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Quantity, Management and Aspects of Resource Preservation of Commercial Solid Waste

Summary

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NATURE CONSERVATION AND NUCLEAR SAFETY

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Quantity, Management and Aspects of Resource Preservation of Commercial Solid Waste

Summary

by

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1 Objectives of the Research Project

The main objective of this research and development project (FKZ 3709 33 314) aims to assess the quantity, the management and the aspects of resource preservation of commercial solid wastes[1] that are subject of the German Commercial Wastes Ordinance. Sub-ordinate targets are the enquiry and presentation of

- commercial solid waste streams (quantity and composition),
- different recovery and disposal techniques,
- secondary raw materials derived from commercial wastes and
- identified problems and opportunities for improvement to use the potentials from commercial wastes more efficiently.

The study bases particularly on statistical data of the federal and state statistical offices, the waste balances of the federal states as well as on primary data collected via questionnaires. Other essential elements of the investigation are three expert panels and one-to-one interviews where expert knowledge of the current disposal situation and future development opportunities were acquired.

The results of the research project are outlined below.

2 Investigation Subject

Subject of the investigation are mixed commercial wastes that are similar to municipal waste (European Waste List (EWL) 200301) but that are delivered or collected separately[2]. Those waste materials are either collected by public or private waste disposal contractors.

The base year for the investigation is 2007. Data of other types of waste or of different years, respectively, are consulted in particular cases for comparison or replenishment of the data set.

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1 Waste materials mentioned in § 1 No. 1 and § 1 No. 3 of the Commercial Waste Ordinance

2 Commercial waste from businesses that is collected together with household waste is not a subject of the study.

3 Quantity of Mixed Commercial Waste

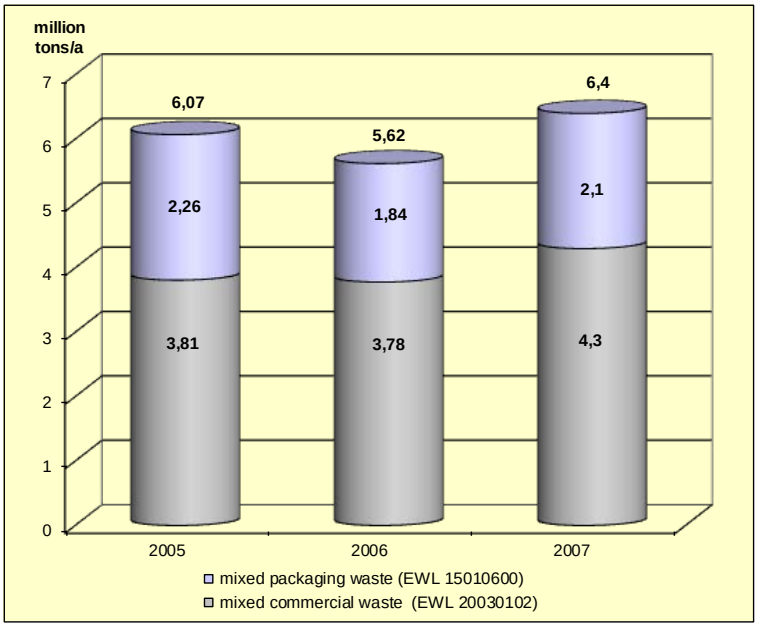
In the year 2007 about 4.331 million tons of mixed commercial wastes were treated in 499 German waste treatment plants whereof 56,000 tons were imported from foreign countries. The waste volume exported abroad was 38,000 tons. Those amounts are not considered in this study. About 60 % by weight of the mixed commercial municipal wastes were treated in the waste disposal plants in Baden-Württemberg, Bavaria and North Rhine-Westphalia.

Nearly half of the commercial waste, about 2.07 million tons, was managed by public waste disposal authorities, the other part was covered by the private sector with the objective of material recycling.

In addition businesses declared mixed commercial waste as “mixed packaging” (EWL 150106). This waste type is formally not liable to the Commercial Wastes Ordinance. The amount totalled about 2.1 million tons and was treated in 462 facilities. All in all about 6.4 million tons of mixed commercial wastes accumulated in 2007.

Figure 3-1 shows the waste volume development between 2005 and 2007. The total amount of mixed commercial municipal waste as well as the mixed packaging waste increased after a reduction in the previous year.

