

Waste and recycling management in Germany – an overview

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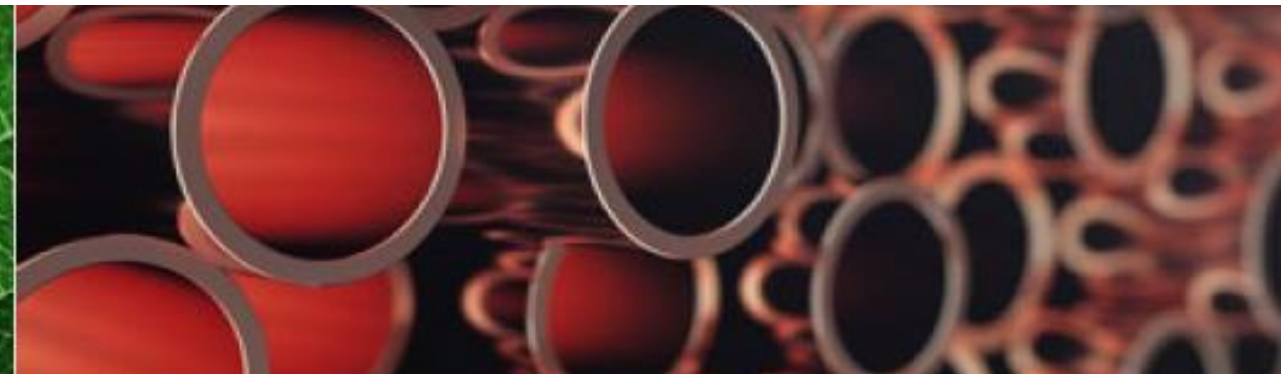
German Association for Waste Management: Who we are...

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Rethinking
resources

- For circular economy we are the NGO with the most experts of various aspects
- We establish new relations and are an independent partner for producers, waste disposal companies, politics & administrations, science and society
- We are an important independent contact for industry and politics due to our strength of opinion formation in a consensual and factual way concerning all aspects of the economy and society
- We work responsible for the future of the waste management sector and stakeholders trust us as the „Voice of Prudence and Common Sense“. **Germany is successful due to a strong civil society.**



Our network of competency and expertise ...how we work:



- We set up independent factual Informations, statements, position papers and policy documents
- We form working groups concerning current topics
- We are an official partner of the world's leading trade fair IFAT
- We organise professional events and experts discussions
- We organise the annual Scientific Conference on Waste Management and Resources Economy
- We cooperate with all important federations and initiatives concerning the topics of waste, resources and environment protection.

The DGAW logo and tagline are repeated on a background of stacked cardboard boxes. The logo is in a magenta square, and the tagline is in white text.

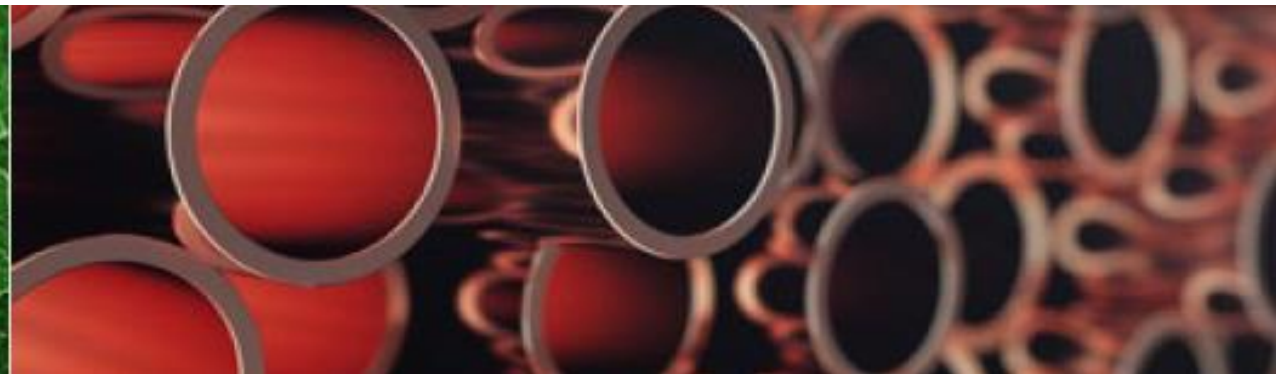
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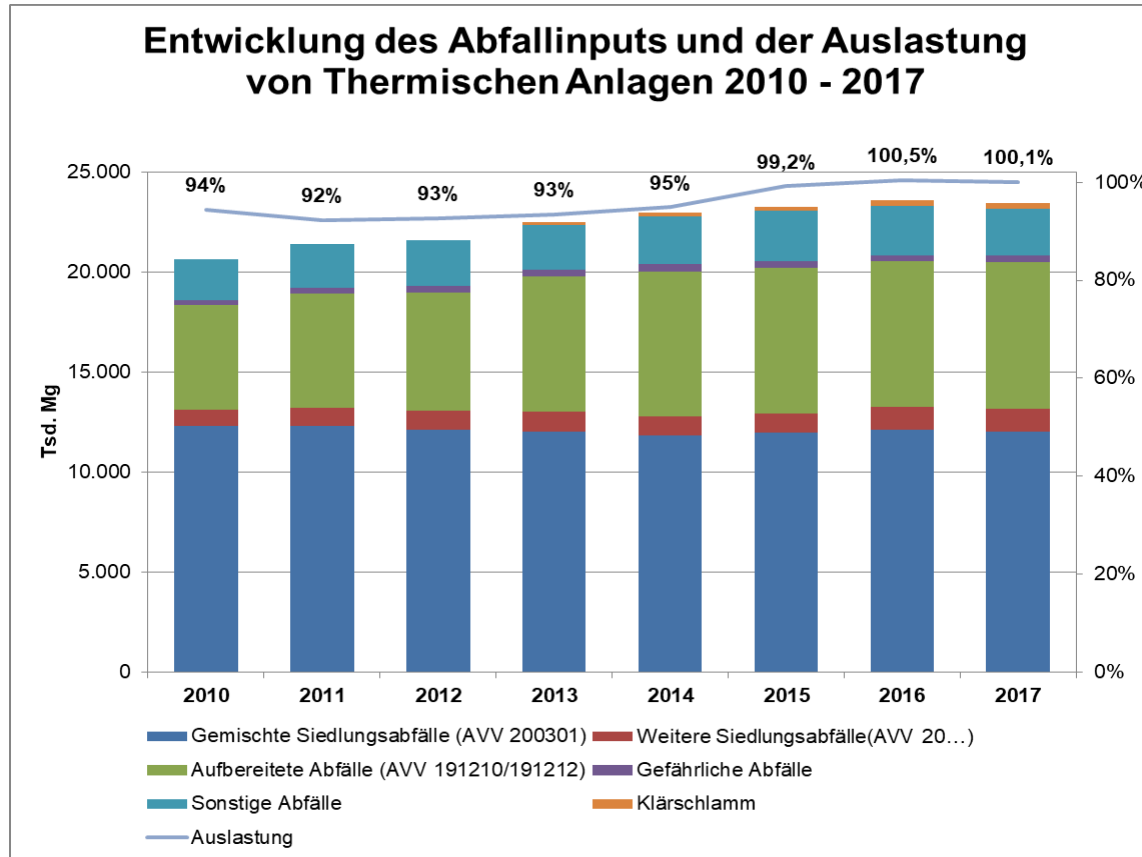
Deutsche Gesellschaft für
Abfallwirtschaft e.V.

