China Integrated
Waste Management
NAMA

GERMANY'S WASTE MANAGEMENT POLICY DEVELOPMENT

A Focus on Municipal Solid Waste

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

NAMA Facility

On behalf of

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

Department for Business, Energy & Industrial Strategy

Danish Ministry of Energy, Utilities and Climate

Imprint

Published by:
Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

Registered offices
Bonn and Eschborn

Address (China Representative Office)
Sunflower Tower 1100
37 Maizidian Street, Chaoyang District
100125 Beijing, PR China

T +86 10 8527 5180
F +86 10 8527 5185

E giz-china@giz.de
I www.giz.de/china

Project:
China Integrated Waste Management (IWM) NAMA

This project is supported by the NAMA Facility on behalf of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), the UK Department for Business, Energy and Industrial Strategy (BEIS) (formerly DECC), the Danish Ministry of Energy, Utilities and Climate (EFKM) and the European Commission

Editors:
Qian Mingyu (GIZ), Nina Mitiaieva (GIZ)

Authors:
Laura Schroeder, Kim Jeonghyun

Design/layout:
Weng Fangping (GIZ)

Photo credits/sources:
Cover, Shutterstock/ Timo Nausch, P6, Shutterstock/ Markus Gann, P11 Shutterstock/ Keikona, P14, Shutterstock/Teerasak Ladnongkhun, P16, Shutterstock/Bilanol, P18, Shutterstock/ Lebedeva Alena, P20-21, Shutterstock/Lightspring, P27, Shutterstock/Maykova Galina, P31, Shutterstock/Maykova Galina, P 32, Shutterstock/NicoElNino, P39, Shutterstock/Tunatura, P41, Mirco Lomoth

URL links:
Responsibility for the content of external websites linked in this publication always lies with their respective publishers. GIZ expressly dissociates itself from such content.

On behalf of
NAMA Facility

GIZ is responsible for the content of this publication.

Beijing, PR China
2019

中华人民共和国住房和城乡建设部
Ministry of Housing and Urban-Rural Development (MoHURD)

NAMA Facility
On behalf of
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
Department for Business, Energy & Industrial Strategy
Danish Ministry of Energy, Utilities and Climate

Implemented by
giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

中国城市环境卫生协会
China Association of Urban Environmental Sanitation

Content

Summary

Over the decades, Germany has achieved remarkable progress in waste management. It has shown a continuous increase in waste recovery and recycling rate, reaching respectively 81% and 69% in 2018, as well as significant GHG emissions reduction in waste management sector. Nowadays, the country is paying increasing attention to waste minimization and improvement of recycling, especially, of single-use plastics.

Circular Economy Act and Packaging Act currently set the tone in German waste management. The former serves as the main federal law outlining the legal basis and fundamental principles of waste management, emphasizing waste reduction, reuse and recycling. Following the circular economy framework, the latter embodies producer responsibility for packaging waste by making producers and importers of goods responsible for recycling, treatment and disposal of their products in a post-use phase. Meanwhile, numerous ordinances diversified by the type of waste (e.g. Biowaste Ordinance) or by the method of waste treatment and disposal (e.g. landfill, compost) control environmental pollution and GHG emissions occurring in waste management operations.

Behind the current high performance and comprehensive regulatory framework, there has been a long history of legislative development. In the course of this process, as its name implies, the focus of German main waste law has been gradually shifted from waste disposal (Waste Disposal Act) to waste management (Waste Act) and ultimately to material circularity (Circular Economy Act).

China, similarly to Germany few decades ago, is being confronted with the rapid increase in waste amount and the urgent need to reduce pollution. China's waste management system is in transition into an integrated system beyond mere waste disposal and/or treatment. For this, long-term and holistic "umbrella legislation" setting concrete goals and providing consistent guidance towards a circular low-carbon economy is required. By looking into Germany's current policy and legislation as well as the history of its development, this report aims to provide an insight for further legislative advancement of China's waste management towards low-carbon integrated approach.

I. Background: Municipal Solid Waste (MSW) Management in Germany

Basic Facts about MSW Management in Germany

Germany is considered to be on the forefront of waste management in in Europe – credit to country's high recycling rate, efficient waste-to-energy system, advanced and widespread use of biological methods for treating organic waste as well as relatively high quality of waste segregation at source.

Until 2012 Germany had even been demonstrating a certain degree of decoupling economic growth from waste generation. Country's GDP had been increasing continuously (with an exception of 2009 when GDP fell due to financial crisis), while the net volume of waste generated had been decreasing. Since 2012, however, the net waste volume has started growing although not as rapidly as Germany's GDP (Figure 1).

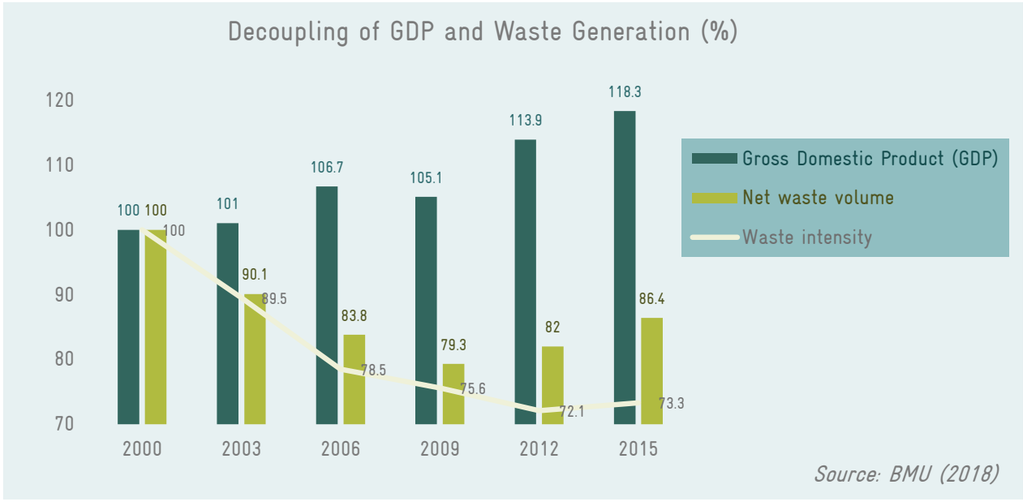


Figure 1. GDP and waste generation in Germany, 2000-2015. Source: BMU (2018) [1]

Among the European countries as well as globally Germany has relatively high per capita waste generation. In 2017, it was estimated at the level of **633 kg per person per year** (European average is 486 kg/person[2]) . At the same time, as mentioned before, Germany is well known for its advanced waste disposal and treatment performance. According to the

data from the Federal Statistics Department, since 2010 the country has been showing a continuous increase in recovery rates (including energy recovery, recycling, reuse) against the backdrop of decreasing volumes of waste disposal. Furthermore, Germany reduced 56 million tCO_2e of greenhouse gas (GHG) emissions since 1990 through the ban on disposal of untreated organic waste and an increase in recycling and energy harvesting[3].

Waste disposal and treatment in Germany has evolved toward high recovery rate as can be seen in the Figure 2. In 2018, the recovery rate reached 81 % whereby 69% of waste were recycled. As of 2015, Germany had **1,143** landfills, **76** incineration plants and **2,171** recovery facilities including energy recovery, recycling and backfilling facilities[4].

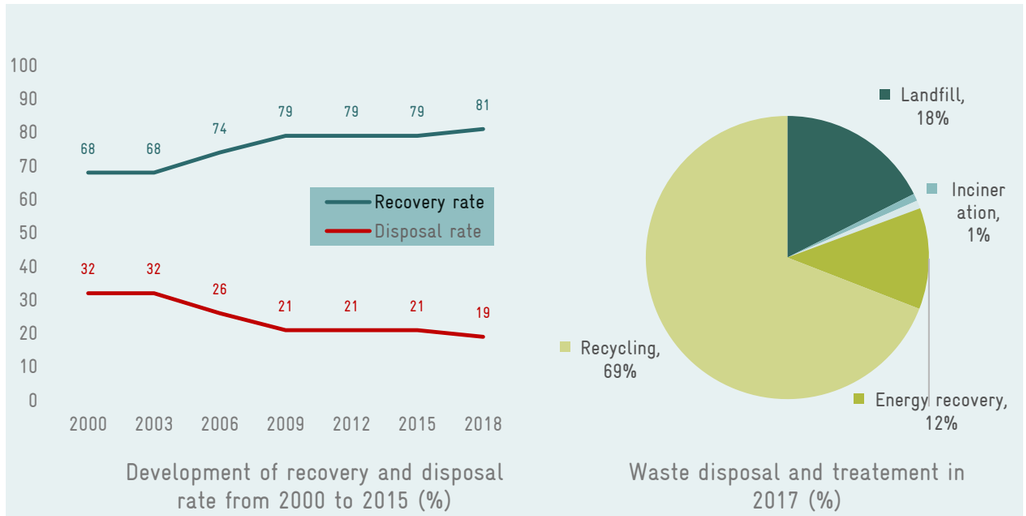


Figure 2. Development and current status of waste disposal and recovery in Germany. Source: Statistishes Bundesamt (2019)[5].

Current trends and goals

Germany's waste management goals follow its circular economy framework, focusing on recycling, reuse and reduction of waste as well as aiming at cutting environmental pollution from waste management operations. In the Circular Economy Act, revised in 2012, Germany sets recovery rates that will become mandatory in 2020. As a preparatory measure, the country aims to reach at least 65% of MSW reuse and recycling by 1 January 2020.

