; WBCSD, 2017).

- **Risk management/shareholder responsibility:** For businesses this involves looking at risk and opportunities carefully to formulate their long-term strategies and governance adequately. One main criterion is here to see if there is a clear business case underlying such a circular strategy from a risk management standpoint. Since the costs for circular activities compared to traditional activities are often higher, the business case is frequently linked to acquiring new customers, strengthening existing customer relationships or opening new markets (BCG, 2018).

With specific business strategies industry leaders can foster circularity across the life-cycle of materials, beginning in the design phase with how and what materials are sourced and with keeping materials within the economy longer by enabling re-use, re-manufacturing, recycling and raising the durability of goods. Re-manufacturing and recycling are relevant business operations leading to changing and adapting business models (EC, 2017c). In certain sectors, re-manufacturing or shifting the model of product-selling to services are some of the examples with

tangible benefits (Business Europe, 2015). Moving towards a circular economy involves a complex transformation process strongly enforcing relevant innovations, investments and other transition costs to enable business model innovations and new ways of collaboration.

4.2 The role of innovation

Eco-innovations towards changing and adapting business models are a key element in the transition towards a circular economy as they can provide solutions by improving environmental performance throughout product life cycles, while rethinking supply chains and minimizing waste generation (Council of the European Union, 2017b). At the individual company level, innovations that foster the reuse or more economic use of resources can also contribute to business strategies to make the company less dependent on scarce resources, increase operational efficiency, drive further innovation, and enable new offerings that attract customers and deepen existing relationships (BCG, 2018). Producing plastic regranulates are just one example for a product innovation substituting virgin materials with recycled materials.

Circular innovations play a key role for formulating a circular strategy in companies from the outset. Yet, there can be different levels of innovations with increasing complexity. For many companies it makes sense to start with the least disruptive change in form of circular process innovations, which involves the development and implementation of new or improves production, logistic or recycling methods. Product innovation is more difficult because it touches more areas of the organisation and might require additional internal but also external know-how and resources. Business model innovation is most challenging as it can change the entire value cycle, including how products are marketed or sold to customers (BCG, 2018).

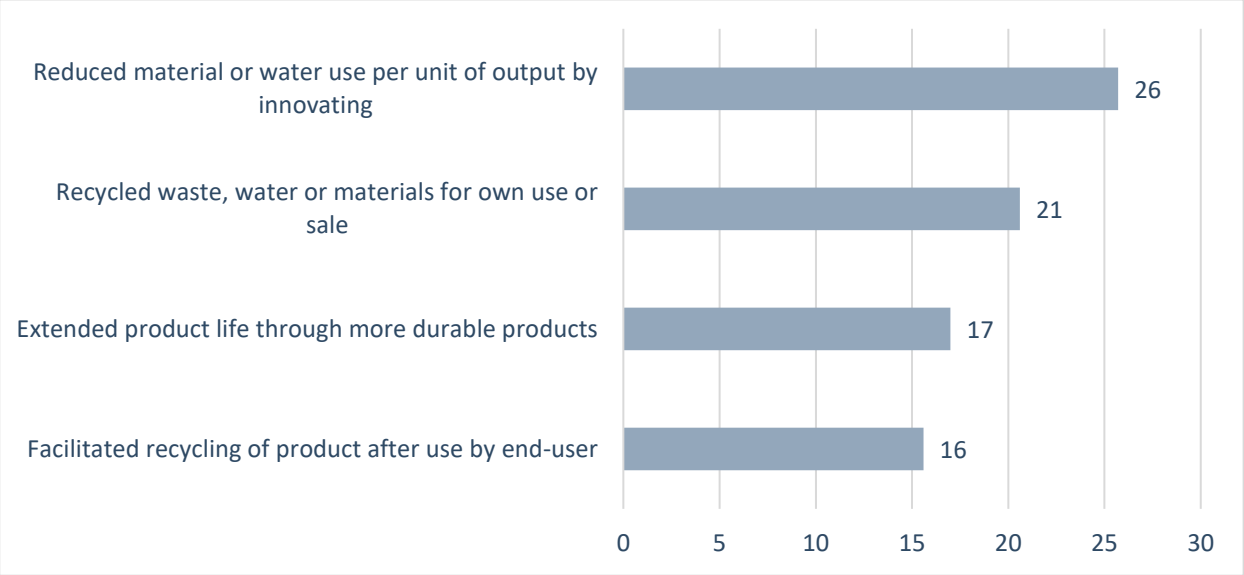
The need to redesign products and materials for circular use and aiming for higher resource efficiency will trigger a large innovation drive across sectors (European Parliament, 2016). There is still upward potential for circular innovations in EU businesses. According to the Community Innovation Survey, which covers results for 22 of the EU Member States, almost every second EU enterprise reported some form of innovation activity during the period 2012-2014. More than half of all innovative EU enterprises reported that their innovations had environmental benefits irrespective of whether these were within the enterprise or when goods and services were consumed or used by end-users. Some innovative firms already focus their innovations on environmental aspects such as recyclability, durability and resource efficiency after use by the end user or within the enterprise (Figure 4-1):

- Around one quarter of innovative firms stated that there were environmental benefits to reduce material or water use per unit of output by innovating.
- One in five innovative firms introduced innovations to recycle waste, water or materials for own use or sale.

