

Sustainable design of packaging

Recyclability and life cycle assessment

§ 21 VerpackG (German Packaging Act) addresses the recyclable design of packaging. This regulation motivates many producers and distributors of packaging to examine the environmentally friendly design of their packaging in a new form, or perhaps for the first time.



The German so-called "dual system" is intended to create incentives to promote the use of materials or material combinations, which can be utilised with the highest possible percentage as high-quality materials, taking into account the practical aspects of sorting and recovery. bifa basically welcomes the intention of § 21 VerpackG, which we see as an important crystallisation point for promoting the urgently needed dialogue between packaging designers and packaging recyclers. However, we are also convinced that the assessment of the ecological performance of packaging reduced merely to the single factor recyclability falls short of what is really needed! Other important aspects of sustainable packaging design, such as reducing the use of packaging material or the fraction of secondary materials in the packaging are ignored. The far greater need is to examine all relevant environmental

impacts of a packaging and to optimise them as interrelated issues. This avoids isolated improvements in packaging properties leading to a trade-off in other aspects. Eco-design considerations are therefore coupled with the concept of complete life cycle analyses as part of life cycle assessments. The integrated, life cycle-based assessment of products and systems is one of bifa's areas of work. We have been producing life cycle assessments for all kinds of different packaging systems for over 20 years. And a complex, currently non-recyclable, multilayer packaging can naturally help to avoid food waste by improving product protection or by extending the shelf life, and thus make a substantial contribution to improving the overall life cycle assessment.

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bifa examined the delivered residual waste for the AVA

Analysis of physical-chemical parameters

The municipal company AVA Abfallverwertung Augsburg engaged bifa to perform a residual waste analysis, in order to determine the main parameters of the delivered residual waste.



The calorific value, the water content and the chlorine content of the waste in particular, are significant for the life time of the incineration plant. Equally, the contaminant load of the material flows also plays an important role in the process. As literature values only were available to date for the characterisation of the residual waste quantity delivered, bifa was engaged to examine the delivered residual waste streams. To this end, in 2019, bifa examined a total of 18 chemical and 3 physical parameters of the delivered residual waste. The sampling took place during a period of high precipitation in winter as well as during a low-precipitation summer campaign. In each investiga-

tion period, 13 areas were sampled at vehicle level, corresponding to 425 Mg residual waste. The districts from which the waste comes were selected and analysed in a differentiated way, according to their settlement structure. The sample preparation took place in a multi-stage process through to double

and triple determination of the selected parameters in the laboratory. Some values were found to deviate substantially from the previously assumed literature values.

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Efficient use of foundry dust

Research project for increased resource efficiency

The use of resources in the metal industry is to be improved even further through efficient use of foundry dust.

The kick-off event of the ForCYCLE II project group took place on 06 November 2019, in the Max-Joseph-Saal of the Residenz palace in Munich. The project group is funded by the Bavarian State Ministry of the Environment and Consumer Protection and stands for more resource efficiency in the Bavarian economy, in particular for SMEs and trades. Within this framework, a total of eleven projects with an average project period of three years have been worked on since mid-2019. The objective is to develop innovative technologies and processes for recycling, as well as the efficient use of resources.

The "Securing and maintaining raw materials through the preparation and utilisation of foundry dust – Bavarian Consortium for Foundry Dust Metal Recovery" subproject is being worked on by the University of Augsburg together with bifa. Several Bavarian foundries are involved in the project: Franken Guss GmbH & Co. KG, Giesserei Heunisch GmbH, Kemptner Eisgießerei Adam Hönig AG and Trompeter Guss GmbH Co. KG. In addition, the SMEs AKW Apparate+Verfahren GmbH and GPS SIC KeBl GmbH u. Co. KG are involved in the project. As in other branches of industry, more environmentally friendly production is an important element of the corporate strategy of Bavarian foundries. The recoverables contained in the dust are currently lost in landfill. >>

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Dear Readers, Dear Partners and Customers of bifa,

Just before I started to write this editorial, the European Parliament declared the "Climate emergency for Europe". This is a political signal. But, above all, we need considered and determined action. Technical innovations must make a significant contribution, even if the change in the economy and society must extend far further. bifa has been working on new climate and environmentally friendly technologies since it was founded. For many years, we have also been working on the question of how society and the economy can adapt to the effects of

climate change. My thanks to all employees for their tireless efforts in this as well as in our other fields of work. I thank you, dear readers, for the many interesting tasks we have been able to work on for you. We look forward to continuing this in the new year. I wish you a peaceful Christmas period and all the best for the new year!

W. Rommel

Yours, Wolfgang Rommel

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Photos: page 1 (below) and page 4 (above): pixabay.com; page 2 (above): Giesserei Heunisch GmbH; all further: bifa Umweltinstitut GmbH

>> As costs are also increasing continuously, treatment and subsequent utilisation of the dust makes sense, not only from an ecological point of view, but also economically. The properties of the dust involved are decisive for its potential utilisation. These not only include the chemical composition (content of main components and trace elements), but also the physical properties (bulk density and particle size). Despite higher fractions of valuable materials, there are currently no or insufficient material utilisation options for many of the types of dust separated out in the exhaust gas cleaning in foundries. In addition, the particle size of the filter dust is mainly within a range between 0.063 mm and < 0.250 mm. This makes the handling and treatment significantly more difficult.