www.dgaw.de

Incineration



Abfallinput und Auslastung von WtE-Anlagen in Deutschland



- Material cycles change
- Recycling rates grow

Despite this:

Thermal waste treatment plants remain a cornerstone of the German recycling economy... due to:

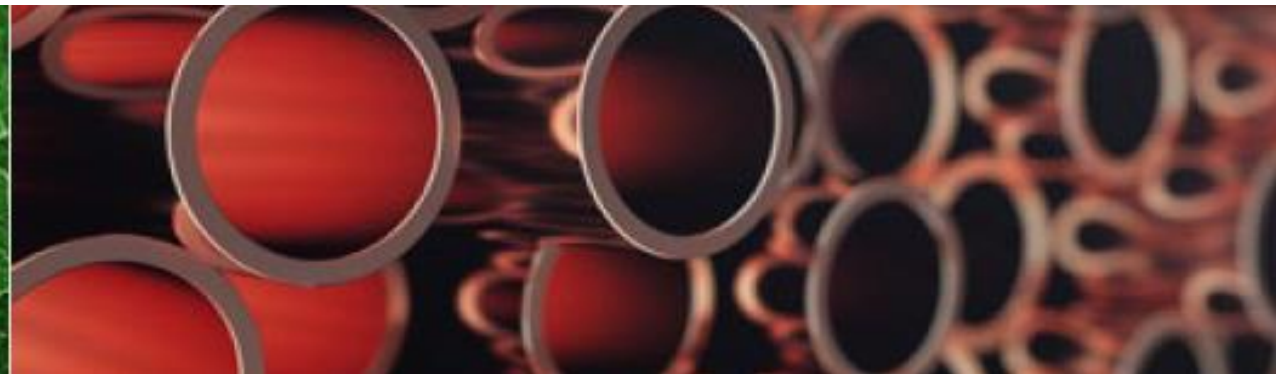
- Demographic change
- Requirements from the chemicals legislation
- Capacities that were previously co-incinerated in coal-fired power plants.

Waste Incineration – topics and trends

- Incineration as “State of the Art Technology” for waste treatment
→ EU Landfill Directive: Landfill quota of 10% from 2035
- Use of district heating networks
- Cooperation with steam consumers from industry
- Metal recovery from bottom ash
- CO₂ Capture and Utilization (Power to X)
- Post-sorting of municipal waste to separate plastics out of residual waste → reach higher recycling rates, more stable incineration
→ volume potentially for feedstock recycling



Extended Producer Responsibility



EU Packaging Directive 2018/852

Packaging Law Germany

Recycling rate Packaging waste				
Type of packaging	D VerpackG		EU PackagingD*	
	2025	2030	2025	2030
Total packaging	-	-	65%*	70%*
Glass	80%	90%	70%	75%
Paper	85%	90%	75%	85%
Plastics	65%	70%	50%	55%
Aluminium	80%	90%	50%	60%
Metal, Iron	80%	90%	70%	80%
Wood	-	-	25%	30%
Beverage Packaging	75%	80%	-	-
Other composite packaging	55%	70%	-	-
Total plastic, metal and composite packaging collected	50%		-	-

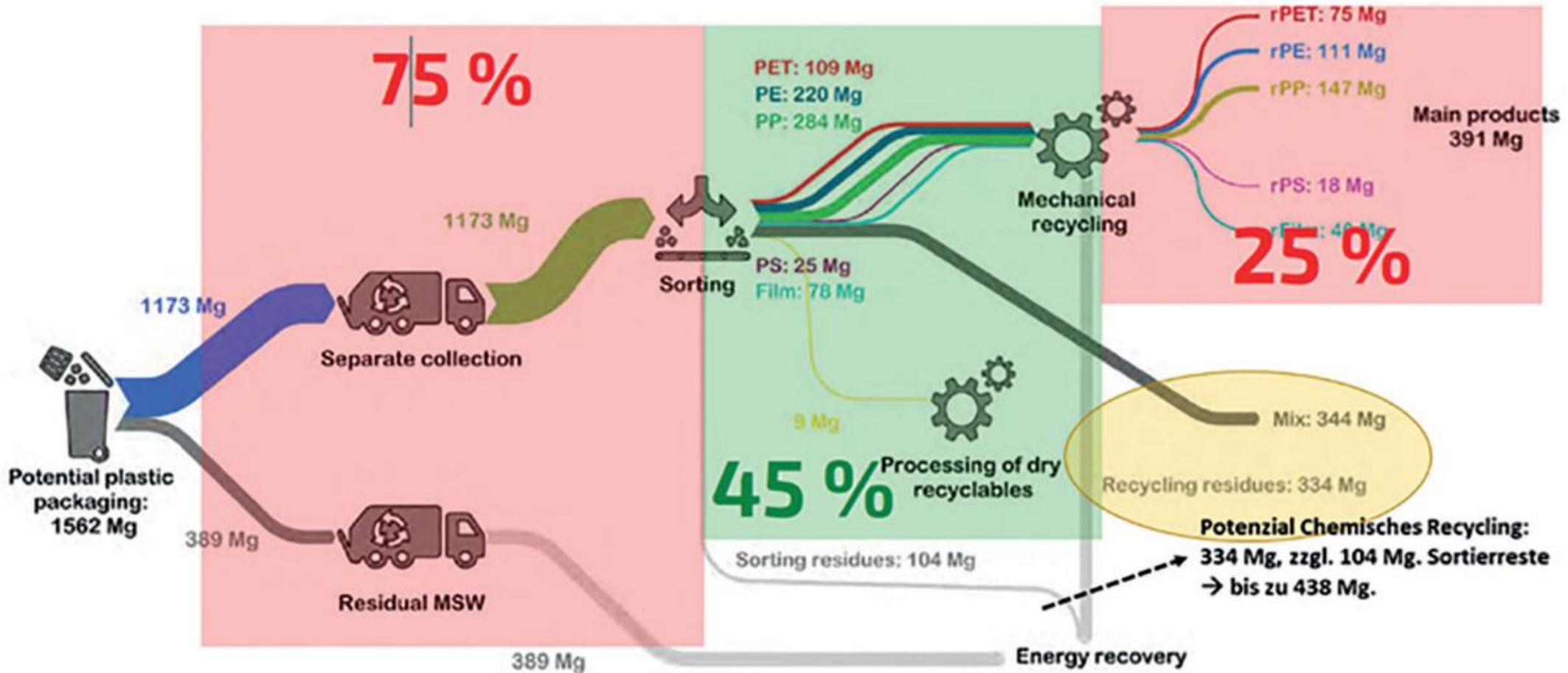
* For up to 5 years below the targets of <15%, based on single fraction or divided into 2 fractions, possible