- Between 16 and 17 per cent of EU innovative firms reported that the introduction of innovative changes facilitated recycling of products after their use and extended product life through the use of more durable products (Eurostat, 2017c).

Figure 4-1: Innovations facilitating recycling, durability and material efficiency

Innovations with environmental benefits in per cent of innovative enterprises, EU*, 2012-14



*excluding Belgium, Ireland, Spain, France, the Netherlands and the United Kingdom.

Sources: Eurostat (2017) (Community Innovation Survey)

The megatrend digitalisation is also an important green innovation driver as digital data, automation, digital user interfaces and networking form the basis for innovative systems for preventing, reducing and eliminating pollution (Roland Berger, 2016). To tap the potential of the technology and digital revolution corporate boards currently face the challenge of making digital networking a core component of their business strategy.

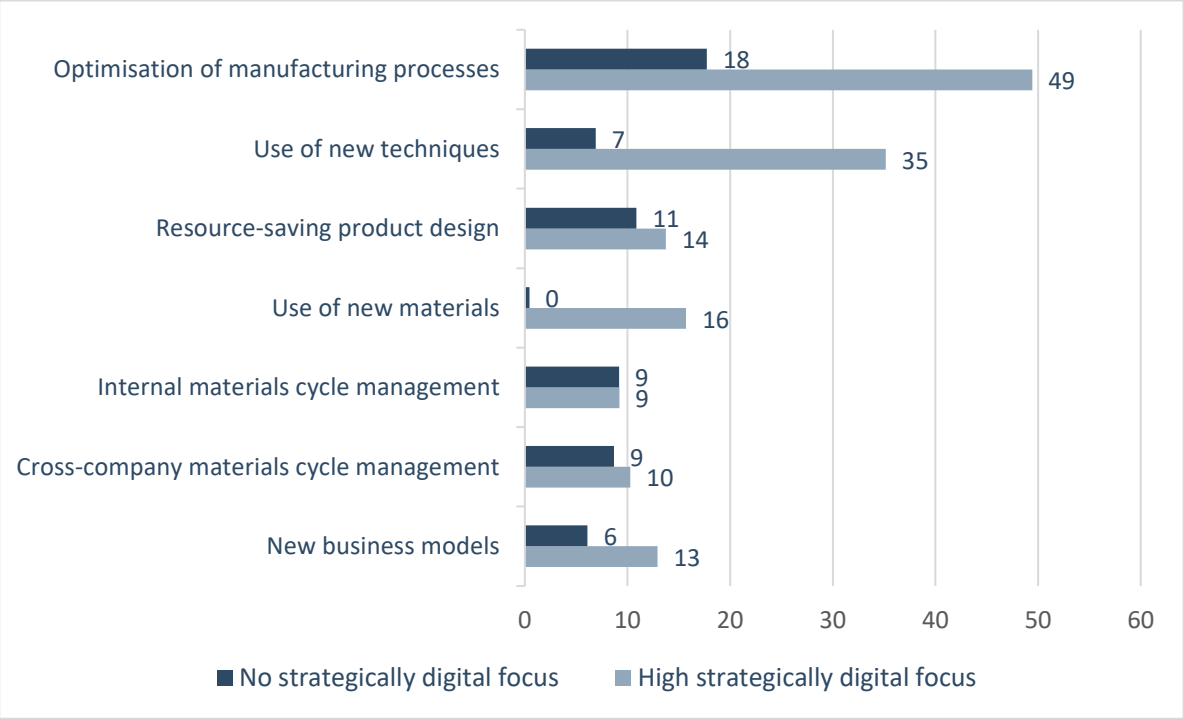
The growing intertwining of modern information and communications technologies with traditional industrial processes offers new potential for both a thriftier and more efficient use and re-use/recycling of resources. In addition, new business fields can develop, for example, the sale of a service instead of a product. Yet, a representative survey of German manufacturing firms shows that up to now material efficiency measures are only rarely digitalised to a great extent. If they are, they tend to be used for process optimisation and not so much for circular-economy relevant approaches such as eco-design. One striking finding is that industrial companies in Germany with a highly-developed digitalisation strategy are also frontrunners on the road to improve material efficiency:

- These companies more frequently use material efficiency measures intensively, are more likely to recognise further potential savings and their efficiency-saving approaches are also clearly more often highly digitalised.

