

# Status and Development of the Circular Economy in Germany



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## 1 Introduction in the Context of Implementation of Circular Economy

What is circular economy? Wikipedia says:

Circular economy is a regenerative system in which resource input and waste, emission, and energy leakage are minimised by slowing, closing, and narrowing energy and material loops; this can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, recycling, and upcycling.

Circular economy is actually very old. People have always reused or recycled materials after use. Of course, that was not due to ecological thinking. Economic constraints and the absence of raw materials were the reasons. Only the constant and inexpensive availability of raw materials led to their disrespect and waste. This environment-destroying economy and way of living have spread worldwide.

The European Union produces more than 2.5 billion tonnes of waste a year. It is currently updating its waste legislation to promote the transition from a linear to a circular economy.

In Germany, the relationship to the circular economy was also shaped by the political division of the country into two states. In the socialist East, the circular economy played a major role due to economic hardship. In the 1970s, the idea of the circular economy began to take root everywhere.

It quickly became clear that only binding legal requirements and financial incentives can drive the circular economy and therefore the conservation of resources. Every year around 360 million tonnes of waste are collected, transported, sorted, processed, recycled or disposed of in Germany. Each German citizen thus accounts

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for more than 4 tonnes of waste per year. The largest part of the waste consists of construction and demolition waste or arises in the extraction and treatment of natural resources. The focus of the circular economy and public interest, however, is primarily on the 56 million tonnes of waste, mainly from industry and commerce, and 52 million tonnes of municipal solid waste, of which around 37 million tonnes are produced in private households.

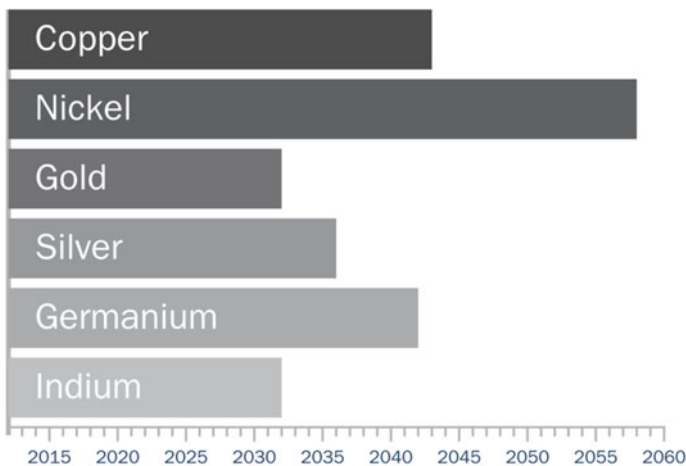
Recycling rates in Germany are high by international comparison. However, the amount of waste increases especially in the private sector! The avoidance of waste is very difficult for the Germans. Recycling often includes the thermal recycling (incineration) of waste. From a scientific point of view, however, only material recycling makes sense!

New regulations will force more material recycling (especially of plastic waste) in the future.

It is about more recycling, higher recycling rates and more recycling and reuse. Consistent recycling dampens demand for primary raw materials. The life and useful life of consumer goods and capital goods must be extended.

Waste prevention has to be much more promoted! The European Union has set itself ambitious recycling targets this year under new waste and recycling legislation. Improving waste management can not only benefit the environment, the climate and human health. The four legal acts of the new “recycling package” are part of a shift in the EU policy towards a circular economy. The idea is to create a system that preserves the value of products, materials and resources in the economy for as long as possible.

Many raw materials are finite. Therefore, it is necessary to manage the resources (Fig. 1).



**Fig. 1** Range of coverage of reserves in years (Oberösterreichische Zukunftsakademie 2013)

The improvement of the recycling economy could bring advantages:

- Less pressure on the environment,
- Increased security of raw material supply,
- Increasing competitiveness,
- Innovation, growth and employment (creating 580,000 jobs in the EU).

In a closed-loop economy, consumers benefit from more durable and innovative products that lead to cost savings and a better quality of life (Fig. 2).

The new rules require that from 2025, at least 55% of municipal waste must be recycled; from 2030, this applies to 60% and from 2035 to 65%. Recycling targets for packaging are 65% from 2025 and 70% from 2030 with specific targets for paper and cardboard, plastics, glass, metal and wood. Germany currently has a recycling quota of municipal waste of about 66% (European Commission (EC) 2019).