Figure 3-1: Development of mixed commercial municipal waste (EWL 20030102) and mixed packaging waste (EWL 15010600) in the years 2005 to 2007[3]



[3] Statistisches Bundesamt: Abfallentsorgung der Jahre 2005 bis 2007, Wiesbaden

4 Composition of Commercial Solid Waste

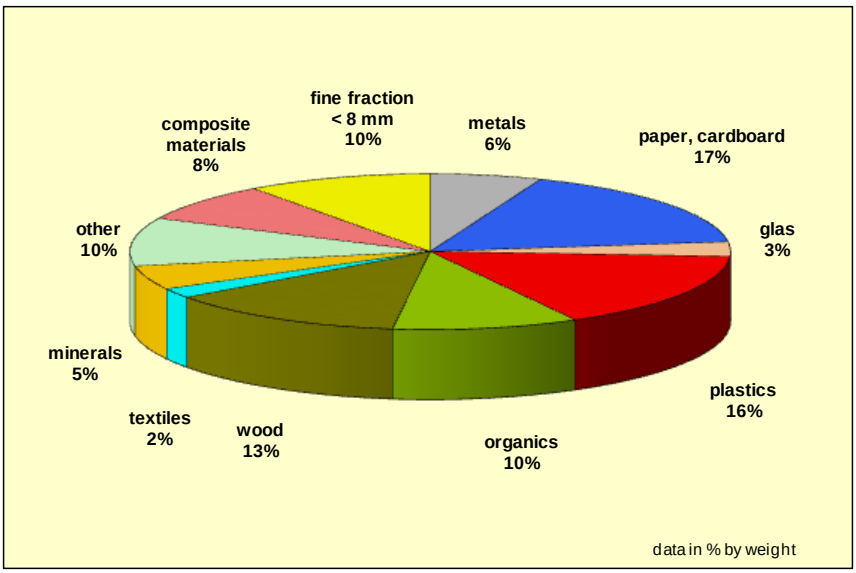
Available data for the composition of commercial wastes are – with a few exceptions – out-of-date and were raised in the 1980s or 1990s.

Effective data are available for municipal-waste-like commercial waste from seven investigation campaigns but not for mixed packaging waste.

In this respect, the composition shown in figure 4-1 has to be regarded as an assessment. However, the potential of valuable materials could be verified in a plausibility check by means of the results of sorting analysis of sorting residues from mechanical pre-treatment (EWL 191212)[4].

The waste contains a high portion of recyclable material indicating, that not all businesses are separating recyclable fractions but dispose of those materials as conglomerate in pre-treatment plants.

Figure 4-1:
Estimated composition of commercial municipal waste in the years 2007/2008
(data in % by weight)



[4] u.e.c. Berlin: Überwachung von Abfallentsorgungsanlagen - Recherchen und Untersuchungen an Abfallbehandlungsanlagen in Sachsen-Anhalt und Abgrenzung der Abfallschlüssel 191209 und 191212, Studie für das Landesamt für Umweltschutz Sachsen-Anhalt, May 2010

5 Pre-treatment Plants

In Germany mixed commercial waste is treated in 491 facilities approved by the Federal Immission Control Act for pre-treatment.

Effective data concerning procedural characteristics could be collected for 42 recycling facilities, whereof 74 % are regarded as pre-treatment plants with middle or high complexity.

According to a research in 2009 about 53 % of a total of 60 treatment facilities in Saxony-Anhalt could be classified as sorting plants for mixed valuable materials of a mid-range complexity or, respectively, as facilities for the production of substitute fuels[5]. Neglecting all plants for the treatment of mono-fractions increases the rate up to 65 % (see table 5-1).

Data available for the pre-treatment plants in North-Rhine Westphalia for the year 2004 show, that only 10 % of pre-treatment plants do have a high technical standard[6].

Recapitulatory it has to be stated that the advances in waste treatment technology are often, if ever, realized with an extensive time delay.

Table 5-1: Classification of pre-treatment facilities

Type of plant	Number of surveyed facilities (nation-wide)	Number of pre-treatment facilities in Saxony-Anhalt[7]
Bottom-of-the-line plant or waste transfer station	4	12
Basic plant for sorting of valuable material mixtures without screening stage	7	5
Sorting plants for mixtures of valuable materials with a mid-range complexity, with screening stage and, possibly, with waste grinding	16	22
Sorting plants for mixtures of valuable materials with a mid-range complexity, with waste screening and grinding, sensing technique or plant for producing substitute fuels	15	10
Number of plants	42	49

[5] Oetjen-Dehne, R. et al.: Erste Ergebnisse aus der Untersuchung von Stoffströmen der Abfallaufbereitungsanlagen in Sachsen-Anhalt, 14. Tagung Siedlungsabfallwirtschaft Magdeburg 2009

