

Biological recoverability of waste from paper coffee capsules

Checking for biological recoverability

Coffee is an extremely popular drink. Around 42 % of Germans consume it. Their green coffee demand is around 17 kg /a. During roasting, the coffee mass reduces by around 20 % and when coffee is brewed, around 25 % of the roasted coffee dissolves.

Around 33 kg coffee residues per coffee consumer are produced each year. This number adds up to a total coffee consumption of around 1.1 mln Mg coffee residues. In 2017, 48.7 % of the coffee consumed in Germany was brewed in the form of filter coffee, 15 % from coffee machines, 10.4 % was made as instant coffee and 5.1 % using mocha pots. In addition to this are the individual portions in the form of coffee pads (12 %) and coffee capsules (8 %). The individual portions in particular are the subject of criticism, as waste coffee capsule are not to be classified as completely emptied packaging in waste

management terms. These can generally only be disposed of as residual waste. Coffee capsule waste consists of more than 90 % residual coffee. Coffee contains a very large fraction of readily biodegradable constituents, which can be easily converted into biogas. Like other biogenic waste, coffee residues contain comparatively large fractions of plant nutrients. Various manufacturers are therefore trying to produce the capsule part of the packaging from biodegradable materials. In this way, use of waste coffee capsules in biowaste treatment plants could become interesting. For the degradation processes, it would be advantageous if the capsules opened relatively quickly so that the coffee remains are mixed with other biowaste. Otherwise, the intensive degradation processes could cause acidification of the coffee in the capsule, which obstructs biodegradation. Many of the coffee capsules on the market

Yields in the recycling process chains

Only that which is actually returned to the cycle provides ecological and economic benefit

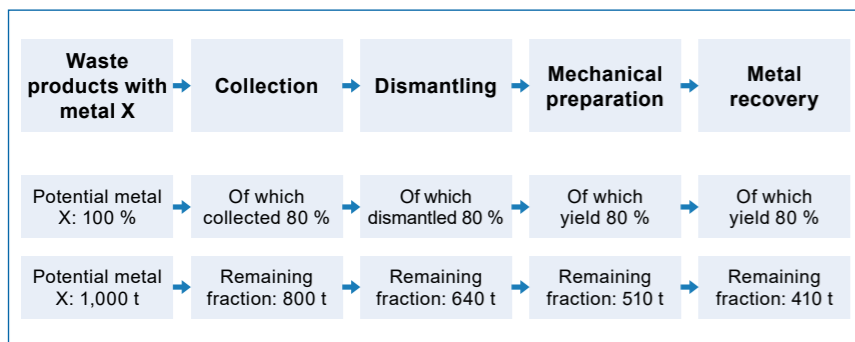
Precious metals, special metals, carbon fibres: Large potential values in waste are often enticing. They can, however, only be used if the material is not lost on the way from the production of waste to the recovery of marketable products.

In fact, in most cases, only part of the waste is collected in recoverable form. After that, further quantities are lost in each pretreatment and treatment step. In particular, if waste has to be collected

in many production sites and tend to contain only small concentrations of the target materials, these losses are mostly considerable. For example, if the metal recovery process chain contains four steps, each with 80 % yield, at the end only around 40 % of the metals are actually recovered. Only this quantity can also make a positive contribution to the ecological and economic balance of the recycling.

In the development and evaluation of recycling processes it is therefore important to examine the whole process chain, from collection through to final recovery. Only in this way is it possible to estimate the actual benefit realistically. This is also the only way to identify parameters that can make a significant contribution to increasing the yield. bifa is using material, energy and value stream analyses to examine added-value chains in existing and planned recycling processes. bifa evaluates the results economically and ecologically to identify effective parameters. Analysis experience from projects for numerous clients in all kinds of different sectors such as electrical and electronic products, carbon fibres, plastics and biowaste provide a good basis to start from.

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Losses in the recycling chain

Implementation of the Packaging Act (VerpackG)

Support for municipalities for the Coordination Agreement and analyses

Points of the new provisions of the Packaging Act (VerpackG) that are important for municipalities come into force on 01.01.2019. A large number of municipalities will be required to make agreements for the period of performance from 2019 in 2018.

Although some aspects for specific negotiations are still open, several public waste management organisations (örE) will take preparatory measures and hold discussions for the Coordination Agreements in the coming months. Open aspects are, for example, methodology issues in determining the volume fractions of PPK (paper/paperboard/cardboard) sales packagings or the as-

signment of the joint representative of the "Dual Systems" as the negotiation partner for the respective örE in its collection area. Especially in the case of the latter, it is hoped that the representatives of the Dual Systems will come to an agreement quickly. Central municipal organisations and negotiators basically recommend that a comprehensive provision be provided and that the Coordination Agreement be negotiated and concluded as a whole. An orientation aid for the Coordination Agreement is currently being drawn up and is planned for the end of April/beginning of May. The principle of consensus and coordination principle is to be >>

Dear Readers, Dear Partners and Customers of bifa,

Do you know someone who is involved in recycling management and has never been annoyed by what people say and write about it? I can hardly imagine it, since I meet so many who vent their anger, at least in private. Occasionally it can be exasperating. Psychology tells us it is good for people to off-load their anger. Those of you who are somewhat older may remember the cartoon figure in HB tobacco advertising, who used to "blow his top" in anger. We offer you our very own "frustration dump" at the IFAT. Come and discuss with us the innumerable, constantly changing regulations, about scientific statements

issued from an ivory tower, about noble political objectives that nobody is sure how they are to be achieved, about people who demand from others what they don't want to fulfil themselves, indeed, about the at times appalling discrepancy between claim and reality, about the worries and hardships in your projects. You can probably think of plenty of other things. Vent your anger. Off-load your frustration. You will see: bifa helps.