One of the major focus points of the current policies is plastic waste and, in particular, single-use plastics. In 2018, Svenja Schulze, German Federal Minister for the Environment, Nature Conservation and Nuclear Safety (BMU), presented five measures to reduce plastic waste, to strengthen application of its alternatives and to improve recycling. The plan combines obligatory and voluntary measures, and will be carried out with a promotional campaign called "No to disposal plastic society" under the motto "Less is better". The key elements of the strategy are as follows:

1. **Reducing unnecessary plastic products and packaging:** The federal government supports a Europe-wide ban on disposable plastic products. At the national level, a dialogue with handlers will be launched to achieve voluntary commitments to reduce the number of plastic bags and the volume of packaging.

2. **Eco-friendly design of packaging and products:** The government considers increase of the participation fee for dual system. The companies/dealers that use packaging that is easy to recycle or consists of recycled materials will pay less than the companies/dealers that apply less environmentally-friendly materials. BMU also proposes a new Eco-design system in accordance to the EU Eco-design guidelines.

3. **Improvement of recycling:** From 2019, the target for recycling rate for plastic packaging has been raised to 58.5% from the previous 36%. In 2022, it shall reach 63% as defined by the Packaging Act. BMU will begin a new recycling plan to increase demand for secondary raw materials.

4. **Improvement of biowaste use:** Under the framework of the "Germany Biowaste Bin Campaign" (Aktion Biotonne Deutschland), BMU will support local communities with waste management advice to promote high quality waste segregation at source, and this way, to avoid plastic ending up in the biowaste bin as well as to prevent biowaste being thrown into the bin for residual waste. Currently, almost 50% of biowaste lands in residual waste bins, while plastic bags, glass and other materials are thrown into the biowaste bin and contaminate organic waste, making the recovery process more complicated as well as less efficient. "Germany Biowaste Bin Campaign" also targets the market for the products of biowaste treatment, including development and application of stricter regulatory measures for the quality of compost.

5. **International engagement against marine litter and for sustainable use of plastic:** At the international level, Germany calls to tackle the issue of marine litter and improve resource efficiency. In particular, BMU plans to allocate a total of 50 million EUR to support developing countries in implementing practical measures to reduce plastic pollution of marine environment.

In September 2019, BMU also announced plans for banning lightweight plastic carrier bags nationwide starting from 2020. It is estimat-

ed that currently each German citizen uses approx. 20 such bags per year.

Beyond these plans, waste management overall is one of the key elements of the German Climate Protection Program 2030. It is expected that until 2030 GHG emissions from the waste sector will have decreased to the level of around 5 million tonnes CO_2e/year – a 50% reduction in comparison to the emission levels of 2016. In total, by achieving this goal, Germany will emit 87% less GHGs from the waste sector than it did in 1990.

Last but not least, the sector is also driven by the self-commitment of stakeholders responsible for waste management service. Thus, country's landfill operators announced their intention to reduce methane emissions by 1 million tonnes CO_2e by 2027 through optimized gas collection and its more effective energetic utilization. If the pledge of the landfill operators is considered, German waste sector will overachieve its 2030 goal, decreasing GHG emissions to approx. 4,5 million tonnes CO_2e annually.

References:

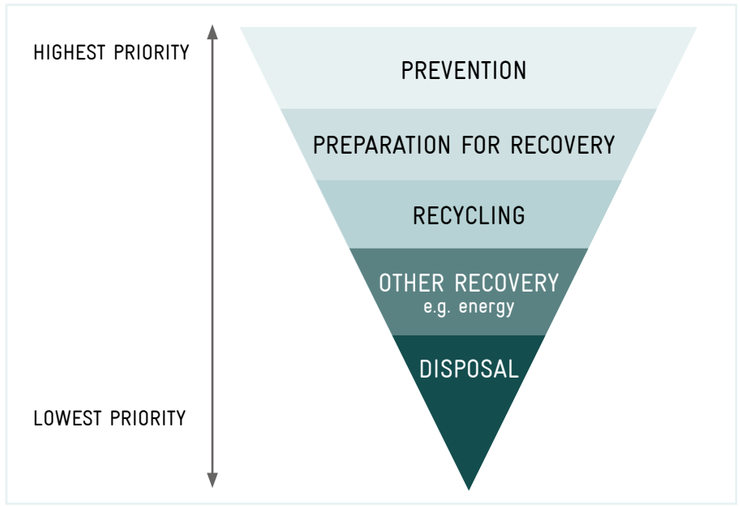
1. BMU (2018). Waste Management in Germany 2018. Retrieved from https://www.bmu.de/fileadmin/Daten_BMU/Pools/Broschueren/abfallwirtschaft_2018_en_bf.pdf
2. Eurostat, Municipal waste statistics (2017). Municipal waste generated, 2017. Retrieved from https://ec.europa.eu/eurostat/statistics-explained/index.php/Municipal_waste_statistics
3. BMU (2018). Waste Management in Germany 2018. Retrieved from https://www.bmu.de/fileadmin/Daten_BMU/Pools/Broschueren/abfallwirtschaft_2018_en_bf.pdf
4. Eurostat, waste generation and treatment (2014). Number and capacity of recovery and disposal facilities. Retrieved from https://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do
5. Statistisches Bundesamt (2019). Waste balance 2017. Retrieved from https://www.destatis.de/EN/Themes/Society-Environment/Environment/Waste-Management/Tables/liste-brief-overview-waste-balance.html

II. German Waste Management Policies and Strategies

Basic Principles

- **Waste Hierarchy Principle:** waste prevention, reuse, recycling, (energetic or other) recovery, disposal
- **Polluter-Pays Principle:** those generating waste also pay for its treatment – this is needed in order to create necessary investments and incentivize environmentally-friendly behavior
- **Precautionary Principle:** the government has the duty to intervene in order to prevent possible damage to the environment/ human health
- **Proximity Principle:** waste should be treated/disposed of as close as possible to the place of its origin in order to avoid unnecessary transportation as well as associated environmental pollution and risks
- **Subsidiarity Principle:** who is doing the job, depends on who is doing it best. Cost, benefit and efficiency are often determined by proximity to waste generation and treatment

Waste hierarchy



Proximity principle

Waste should be disposed of close to where it arises to avoid unnecessary transportation and the related environmental impacts and risks. If environment-friendly capacity is located further away, however, transportation may make sense – possibly including to another country.

Polluter-Pays Principle

The waste producer or owner is the potential polluter and carries the responsibility (including financially). The polluter pays principal creates the necessary incentives for environment-friendly conduct and the required investment.

Subsidiary principle

Tasks are carried out at the level best suited to handling them, whether by the private sector or the state, at national or local level. Costs, benefits and efficiency often come down to proximity to where waste arises and is treated.

Precautionary Principle

The state has the duty to intervene to avert potential hazards arising from waste disposal, as it does elsewhere. For example, it can make use of alternative funding systems or waste management structures of its own to attain the goals of advanced waste management.

Principles of sustainable waste management

Figure 3. Principles of sustainable waste management. Source: Modern waste - Goals and Paths: Germany's expertise for an advanced circular economy. Source BMU (2016)

Circular Economy

"Circular economy", a top priority for German environmental policy, is embedded in country's waste management strategies. Market-based policy instruments and initiatives such as Product Responsibility Scheme (PRS), Extended Producer Responsibility (EPR), Pay-As-You-Throw (PAYT) mechanism, as well as Public-Private Partnerships are essential elements, supporting circular economy, helping to improve resource efficiency and minimize negative impacts during products' life-cycles.

» Product Responsibility Scheme (PRS)

Product responsibility scheme (PRS) is based on the idea that conditions for effective and environmentally friendly waste prevention and recycling are anchored in the design phase of goods. It sets out the concept that waste prevention can best be achieved if the producer is held responsible for the amount of waste generated. Thus, manufacturers of goods must design their products to minimize waste that will occur during production and subsequent use. They also must consider the post-use phase and guarantee that the product can be reused/recycled or at least treated/disposed of in an environmentally sound manner.

The legal basis for PRS includes the Circular Economy Act (KrWG) and the Federal Immission Control Act (BImSchG). Product responsibility has been introduced for packaging, end-of-life vehicles, WEEE, batteries and waste oils.

» Extended Producer Responsibility (EPR)

EPR draws upon PRS and underlines the responsibility of manufacturers and importers for the environmental impacts of their products throughout the whole product life-cycle, including upstream impacts from the selection of materials, impacts from the production process itself, and downstream impacts from the use and treatment/disposal of the used products.

Under EPR, producers support/pay the costs of collecting, transporting, recycling and treating/disposing their products at the post-use phase. The scheme may take the form of a reuse, buy-back, or recycling programs and gives manufacturers and importers an opportunity to choose how the scheme will operate, enabling them to secure better access to secondary materials for their own supply chains. OECD countries demonstrate strong trend towards the extension of EPR to new products, product groups and waste streams such as WEEE (waste electric and electronic equipment).

EPR is an essential element for achieving recycling quotes and triggering a shift towards a circular economy. In Germany, EPR is anchored in a so-called dual system (Duales System Deutschland).

References:

- https://dejure.org/gesetze/KrWG/23.html
- https://de.wikipedia.org/wiki/Produktverantwortung
- https://www.umweltbundesamt.de/themen/abfall-ressourcen/produktverantwortung-in-der-abfallwirtschaft
- http://www.oecd.org/env/tools-evaluation/extendedproducerresponsibility.htm
- https://www.theguardian.com/suez-circular-economy-zone/2017/may/10/extended-producer-responsibility-the-answer-to-cutting-waste-in-the-uk
- https://en.wikipedia.org/wiki/Extended_producer_responsibility

» Der Grüne Punkt (The Green Dot) by Duales System Deutschland Ltd. (DSD)

The dual system was created as a result of the Packaging Ordinance from 1991. Grüne Punkt, a symbol of Germany's EPR, is one of the authorized companies operating within the system in compliance with the Packaging Ordinance (currently, the Packaging Act (VerpackG)). The authorized companies for dual system carry the producer responsibility on behalf of the contracted manufacturers by managing collection, sorting, recycling of their packaging waste. The following diagram illustrates the scheme of the Grüne Punkt .