9 Systems take over separate collection

Challenges:

- Separation by citizens inadequate
- Many missed throws
- Recycling rate hardly achievable with new calculation method
- Almost 50% goes into combustion
- The recycling process also produces residual materials
- Mechanical recycling has limits in quality and pollutants are also enriched

Recycling rate of packaging plastic



Alternative treatments solutions for non-recyclable plastics

Chemical recycling might be an alternative for non-recyclables that are now incinerated:

Treatment by pyrolysis, gasification, „plasma process“...

Target: completely reprocessing of plastics

- Crediting to the recycling quota according to the EU Waste Framework Directive
- Credit if products made of CR are used to manufacture plastics
- no recycling when CR products are used to produce fuels



- CR should be seen as a possible **complement** to mechanical recycling
- After all, it is clear that we need **alternatives** if we are to **achieve the ambitious recycling quotas** in the future.
- Therefore, studies should urgently be carried out to examine the **ecological effects, the CO₂ balance** and the economic feasibility

EU Directive 2006/66/EC calculation of recycling efficiencies of the recycling processes of waste batteries and accumulators

Battery law in Germany



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The manufacturers of portable batteries have set up five proprietary take-back systems for collection

There are about 200,000 collection points where consumers can dispose of used batteries.

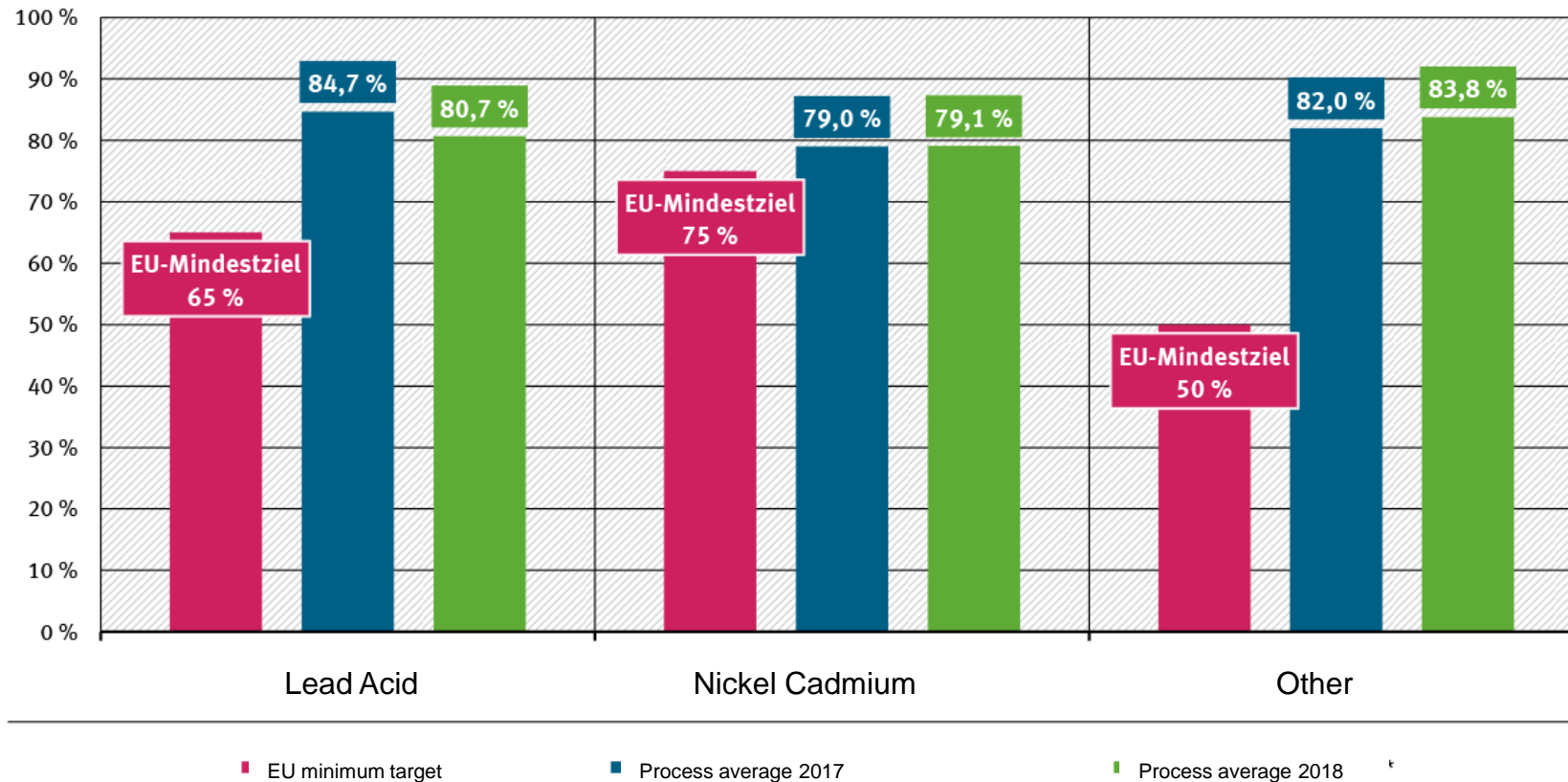
The collection are located wherever new batteries are sold:

- Supermarkets and drugstores
 - department stores
 - electrical stores
 - DIY stores and gas stations.
-
- Voluntary collection points
 - Recycling centers



Battery law in Germany

Efficiencies of recycling processes for spent batteries 2017 and 2018



The recycling efficiencies shown are calculated according to the requirements of the EU regulation. Datasource: Recycling companies for used batteries

EU WEEE-Direktive (Waste of Electrical and Electronic Equipment)

Elektro law in Germany Oktober 2015



For major distributors the law obliges:

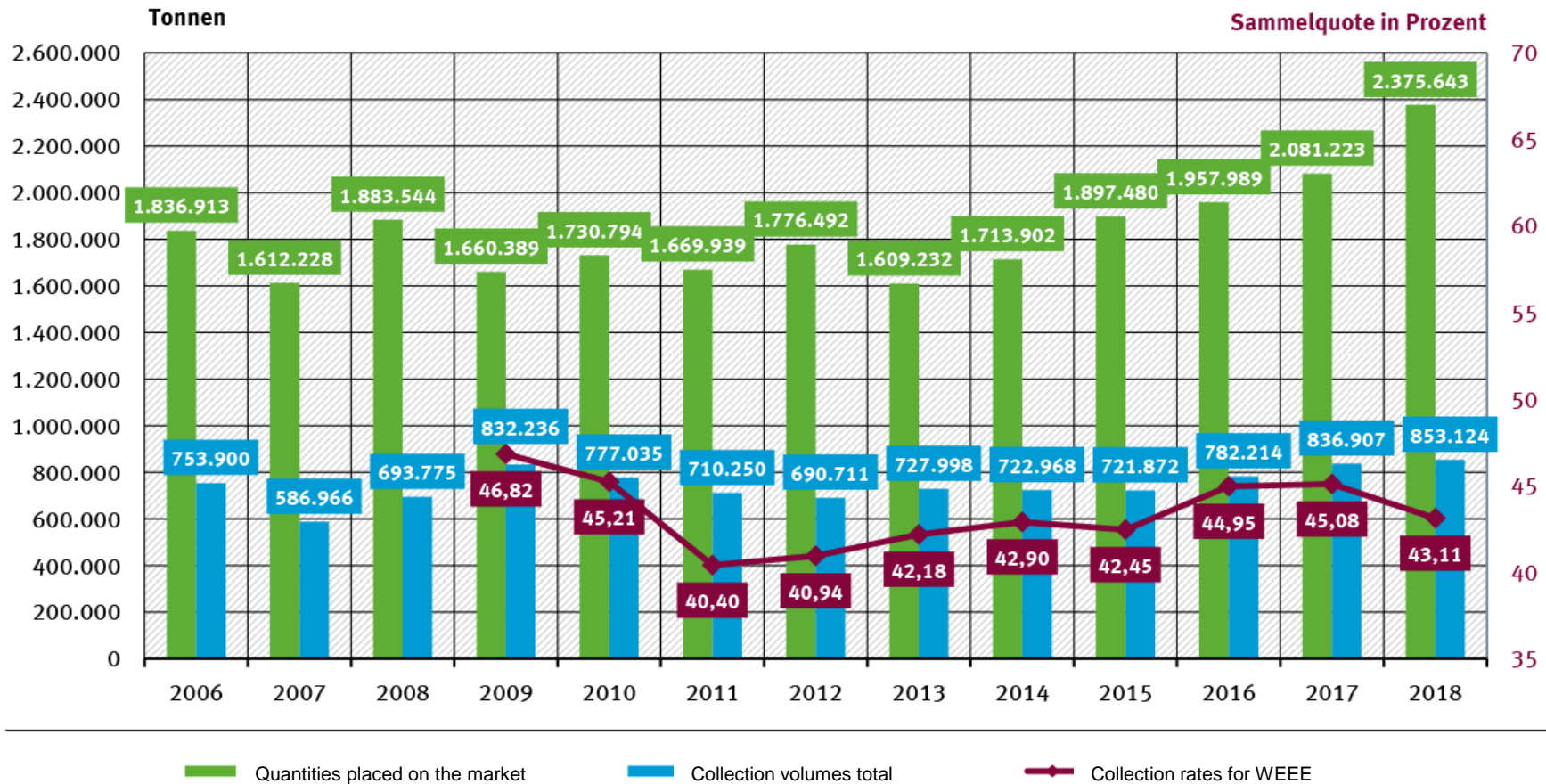
- take back WEEE free of charge
 - dispose it professionally or hand it over to a professional recycler
 - Report it to stiftung “ear” (register for WEEE)
 - → there are no take-back systems for collection
-
- Minimum collection rate: 45% (2016 to 2018), achieved rate for 2018: 43%
 - From 2019 on: 65%
-
- The collection rate refers to average total weight of electrical and electronic equipment placed on the market in the three previous years.
-
- Included in the quota: Old appliances/devices from private households and industry, public authorities, etc.
 - Recovery rates of 75% to 85% depending on the category of equipment (including energy recovery)
 - Rate of re-use and recycling: 55% to 80% depending on the category of equipment