[6] Both, G. et al.: Status Quo der Gewerbe- und Baumischabfallaufbereitung in NRW, Müll und Abfall 12 2005

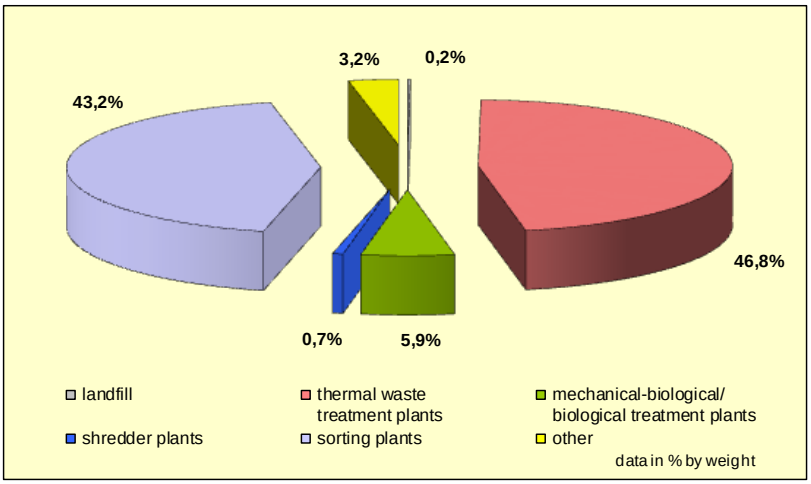
[7] 11 of the 60 plants surveyed are sorting plants for recyclables from municipal waste or plants for special purpose.

6 Recycling and Disposal

The biggest amount of mixed commercial municipal waste (app. 60 % by weight) is directly treated in waste incineration plants without pre-treatment, only 30 % by weight are treated in sorting plants. In contrast app. 70 % by weight of mixed packaging waste is treated in sorting plants.

Based on a total volume of app. 6.4 million tons in 2007 of both waste mixtures only 43 % by weight or respectively 2.77 million tons were fed into mechanical pre-treatment plants (Figure 6-1).

Figure 6-1:
Allocation of mixed commercial municipal waste (EWL 20030102) and mixed packaging waste (EWL 15010600) to different disposal plants in the year 2007[8]
(data in % by weight)



7 Secondary Raw Materials from Sorting of Mixed Commercial Waste

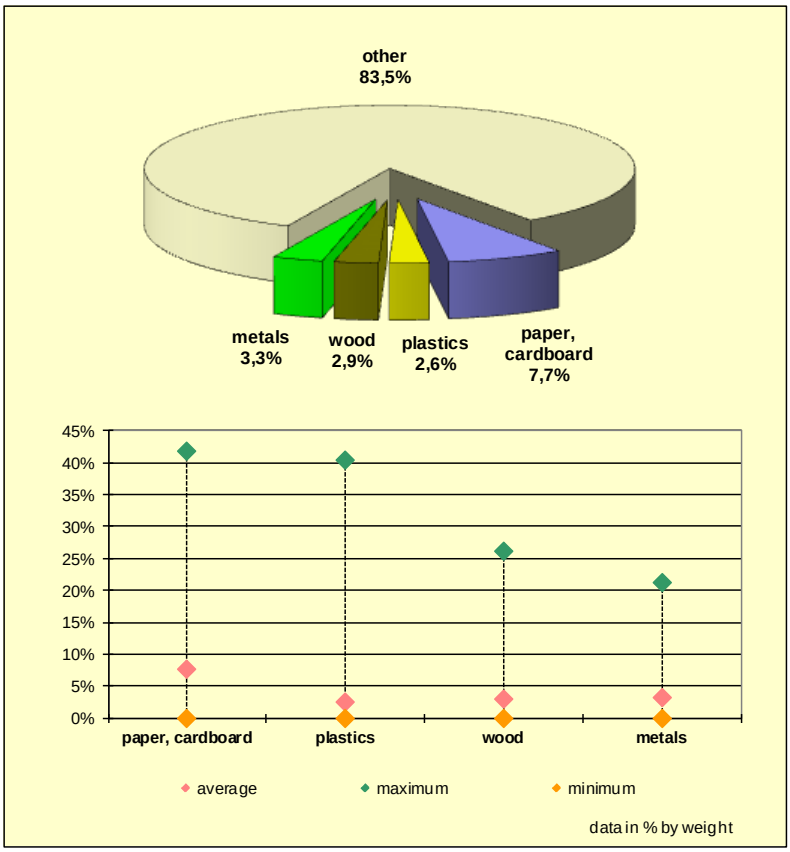
Within the pre-treatment facilities secondary raw materials are sorted from the processed mixtures, while, since 2005, the remaining sorting residues are utilized directly or indirectly for energy recovery.