Fig 4. The Principle of EPR under the dual system.
Source: https://www.grontpunkt.no/media/2866/2017-11-22-denison-dsd-oslo-final.pdf

Every manufacturer targeted by VerpackG shall sign a contract with a system that will manage its packaging waste. Manufacturers pay the waste management fee according to the weight and material of the packaging they put on the market, which incentivize them to reduce and/or optimize packaging for recycling. Manufacturers participating in the dual system can publish the symbol of the system on their packaging, indicating to the end user that manufacturers fulfil their obligations under the VerpackG.

References:

- https://www.gruener-punkt.de
- https://www.grontpunkt.no/media/2866/2017-11-22-denison-dsd-oslo-final.pdf
- https://cdn.ymaws.com/www.productstewardship.us/resource/resmgr/imported/German%20Packaging%20Case%20Studies%20Apr09%20Power%20Point.pdf
- Der Grüne Punkt and other European producer responsibility organisations (PROs) have formed PROsPA (Producer Responsibility Organisations Packaging Alliance). The alliance fosters the exchange of knowledge and experiences between PROs operating in different settings. https://www.gruener-punkt.de/en/communication/news/article/details/der-gruene-punkt-joins-new-alliance-of-leading-european-producer-responsibility-organisations.html
- Der Grüne Punkt presents an online guide to Design4Recycling / Easy-read brochure on the recycling-friendly design of plastic packaging. https://www.gruener-punkt.de/en/communication/news/article/details/kunststoffverpackungen-recyclinggerecht-gestalten.html

» Pay-As-You-Throw (PAYT) Mechanism

The "pay-as-you-throw" (PAYT) is an economic instrument for waste management that applies the 'polluter-pays-principle' by charging the city dwellers according to the amount of waste they generate.

The most common forms of PAYT schemes are volume-based schemes (choice of container size); sack-based schemes (number of sacks set out for collection); weight-based schemes (the weight of the waste collected in a given container); and frequency-based schemes (the frequency with which a container is set out for collection).

The experience gained so far indicates, that the most feasible PAYT design is when the waste fee includes both a basic and a variable (service-based) fee, and does not only depend on the amount of waste generated. The inclusion of a fixed (basic) fee helps to avoid illegal disposal practices which can increase if fees are only levied on the quantities of collected waste.

German cities and counties operate various schemes, having the right to develop and impose charges according to the subsidiary principle. Most of the PAYT systems based on the approach that households pay less for separately collected waste than for mixed residual waste. In some cases, cities only charge residents for the amount of residual waste generated, while in case of more elaborated systems, charges also apply to the generated organic, green and/or bulky waste.

When combined with well-developed infrastructure to collect the segregated waste fractions (residual waste, paper and cardboard, plastics, biowaste, green cut etc.) as well as upon the condition of a high citizens' awareness, PAYT is frequently linked to an increase in the collection rates of recyclables and overall reduction of per capita waste generation.

References:

- http://www.mdpi.com/2079-9276/6/1/8
- https://www.umweltbundesamt.de/sites/default/files/medien/378/publikationen/uba_abfall_web.pdf
- http://www.arc.cat/jornades/jornadaprevencio2010/pon_4.pdf

» Public-Private Partnerships

Public-Private Partnerships (PPPs) are understood as long-term contractual relationships between a public and a private partner for the provision of public infrastructure/ services. Within such a setup, the private partner may assume investment into the infrastructure and/or facilities construction and operation. In return, the private partner may either receive fees charged from the end-users by public authorities or acquire the right to charge the fees itself. Such partnerships provide attractive models for financing capital-intensive infrastructure for MSW treatment and disposal, including integrated screening, sorting, recycling facilities as well as facilities for biological and thermal treatment. Experiences show

that PPPs can also contribute to lowering both investment and lifecycle costs of the infrastructure projects. However, their efficiency and impact largely depend on the agreements made between public and private partners to provide sufficient incentives for continuous private investments and quality maintenance of the waste management facilities. Other key aspects to be considered include: (1) the transparency and fairness of the partnerships and of the market competition to drive down costs; (2) the provision of a sound financial basis which guarantees availability of funds throughout the entire facility life-cycle.

In Germany, the provision of public services with support of the private sector has been gaining more and more importance. Historically, this model was driven by a number of policy reforms, inter alia, introduction of EPR. Till date, it has fueled the creation of a waste management industry with more than 250,000 employees and an estimated annual turnover of around 50 billion EUR.

References:

- Sino-German Dialogue Forum on Environment and Climate Change: Exploring Solutions in Urban Solid Waste Management, Beijing, June 6, 2018

III. Regulatory Framework

Germany as the member state (MS) of the European Union (EU) is widely influenced by the EU laws & policies. Thus, EU legislation forms the context and constitutes an essential part of the German legal framework. In addition, waste management, falling under the broader scope of environmental laws, is a subject of so-called "shared competences", meaning that both the EU as well as the German Federal Government can pass laws to address the issue. Thereby, the following hierarchy of legislation shall be applied when examining the waste management policies in Germany:

1. European laws

Waste management is governed by a number of European regulations and directives. The former automatically apply to each of the MS, while the latter must be separately transposed into the national law. The basis of the EU legal framework in the waste management field is the Waste Framework Directive (2008/98/EC).

2. German Federal law

The Circular Economy Act (KrWG) is currently Germany's main waste management statute setting goals and defining principles of waste management in the country as well as taking into consideration fundamentals set out in the Waste Framework Directive. Disposal of specific waste streams (e.g. end-of-life vehicles, used batteries and end-of-life electronic and electrical devices) is governed by the separate laws such as End of Life Vehicles (ELV) regulation (AltfahrzeugV), Battery Act (BatterieG) and Electronic Devices Act (ElektroG).

3. State Law of of German Federal States

KrWG is further differentiated by the waste management state laws, but they only have jurisdiction over those aspects of waste management that are not regulated by the federal law such as implementation-related matters. The states are also responsible for drafting waste management plans and concepts as well as aggregating statistics including type, origin and volume of waste generated.

4. Municipal waste disposal law

Further specification of implementation-related matters takes place on the municipal level as municipalities define how public infrastructure will be used, what system of waste segregation and collection will be practically applied etc. In addition, municipalities set charges for waste collection. The collection and recovery of household waste at the municipal level are governed by municipal ordinances.

Framework legislation in waste management

» EU Waste Framework Directive (EU WFD) 2008 (Directive 2008/98/EC)

The EU WFD 2008 is currently the major EU law on waste. It provides an overarching legislative framework, defines terms and basic requirements to waste management. The WFD also requires the MS to set up separate collection of waste where appropriate, and to draw up waste management plans and waste prevention programs. It has been originally built upon the EU WFD 1975 (Directive 75/442/EEC), which was the first directive on waste and included requirements on waste treatment for the MS.

Key points of the EU WFD 2008 are:

- The legislation establishes a waste hierarchy: prevention, re-use, recycling, recovery for other purposes (e.g. energy generation) and disposal.
- It confirms the 'polluter-pays principle' whereby waste generators must pay the corresponding cost of waste management.
- It introduces the concept of 'extended producer responsibility'. This may include an obligation of manufacturers/distributors/importers to accept and dispose products returned after use.
- It makes a distinction between waste and by-products.
- Waste management must be carried out without any risk to water, air, soil, plants or animals, without causing a nuisance through noise or smells, or harming the countryside or places of special interest.
- Generators or holders of waste must treat it themselves or have it handled by an officially recognized operator. The operators require permits and are inspected periodically.
- Competent national authorities must establish waste management plans and waste prevention programs.
- Special conditions apply to hazardous waste, waste oils and biowaste. As for the latter, the MS are required to promote a separate collection of biowaste to treat it according to the waste hierarchy and to use the materials produced from biowaste.
- It sets binding recycling and recovery targets to be achieved by 2020 for household waste (50 %) and for construction and demolition waste (70 %).

Access: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=legissum:ev0010

» Circular Economy Act (Kreislaufwirtschaftsgesetz (DE KrWG 2012))

The German KrWG serves as the main federal law regulating waste management in Germany. It draws upon the Circular Economy and Waste Management Act from 1996 (Kreislaufwirtschafts- und Abfallgesetz (KrW-/AbfG 1996) and implements the EU WFD. Based on the requirements of the EU WFD, a five-level waste hierarchy is introduced in the KrWG. Another central concept of the law is producer responsibility. It calls on manufacturers to design and produce their products in such a way that it will lead to avoidance of waste and/or will ensure a smooth recycling process. Producer responsibility can be implemented through legal measures as well as through voluntary commitments by manufacturers and distributors.

The KrWG makes a distinction between the two different types of waste:

- Waste for recycling or energy recovery (responsibility with the waste owner or generator)
- Waste for disposal (responsibility with the public waste disposal carrier)

The law also contains a new provision concerning the distinction between waste and by-products, defining "by-product" as a substance that is produced in connection with the manufacturing of another substance or product. A by-product shall meet certain criteria (possibility of reuse; no or limited pre-processing; inherent to the manufacturing process; not hazardous for health and environment).