EU WEEE-Direktive Elektro law in Germany Oktober 2015



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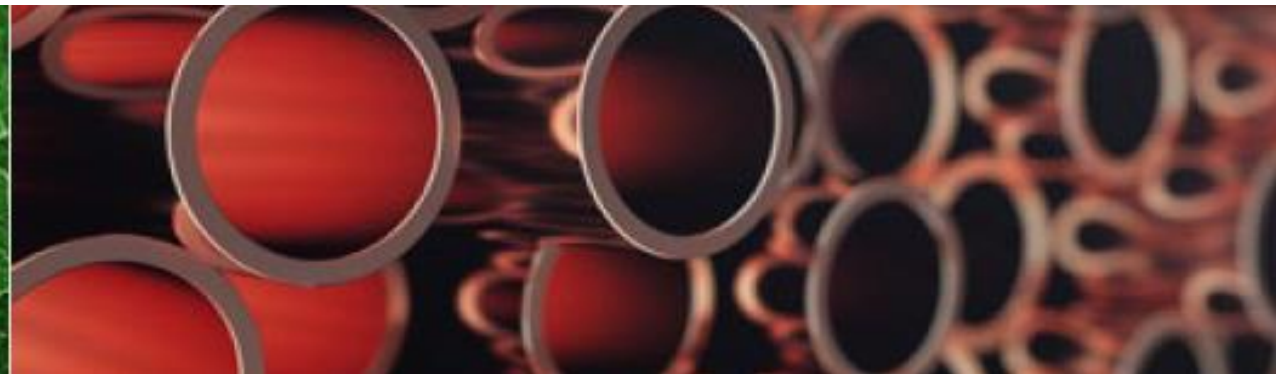
Quantities placed on the market, collection volumes and rates for WEEE



*bezogen auf den Durchschnitt der in den 3 Vorjahren in Verkehr gebrachten Menge

Quelle: Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit
(<https://www.bmu.de/themen/wasser-abfall-boden/abfallwirtschaft/statistiken/elektro-und-elektronikaltgeraete/>)

Bio Waste and Garden Waste



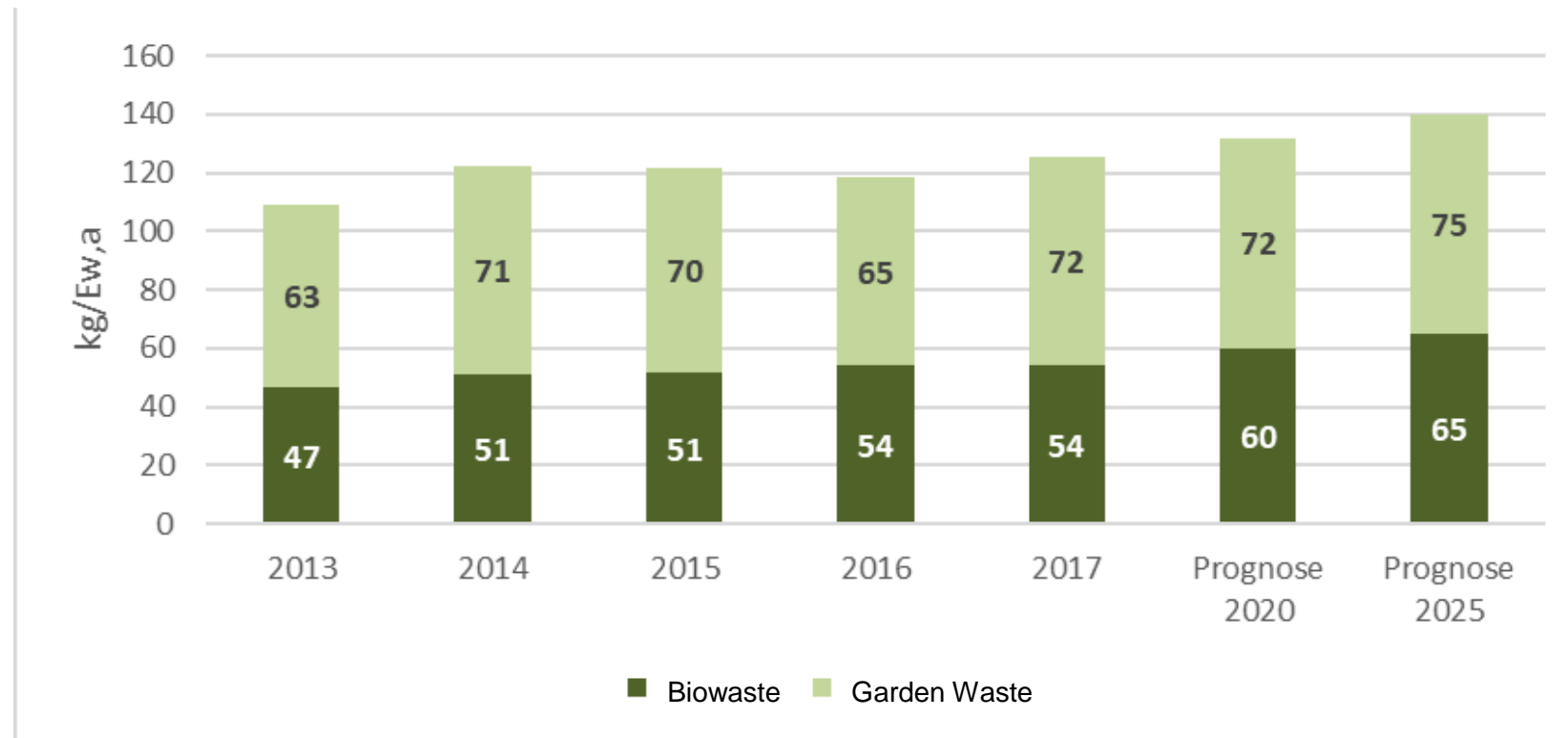
Status and development of the bio waste and garden waste volume

In Germany currently about 50 kg/capita*year organic waste is collected separately

The area-wide separate collection is not yet fully implemented

A current residual waste analysis of the Federal Environment Agency came to the conclusion that the residual waste still contains about 40 kg/ capita*year of biowaste

It is not easy to raise the potential



Quality of Compost: Limit values for impurities

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Quality marks guarantee quality through independent quality monitoring and create confidence in the market

In Germany the RAL quality assurance system of the Bundesgütegemeinschaft Kompost e.V. (BGK) are voluntary product certifications for manufacturers of fertilizers and soil improvers from the recycling industry

Limit values for the content of foreign matter > 2 mm are regulated in Germany by various regulations

Limit values of the fertilizer ordinance :

- non-degraded plastics (foils): 0.1 wt.% DM
- sum of all other foreign substances: 0.4 wt.% DM

Limit values BioAbfV: Total foreign substances: 0.5 weight % TM



Quality of Compost: Limit values are met

Tabelle 1: Gehalte an Fremdstoffen und Kunststoffen > 2 mm in Kompost und in Gärprodukten
(arithmetische Mittelwerte, Ergebnisse der RAL-Gütesicherungen)