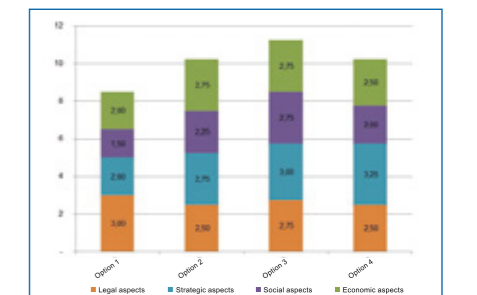
W. Rommel
Yours Wolfgang Rommel

Visit us at the IFAT in Munich, from 14 - 18 May 2018, Hall A4, Stand 147/246.



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>> applied in the Coordination Agreement, as was the case to date. As an exception from this, in a framework requirement for the organisation of lightweight packaging (LVP) collection from private households, the öRE can define the type of collection system as a pick-up or bring system or as a combination of both, and can define the type and size of the collection containers and the frequency and period of the container emptying. The framework requirement can be issued as an administrative decision or can be fixed as part of the Coordination Agreement. Early consultation should take place for the LVP collection system design, so that the political decision-making process can be taken into consideration. Whether the collection is to take place in the yellow bin, yellow sacks or in recoverables banks or the recycling depot depends on many basic conditions and is often an emotional topic for citizens and politicians. It can therefore be useful to involve citizens through questionnaires on the future collection

of LVP. At the same time, questions can be included on the attitude to the introduction of a recyclables bin, where in particular the economic feasibility of the introduction is also to be checked. Arrangement of the joint PPK use is also part of the coordination and must be negotiated with the joint representative of the systems. Legal charges principles are to be applied to determine the appropriate remuneration. The costs component of the PPK sales packagings must be taken into account as a mass or volume component. After the decision for nationwide determination of the volume components by independent experts failed, an independent report for the respective collection area can be useful for the negotiations. Furthermore, the incidental charges for PR work and collection bank site cleaning must also be included in the Coordination Agreement. bifa offers support for all the aspects mentioned, which are required in a Coordination Agreement: From the analysis of the status quo to advice on the drafting and detailing of the



agreement through to calculation of the joint use charges. Preparatory activities such as a survey of citizens on the system arrangements and providing advice and support for the political decision-making process are all standard services. Initial expert determinations of mass and volume components of the PPK sales packagings of different collection systems according to the largely agreed methodology have already been performed. We will be pleased to advise you and perform appropriate analyses.

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“Make or Buy” study for the waste management of Landkreis Garmisch-Partenkirchen

Checking self-fulfilment of the collection services from a legal and economic point of view

Restructuring processes and investment decisions are decisions that are often lengthy and involve appropriate analyses and considerations in advance. Landkreis Garmisch-Partenkirchen decided to deal with the advance analyses and considerations together with bifa Umweltinstitut. In addition to possible reorganisation of the waste management (currently an organisational unit of the municipality (“Regiebetrieb”)) in

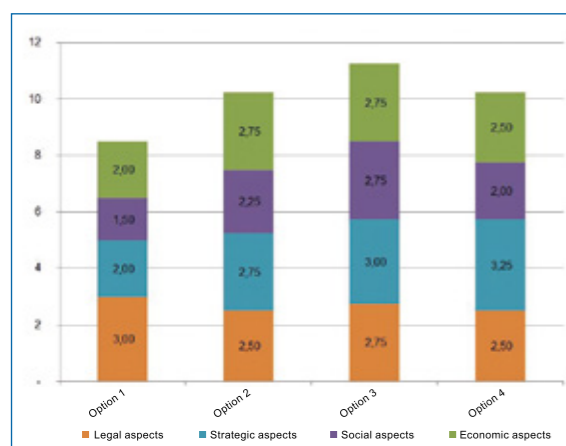
a municipal enterprise, the implementation of individual operative tasks as in-house performance should also be examined as a “Make or Buy” consideration. The focus is on profitability and sustainability criteria.

The status quo of Landkreis Garmisch-Partenkirchen, i.e. the “Regiebetrieb” organisational form was compared with diverse organisational and legal forms for a “municipal enterprise”. In particular, the “public-law institution (“Anstalt des öffentlichen Rechts”) and “owner-operated municipal enterprise” (“Eigenbetrieb”) legal forms are options here. In addition, the main advantages and disadvantages of performance in-house or outsourcing the waste management services were discussed. A multi-criteria analysis

was performed in a matrix structure to compare the possible organisational forms. The criteria were discussed and evaluated with the Landkreis. The aggregation of the individual evaluations to form an overall rating was carried out with the help of weighting factors, which were individually defined according to the concerns of Landkreis Garmisch-Partenkirchen. As a result, at the end of the evaluation, the favoured organisation form for the defined tasks is named.