According to the new regulations, the maximum landfill quota for municipal waste from 2035 may only be 10%. Some EU countries (Austria, Belgium, Denmark, Germany, The Netherlands, Sweden) dump no household waste in landfills. Other EU countries (Cyprus, Croatia, Greece, Latvia and Malta) still landfill more than three-quarters of their municipal waste.

It was also agreed that biowaste must be collected separately from 2024 across the EU. The same applies to textiles and household waste classified as hazardous

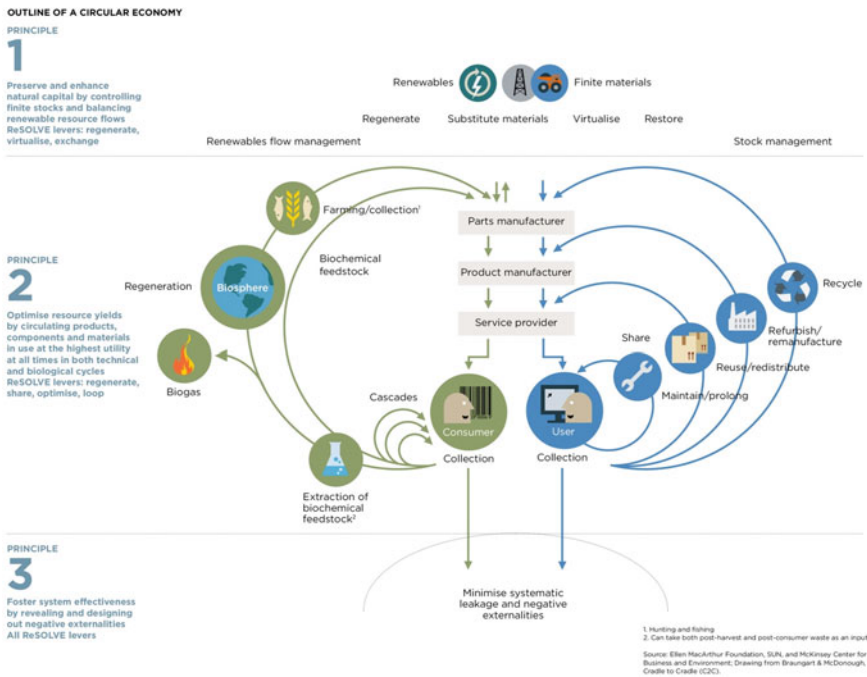


Fig. 2 Circular economy system diagram (Circular Economy System Diagram 2018)

from 2025. In line with the United Nations Sustainable Development Goals, Member States should aim to reduce food waste by 30% by 2025 and 50% by 2030. In order to avoid food waste, Member States should encourage the collection of unsold food and its safe redistribution. Consumer awareness of the importance of shelf life data on labels should also be improved (European Commission (EC) 2019).

## 2 Legislation in the European Union and Germany

### 2.1 Legislation in the European Union

A sustainable policy of conserving natural resources attaches great importance to the creation of closed material cycles. Modern waste policy is a very important part of it. It ensures that wastes generated are reused or recycled as high as possible.

The goal of material flow management is to use the materials taken from nature as intensively as possible in order to save resources and avoid waste. The aim is to decouple economic growth and the impact on human health and the environment associated with waste generation.

In order to harmonise the requirements for the prevention, recycling, recovery and disposal of waste in all EU Member States, the EU has adopted numerous regulations since 1974. The key European requirement in this policy area is the 2008 updated EU Waste Framework Directive (EU Directive 2008/98/EC on waste).

Waste legislation is characterised by a large number of European legal acts. While regulations have direct effect in the Member States, directives must be transposed into national law. The Waste Framework Directive defines essential waste-related terminology and specifies, among other things, a five-level waste hierarchy. The guideline contains important requirements for German waste legislation.

The EU has made major changes to the EU waste prevention, recovery and disposal policies. Many things in the right direction: more recycling, more re-use, but there are also weak points.

Four key European waste legislations will be amended:

- the Waste Framework Directive,
- the Packaging and Packaging Waste Directive,
- the Landfill Directive as well as
- the directives on end-of-life vehicles, batteries and accumulators, old batteries and accumulators, and waste electrical and electronic equipment.