Analysen ⁵⁾	Trocken- masse	Folien- kunststoffe	Hart- kunststoffe ⁶⁾	Kunststoffe gesamt
	%	Gew.-% TM	Gew.-% TM	Gew.-% TM
Kompost gesamt ¹⁾	58,4	0,008	0,024	0,032
Kompost aus Biogut ²⁾	59,9	0,012	0,029	0,041
Kompost aus Grüngut ³⁾	56,7	0,004	0,018	0,022
Gärprodukt flüssig ⁴⁾	6,71	0,010	0,013	0,023

Limit values fertilizer ordinance :

- sum of all other foreign substances:
0.4 wt.% DM
- non-degraded plastics (foils):
0.1 wt.% DM

¹⁾ Kompost aus Behandlungsanlagen, die Biogut und Grüngut behandeln (n=1.417)

²⁾ Kompost aus Behandlungsanlagen, die sowohl Inhalte der Biotonne als auch separat erfasstes Grüngut behandeln (n=744)

³⁾ Kompost aus Behandlungsanlagen, die ausschließlich separat erfasstes Grüngut behandeln (ohne Biotonne) (n=673)

⁴⁾ Gärprodukt aus der Behandlung von Bioabfällen (hier nicht enthalten: reine NawaRo-Gärprodukte) (n=417)

⁵⁾ Regeluntersuchungen der RAL-Gütesicherung im ersten Halbjahr 2018

⁶⁾ Hartkunststoffe rechnerisch geschätzt (Hartkunststoffe = Fremdstoffe gesamt abzgl. Glas abzgl. Folienkunststoffe)

Problem Microplastics

Different studies found that plastic pollution in soils is (up to 40 times) higher than in water (without tire abrasion) due to littering, plastic films in agriculture, use of compost and sewage sludge in agriculture

The Berlin researchers investigated the origin of the microparticles:

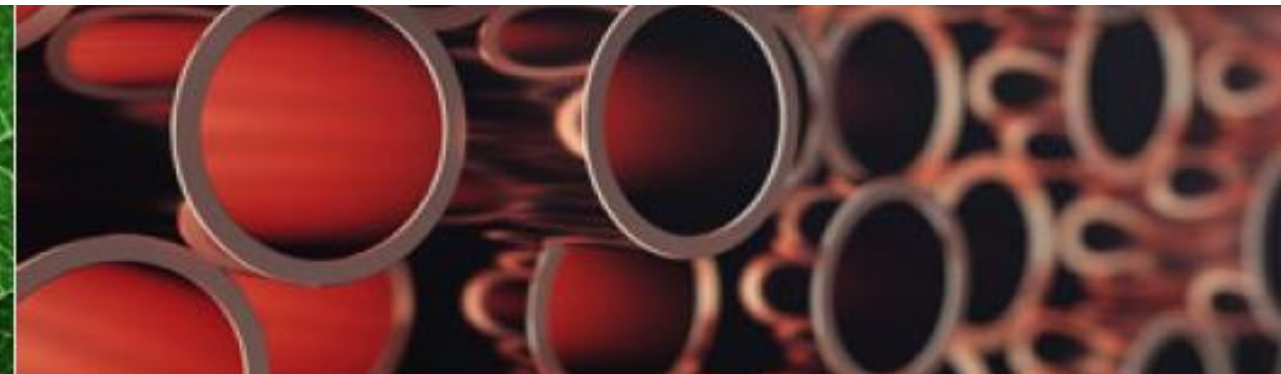
- They found it from the wastewater sewage sludge, which is used agriculturally

The Bayreuth researchers examined the origin even more closely:

- Microplastics mainly made of PS and PE
- "These are precisely the plastics that are often used to make packaging and wrapping paper for food products".
- "Compared to the sea, depending on the environment, 4 to 23 times more plastic particles with a size of less than five millimeters were stuck in the ground

Plant	Recycled Material	Microplastic particles per kg dry weight
Composting with prescreening	Organic waste, garden waste and leaves from households	20 - 24
Biogas plant	Organic waste from households, little garden waste	70 - 146
Fermentation	commercial organic waste from restaurants and supermarkets	895
Biogas plant	Corn, grass silage	0
10 different Biogas plants	dung, liquid manure, fruit residues, seeds	0

Sewage Sludge



Sewage Sludge Ordinance



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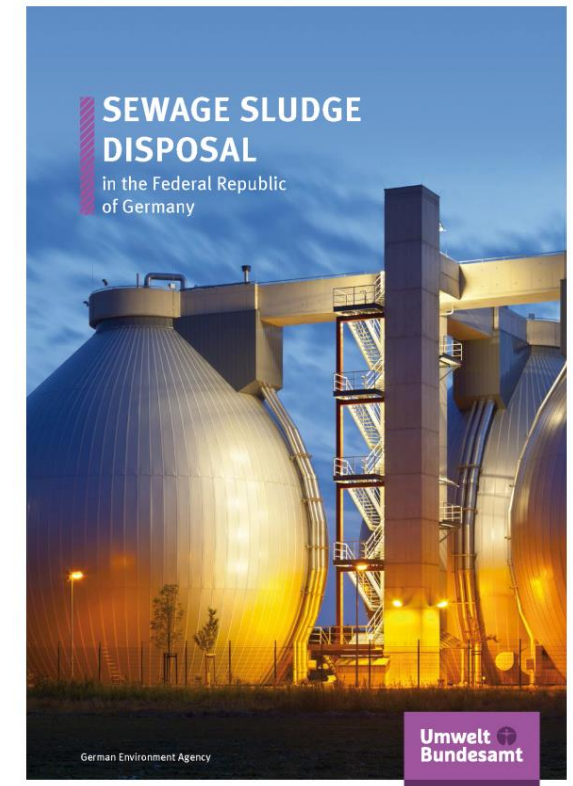
Future obligations for phosphorus recovery in accordance with the amended Sewage Sludge Ordinance