The “Make or Buy” consideration is based on extensive data collection and evaluation. From the economic side, the status quo is compared with in-house performance of the collection service. The cost of purchasing waste collection vehicles and setting up and operating a depot were calculated and compared to the current costs of the collection services.

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Waste legislation classification of bottom ash from household waste incineration

Differentiating analysis allows conclusions to be formed regarding chemical bonding forms

Slag from household waste incineration (“HMV bottom ash”) is the most important residual material of waste incineration, accounting for around 20 % of the waste quantity. In 2016, around 610,000 t bottom ash was produced in Bavarian waste incineration plants; most of this ash was recovered (recycled).

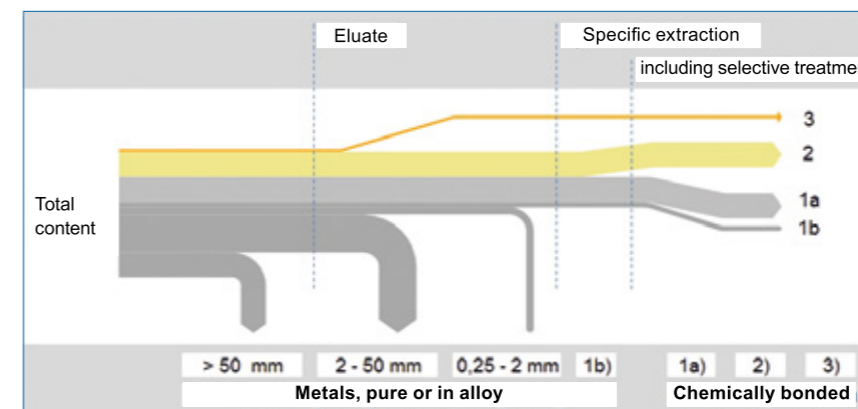
HMV bottom ash contains metals, which on the one hand have recoverable potential and on the other hand, heavy metals are a risk to the environment. Depending on their hazardous substances content, HMV bottom ash can be “non-hazardous” (waste code

number (EWC) 19 01 12) or they must be classified as hazardous waste (EWC 19 01 11*). In general, the risk-relevant property HP 14 proves to be critical for the classification: “hazardous to the environment”, which from July 2018 must be evaluated according to the new provisions of the Waste Framework Directive. The total content of the copper, zinc and lead elements at around 1 % (in total) is so high that HMV bottom ash must be classified as hazardous waste, if the classification is based on the total content and the assumption of high toxicity. This would probably have serious effects on the recovery options.

Large fractions of copper zinc and lead exist in HMV bottom ash in metallically pure form or as alloys. But compact metals are not to be considered dangerous (under waste legislation), so that only correct determination of these fractions is important for the classification. Further differentiation is possible by type of chemical bonding: For example, copper and zinc in mixed oxides with spinel structure and in several silicates are so tightly bonded that they are not released into the environment and therefore do not have an ecotoxic effect.

bifa has developed a sampling and analysis schema, which enables differentiation between substance groups with different ecotoxicity for correct determination of the critical heavy metal fractions present as metals and to differentiate between bonding forms. Therefore, differentiated consideration of the bonding forms is possible and provides the basis for more detailed classification.

The bottom ash examined by bifa to date using the new analysis schema can be classified as “non-hazardous waste”.



3: water soluble, 2: soluble in weak acid or with strong complexant agents, 1a: not soluble in weak acid, 1b: pure metal or alloy, < 0.25 mm

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Multi-year temporary storage as a part of the solution?

bifa examines ways to recycle waste containing precious and special metals

Methods for recovering metals such as neodymium or indium have already been developed in numerous research projects. A fundamental challenge in their large-scale implementation is the lack of investment security for currently still small quantities of available waste. Especially for waste with growing quantities, such as NdFeB magnets, temporary storage for several years could help the critical mass for plant investment to be reached and to bridge the time until the recycling plant is available.

However, the temporary storage of waste earmarked for recovery for longer than three years is not permitted at present.

In the “Controlling waste streams containing precious and special metals intelligently: consolidation, temporary storage, degree of recovery” project on behalf of the Federal Environmental Agency (Umweltbundesamt), bifa together with Augsburg University of Applied Sciences and the lawyers avocado Rechtsanwälte, is examining, among other things, how such storage facilities would have to be designed. What requirements must be set for waste to be stored? What changes to legislation would be required to enable the temporary storage of waste containing special metals for more than three years. Who could be the operators? How can

the costs of setting up and operating the storage be funded? Who funds the cost of the dismantling firms, which dismantle the magnets from motors? What challenges does quality assurance face? The time factor is also important, because the maximum volume of the storage facility will only be fully utilised for a short time. Answers to these and many other questions will be available on 05 October 2018, at the closing event of the project to be held in Berlin.

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