The proposed amendments to the Waste Framework Directive (European Commission (EC) 2018) essentially include expanded requirements for promoting waste prevention, setting targets for recycling and preparing for the reuse of municipal waste. An output-based calculation method is used. There are now minimum requirements for extended producer responsibility (EPR) systems, extended criteria for end-of-waste assessment and new requirements for separate collection.

The requirements for the separate collection are significantly expanded. From now on, Member States will have to collect paper, metal, plastics, glass and, from 2025, used textiles separately. Construction waste is also regulated to a greater extent: for selective removal, for example, welcome that gypsum is recorded as a separate material fraction. This creates an important prerequisite for high-quality recycling and the discharge of impurities.

The requirements for the prevention of waste are significantly expanded.

The core elements of the amendment to the Packaging Directive are the new minimum recycling rates for packaging waste. The Packaging Directive also includes approaches to strengthen the reuse of packaging. The EC counts the composting of biodegradable packaging for recycling. That is not the case in Germany.

## ***2.2 Federal Law in Germany***

In Germany, the first nationwide regulation of waste law was created in 1972 with the Waste Disposal Act (Abfallbeseitigungsgesetz, AbfG). Today, the Act to promote closed substance cycle and to ensure environmentally compatible waste management (Kreislaufwirtschaftsgesetz, KrWG) is the core regulation of waste legislation. As a successor regulation, the KrWG retains the essential structural elements of the old Closed Substance Cycle and Waste Management Act (KrW-/AbfG).

Regulations for specific product waste can also be found in the End-of-Life Vehicles Ordinance (AltfahrzeugV), the Battery Act (BatterieG) and the Electrical and Electronic Equipment Act (ElektroG).

Waste legislation in Germany is based on the Closed Substance Cycle Act (KrWG), which came into force on 1 June 2012 and implements the requirements of European waste legislation. The aim of this law is to promote closed-loop recycling in order to conserve natural resources and to ensure the protection of people and the environment in the generation and management of waste.

A central principle of the law is the five-level waste hierarchy:

1. avoid or reduce waste
2. preparation for re-use of waste
3. waste recycling
4. other recovery of waste (energy recovery, backfilling of excavation or mining sites, etc.)
5. disposal of waste.

On the basis of these principles, the waste management measure best suited to the protection of man and the environment shall be selected. Technical, economic and social aspects must be taken into account.

With a few exceptions, there is a ban on mixing hazardous waste. The mixing of waste in order to reduce contents and thereby comply with limit values is prohibited.

Since January 2015, Germany has had separate collection obligations for biowaste, paper, metal, plastic and glass waste. For decades, it has been collected separately. However, the obligation has now also been laid down in law.

The Closed Substance Cycle Act (KrWG), the German Packaging Act and the EU Packaging Directive lay down new minimum requirements for recycling quotas (Table 1).

More recycling generates raw materials that no longer have to be taken from the environment. Between 1995 and 2010, the share of secondary raw material on all raw materials is showed a clear overall increase, excluding mineral oil, uranium, coal and gas (Institut der deutschen Wirtschaft Köln 2010), (Fig. 3).

In some industrial sectors, the share of secondary raw materials (recycled waste) is already very high. Especially for very rare or very expensive or environmentally damaging raw materials, the proportion of secondary raw materials has to be increased (Fig. 4).

### ***2.3 Federal Waste Prevention Programme***

On 31 July 2013, the Federal Government ratified the federal waste prevention programme. It systematically and comprehensively records targeted public approaches to waste prevention in the form of concrete recommendations, instruments and measures. It analyses various waste avoidance measures in production, product design, trade, industry and the use of products, also taking into account economic, social and legal criteria.

Thus, for the first time, systematic and comprehensive targeted public approaches to waste avoidance were recorded in the form of recommendations for concrete instruments and measures. At the same time, the cabinet decision marks the start of a dialogue between the Federal Government, the Federal States, local authorities and other stakeholders on waste prevention. The programme was drawn up with the participation of the Federal States.