In order to promote recycling, the KrWG sets recycling rates that will become mandatory in 2020. In addition, since 2015 the law obliges all municipalities in Germany to separately collect bio-, paper, metal, plastic and glass waste (few exemptions possible).

The KrWG is supplemented by a series of statutory acts and ordinances such as the Waste Catalogue Ordinance, Biowaste Ordinance, Landfill Ordinance, Packaging Act etc. As a rule, they serve to specify and complete the provisions of the KrWG.

Access: https://www.gesetze-im-internet.de/krwg/KrWG.pdf

» Regulation on the Verification of Waste Disposal (Verordnung über die Nachweisführung bei der Entsorgung von Abfällen (NachwV 2006))

The NachwV is an implementing provision to the KrWG. It regulates the verification process of waste disposal as well as determines its type and scope. The version that came into force in January 2007 includes important innovations such as the omission of the simplified disposal certificate, and the mandatory Electronic Waste Documentation (electronic waste collection) for hazardous waste since April 1, 2010.

Access: https://www.gesetze-im-internet.de/nachwv_2007/NachwV.pdf

» European Waste Catalogue (2014/955/EU)

The European Waste Catalogue classifies waste mainly according to the sector of origin and assigns it to a certain waste type with a specific code number. The aim of the waste classification is the Europe-wide uniform waste designation. The European Waste Catalogue distinguishes between dangerous and non-hazardous waste types. It also determines the dangerousness of waste (depends on the content of hazardous substances), which influences the requirements/obligations established for all parties involved in the disposal process.

In Germany, it was converted into the national law by the Waste Catalogue Ordinance (AVV).

Access: https://www.umweltbundesamt.de/sites/default/files/medien/2503/dokumente/2014-955-eg-de.pdf

» Waste Catalogue Ordinance (Abfallverzeichnis-Verordnung (AVV 2001))

AVV is used to designate and classify wastes according to the monitoring needs. It was adopted on December 10, 2001 to implement the European Waste Catalogue (EWC). The AVV consists of three paragraphs and the Waste Catalogue as an attachment. The waste list of Annex I comprises a total of 232 types of waste.

Access: https://www.gesetze-im-internet.de/avv/AVV.pdf

Biowaste

» BioWaste Ordinance (Bioabfallverordnung (DE BioAbfV 2013))

The Biowaste Ordinance is one of the major legislative documents implementing the KrWG since it regulates recycling/reuse (and treatment) of organic waste. The ordinance applies to treated (compost, digestate) and untreated biowaste that is used on land for landscaping, agricultural, silvicultural and horticultural purposes, as well as targets all parties involved in biowaste production, collection, transport, treatment and use. The ordinance contains information and requirements on suitable input materials, processes, quality, disease and phytohygienic safety, contaminant limits, heavy metal contents and foreign substances in the products of biowaste treatment, defines conditions for their application, as well as stipulates obligations to prove that waste management companies, producers, owners, handlers and generators of biowaste and mixtures are compliant with the specific requirements.

In § 2, the terms biowaste, treatment, untreated biowaste, treated biowaste and mixtures are defined by law.

Access: https://www.gesetze-im-internet.de/bioabfv/BioAbfV.pdf

Fertilizer

» EU Fertilizer Regulation (2003/2003/EC)

This EU-level law regulates production, composition and labelling of fertilizers and lays down rules applying to the products placed on the market as fertilizers. The regula-tion contains requirements on the permitted input material, the content and the efficacy of nutrients. In addition, it limits the quantity of undesirable substances. Fertilizers are defined by the Article 2 as the materials, main function of which is to provide nutrients for plants. The regulation includes provisions on packaging, labelling, identification and traceability of fertilizers/fertilizing products. With the objective of achieving an EU-wide circular economy with closed loops of resources, new regulations are under discussion, including a revised EU Fertilizer Regulation, which would promote the use of organic and waste-based fertilizers. The draft of the revised EU Fertilizer Regulation "contains several elements that will help create a level playing field for all fertilizing products, while at the same time ensure high safety and environmental protection standards".

Access: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32003R2003

» Fertilizer Act (DE DüMG 2009)

The Fertilizer Act (DE DüMG 2009) has emerged from the reform of the Fertilizer Act of 1977 (DE DüngMG 1977) and now regulates both the placing of fertilizers on the market and the process of applying the fertilizer (Düngung). A key innovation is the formulation of soil fertility as an essential goal of fertilizer application.

Access: https://www.gesetze-im-internet.de/d_ngg/DüngG.pdf

» Fertilizer Ordinance (Düngeverordnung, DüMV 2012)

As the implementing ordinance to the Fertilizer Act 2009, the German Fertilizer Ordinance (DE DüMV) regulates the application of fertilizers, soil additives, growing media and plant additives according to the principles of a good fertilizer practice. It specifies minimum contents or tolerances of the ingredients and limits values for contaminants such as heavy metals for compost or digestate intended to be used as fertilizer, soil improver, growing media, or plant additives. The ordinance also regulates labeling of fertilizers.
Access: https://www.gesetze-im-internet.de/d_v_2017/DüV.pdf

» Federal Soil Protection Act and Federal Soil Protection Ordinance (Bundes-Bodenschutzgesetz (DE BBodSchG 1999) und Bundes-Bodenschutz- und Altlastenverordnung (DE BBodSchV 1999))

Both documents set legal framework with regard to soil protection and pursue the goal of securing sustainability or restoring soil functions. Due to their subject, they are relevant for the legislation on fertilizers and, subsequently, biowaste.

Access: https://www.gesetze-im-internet.de/bbodschv/BBodSchV.pdf

Access: https://www.gesetze-im-internet.de/bbodschg/BBodSchG.pdf

Animal By-product

» EU Animal By-Products Regulation (1069/2009/EC)

This regulation lays down rules/requirements for composting and anaerobic digestion facilities, which treat animal by-products. Together with the EU Fertilizer Regulation 2003/2003/EC, it provides specific requirements for input material and for the use of resulting compost or diges-tate. The Animal By-¬Prod-ucts Regulation specifies, inter alia, which animal by-products are allowed to be composted or digested and, after this, used in agriculture. The catering waste is a subject of this regulation.

Access: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32009R1069

» Animal By-Products Disposal Act and Animal By-Products Disposal Ordinance (Tierische Nebenprodukte-Beseitigungsgesetz (DE TierNebG 2004) und Tierische Nebenprodukte- Beseitigungsverordnung (DE TierNebV 2006))

Both documents supplement the implementation of the EU regulation in Germany. Thus, the ordinance classifies animal by-products into three risk categories according to the degree of danger they pose to human and animal health. Different risk categories have to be processed or disposed of differently (incineration/co-incineration, composting, anaerobic treatment, fodder).
Access: https://www.gesetze-im-internet.de/tiernebg/TierNebG.pdf
Access: https://www.gesetze-im-internet.de/tiernebv/TierNebV.pdf

Packaging Waste

» European Directive on Packaging and Packaging Waste (PPWD) (94/62/EC)

The aim of the Directive is to harmonize the different measures of the MS in the field of packaging and packaging waste management and to ensure a high level of environmental protection. The Directive aims to prevent packaging waste in the first place, to recover unavoidable waste and, as a result, to reduce the final disposal of packaging waste.
The Directive requires the MS to take measures to prevent packaging waste and to develop packaging reuse systems. The original 1994 Directive, and the amended version from 2018, set targets with regard to recovery and recycling of packaging waste, including modified requirements on lightweight plastic carrier bags (plastic bags). The targets promoted by the Directive are as follows:

By 2025	By 2030
50 % of plastic	55 % of plastic;
25 % of wood;	30 % of wood;
70 % of ferrous metals;	80 % of ferrous metals;
50 % of aluminium;	60 % of aluminium;
70 % of glass	75 % of glass
75 % of paper and cardboard	85 % of paper and cardboard

The Directive also sets an overall target for recycling of all packaging waste by weight at the level of 65% and 70% that are to be achieved by 31 December 2025 and 2030 respectively.

Access: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32018L0852

» Directive (EU) 2015/720 on Reducing the Consumption of Lightweight Plastic Carrier Bags

The Directive contains provisions to reduce the use of lightweight plastic carrier bags. The MS are obliged to reduce the consumption of plastic carrier bags to a maximum of 90 units per inhabitant per year by the end of 2019 and to 40 units per inhabitant per year by the end of 2025. The choice of instruments to implement the Directive is open to the MS.
Access: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=legissum:200403_2

» Packaging Act (Verpackungsgesetz, VerpackG)

The Packaging Act came into force on January 1, 2019, replacing the Packaging Ordinance 1998. The latter obliged all manufacturers/importers of goods intended for private consumption on the German market to participate in an authorized system for recycling and disposal of packaging waste ("dual system" – for more information refer to the section II). The Packaging Act reinforces the system by establishing a centralized control and supervision mechanism aimed at preventing "free riding" and improving the efficiency of recycling.

As part of the act, recycling targets for the different packaging materials are established. Thus, by 2022, the recycling of plastic packaging should reach 63% (from the current 36%). A 90% recycling target has been set for metal, glass, paper and cardboard.

The Act applies to all manufacturers, importers, distributors and online retailers placing goods on the German market. All companies which sell goods in Germany must prepare to participate in a dual system to arrange for packaging waste recovery/recycling to continue trading in the country.