The Federal Statistical Office has no available data concerning the mass portions for material recycling and energy recovery of the pre-treatment plants. Therefore the investigation of the quantity of secondary raw materials from pre-treatment is based on operator data.

According to that data about 16.5 % by weight were separated in 2007. The following figure shows the spread of secondary raw material fractions.

8 Statistisches Bundesamt: Abfallentsorgung 2007, Wiesbaden. Also recalculation of EWL 20030102.

Figure 7-1:
Fractions of secondary raw materials separated from mixed commercial waste (n=38)



According to this mass distribution a theoretical quantity of secondary raw material of app. 1.1 million tons can be calculated, related to a total of 6.4 million tons of mixed commercial municipal waste and mixed packaging waste. Since the pre-treatment of commercial waste is only about 2.77 million tons in 2007, the effective amount of secondary raw materials is set to a low of 0.46 million tons.

The comparison with the data of a statistical survey of waste production in 19,348 businesses (as of 2006[9]) shows a separate collection of app. 19.5 million tons of secondary raw materials. In conclusion, the contribution of pre-treatment plants to the supply of secondary raw materials is marginal. Nevertheless, a country with little resources cannot afford not to take advantage of secondary raw materials that are part of commercial municipal waste.

9 Statistisches Bundesamt: Erhebung über die Abfallerzeugung 2006, Wiesbaden 2008

Table 7-1: Estimation of secondary raw materials, separated from mixed commercial waste in the year 2007

Valuable material	Mean fraction of secondary raw materials separated from mixtures (% by weight)	Total of mixed commercial municipal waste and mixed packaging waste in the year 2007 (million tons/a)	Recoverable secondary raw materials (million tons/a)
paper, cardboard	7.7%	6.41	495,000
plastics	2.6%		167,000
wood	2.9%		188,000
metal	3.3%		213,000
total	16.5%		1,063,000
Actual quantity of secondary raw materials related to a total of 2.77 million tons of waste material pre-treated in the year 2007.			**459,000**

8 Disposal Costs and Attainable Revenues

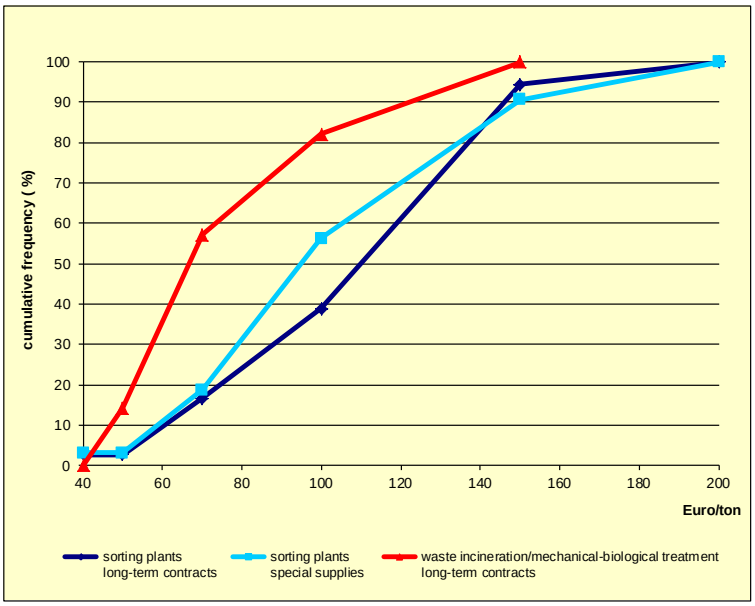
Revenues for the disposal of mixed commercial municipal waste vary according to market conditions, as well as the costs for the output flows of the pre-treatment plants.

Particularly prices for the waste incineration can be regarded as a reference value for pre-treatment plants. About 80 % of the disposal plant operators (waste incineration and mechanical-biological waste treatment plants) attending the survey priced the treatment of mixed commercial municipal waste up to 100 Euro/ton, over 50 % of them named prices up to 70 Euro/ton. Compared to that, the average price level for pre-treatment is currently about 30 Euro/ton higher.

The fact that prices for the direct disposal of commercial waste are lower than pre-treatment costs was confirmed by information from expert panels. According to the experts a number of pre-treatment plants had to close down for this reason, even in the states of Bavaria and Baden-Württemberg, where the waste incineration has a rather superior price level (see Mayer[10]).