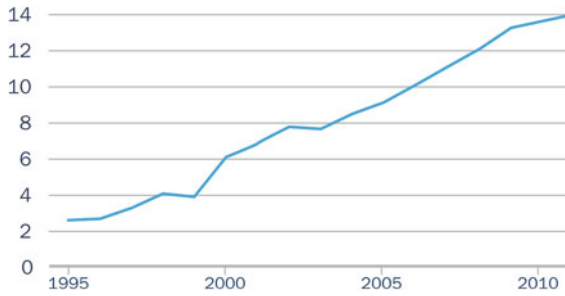
The waste prevention programme analyses various waste prevention measures that affect the various life cycle stages of products, including approaches that take into account production, product design, trade, commerce and the use of products. In addition to the key criteria of waste prevention potential and environmental impacts, the analysis also looks at economic, social and legal criteria. The waste prevention programme only recommends measures that can be expected to have a positive impact if all these criteria are taken into account.

In addition to information and sensitisation as well as research and development, the following approaches, among others, are pursued in the waste prevention programme:

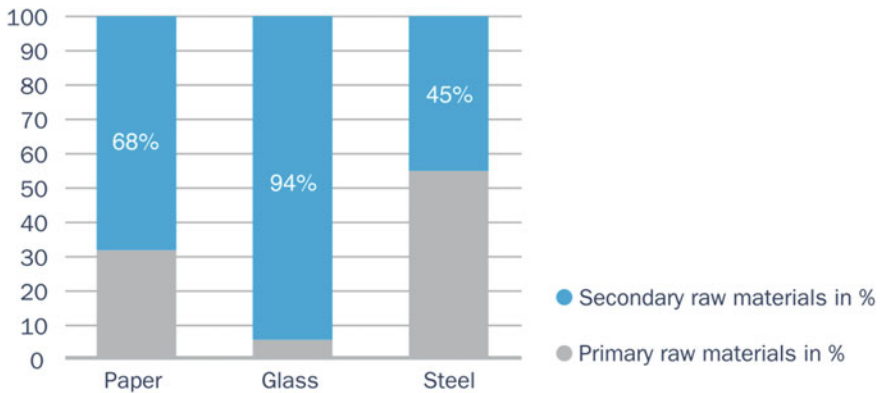
- Active monitoring of European research on waste-saving criteria within the framework of the EU Eco-design Directive

**Table 1** Recycling quotas of the EU packaging directive (applies to all packaging waste) and the packaging act in Germany (applies only to packaging waste from private end consumers) as well as the rate of recycling of all materials in Germany in 2017 (European Commission (EC) 2019; Statistisches Bundesamt (Destatis), Abfallwirtschaft 2017; and own estimations)

	Current EU Packaging Directive	Future EU Packaging Directive		Packaging Act Germany		Material recycling Germany in 2017
		By 31.12.2025	By 31.12.2030	From 01.01.2019	From 01.01.2022	
Plastics	22.5	50	55	58.5	63	34
Wood	15	25	30	-	-	26
Ferrous metals	50	70	80	80	90	92
Aluminium		50	60	80	90	88
Glass	60	70	75	80	90	85
Paper, cardboard	60	75	85	85	90	86
Beverage carton packaging	-	-		75	80	-
Another composite packaging	-	-		55	70	-



**Fig. 3** Growing shares of secondary raw materials in Germany in raw materials in total (without mineral oil, uranium, coal and gas), in percent (Institut der deutschen Wirtschaft Köln 2010)



**Fig. 4** Use of secondary raw materials for production in Germany (BMW I 2016)

- Organizational or financial promotion of structures for the reuse or multiple use of products and repair centres
- Promotion of the concept of “use instead of own” with the aim that consumer goods are used more intensively and by a larger circle of users (e.g. car sharing).
- Concerted actions and agreements between public sector and industry or commerce to reduce food waste generated along the production and supply chain.
- Inclusion of further product groups in the Blue Angel’s portfolio; creation of practical working aids for contracting authorities for increased consideration of resource efficiency and waste avoidance aspects.

The Blue Angel is the German eco-label (<https://www.blauer-engel.de/en>). The Blue Angel has been the German government’s eco-label since 1978. The Blue Angel sets high standards for environmentally friendly product design and has proven itself over the past 40 years as a reliable guide to more sustainable consumption.



## ***2.4 Waste Law of the Federal States***

Politically, the Federal Republic of Germany is divided into 16 Federal States. Due to their constitutions, these states form a federal republic, not a loose confederation of states.