- Industrial companies with a highly developed digitalisation strategy make considerably more intensive use of new techniques and optimisation approaches in manufacturing processes and also rather avail themselves of new materials or new business models than companies without a digitalisation strategy (Figure 4-2). Hence, developing an extensive digitalisation strategy can also enhance circularity in businesses.

Figure 4-2: Important measures according to digitalisation strategy

Shares as a percentage of companies in the manufacturing sector applying the respective measure to a high degree according to strategic focus on digitalisation, Germany, 2016



All possible indications of the level of usage: to a high, moderate, low degree, not yet, measure not suited.

All possible indications of strategic focus on digitisation: to high, moderate, low, no focus.

Sources: Neligan (2017)

4.3 Costs

Turning into a circular economy can create an opportunity for economic and industrial renewal. Yet, it will also involve considerable transition costs. Today few corporate leaders know to what extent their future markets will be orientated towards circularity, making long-term investments difficult (Ellen McArthur Foundation, 2016; Morier, 2018). With its targets and ambitions

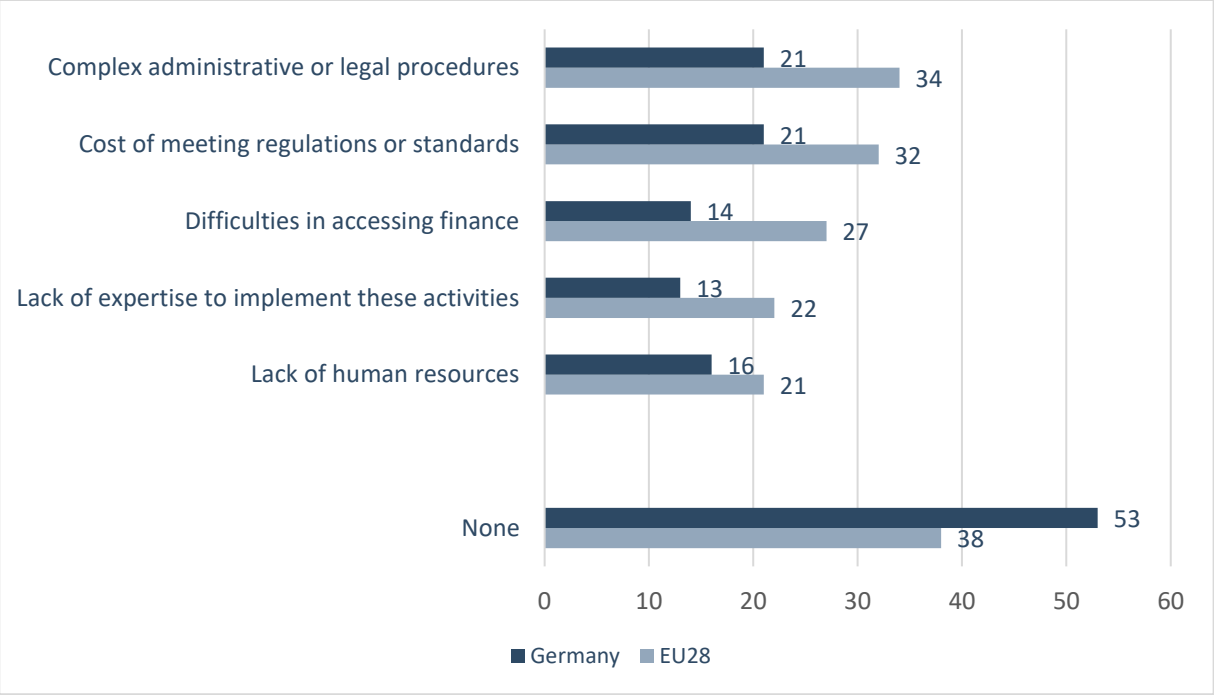
the EU Circular Economy Package now gives a first indication how the European Union wants to become more circular, allowing a better analysis of necessary investments and possible trade-offs for corporate boards.

Companies undertaking circular activities very often face bureaucratic challenges including costs, which corporate boards have to take into account in their circular strategy. A Eurobarometer survey exploring activities by small and medium enterprises (SMEs) in relation to the circular economy in 2016 shows that around 7 out of 10 SMEs realised at least one circular economy-related activity. For this survey 10,618 small and medium-sized enterprises employing 1 to 250 employees in manufacturing, services and the industry sector were interviewed within the European Union. 93 per cent consisted of small enterprises (1-9 employees) (EC, 2016).