10 Mayer, S.: Kurzvorstellung der LOGEX, 3. Expertenpanel, May 2010

Figure 8-1:
Results of primary data survey concerning treatment prices (n=64), as of 2010



Model calculations indicate that a pre-treatment facility relies on a revenue ranging between 86 and 89 Euro/ton (as of 2010) in order to cover all its costs.

Both the Federation of the German Waste, Water and Raw Materials Management Industry (BDE) and the German Association for Secondary Raw Materials and Waste Disposal (bvse) estimate that the costs for a high-quality treatment combining the recovery of recyclables and the production of substitute fuels range between 80 and 100 Euro/ton. This assessment is verified by the results mentioned above.

In particular the specific personnel expenses for the manual sorting cannot be covered through the revenues for valuable materials. This fact is eminently valid for plastics for which the manual sorting causes specific personnel expenses between 250 and 350 Euro/ton due to the marginal unit weight. This differs from paper. Here the manual sorting causes personnel expenses of about 35 Euro/ton.

In summary, since 2009 only in single cases the prices of pre-treatment plants are competitive compared to those of incineration plants (less than 70 Euro/ton) for instance if the facility is already depreciated, if the treatment costs are very low or in case of high revenues for valuable materials and high-quality input. In contrast to the year 2007 the majority of the pre-treatment plants currently cannot compete against the energy recovery plants.

9 Suggestions for an Efficient Use of Resources Contained in Mixed Commercial Waste (Material and Energy)

As mixed commercial municipal waste will also accrue in the future both the contained material and energetic potential should be utilized more efficiently than in the past. This will serve the purpose of saving raw materials and thereby primary energy, provided by fossil fuels, and it will also support the efforts for climate protection.

To achieve this goal, different optimizing approaches can be listed:

- Mixed commercial waste in total shall be fed into pre-treatment plants with a technical minimum standard. Through that the utilizable portion of secondary raw materials would be 1.1 million tons instead of 0.46 million tons in the year 2007.
- The yield of recyclables has to be increased.
  The recovery of recyclables from mixed commercial municipal waste fed into the pre-treatment process is limited by the composition and material properties.[11] Even with sensing techniques the fine fraction is not suitable for sorting. Nevertheless, it should be possible to increase the average yield of valuable materials from 16.5 % by weight in 2007 up to 30 % by weight. If the mixed commercial waste would generally be fed into pre-treatment plants the yield of secondary raw materials could rise up to app. 1.9 million tons per year. Currently this potential is not feasible due to low incineration prices.
- The material recycling for mixed plastics has to be optimized.
  Increasing the yield of recyclables would lead to a greater fraction of mixed plastics, which however were increasingly less a subject of material recycling in former years[12]. More favourable than the use for energy recovery in cement plants is a subsequent treatment and reuse of mixed plastics. Regarding greenhouse effect and cumulative energy consumption (CEC fossil) new utilization technologies should be developed and brought to a ready-for-use state.
- The separation of non-ferrous metals has to be optimized.
  Up to now, assembly units for the separation of non-ferrous metals are only installed in a few sorting facilities, apparently due to investment costs. In order to reduce the significant

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11 Oetjen-Dehne: Gewerbeabfallverordnung: ein Glücksfall für Betreiber von Sortieranlagen? Fachtagung des VKS Ost, 05.02.2003. It is demonstrated that about 30 % by weight of surveyed mixed commercial wastes contain a fine fraction less than 70 mm and are therefore not suitable for manual sorting. The yield for plastics is at best only 30 to 40 % by weight.

12 Consultic GmbH: Produktion, Verarbeitung und Verwertung von Kunststoffen in Deutschland 2009, September 2010

potential of non-ferrous metals in the substitute fuels, the separation of these metals should be optimized.

- High-grade and low-emission refuse-derived fuel has to be generated.
  The sorting residues remaining after an optimized separation of recyclables have to be converted to high-grade and low-emission substitute fuels instead of mere shredding and metal segregation as it is commonly done today. Depending on quality requirements, at least 30 % by weight of the remaining sorting residues (about 2 million tons/a) could be transformed into high-quality substitute fuels for high-grade energy recovery processes.
- The residues from waste treatment have to be utilized for energy recovery.
  Only after the separation of valuable materials and high-quality substitute fuels the residues from waste treatment are fed into incineration plants (substitute fuel grate firing plants, waste incineration plants). Screen underflow fractions from classifiers either have to be subsequently treated, used for energy recovery - combined with other sorting residues - or disposed of in other ways.[13]
- Improvement of material flow transparency.
  From a legal point of view the critically assessed use of low-priced sinks[14] for sorting residues must be prevented. In order to accomplish that the material flows of the pre-treatment plants have to be transparent and also have to be controlled transnationally.