The Federal Closed Substance Cycle Waste Management Act is supplemented and substantiated by the waste laws of the 16 Federal States. Due to the competing legislative competence of the federation for waste management (Art. 74 Para. 1 No. 24 GG), however, federal state legislation is only possible in areas that are not already covered by federal law. The states waste laws therefore essentially concern questions of enforcement; for example, the determination of the bodies responsible for waste management and the competent authorities in the waste sector.

## ***2.5 Municipal Waste Law***

The collection and processing of household waste are laid down at municipal level in the form of statutes. For example, waste statutes contain regulations on compulsory connection and use. Charges for the use of waste disposal are levied on the basis of municipal waste charge statutes.

# **3 Nuclear Waste Management**

In Germany, radioactive waste is not subject to waste management regulations.

Radioactive waste is disposed of under special conditions. Radioactive wastes are subject to nuclear law.

The basic law of the Federal Republic of Germany (for historical reasons the term constitution is not used in Germany) contains provisions on the competences of the Federal Government and the Länder with regard to the use of nuclear energy (Articles 73(14), 87c and 85). Accordingly, the Federal Government has exclusive legislative competence in this area. As the competent licensing and supervisory authorities, the Länder implement nuclear law on behalf of the federation (Federal Mandate Administration). In doing so, the federation exercises legal and expediency supervision and can, if it deems it necessary, draw on the expertise.

The state is obliged to make every effort to identify potential hazards at an early stage and to counter them with the necessary constitutional means. The legislature has therefore enacted provisions of nuclear protection law and radiation protection law. They are directed towards a comprehensive and interlocking structure of standards that ensure the complete sovereign control and monitoring of all behaviour patterns and facilities for the peaceful use of nuclear energy.

The Atomic Energy Act (AtG) was promulgated on 23 December 1959 after the Federal Republic of Germany declared its renunciation of nuclear weapons and has since been amended several times. The purpose of the Atomic Energy Act is, among other things, to protect life, health and property against the dangers of nuclear energy and the harmful effects of ionising radiation.

Against the background of the accident at the Japanese nuclear power plant Fukushima in March 2011, the Federal Government decided to accelerate the energy system transformation and to gradually abandon completely the generation of electricity in German nuclear power plants until the end of 2022.

The Atomic Energy Act contains the basic national regulations for protection and precautionary measures, radiation protection and the disposal of radioactive waste and irradiated fuel elements in Germany and is the basis for the associated ordinances.

Since 1962, a total of 37 nuclear power plants (NPPs) have been constructed in Germany and have started commercial operation. Some of them were only briefly connected to the grid.

At present, there are still seven nuclear power plants on the grid, all of which will be shut down by the end of 2022 at the latest.

In addition to the commercial generation of electricity from nuclear energy, nuclear technology is used in Germany in a variety of processes in medicine, industry and research. This use as high technology will be needed in Germany beyond 2022. The precautionary measures required for this—such as nuclear safety and radiation protection—must therefore continue to be guaranteed.

A number of different companies in the nuclear industry are located in Germany: Uranium supply companies, companies in the field of uranium enrichment and fuel element production, planners and constructors of nuclear facilities as well as companies involved in the transport of nuclear fuels, the treatment and storage of radioactive waste and the decommissioning and rehabilitation of nuclear power plants, including their suppliers and service companies. Many of these companies also export.

### **Intermediate Storage**

The irradiated fuel elements and the waste from reprocessing are stored in transport container storage facilities. In addition to the on-site interim storage facilities at the nuclear power plant sites, there are the transport container storage facilities in Gorleben, Ahaus and the interim storage facility North.

It is expected that by 2027, all fuel elements used in the power reactors will have been placed in transport and storage casks in transport cask storage facilities. The radioactive waste resulting from reprocessing is also contained in transport and storage casks.

Sufficient interim storage capacities for the storage of all irradiated fuel elements and radioactive waste from reprocessing are available in Germany.

According to the licences issued, the storage period for transport and storage casks is limited to 40 years.

## **Final Disposal**

In Germany, the Konrad shaft has been approved as a repository for low- and intermediate-level radioactive waste. The former mine has been converted into a repository since 2007 and is expected to go into operation in 2027, receiving up to 303,000 m<sup>3</sup> of radioactive waste with negligible heat generation.