While on EU average around 60 per cent encountered a problem during the implementation, less than half of German SMEs did (Figure 4-3). In most countries complex administrative or legal procedures and the cost of meeting regulations or standards were the most prevalent issues in this case. In Germany all of these issues are relevant to a considerable lesser extent. Yet, when it comes to the problem of lacking human resources, the differences for German SMEs to the EU average becomes smaller.

Figure 4-3: Main issues encountered while undertaking circular-economy relevant activities

Share of SMEs undertaking at least one circular-economy relevant activity in per cent, Germany and EU, 2016*



*Multiple answers possible

Sources: European Commission (2016) (Flash Eurobarometer 441)

When planning a circular strategy company leaders need to take into account that circular thinking requires innovative thinking, which might need specific know-how, collaboration and resources not yet available in the company. In addition, even though businesses are keen to take action, they often do not know where or how to begin (BCG, 2018). The lack of a clear idea about costs as well as about required investment and the lack of expertise were the main reasons given by European SMEs for not having undertaken any circular economy-related activities according to the Eurobarometer survey.

The implementation of circular economy activities requires investment. Hence planning security and good business conditions are relevant issues for corporate boards to move towards a circular economy. For European SMEs, in particular in the case of Germany, the Eurobarometer survey shows that only a minority found it difficult to access finance for their circular economy-related activities. On EU average, in the majority of the cases (70 per cent) they were even able to self-finance them. Those in Germany are the least likely to have done so – however it still represented six in ten companies. Other sources of financing were rarely used by European SMEs, except for standard bank loans. However, German SMEs were one of the few countries to have used government grants (4 per cent) and/or green loans (1 per cent).

Yet, lack of information on financing possibilities could prevent enterprises, in particular SMEs, from taking steps towards green innovations supporting a circular economy. Although half of the European SMEs have not searched for information on accessing finance, according to the Eurobarometer survey 30 per cent of those who searched for information believe that there is a lack of such information in their country. However, in Germany only a fifth of the SMEs state there is a no information available on this issue (EC, 2016 und EC, 2017c).

5 Conclusions

Setting EU targets are a key impulse to move all EU member states towards more recycling and less landfilling. To comply with EU legislation national measures concerning waste management will have to be adjusted considerably in many member states. Since only a few member states are on track to meet the goals yet, the targets are a way to enforce the restructuring of the waste management infrastructure in many countries. This in turn can lead to new business opportunities for companies making and exporting circular economy-relevant products and services. Germany, for example, is a role model not only for its long recycling tradition and modern waste management, but also for its excellent recycling technologies. Eight out of ten of the globally most successful innovators in constructing waste separation systems are from Germany (Koppel/Neligan, 2016).

Resource conservation is only possible with functioning markets for secondary raw materials. Yet, on the one hand it is unlikely that all material loops will close fully for two reasons: first, some of the processed materials are used to provide energy and are not available for recycling.

Second, due to increasing complexity of products and materials, for example plastic and metal alloys, it becomes technically more challenging to recycle.

The recent agreement is an important step forward to ensure planning and investment security. Otherwise it is difficult for businesses to initiate further necessary investments in recycling technologies and capabilities. In addition, minimal bureaucracy, good access to finance, capacity building and specific expertise are key to not impede relevant activities to a circular economy. There is still untapped potential for more eco-innovations and for the use of digital solutions to speed up the transition towards a circular economy.

An extension of the EU Eco-design Directive to circular economy-relevant aspects is welcomed, as at least for the products or product groups considered in the directive the way will be paved for easier recycling and repair, longer life and for saving resources. However, the instrument, which has worked well so far in terms of energy efficiency, should not be paralysed by additional aspects. New demands on the resource efficiency of a product must be verifiable and must not be in conflict with existing energy efficiency criteria. To ensure competitiveness for the best technologies and materials and the ability to innovate functionality, affordability and technology neutrality should also be guaranteed in the future. In addition, the current implementation process should be speeded up to avoid outdated standards incurring additional costs for businesses (Neligan/Schmitz, 2017).

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List of Tables

Table 2-1: The Circular Economy Package 5

List of Figures

Figure 3-1: Recycling target for 2025 in many cases far away 10
Figure 4-1: Innovations facilitating recycling, durability and material efficiency 16
Figure 4-2: Important measures according to digitalisation strategy 17
Figure 4-3: Main issues encountered while undertaking circular-economy relevant activities 18