Wastewater treatment plants	Expansion size	Expansion size	Expansion size
	≤ 50.000 EW	> 50.000 ≤ 100.000 EW	> 100.000 EW
Current	Utilisation on soil feasible	Utilisation on soil feasible	Utilisation on soil feasible
In 2023	Reporting obligation for planned P-recovery measures, for utilisation on soil or other disposal Obligation to investigate P-content (and basic substances)		
From 01/01/ 2029 (Transition period approx. 12 years from the entry into force-of the AbfKlärV)	Utilisation on soil feasible Exempt from P-recovery obligation (≥ 2 % P)	Utilisation on soil feasible Exempt from P-recovery obligation (≥ 2 % P)	Utilisation on soil not permitted P-recovery obligation (≥ 2 % P)
From 01/01/2032 (Transition period approx. 15 years from the entry into force of the AbfKlärV)	Utilisation on soil feasible P-recovery obligation (≥ 2 % P)	Utilisation on soil not permitted P-recovery obligation (≥ 2 % P)	Utilisation on soil not permitted P-recovery obligation (≥ 2 % P)

Future challenges of sewage sludge utilization

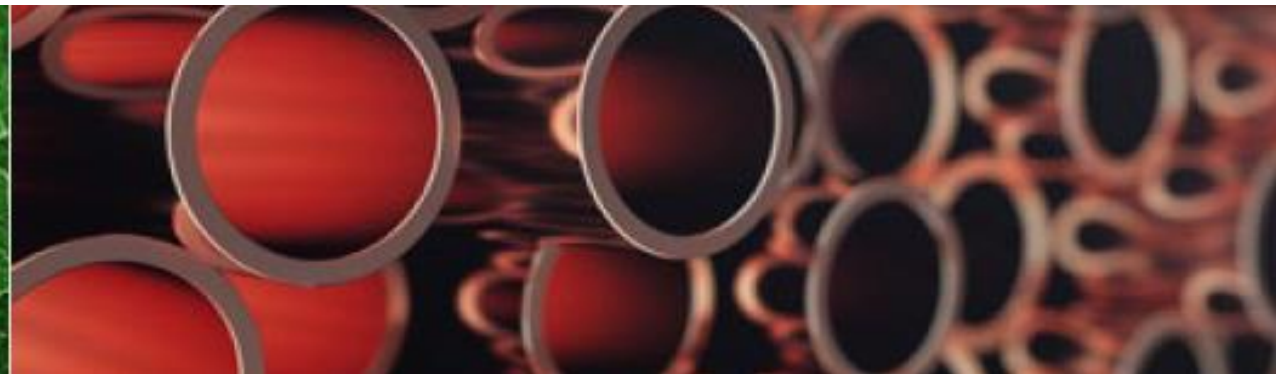
- Soil-related recycling after the transition periods only possible for small plants
- Currently, about 625 kt are still used in agriculture/landscaping
- The current treatment capacity of combustion is around 860,000 kt, but about a third of this is in lignite and hard coal-fired power plants, which will be eliminated due to the coal phase-out
- → Demand for disposal capacities: Mono Incineration
- Phosphorus recovery is mandatory for sludge with minimum 20 g phosphorus/ kg as well as for sewage sludge ashes
- P-recovery processes must be implemented on an industrial scale

The situation is further aggravated by the amendment of the fertilizer ordinance, which makes the use of sewage sludge as fertilizer in agriculture more difficult

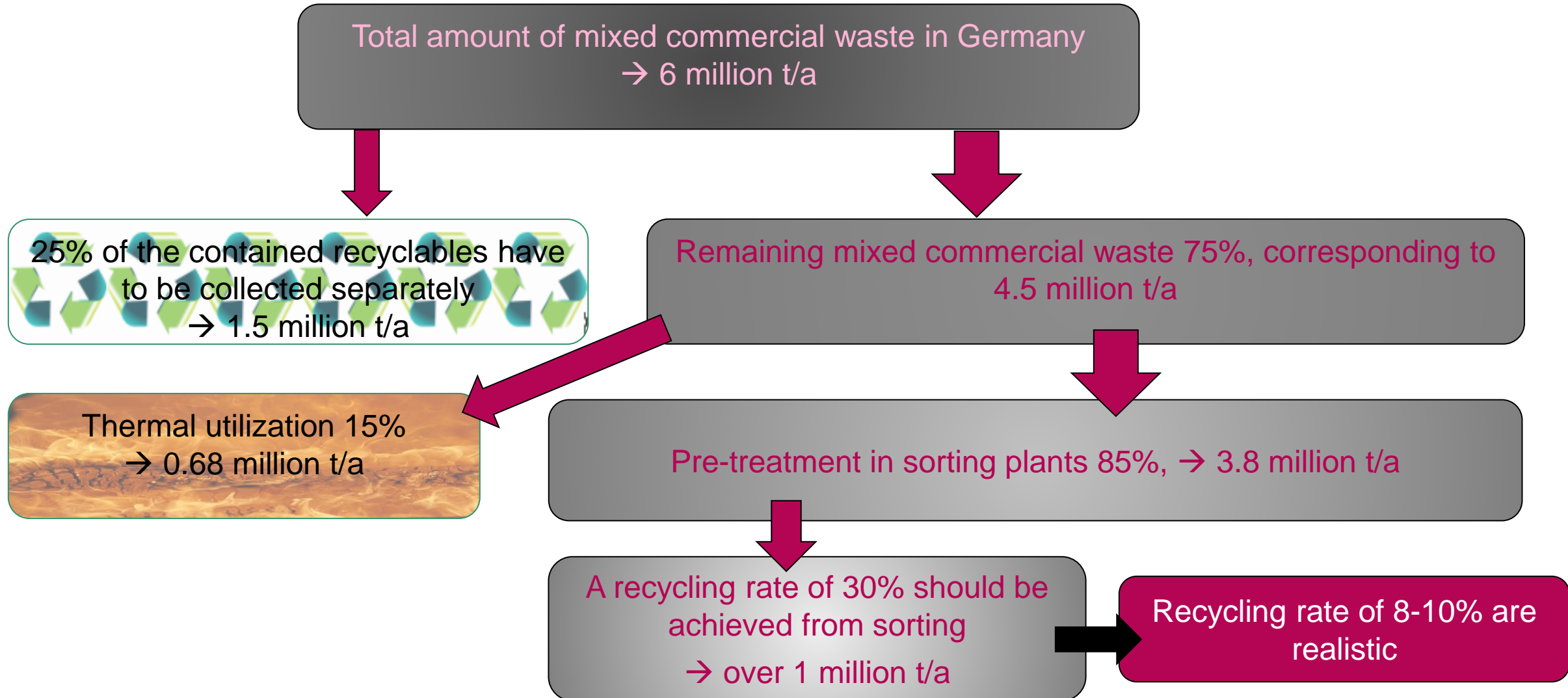


An English version of the publication “sludge treatment in Germany” can be downloaded:
https://www.umweltbundesamt.de/sites/default/files/medien/1410/publikationen/190116_uba_fb_klaerschlamm_engl_bf.pdf