Germany is currently looking for a site for a repository for heat-generating radioactive waste:

- The waste is to be disposed of in Germany, in a repository in deep geological formations.
- The aim is to finally close the repository mine—with the possibility of retrieval for the duration of the operating phase and recovery for 500 years after closure.
- The safe containment of the waste must be guaranteed for a period of one million years.

## **4 Benefits**

In practice, the concept of closed-loop waste management involves keeping waste to a minimum. Once a product has reached the end of its service life, the materials it contains remain in the economic cycle as far as possible. In this way, they can be used again and again in the manufacture of products and contribute further to added value. Measures leading to a circular economy include the reuse, repair, overhaul and recycling of existing materials and the products made from them. What used to be considered “waste” can now be transformed into a valuable resource.

The transition to a closed-loop economy will reduce the pressure on the environment, increase the security of raw material supply, increase competitiveness, innovation and growth and create jobs.

## **5 Learning from Other Countries and Collaboration with Other Countries**

Waste is a potential source of raw materials that are becoming increasingly important in view of the global scarcity of resources. If, however, waste is incorrectly disposed of, it endangers the environment and health. Germany supports its partner countries in avoiding, collecting, recycling and disposing of waste in an ecological, social and economic way.

Waste volumes are rising rapidly worldwide, but around two billion people still do not have access to regulated waste collection. Waste often ends up on the roadside, in rivers and uncontrolled landfills, or is improperly incinerated in backyards. Poor air,

polluted water and contaminated soil are the consequences—and thus health risks, climate-damaging greenhouse gas emissions and threats to biological diversity.

With Agenda 2030 for Sustainable Development, the United Nations and German Development Cooperation are striving to achieve environmentally sound management of all waste. Waste volumes are to be reduced as far as possible through avoidance, reuse and recycling. In particular, cities are called upon to reduce their environmental impact through improved waste management. Pollution of the seas by waste from the mainland must also be significantly reduced.

The German Federal Ministry for Economic Cooperation and Development (BMZ) supports partner institutions in developing strategies and legal regulations and in setting up corresponding structures (<https://www.bmz.de/de/themen/abfall/index.html>). It also promotes the initial and further training of technical and managerial staff. It provides financing instruments for the construction of recycling and disposal facilities.

In order to exploit the opportunities offered by improved waste management and environmental services, the BMZ promotes partnerships with the private sector, non-governmental organisations and international initiatives. The ministry ensures that waste collectors in the partner countries are also involved and that their working and living conditions are improved.

Current development cooperation focuses on waste and recycling management, urban waste management, marine waste, electronic waste, climate change and Agenda 2030.

### ***5.1 Development of an Integrated Urban Waste Management System***

The population of large cities in developing and emerging countries is rising rapidly, consumer behaviour is changing and waste problems are also growing as a result. Worldwide around two billion tons of municipal waste are produced each year. In the cities alone, the amount of waste is expected to double from 1.3 to 2.6 billion tons per year by 2025.

Waste management is the least developed urban service in many countries. There is often a lack of know-how, clear responsibilities and adequate financing. Municipal administrations are faced with the challenge of further developing their waste and recycling management systems in order to ensure a healthy living environment for their citizens and to better exploit the economic potential of waste recycling.

The “New Urban Agenda” adopted by the United Nations in October 2016 calls for universal access to environmentally sound waste management in cities. This requires comprehensive investment in sustainable infrastructure and support for urban decision-makers.

In order to develop an integrated urban waste management system, technical, legal and institutional issues must be tackled jointly. This is the only way to exploit the

potential for environmental and climate protection and for the creation of jobs and training places.

Care must be taken to ensure that the many waste collectors who have hitherto been active outside formal employment relationships are included in the value chains. Only then can their working and living conditions improve.

Germany supports its partner countries in developing waste management concepts, training specialists and monitoring the collection, recycling and disposal of waste. Awareness-raising among the population is also promoted.

In order to increase the recycling rate, adapted solutions for the sorted collection of recyclable materials and organic waste are being developed. In addition, the German Federal Ministry for Economic Cooperation and Development supports the partners in financing waste management on a cost-covering basis, for example by further developing fee models or introducing take-back and deposit systems.