To implement these suggestions into practise some target oriented adjustments to the Commercial Wastes Ordinance are practical.

10 Approaches for the Further Development of the Commercial Wastes Ordinance

Already in 2004 the German Advisory Council on the Environment expressed the assessment that the Commercial Wastes Ordinance is an instrument which requires elaborate enforcement hence overstraining the waste management authorities. This perception is confirmed by all participants of the conducted expert panels.
Important elements of the Commercial Wastes Ordinance are either not executed at the designated level or not executed at all.

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13 see footnote 4

Apart from easily remediable inaccuracies certain controlling elements such as on the level of business enterprises, are not executable with the available financial and personnel resources. As both the EC Framework Directive on Waste and consequentially the draft Waste Avoidance, Recycling and Disposal Act acknowledge the priority of material recycling over energy recovery, the realization of the five-step waste hierarchy for commercial municipal waste in the Commercial Wastes Ordinance is required.

This raises the question, how the ordinance can be adjusted and, at the same time, can be simplified in regard to its realization.

According to Jung[15] this ordinance seems to be dispensable due to its small applicatory relevance. He states that it would be adequate to impose an obligation on businesses and industries to separately collect those materials which are collected separately in households as well. To feed the mixed recyclable fraction into a sorting facility should be allowed but not the straight disposal of commercial waste in a waste incineration plant. Instead an internal separate collection system should be established. The practical relevance of an obligational household waste bin is henceforth diminished due to the fact that waste-fed heating and power plants receive recycling-plant-status.

A guiding instrument for recyclable materials, for example a pre-treatment obligation, is considered necessary by some associations and operators of pre-treatment plants. Consequently, the industry comprising of small and medium-sized enterprises would be enabled to consolidate and expand its innovative strength and its share of resource supply.

Following up on the suggestions made above some items of possible adjustments of the Commercial Wastes Ordinance are shown below.

10.1 Voluntary Separate Collection in Business Enterprises

Currently there is no efficient control by responsible authorities whether business enterprises are collecting recyclables (e.g. paper and cardboard, plastics, metals) separately or if they are handing over waste mixtures to pre-treatment or energy recovery plants. This is due to staff shortage and the huge number of businesses.

Therefore the choice whether generated recyclables are held separately and are disposed of with possible cost benefit or if the generated waste is disposed of as mixture should be left to

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[14] For example the transfer to composting or anaerobic digestion plants, the targeted admixture of “impurities” to biomass (wood), or the addition of environmentally critical substances (lightweight shredder fraction from automobiles) to the sorting residues.

the business enterprises. In this case the stimulation of the Commercial Wastes Ordinance concerning the composition of the mixed waste could be removed without replacement.
It rather can be committed to the waste management industry to use the financial appeals of raw material markets and to realize a win-win situation together with their customers.
Even today appealing financial benefits are used to increase the quality of waste mixtures by omitting organic fractions.

10.2 Pre-Treatment Obligation for Mixed Commercial Municipal Waste

To consolidate material recycling the immediate incineration of mixed commercial municipal waste is supposed to be prevented by eliminating the obligation to separately collect waste in business enterprises. This measure is assimilable to the approach of banning landfilling untreated waste. Instead, the mixed commercial municipal waste shall be allocated to pre-treatment facilities, for which a technical minimum standard has to be defined.
This averts the unequal price competition between pre-treatment plants and incineration plants in the same manner as it did the previous one between landfilling and incineration plants.
The survey shows that in Germany exist some facilities of a bottom-of-the-line technical standard, where the delivered waste materials are only accepted, recyclables sorted roughly by grab crane and/or by hand and the remains are provided for transportation.
In terms of the concept objectives the output fraction of those facilities has to be subject of a pre-treatment obligation and must not be fed directly into incineration plants.

10.3 Quality Rating for Material Recycling and Energy Recovery

So far the Commercial Wastes Ordinance only provides a mass-related rating which makes no difference between material recycling and energy recovery. Which recycling path is reasonable and has to be preferred in individual cases could be judged on the basis of eco-balances.[16]
This could finally lead to an assessment of generation paths and the earlier constitution of steering incentives in the process chain.
A fast and viable concept of managing material flows is developed within the study.