Commercial Waste Ordinance



Obligations in the Commercial Waste Ordinance



Other challenges with the Commercial Waste Ordinance

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Commercial and industrial customers separate themselves very effectively

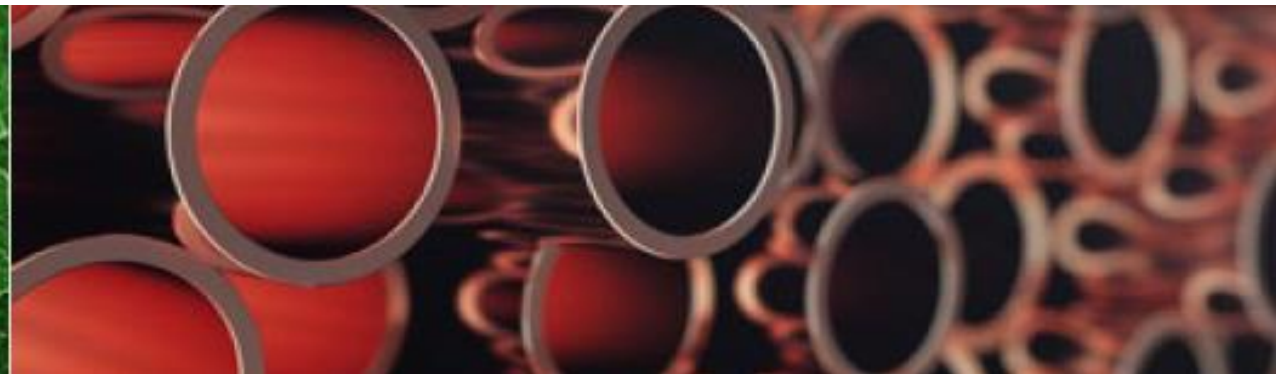
- Very high documentation effort (digital & analog) with additional Personnel expenses
- Recyclingrate after sorting with bulky waste approx. 8 %
- Without bulky waste the recyclable portion would be even lower
- Long transport routes (money is burned on the road)



The German market lacks plant capacities for Sorting

- Sorting rates of 85 % achievable
- Recycling rate of 30 %, especially for commercial waste currently not available
- With Mixed construction waste (high inert content) better achievable
- Finding markets for various recycling materials currently problematic

New business models in waste management



The future of the waste management sector in Germany – topics and trends

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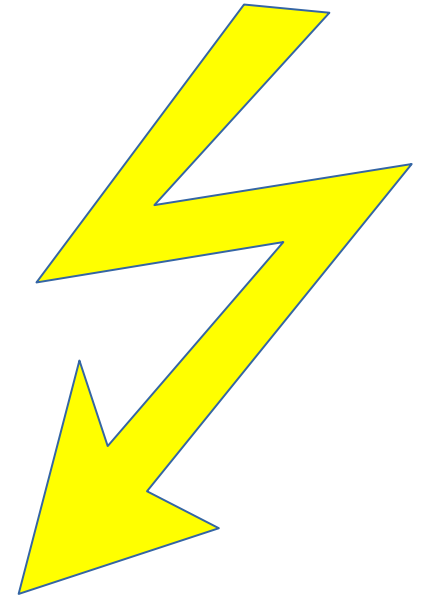
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Disruptive business models:

- „traditional business models“ were based on the division of business, that waste would be handled just by either public or private waste management companies
- This division of work guaranteed somehow the financing of the waste management companies – originally through waste disposal, then also through reusable fractions

Now: new players enter the waste management sector whose core business is not waste management

- these players optimize their waste costs by collecting and treating the waste of their own branches: e.g. Lidl, Werner & Merz or
- They use their capacities and know-how of their core business to enter waste management markets like „take-back-systems“. Possible players are e.g. logistics providers like Amazon, DHL, UPS.



The future of the waste management sector in Germany – topics and trends

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The rising of online-platforms and intermediaries:

- Platforms between recyclers and customers
- Online traders of secondary raw materials e.g. the start-up „Remetal“ buying scrap metal directly from consumers and pick it at their private doors
- Apps – service apps to order online containers, picking up of bulky waste e.g. „Resourcify-App“ (Waste management app for industry), the app: "Zero Waste Map" of Stadtreinigung Hamburg in order map offers producing less waste compared to competitors



DGAW Board members

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Dr. Alexander Gosten, BSR AöR, Berlin - Vorstandssprecher
Sieglinde Groß, Fehr Umwelt Ost GmbH, Dresden – stellv. Vorstandssprecherin
Aloys Oechtering, Remondis, Lünen – stellv. Vorstandssprecher
Gerd Mehler, Hünfelden - Schatzmeister

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Ehrevorsitzender: Thomas Obermeier,
TOMM+C, Berlin
Ehrenmitglied: Prof. Dr. Wolfgang Klett,
Kanzlei Köhler & Klett, Köln

Staffed office: Nieritzweg 23, 14165 Berlin
Managing director: Ms. Isabelle Henkel, Berlin
Various directors for special tasks...



We implement our Mission jointly with members



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Private and municipal waste disposal companies, product and plant manufacturers, chemical companies, recyclers and sorters, politicians, administrators, scientist, researchers, engineers, consultants, lawyers, lobbyists and other NGOs with whom we do have mutual memberships.

and care about the future of resources

Dealing with markets, product stewardship, current legislation in Germany and the European Union and recycling issues. We see today's products as tomorrow's resources. We encourage an interdisciplinary exchange of opinions between different people, reflect our own positions and support the national and international transfer of knowledge.



Thank you very much – open for dialogue

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DGAW Staffed Office (Headquarters)

Nieritzweg 23, 14165 Berlin, Germany

Tel.: +49 – 30 – 84 59 14 77

Fax: +49 – 30 – 84 59 14 79

E-Mail: info@dgaw.de - www.dgaw.de

Director for International Affairs

Dr. Volker Ludwig

Tel.: +49 – 228 – 928 948 71

E-Mail: international@dgaw.de - www.dgaw.de