Appropriate financing instruments are being promoted to establish suitable infrastructure for the collection, recycling and disposal of waste. Interactions with other sectors, such as the protection of groundwater when planning landfills, are taken into account.

## ***5.2 Marine Waste—A Danger for Humans and Animals***

Marine waste poses a global threat to marine ecosystems, fisheries, tourism and, possibly, human health through the food chain. It is estimated that every year between 4.8 and 12.7 million tonnes of plastic waste are transported from land to sea worldwide. Much of this comes from developing and emerging countries, including South-east Asia and the Mediterranean. In addition, there are fishing nets lost at sea and microplastics from cosmetics, textiles and other products contained in wastewater.

Negative effects of marine waste on around 800 animal species are currently known. Seabirds and marine mammals in particular, as well as marine reptiles and fish, absorb or trap plastic in their food.

### **Reduce Marine Litter**

With Agenda 2030, the United Nations aims to significantly reduce marine pollution, especially from marine waste and land nutrients, by 2025. Decisions within the framework of the UN Environment Assembly and the Biodiversity Convention as well as regional marine waste action plans call for the development of environmentally sound waste management and the adoption of further measures.

The Federal Ministry for Economic Cooperation and Development supports the G7 Action Plan and the G20 activities to combat marine waste.

With its own 10-point action plan “Marine protection and sustainable fisheries”, the BMZ aims to help eliminate the causes of marine pollution. To this end, it is expanding environmental policy cooperation with its partner countries and working

with them to develop model approaches to integrated waste management. In addition, the BMZ is committed to the exchange of knowledge between developing and emerging countries and to partnerships with the private sector.

### ***5.3 Electronic Scrap—Recycling Valuable Raw Materials***

In 2018, around 50 million tons of electronic scrap is expected to be generated worldwide; for example, refrigerators, televisions, computers, mobile phones and batteries. In 2014, the figure was around 42 million tons. In many developing and emerging countries, the volume of waste electrical and electronic equipment is growing particularly rapidly. The reasons for this are rising prosperity, digitalisation, changing consumer habits and population growth. In addition, there are often illegal imports of scrap from industrialised countries.

According to the International Basel Convention (1989), e-waste must not be exported to countries that do not have an adequate recycling infrastructure. However, used equipment may be exported and is more affordable for the local population than new equipment. However, they too will sooner or later end up on the mountain of waste. An estimated 1.5 million tonnes of used electrical appliances were exported from the European Union in 2012. Of these, around 400,000 tonnes were electrical scrap.

#### **Very Few Official Collection and Recycling Systems**

In most developing and emerging countries, there are neither official collection systems for old appliances nor legal regulations and corresponding facilities for recycling and disposal. In these countries, the collection and recycling of electrical and electronic waste are predominantly carried out in the informal sector by workers, for whom, for example, copper and gold from electrical and electronic waste represent an important source of income.

However, the recovery of precious metals is often carried out using the most primitive techniques—such as incineration in the open air using cyanide and mercury—and poses considerable risks to people and the environment. The aim here is to promote the expansion of local structures and the introduction of simple, but efficient and environmentally compatible techniques for the recovery of metals.

In its partner countries, the German Federal Ministry for Economic Cooperation and Development (BMZ) is working to reduce the negative consequences of uncontrolled management of electronic waste while at the same time exploiting the employment and income potential of the recycling of electronic waste.

By further developing recycling systems, resources can be used more efficiently and secondary raw materials can be tapped. In order to organise and finance the proper collection and recycling of WEEE, producers and importers must be involved and technology cooperation must be expanded. At the same time, more must be done in the industrialised countries to combat the illegal export of electronic waste. The BMZ promotes international exchange on solutions for electronic waste management.

German Development Cooperation supports the partner countries in setting up socially and environmentally compatible recycling systems. It advises on the drafting of laws and regulations on waste and electrical scrap management and supports authorities in their implementation.

It also promotes dialogue between government and private sector actors (e.g. manufacturers and importers, collectors and recyclers) in order to establish effective financing and management systems. Informally, active workers in particular are actively involved in this process. The aim is to secure their livelihood while at the same time improving their working conditions. In addition, the BMZ supports the international exchange of solutions for electric scrap management.