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15 Jung, G.: Von der Abfallwirtschaft zur Rohstoffwirtschaft – Erwartungen an den Gesetzgeber aus Landessicht, in: Recycling und Rohstoffe, Band 3, TK-Verlag, 2010

16 Faulstich, M.: Öffnet die gelbe Tonne – Diskussionsbeitrag im ForumZ, http://www.forumz.de/default.asp?Menue=49&Blog=198

This concept seizes both the objectives of the EC Framework Directive on Waste and the draft Waste Avoidance, Recycling and Disposal Act and transfers them to the output flows of the pre-treatment plants for mixed commercial municipal waste.

The concept proposes a rating that primarily supports material recycling but also considers the production of high grade substitute fuels. This particularly provides the opportunity to react on changing compositions of the input materials. The following figure shows a brief approach to change the mass-related combined ratio for recycling and energy recovery into a rating considering both quality and quantity attributes.

Figure 10-1: Rating quota for a high-grade and innocuous disposal of mixed commercial municipal waste

$$\text{rating quota} = \frac{m_{\text{material recycling}} \cdot Bf_{\text{material recycling}} + m_{\text{SBS}} \cdot Bf_{\text{SBS}} + m_{\text{EBS}} \cdot Bf_{\text{EBS}}}{m_{\text{output}}}$$

$$\text{rating quota} \geq 30$$

m = mass, Wf = weighting factor,

weighting factor $_{\text{material recycling}}$ = 100,

weighting factor $_{\text{SBS}}$ = 20,

weighting factor $_{\text{EBS}}$ = 10

Recyclable materials, high grade and low emission substitute fuels for incineration facilities with high combustion efficiency (SBS) and substitute fuels for energy recovery (EBS) are rated with different weighting factors (Wf) ranging from Wf = 100 to Wf = 10. Waste sorting residues (EWL 191212) as well as fine fractions enriched with minerals are rated with a zero weighting factor, hence these fractions are no objects in the rating.

Accordingly a rough sorting by grab crane cannot fulfil the target instead the delivered mixtures will have to be redirected to facilities with a higher technical standard.

The rating will be performed for specific treatment plants. To avoid manipulation, mono-fractions that are co-treated, such as separately collected paper and cardboard (EWL 200101) or paper and cardboard from mechanical pre-treatment (EWL 191201), will have to be deducted from the output.

The total rating quota that has to be achieved is set on a specific level to provide an incentive for material recycling and to effect the production of substitute fuels as well. A rating quota of 30 would provide these effects.

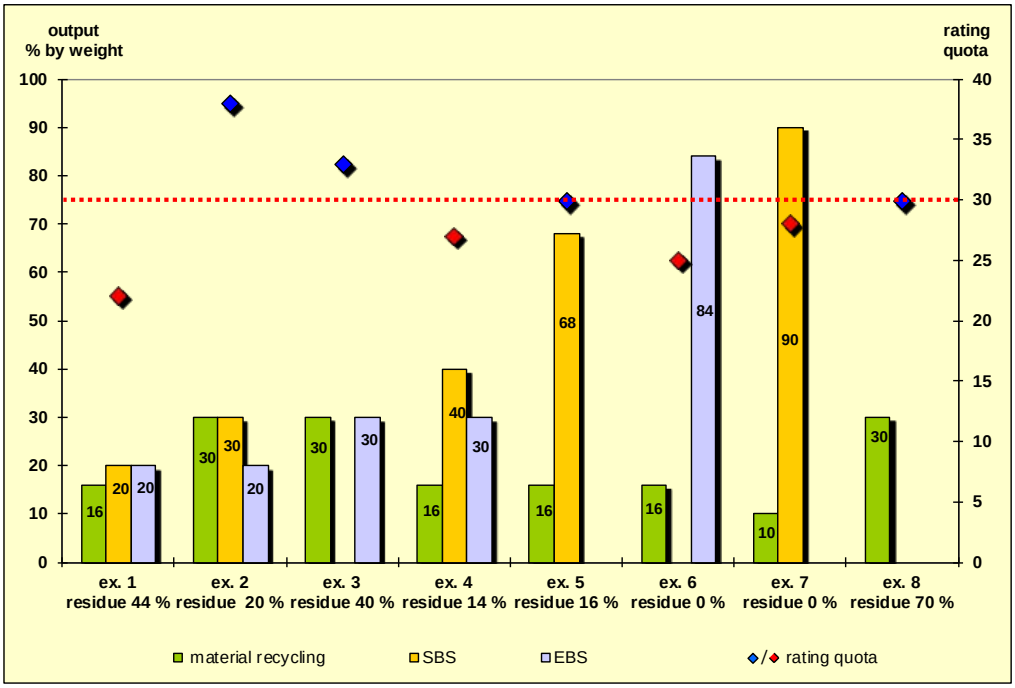
A case study shows that the current recycling quota of about 16 % by weight with a portion of 20 % by weight of EBS and SBS and a portion of 44 % by weight of sorting residues would miss the objective of achieving a rating quota of 30 (see example 1 in figure 10-2).