The biggest changes made in the VerpackG are the following:

- Establishment of a national authority (Central Point (Zentrale Stelle, §24))
  For the transparency and centralization of the system, Central Point, a national authority, established by manufacturers and related associations, is responsible for the supervision of the packaging registration, as well as for the data management and publication to achieve full transparency.
- New registration requirement (§9)
  Every manufacturer is obligated to register online at the Central Point before putting their products on the market. Products without registration cannot access German market. The registered manufacturers will be disclosed at the online portal of the Central Point.
- New reporting requirement (§10)
  All manufacturers subjected to VerpackG are obligated to report the volume and material of packaging they put on the market to the Central Point. The data shall also specify the dual system that the manufacturer is participating in. Since the Act does not contain any threshold with regard to the size of the company that is subjected to the mandatory reporting, even small-scale manufacturers/importers/distributors shall register and report to the Central Point.

Violations of the Packaging Act can result in substantial fines reaching up to EUR 200,000.

Access: http://www.gesetze-im-internet.de/verpackg/index.html

E-Waste

» Restriction of Hazardous Substances Directive (RoHS 2 Directive 2011/95/EC) and Directive on waste electrical and electronic equipment (WEEE Directive 2012/19/EU)

The RoHS Directive restricts the use of certain hazardous substances in electrical and electronic equipment (EEE), while the WEEE Directive sets collection, recycling and recovery targets for all types of electric and electronic goods placed on the market.

Access: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX-:32012L0019&qid=1434032353636

Access: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02011L0065-20171211

» Directive on batteries and accumulators (Directive 2013/56/EU)

The 2006 EU Directive on batteries and accumulators aims to improve waste management and environmental performance of batteries and accumulators, as well as to ensure functioning of the single market by establishing rules for the collection, recycling, treatment and disposal of batteries and accumulators. The Directive also sets limit values for certain hazardous substances (in particular mercury and cadmium), prohibiting batteries or accumulators that contain more than 0.0005% of mercury and 0.002% of cadmium per weight.

Access: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02006L0066-20131230

» Electrical and Electronic Equipment Act (Elektro- und Elektronikgerätegesetz, ElektroG)

In 2005, the EU WEEE directive was transposed into German legislation via ElektroG. It manages EEE placed on the market as well as recovery and recycling of WEEE in Germany, stating the responsibility of producers, importers and distributors of electronic goods for the whole products life-cycle. In particular, those placing EEE on the market, have to take back and dispose of WEEE at their own charge. Accordingly, private consumers may return WEEE covered by ElektroG to the nearest public collection point free of charge.

Access: https://www.gesetze-im-internet.de/elektrog_2015/ElektroG.pdf

Landfill

» EU Landfill Directive (EU LD 1999) (1999/31/EC)

The EU LD 1999 regulates management of waste landfills in the EU. The Directive's overall aim is "to prevent or reduce as far as possible negative effects on the environment, in particular the pollution of surface water, groundwater, soil and air, and on the global environment, including the greenhouse effect, as well as any resulting risk to human health, from the landfilling of waste during the whole life-cycle of the landfill". The Directive is applicable to all waste disposal sites and divides them into three classes: landfills for hazardous waste, landfills for non-hazardous waste, and landfills for inert waste.
The following waste types are banned from being disposed at landfill sites and must either be recovered, recycled or disposed of in other ways: liquid waste, flammable waste, explosive or oxidising waste, hospital and other clinical waste which is infectious, used tires etc.

To avoid further risks, there is the following standard waste acceptance procedure for landfills:

- waste must be pre-treated before being landfilled;
- hazardous waste within the definition of the Directive must be assigned to a hazardous waste landfill;
- landfills for non-hazardous waste must be used for municipal waste and for non-hazardous waste;
- landfill sites for inert waste must be used only for inert waste;
- criteria for the acceptance of waste at each landfill class must be adopted by the European Commission in accordance with the general principles outlined in the Directive (Annex II).

One of the main objectives of the Landfill Directive is to oblige the MS to take all possible measures to prevent methane emissions from landfills, reducing the warming of the Earth's atmosphere. To ensure that bio¬waste is managed in accordance with the waste hierarchy, the EU LD 1999 stipulates gradual reduction of the amount of biodegradable waste to be landfilled. In addition, it specifies that since 2009, all landfills operated in Europe should meet the common requirements or be closed.

Access: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=legissum:l21208

» Landfill Ordinance (Deponieverordnung (DE DepV 2009))

The DepV 2009 provides regulations concerning the construction and maintenance of landfills. It defines different landfill classes (LCs), setting requirements for design, operation, decommission and aftercare. The main distinction between landfills is the type of waste that is allowed to be disposed there.

The Landfill Ordinance distinguishes between five types of landfills (depending on the danger of the waste to be landfilled):

- Landfill Class 0 – above-ground landfill for inert waste (low-level mineral waste);
- Landfill Classes I and II – landfills for non-hazardous waste (low organic content); "non-hazardous waste" includes treated (incinerated or cremated) domestic and industrial waste without special monitoring requirements;
- Landfill Class III – above-ground landfill for "hazardous" waste;
- Landfill Class IV – underground landfill for "hazardous" waste.

Access: https://www.bmu.de/fileadmin/bmu-import/files/pdfs/allgemein/application/pdf/deponievo.pdf

Emissions

» Industrial Emissions Directive (Directive 2010/75/EU)

This directive has replaced the former Waste Incineration Directive (Directive 2000/76/EC) and obliges the MS to control and reduce the impact of industrial emissions on the environment. The directive aims to lower emissions from industrial production through an integrated approach and application of Best Available Technology (BAT) as well as promotes the "polluter-pays-principle" to assign the cost of facilities updates. Waste incineration plants and landfills are the waste management facilities affected by the directive.

Access: https://eur-lex.europa.eu/legal-content/DE/TXT/?uri=celex%3A32010L0075

» Federal Immission* Protection Act (Bundes-Immissionsschutzgesetz (DE BlmSchG 2002))

The BlmSchG regulates the protection of people, animals, plants, soil, water, atmosphere and cultural assets from pollution and emissions, and aims to achieve a high level of environmental protection. In the framework of the Federal Immission Control Act, harmful environmental effects caused by emissions into the air, water and soil, including waste management, should be avoided and reduced. In order not to interfere into the freedom of trade, the Act states that the emissions can only be limited according to the principle of proportionality – analogous to their harmfulness, i.e. their impact on the environment and human health. The Act is based on both the "polluter-pays-principle" and the precautionary principle, and is especially relevant for waste incineration facilities.

Access: https://www.gesetze-im-internet.de/bimschg/BImSchG.pdf

** Immission: Immission is the impact of air, soil and water pollution on living organisms or objects such as buildings or people (the recipients). The legally defined maximum values stipulate the permitted concentration for many substances. Source: https://www.ikz.de/ikz-praxis-archiv/p0006/000613.php*

Compost & Digestate - Quality Assurance

» European Quality Assurance Scheme (QAS) for Compost and Digestate (2010)

QAS is seen as an instrument that would allow the MS to expand composting and anaerobic waste treatment activities in order to increase material recycling, decrease the amount of biodegradable waste being landfilled, and to consequently implement the waste hierarchy. For this, the MS can establish a quality assurance system (QAS), comprising an organisation with the competence to control the quality of compost and digestate (quality assurance organisation, QAO).

» Quality Assurance System (QAS) for Compost & Digestate from Biowaste (1989)

Germany has been operating QAS since 1989, when establishment of the system was driven by the need to guarantee high quality of compost and digestate as well as to ensure compliance with the relevant standards and legislation. The system consists of two organisations – The German Institute for Quality Assurance and Certification (RAL) that develops quality standards and accepts the *Bundesgütegemeinschaft Kompost e.V.* (BGK) as QAO.

BGK implements the developed quality standards, appoints quality advisors, supervises plant operators and awards the RAL quality label. In order to be certified according to the RAL standards, compost or digestate have to meet specific quality requirements, major of which are harmlessness, usefulness, appearance, reliability, and marketability.

Shipment of Waste

» EU Regulation on the Shipment of Waste (1013/2006/EC)

This EU regulation specifies under which conditions waste can be shipped between countries and establishes procedures and control regimes, depending on the origin, destination and route of the shipment, the type of waste shipped and the type of treatment to be applied to the waste at its destination. The regulation targets the shipment of waste within the EU, its import, export and transit through the EU. The law builds upon the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal.

Access: https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32006R1013

» Waste Shipment Act and Waste Shipment Fees Ordinance (Abfallverbringungsgesetz (AbfVerbrG 2007), Abfallverbringungsbußgeldverordnung (AbfVerbrBußV))

In Germany, the EU Regulation on the Shipment of Waste is implemented by the Waste Shipment Act (AbfVerbrG) and the Waste Shipment Fees Ordinance (AbfVerbrBußV), which supplement and clarify the EU Regulation. Herewith, the costs for import and export of waste are determined by the respective federal states.

Supporting legislation

» Ordinance on Waste Management Officers (Verordnung über Betriebsbeauftragte für Abfall (Abfallbeauftragtenverordnung (DE AbfBeauftrV 2016))

This ordinance obliges a wide range of companies to appoint waste management officers and sets the corresponding requirements to the position. Thus, the waste manager acts as a consultant in matters of a circular economy, in particular, waste prevention, recycling, and disposal. Waste management officers are obliged to attend trainings at least every two years.

Access: https://www.gesetze-im-internet.de/abfbeauftrv_2017/BJNR278900016.html

» Ordinance on Waste Disposal Companies, Technical Monitoring Organisations and Waste Management Communities (Verordnung über Entsorgungsfachbetriebe, technische Überwachungsorganisationen und Entsorgergemeinschaften (EfbV 2017))

The EfbV regulates the requirements to companies and public institutions, that collect, transport, store, treat, recycle, dispose waste or trade it. The EfbV also regulates monitoring and certification of waste disposal companies by technical monitoring organisations and waste management communities.