## ***5.4 Waste and Climate Change***

Waste that is not disposed of in an environmentally sound manner contributes significantly to global climate change. The climate-damaging methane gas escapes in large quantities from open landfills or illegal waste disposal sites. The irregular incineration of waste produces exhaust gases that are not only bad for the climate but also very harmful to health. According to estimates by the Intergovernmental Panel on Climate Change (IPCC), landfills and wastewater treatment plants are responsible for around three percent of global greenhouse gas emissions.

However, the potential contribution of waste management and recycling to climate protection is much greater: according to estimates, global greenhouse gas emissions can be reduced by around 10 to 15% through improved waste management. This includes, for example, the possibility of producing more energy from waste instead of fossil fuels. Even though industry is increasingly using recycled materials, large amounts of energy are saved, and fewer raw materials are consumed. Improvements in waste transport are also taken into account in the calculations.

### **Paris Climate Agreement**

With the Paris Climate Agreement of December 2015, the global community aims to limit global warming to a maximum of 2 °C, but if possible below 1.5 °C, compared to the pre-industrial era. As part of their nationally determined contributions (NDC), the parties also formulate targets and measures in the field of waste management and recycling.

### **German Commitment**

German Development Cooperation supports partner countries in making their waste management more climate-friendly. It provides instruments for calculating greenhouse gas emissions in the waste sector and advises on the restructuring of waste management. In addition, the partner countries are supported in expanding the recycling of recyclable materials and in recycling biowaste. By means of appropriate financial instruments, Germany promotes the construction of landfills with control systems to record the climate-damaging landfill gas.

In the field of energy generation from waste (“waste-to-energy”), the German Federal Ministry for Economic Cooperation and Development supports the introduction of appropriate technologies. It also offers advice on environmental and safety standards as well as on the necessary institutional and financial requirements. These include the energetic use of landfill gas, the construction of biogas plants and the processing of waste into alternative fuels for cement works and waste incineration plants.

## 5.5 Waste as a Topic of Agenda 2030

Waste management and environmental services play an important role in Agenda 2030, especially in the Sustainable Development Goals (SDGs) on “Sustainable Cities and Municipalities” (SDG 11), “Responsible Consumption” (SDG 12) and “Life under Water” (SDG 14):

- SDG 11.6: “Reduce per capita pollution from cities by 2030, including special attention to air quality and municipal and other waste treatment” (SDG 11.4).
- SDG 12.4: “By 2020, achieve environmentally sound management of chemicals and all wastes throughout their life cycle in accordance with agreed international frameworks and significantly reduce their release into air, water and soil to minimise their adverse effects on human health and the environment”.
- SDG 12.5: “Significantly reduce waste generation by 2030 through prevention, reduction, recycling and reuse”.
- SDG 14.1: “Prevent and significantly reduce by 2025 all types of marine pollution, in particular from land-based activities and in particular marine waste and nutrient pollution”.

In addition, the development of a functioning waste and recycling management system makes a positive contribution to other objectives, such as health (SDG 3), decent work (SDG 8) and climate protection (SDG 13).

### **Agenda 2030**

*On 25 September 2015, the “Agenda 2030 for Sustainable Development” was adopted at a UN summit in New York. It takes the form of a World Future Treaty and contains 17 Sustainable Development Goals (SDGs). Agenda 2030 is the first international agreement in which the principle of sustainability is linked with poverty reduction and economic, ecological and social development. The Agenda is intended to help all people worldwide to live in dignity. It is intended to promote peace and to help all people to live in freedom and an intact environment. The Agenda is addressed to all states of the world community. They are equally called upon to stand up for the development goals*



*formulated in it—there is no division into “donors” and “recipients” or into “first”, “second” and “third world” in the Agenda.*

### Important Steps for Implementation

The Habitat III Conference on Sustainable Urban Development, held in October 2016 in the Ecuadorian capital Quito, was the first important milestone in the implementation of these goals in cities. It reaffirmed the goal of sustainable waste management and recycling.

In June 2017, the UN conference was held in New York on the implementation of SDG 14 on marine conservation, including the prevention of marine waste. In July 2018, the United Nations High-Level Policy Forum on Sustainable Development reviewed progress in urban development (SDG 11) and sustainable consumption and production patterns (SDG 12).

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