Even the enhancement of the SBS-yield up to 40 % by weight and the EBS-yield up to 30 % by weight would not increase the material recycling and subsequently miss the target (see example 4).

With a low portion of material recycling (16 % by weight) it is necessary to generate a high portion of substitute fuels (68 % by weight) to score a rating quota of 30 (see example 5)

A rating quota of 30 could be achieved just by concentrating on the extraction of recyclable material fractions with an output portion of 30 % by weight (see example 8).

Figure 10-2: Calculation rating examples for a high-grade and innocuous disposal of mixed commercial municipal waste (blue = quota achieved; red = quota missed)



From the perspective of the enforcement it could be problematic to discriminate between EBS and SBS on the base of material properties. An alternative way renounces distinctive material

qualities but uses the criteria for energy efficiency of the Framework Directive on Waste to determine the quality of the energy recovery.

Already in late 2008 the Privity of Waste Incineration Plants in Germany (ITAD) performed a survey[17] and evaluated the data (Electricity $_{prod}$, Electricity $_{exp}$ and Heat $_{exp}$).

Equivalent inquiries should be easy to perform for EBS incineration plants. In case that the produced substitute fuels are fed into cement plants or co-combustion plants a value for the substitution of fossil fuels could be consulted.

Eventually this procedure could compile a list of all energy recovery plants which contains data for the quality of the incineration process and classifies the plants in at least two categories, similar to the differentiation between EBS and SBS.

In case of a plant inspection the enforcement authority could verify the paths of disposition of the output just by checking the weight notes. This proposed plant ranking could also be an appeal for technical improvement.

10.4 Transparency of Material Flows

Operators of pre-treatment plants have to fullfill certain report obligations. Some federal states are already acting on the issue, e.g. the coalition agreement in North-Rhine Westphalia constitutes that authorities should be enabled to comprehend precisely the material flows of both disposal and recycling of waste.[18]

A possible revision of the Commercial Wastes Ordinance should emphasize the implementation of a federally uniform reporting system using electronic media and the traceable depiction of the management of fractions used for material recycling and energy recovery. This is already standard procedure for other materials such as packagings.

10.5 Feasible Requirements for the Enforcement Authorities

Federally uniform executable criteria may be handed to the enforcement authorities to control the Commercial Wastes Ordinance regulations such as check lists that define the technical minimum standards for mechanical pre-treatment facilities or, as discussed, a list of all energy recovery plants, to survey the quality standard of the disposal pathways.

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17 Spohn, C.: Waste-to-Energy – Steigerung der Energieeffizienz in: Umweltministerium Baden-Württemberg und VKS im VKU Landesgruppe Baden-Württemberg (Hrsg.).: Abfall als Ressource, Ludwigsburg 2009

18 Koalitionsvertrag zwischen der NRW-SPD und Bündnis 90 / Die Grünen NRW, Juli 2010

11 Outlook

Whilst processing the research project and discussing its results in the expert panels different issues were identified that may be subject to further investigation:

- Even the members of the waste management industry involved in the project indicated the necessity of **effective and reliable data on the composition of mixed commercial waste**. Those levies should not just provide composition data on the basis of material groups but should also provide data concerning the assessment of sorting or recycling capabilities.
- A possible revision of the Commercial Wastes Ordinance should enclose the **final determination of the combined rating quota value as well as the weighting factors for the different disposal pathways**, considering both ecological and economical boundary conditions.
- In addition it is necessary to define **federally uniform rating criteria for energy recovery plants** to enable the enforcement of the Commercial Wastes Ordinance regulations.
- Issues of the material recycling of commercial waste were investigated in 1993 at federal level (nation-wide commercial waste survey) and now (2010). An interval of 17 years is too long to monitor this eminent sector of waste management. It appears to be necessary to **reduce the time-lag in updating surveys in the field of mixed commercial municipal waste**.
- In case of the further development of the Commercial Wastes Ordinance **applicable requirements for the enforcement authorities** at an early stage should formulate. Those requirements will have to be assessed by all parties involved in regard to suitability for daily use and have to be revised wherever and whenever appropriate.