Access: https://www.gesetze-im-internet.de/efbv_2017/EfbV.pdf

» Commercial Waste Ordinance (Gewerbeabfallverordnung (GewAbfV 2003))

The Commercial Waste Ordinance (GewAabfV) is concerned with the management of commercial municipal solid waste and certain construction and demolition waste, and determines that businesses must already separate their waste at the point of origin in order to ensure the highest possible rate of waste recycling. As from 2017, the new version of the ordinance has supplemented the previous five categories of the waste mandatory for segregation (paper, glass, plastics, metals, biowaste) by two more categories (wood and textiles). The aim is to reduce the incineration of commercial waste and increase the recycling rate from 7% to at least 30%.

Access: https://www.gesetze-im-internet.de/gewabfv_2017/GewAbfV.pdf

IV. Legislation Development

This chapter addresses the milestones in the historical evolvement of German legislation in the field of waste management.

Initial situation:

- Until 1970s – untreated waste on landfills;
- 1970 – 50.000 landfills, mostly unregulated;
- 1972 – Waste Disposal Act, focus on sanitary waste disposal and waste prevention, compost production from mixed municipal waste, quality problems with compost;
- 1980s – 'managed' landfills (development of a multi-barrier concept), 42 incineration plants, flue gas treatment is not widely applied;
- 1990s – legislation on waste incineration; packaging ordinance; tendency towards separate collection of the organic fraction of MSW – foundation for more advanced, diverse, integrated waste management system is laid.

Initial focus on: safe disposal of waste - making landfills safer and waste incinerators cleaner, though, the goal of waste prevention was already set as a primary goal in the Waste Act in 1986.

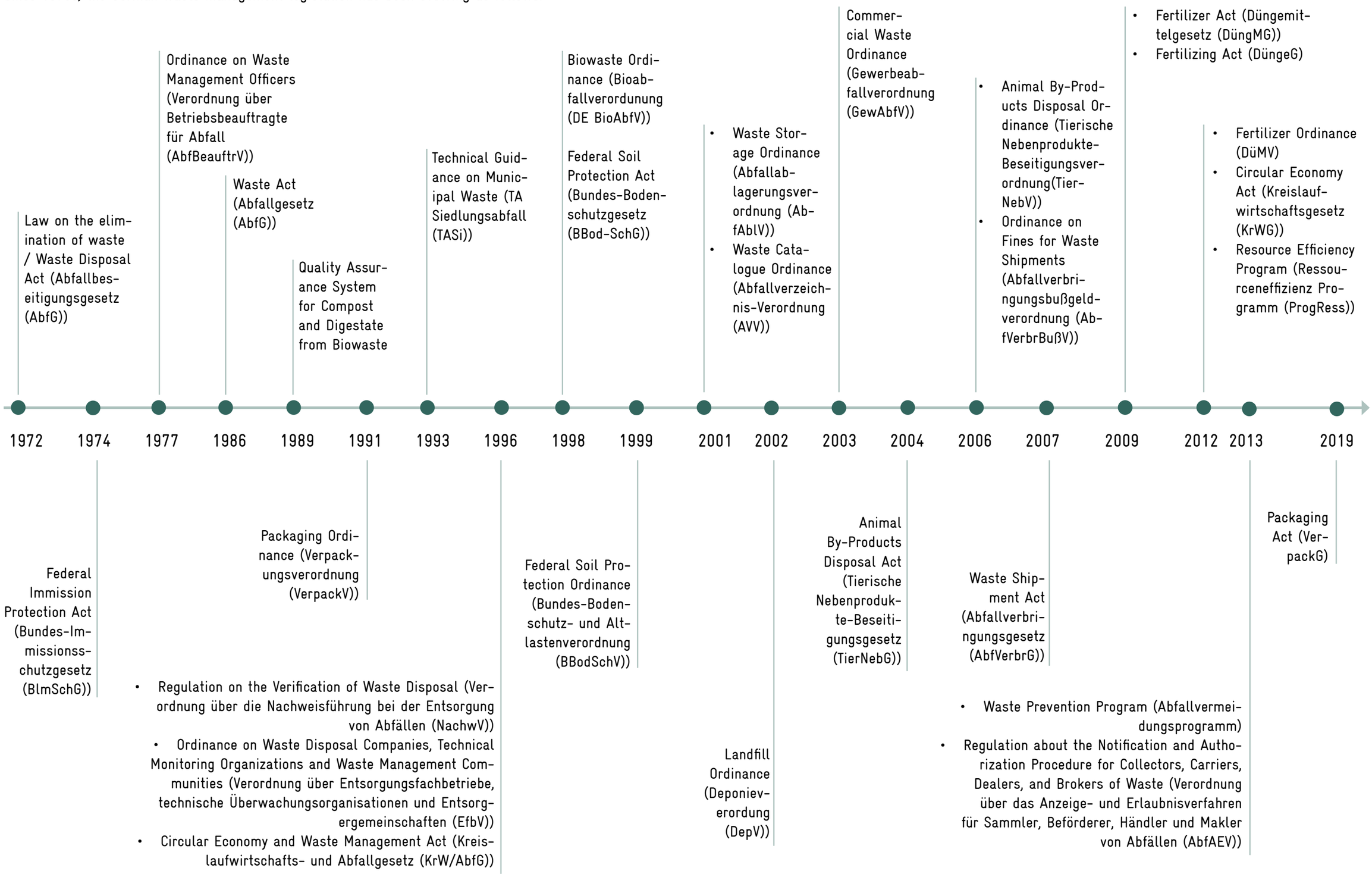
Latest situation:

- Waste segregation at source, awareness-raising activities to promote recycling;
- Acknowledgement of the problem of the growing amount of plastic waste/single-use plastics; public campaigns to reduce the number of plastic bags per capita as well as disposable coffee cups; overpackaging in supermarkets as an issue of concern;
- Diverse waste treatment technologies according to the specific waste streams in order to maximize resource recovery; application of a variety of modern sorting, recycling & treatment technologies;
- Strong focus on upstream interventions, i.e. product design, in order to prevent waste from occurring;
- Strict waste management regulations (ban on landfilling of untreated organic waste; pollution control at incineration plants etc.) and clear quantifiable goals that all stakeholders need to comply with;
- Higher recycling rates at the EU level & attempts to standardize the approach to the calculation of recycling rate (and ensure that recycling takes place) by anchoring it in the volume of output materials rather than the volume of recyclables collected from the designated bins.

Focus on: circular economy; resource efficiency & upstream interventions to prevent waste (EPR; polluter-pays-principle; shared public & private responsibility); advanced material flow management & conservation/recovery of valuable materials through waste segregation, pre-treatment, waste recycling or energetic utilization of waste (technical upgrades to maximize efficiency).

Germany has made considerable efforts since the 1970s to develop a comprehensive integrated waste management system, which is seen as the building block of a circular economy. The focus of waste legislation has evolved from waste disposal to waste management, and finally to material circularity. The Waste Disposal Act from 1972 focused on the safe disposal of waste, stipulating that waste must be treated only at a specific disposal facility. Switching the focus from waste disposal to waste management, the Waste Act 1986 imposed the duty of recycling. Hereby, waste started being considered as an economic good. Finally, the Circular Economy and Waste Management 1996 marked a paradigm shift. By laying down the guiding principle of waste avoidance and embodying product responsibility, it integrated waste management into a circular economy. After several amendments, it evolved into the Circular Economy Act with a five-level waste hierarchy and the producer responsibility at its core.

Since 1970s, the German waste management legislation has been evolving as follows:



V. Current Challenges (Germany and the EU)

Increasing amount of waste

The amount of waste, in particular packaging waste, is increasing due to the growing affluence of the population and the associated increase in consumption. In the meantime, waste prevention still poses a challenge from an economic point of view as well as in a connection to the goal-setting, monitoring and reporting aspects (how to quantify prevented waste?). There is an understanding that to address this issue, collaboration among various actors along entire products' value and supply chains is needed in order to promote eco-friendlier product design and cleaner production technologies, because the challenge of the growing waste quantities cannot be solved by efficient waste management and recycling alone. Waste must be analysed and handled as an integral part of the total material flow at a given scale (community/city/region/state etc.).

Inefficient plastic recycling and China's ban on imported waste

In July 2017, China – at that point the world's main importer of plastic waste - notified the WTO that it would ban imports of 24 categories of waste from January 2018, including plastic and mixed paper and would totally phase out waste imports by 2020. The ban challenged the global waste supply chain and made developed countries to adjust their waste management practice as it appeared that national recycling systems either were not in place at all or were malfunctioning after the years of waste exports (the EU used to export 3 million tonnes of plastics every year to China).

Nevertheless, the major effect of China's ban on the international community was that the plastic waste found other destinations in ASEAN countries such as Malaysia, Vietnam and Philippines. Against the backdrop of the states' protest, in March 2019, mixed plastic scrap was added to the Basel Convention which would come into force in 2020. Since the latter forbids trade between Parties and non-Parties of the Convention, any future exports of mixed and dirty plastic to developing countries will be considered illegal which also applies to the EU MS.

Increasing plastic contamination of biowaste and compost

Plastic pollution in organic waste posed a significant challenge for many European countries as was acknowledged at the Kasseler Abfall- und Ressourcenforum 2018, the German biowaste conference. In particular, the analysis of a compost showed higher plastic contamination levels in digestate coming from anaerobic digestion facilities in comparison to a compost produced by composting plants due to a more intensive pre-treatment process associated with the anaerobic digestion. The shared conclusion has been that for an efficient and effective recovery of organic waste, one of the main objectives has to be the elimination of a non-compostable plastic from biowaste before the latter reaches anaerobic digestion and composting facilities.

Distinct waste management systems across the EU

According to the European People's Party (EPP) representatives in the European Parliament, waste management in different MS varies significantly, particularly when it comes to the definitions (no common definition of waste treatment) and monitoring/quantification methodologies (no single method for measuring recycling rate). A new Circular Economy Package is aimed to further harmonize the different systems, including the calculations behind recycling rate.

Uncertainty regarding the effect of microplastics

Microplastics are tiny particles of plastic material (typically smaller than 5mm) formed through the continuous breakdown of plastic in the environment. Once released to the surroundings, they may accumulate in living organisms, including fish and shellfish, and be consequently consumed as food by humans. Potential human health effects of microplastics along the food chain are still unknown, but the issue receives increased attention due to the growing amount of microplastics found in the environment (oceans, rivers, mountains etc.) as well as in conjunction with the problem of marine pollution (marine litter).

Action areas and necessary changes

During the Sino-German Dialogue Forum in 2018 it was concluded that certain measures have to be implemented by Germany to mitigate the negative environmental impact of waste:

- Promotion and support of the market for secondary raw materials;
- High-quality recycling and resource conservation;
- Development of new materials and technologies.

In addition, the issues of recycling rate suitability as a measurement for the level of success of a circular economy as well as enforcement of a stricter control over the resource use have been widely discussed. The Resource Commission of the German Environmental Agency (UBA) has suggested to introduce a so-called "Substitution Rate" to capture the amount of secondary raw materials that substitute primary raw materials in the production process. The suggestion has been made, because the recycling rate (measured either as an input to or output of the recycling facilities) does not consider this crucial aspect.

References:

- https://www.umweltbundesamt.de/daten/ressourcen-abfall/verwertung-entsorgung-ausgewaehlter-abfallarten/verpackungsabfaelle#textpart-3
- https://www.focus.de/finanzen/news/abfall-deutschen-produzieren-unveraendert-viel-verpackungsmuell_id_9315712.html
- http://www.eu-asiacentre.eu/pub_details.php?pub_id=235#_ftn2
- https://globalnews.ca/news/4285719/china-plastic-waste-pollution-ban-recycling/
- https://www.ban.org/news/2019/5/10/basel-convention-agrees-to-control-plastic-waste-trade
- https://www.novamont.com/eng/read-press-release/increasing-amounts-of-plastics-found-in-bio-waste/

References (Continuing):

- https://waste-management-world.com/a/increasing-levels-of-plastics-in-biowaste-a-challenge-for-composters
- http://www.eppgroup.eu/news/Turning-waste-into-opportunity
- http://recyclingportal.eu/Archive/37070
- https://www.lexology.com/library/detail.aspx?g=652447d9-72c1-4ac0-bb47-ebdc30c62f7b
- https://www.jonesday.com/closing-the-loop-european-circular-economy-package-to-improve-waste-management-07-03-2018/
- https://www.umweltbundesamt.de/publikationen/substitutionsquote-ein-realistischer
- https://echa.europa.eu/hot-topics/microplastics
- https://www.state.nj.us/dep/sab/NJDEP-SAB-PHSC-final-2016.pdf

VI. Relevance for China

Waste management situation in China

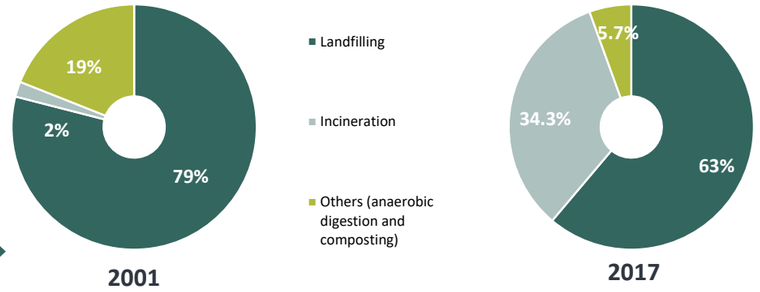
MSW generation per capita (per year/2018)

401 kg

MSW harmless treatment (2017)

96.1%

Main waste treatment option



The amount of MSW is to increase due to continuous urbanization; the waste composition is changing as a result of new consumption habits and growing affluence of the Chinese society

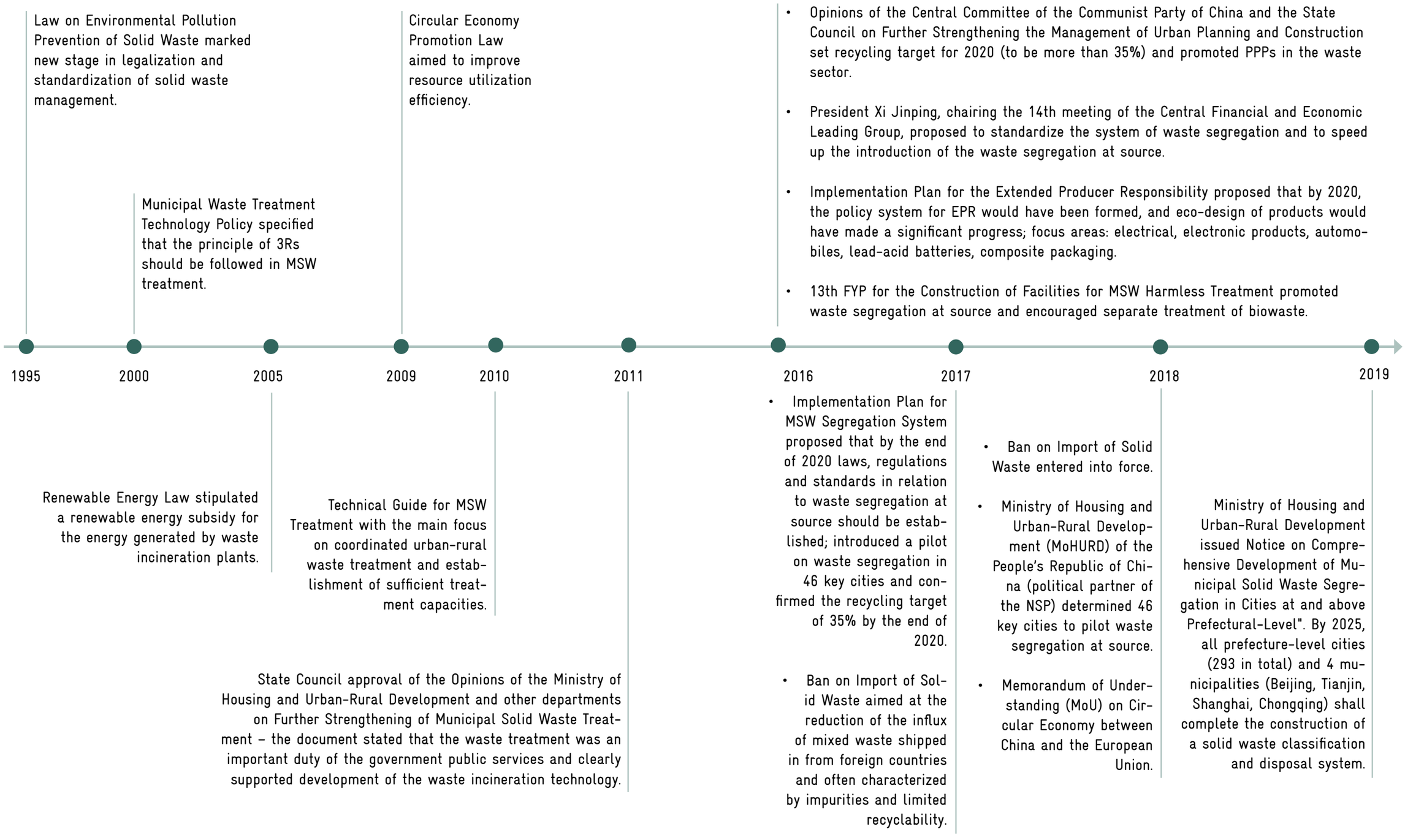
Challenges:

- unreliable data/insufficient data collection
- low calorific value of non-segregated MSW
- informal recycling statistics
- underutilized potential for organic waste recycling

Due to the rapid urbanization and population growth, the amount of MSW has been increasing in China continuously. To respond to the challenge, the way of dealing with waste has undergone a transition from an open dumping existing until 1980s to the current sanitary landfilling-incineration model. According to the China Urban Construction Statistical Yearbook (2017), the total environmentally friendly treatment rate has achieved 96.1% for the city and county area in China, and with 34.3% for incineration and 63.0% for sanitary landfill.

Since the announcement of the 12th Five-Year-Plan (2011-2015), integrated waste management and high-quality development had been the new trend. During 2011-2015, 100 cities in total participated in the pilots for restaurant waste utilization, which have promoted the segregation and treatment of restaurant waste. Since 13th Five-Year-Plan, waste segregation has been back to the hot topic. In 2017, NDRC and MoHURD jointly released the "Implementation Plan for MSW Segregation System" and set the target for 46 key cities across China of 35% of MSW recycling rate until 2020. In 2019, MoHURD issued Notice on Comprehensive Development of Municipal solid Waste Segregation in Cities at and above Prefectural-Level, and by 2025 all prefectural level cities (293 in total) and above (4 directly controlled municipalities – Beijing, Tianjin, Shanghai and Chongqing) shall fully implement municipal solid waste comprehensive segregation and treatment.

Overall, China has a strong focus on curbing pollution of soil, air and water as well as reducing GHG emissions as per countries' nationally determined contributions (NDCs). In case of both aims, waste management is seen as an essential contributing factor. Along with the implementation of waste segregation at source and introduction of diversified treatment of various waste streams, China gradually starts paying attention to waste reduction (a pilot program on "zero-waste" cities launched in 2019) and up-stream interventions to avoid waste generation at the first place.


1995
Law on Environmental Pollution Prevention of Solid Waste marked new stage in legalization and standardization of solid waste management.
2000
Municipal Waste Treatment Technology Policy specified that the principle of 3Rs should be followed in MSW treatment.
2005
Renewable Energy Law stipulated a renewable energy subsidy for the energy generated by waste incineration plants.
2009
Circular Economy Promotion Law aimed to improve resource utilization efficiency.
2010
Technical Guide for MSW Treatment with the main focus on coordinated urban-rural waste treatment and establishment of sufficient treatment capacities.
2011
State Council approval of the Opinions of the Ministry of Housing and Urban-Rural Development and other departments on Further Strengthening of Municipal Solid Waste Treatment – the document stated that the waste treatment was an important duty of the government public services and clearly supported development of the waste incineration technology.
2016
• Opinions of the Central Committee of the Communist Party of China and the State Council on Further Strengthening the Management of Urban Planning and Construction set recycling target for 2020 (to be more than 35%) and promoted PPPs in the waste sector.
• President Xi Jinping, chairing the 14th meeting of the Central Financial and Economic Leading Group, proposed to standardize the system of waste segregation and to speed up the introduction of the waste segregation at source.
• Implementation Plan for the Extended Producer Responsibility proposed that by 2020, the policy system for EPR would have been formed, and eco-design of products would have made a significant progress; focus areas: electrical, electronic products, automobiles, lead-acid batteries, composite packaging.
• 13th FYP for the Construction of Facilities for MSW Harmless Treatment promoted waste segregation at source and encouraged separate treatment of biowaste.
2017
• Implementation Plan for MSW Segregation System proposed that by the end of 2020 laws, regulations and standards in relation to waste segregation at source should be established; introduced a pilot on waste segregation in 46 key cities and confirmed the recycling target of 35% by the end of 2020.
• Ban on Import of Solid Waste aimed at the reduction of the influx of mixed waste shipped in from foreign countries and often characterized by impurities and limited recyclability.
2018
• Ban on Import of Solid Waste entered into force.
• Ministry of Housing and Urban-Rural Development (MoHURD) of the People's Republic of China (political partner of the NSP) determined 46 key cities to pilot waste segregation at source.
• Memorandum of Understanding (MoU) on Circular Economy between China and the European Union.
2019
Ministry of Housing and Urban-Rural Development issued Notice on Comprehensive Development of Municipal Solid Waste Segregation in Cities at and above Prefectural-Level". By 2025, all prefecture-level cities (293 in total) and 4 municipalities (Beijing, Tianjin, Shanghai, Chongqing) shall complete the construction of a solid waste classification and disposal system.

Outlook for further development of China's policies in waste management

The presented above brief outline suggests that China has substantially advanced its waste management in terms of both governance and infrastructure. Nevertheless, growing amount of waste and changing consumption habits leading to the changes in waste composition will remain serious practical challenges, requiring well-planned, forward-thinking waste management solutions designed for mid- and long-term timespans.

From the legislative point of view, China will need to continue establishing a comprehensive, clear and consistent system for regulating waste management and linking it effectively to the adjacent sectors of economy (energy, agriculture, industrial production sector etc.). For that, specific policies and standards targeting collection, recycling/treatment and disposal of individual waste streams shall be developed under an "umbrella legislation" setting concrete goals and providing consistent guidance towards a circular low-carbon economy.

In order to increase recycling rate and effectively direct separately collected waste towards the corresponding treatment/recycling/recovery facilities, market-based political instruments such as EPR and waste charges as well as command and control mechanisms such as ban on landfilling of non-treated MSW/ organic waste etc. can be introduced. Further, cooperation with the industry and R&D aimed at waste prevention at the stage of a product design should be carried out.

Attention should also be paid to awareness-raising and public education in order to trigger behavioral change and allow for more conscious choice of products and activities based on the idea of waste reduction, reuse or recycling as well as to increase the quality of waste segregation at source.

Based on the German experience it can be stated that overall decentralization of waste management (subsidiary and proximity principles) and citizens involvement (inclusiveness of waste management) in the process of decision-making can be seen as important constituents of an integrated waste management system.

References:

- https://www.sciencedirect.com/science/article/pii/S0301479710000848
- https://www.coresponsibility.com/china-food-waste-management-opportunity/
- Baseline Study Report on Waste Management of Demonstration Municipalities by SinoCarbon, CUCD, CERT (commissioned by the China Integrated Waste Management NAMA Support Project, 2019)

Annex I - Comparison of the major legislative documents regulating waste management in Germany and China

Germany	China
Circular Economy	
Circular Economy Act (Kreislaufwirschaftsgesetz) • Came into force in 2012, as a further evolvement of the Circular Economy and Waste Management Act from 1996. • Aims to preserve natural resources and to protect environment. • Defines the recycling rate of 65% for municipal waste by 1 January 2020. • Introduces five-level waste hierarchy: Avoidance, Preparation for recycling, Recycling, Other recovery, Disposal. • States that waste generators are obligated to carry responsibility for their waste. • Obliges waste generators to manage and reduce their waste, and states corresponding principles. • Obliges public waste disposal providers to dispose/treat waste in sustainable way and states corresponding principles. • Provides requirements for waste treatment facilities and supervision. • Stipulates separate waste collection and requires establishment of waste management plans for each municipality. • KrWG is supplemented by a series of statutory ordinances such as the Waste Catalog Ordinance, Biowaste Ordinance, Landfill Ordinance, Packaging Ordinance etc. that specify and complete the provisions of the KrWG.	Circular Economy Promotion Law • Came into force in 2009. • Aims to improve the resource utilization efficiency, to protect the environment and to implement the goal of sustainable development. • Covers comprehensive environmental issues such as energy saving, water efficiency, mining etc., besides waste generation and recycling. • States the duty of enterprises in diverse sectors of economy to reduce pollution, to improve energy and resource efficiency, to recycle and reuse waste. • States the duty of various governmental institutions to reduce pollution, to improve energy and resource efficiency, to recycle and reuse waste. • Article 15 in the Circular Economy Promotion Law states that enterprises producing products or packaging that are subject to the compulsory recycling must take responsibility for recycling the specified products or packaging. Nevertheless, there is no annex or a complementary law specifying which products and/or packaging are subjects to the compulsory recycling. • Introduces financial incentives such as taxes and/or rewards to promote environmentally sustainable activities. • Sets fines for violation of the law and its requirements.

Extended Producer Responsibility

Provision on EPR is specified in VerpackG 2018 (Packaging Act) replacing the Packaging Ordinance from 1998.

- According to VerpackG, every manufacturer is obligated to sign a contract with an authorized company under the dual system (e.g. Green Dot/Grüne Punkt) that will manage recycling/treatment/disposal of their waste. Manufacturers pay waste management fee according to the weight and material of the packaging they place on the market.
- Manufacturers are obligated to register at a central authority called Central System (Zentrale Stelle) and to regularly report data on the amount and material of the packaging they place on the market.
- Refusal to register or disclose information is a violation of VerpackG, causing financial punishment of up to 200,000 Euros.

EPR Implementation Plan

- Came into force in 2016.
- Requires manufacturers to be responsible for the entire lifecycle of their products and promotes information disclosure in certain focus areas.
- Stipulates that EPR policy framework should be established by 2020, while the relevant laws and regulations shall be formed by 2025.

Packaging

Packaging Act (Verpackungsgesetz)

- Came into force in 2018, replacing Packaging Ordinance from 1998.
- Aims to prevent "free riding" associated with EPR, which has been an issue with Packaging Ordinance.
- Aims to improve recycling efficiency by establishing a Central System to control and supervise the amount of packaging waste.
- Specifies duties and obligations of packaging waste generators.
- Sets requirements for packaging waste collection and disposal process.
- Sets requirements for "dual system" operators and the centralized authority (Central System).
- Applies to all manufacturers, importers, distributors and online retailers placing packed goods on the German market.
- Sets recycling targets for different packaging materials to be reached by 2022 – 63% for plastic (from the current 36%); 90% for metal, glass, paper and cardboard.

- No legislation is in place to monitor and regulate production and recycling/disposal of packaging waste.

Several laws and standards specify requirements for harmlessness of food and drug packaging (e.g. Food Safety Law and Standards for Additives in Food Containers and Packaging Materials).

The Law on the Prevention and Control of Environmental Pollution by Solid Waste includes regulatory measures to control pollution from packaging production.

Organic waste management

Biowaste Ordinance (Bioabfallverordunung)

- Came into force 1998 and was amended in 2017.
- Aims at a proper treatment and recycling of organic waste and mixed waste containing organic matter.
- Sets requirements on suitable input materials, process quality, hygiene of the products and specifies product application.
- Obliges organic waste treatment facilities to undergo sanitary and temperature tests.
- Imposes various restrictions on untreated organic waste, sanitarily treated organic waste, stabilized organic waste.

- No legislation is in place to comprehensively regulate organic waste management

China Integrated Waste Management (IWM) NAMA Project
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Tayuan Diplomatic Office Building 2-5, 14 Liangmahe South Rd, Chaoyang District,
100600 Beijing, PR China
Contact: Mr. Qian Mingyu
Tel: +86 (0)10 8527 5589

E-mail: iwm-nama@giz.de
Website: www.iwm-nama.org

Website

Wechat

GIZ China Integrated Waste Management NAMA Project