Furthermore in the project, potential parameters for reducing the quantities of waste are to be considered. In addition to appropriate collection and supply logistics, adapted treatment and extraction processes must be available. As this has only been the case to a minor extent to date, further development efforts are also required here. The objective of the project is, to work

with the foundries to develop practical ways which enable the treatment and potential reuse of the foundry dust produced. In this way, economic alternatives to disposal are to be developed, and the recoverables contained in the residual materials, for example, tin and iron, are to be made available for reuse.

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Energy use plan for the Town of Fürth

bifa determines potential for renewable energy in the urban area

An energy use plan is a municipal planning instrument for municipalities, towns and cities, to record the status, the potential and the possible actions regarding energy.

On behalf of Energieagentur Nordbayern GmbH, bifa produced a detailed, geo-referenced heat register for the Town of Fürth, and determined the potential for use of renewable energy. The domestic heating requirement was shown for all residential buildings in the town, according to the age and type of building. In particular, the 2,112 listed buildings within the area of the town were considered separately. The

consumptions of all public properties and the buildings of the municipal housing association were also included in the mapping. Available industrial waste heat sources were identified as the basis for local heating concepts. bifa determined the potential for renewable energy in the urban area – in heat generation by means of solar-thermal energy, biomass / biogas and geothermal energy, in power generation by means of photovoltaic systems mounted on roofs and in open spaces, biogas, hydropower and wind. The greatest development potential for electricity lies in the erection of further PV systems on the roofs of residential

buildings and in the construction of PV systems in open spaces along motorways and railway lines. The roof areas were analysed on the basis of 3D building models (LoD2). The potential was analysed for all suitable buildings, based on the suitability of the existing roof shapes and areas, and taking into consideration existing PV systems. The open space potential along motorways and railway lines was determined and mapped for each land plot. The greatest development potential for heat lies in the use of solar energy by means of solar-thermal energy systems mounted on house roofs to heat domestic water and for heating support. In addition, near-surface geothermal energy is available for development in the whole urban area. It can be used as an almost inexhaustible source for generating useful heat by means of heat pumps. On the other hand, the development of deep geothermal energy for heat supply requires intensive investment due to the drilling depths required, and biogas is already highly used in the current actual status.

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Green City of the Future

Citizen workshops in Messestadt Riem

In November, Riem's citizens discussed the "now" and the "future" of their housing district in two workshops moderated by bifa. Both events were well-attended and were held locally in the "Green Workshop" in the "trade fair town Riem" (Messestadt Riem), a new district of Munich developed on the site of the former airport. The citizen workshops were held as part of the collaborative "Green city of the future – climate-resilient districts in a growing city" project, funded by the Federal Ministry of Research.

The involvement of citizens is a central element of this project, in which bifa is participating as a subcontractor of the Ludwig-Maximilians University of Munich. After numerous surveys of passers-by and qualitative interviews held locally, two citizen workshops were organised in November, which were met with animated interest of the residents. In the first event, a multi-generational discussion was held on how people found the quality of life and occupancy of the district and

what the residents would like to change. In the second workshop, with the question "How will we live in the trade fair town tomorrow?", the focus was on the development of future visions for the trade fair town Riem, against the background of the two trends: "population increase in Munich" and "climate change". In both workshops the existing infrastructure, the generous park and the Riemer Lake, as well as the multicultural diversity of the district were highlighted positively. It also became clear, how much the residents identify with the district and thus how high their willingness is to engage in its further development. For the future, the participants wanted the existing open space quality to be retained through moderate re-densification, planting and design of the spaces in the district and through the reduction of car traffic. The trade fair town could also serve other as a successful example for other districts of



living in the diversity and community of young and old, cultures and religions.

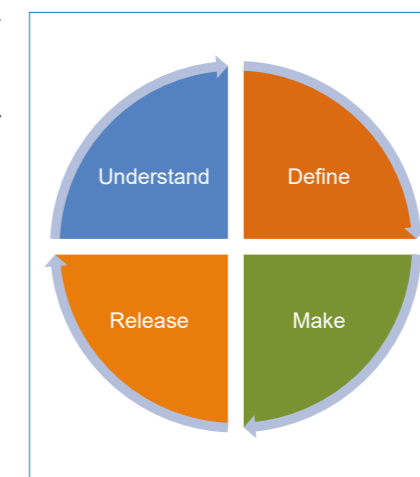
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Green Manufacturing

Project start at the Fraunhofer Institute for Solar Energy Systems, ISE in Freiburg

The green manufacturing project started on 23/10/2019 with the kick-off event at the coordinator, the Fraunhofer Institute for Solar Energy Systems, ISE in Freiburg.

In the project funded by the BMWi, experts of leading research institutes and industrial companies worked over a period of three years on the development and evaluation of ecologically and economically efficient PV production methods. To this end, the eco-efficiency analysis and circular economy concepts were applied using the example of the production of c-Si and thin film PV modules and the entire value-added chains were examined. In addition to continuous yield maximisation, integrated factories offer the advantage of collecting not entirely avoidable waste,



Circular Economy

such as by-products, rejects, media, used consumables, etc., homogeneously under clearly defined conditions and, after quality control, to optimise their

further treatment route. The standards for the life cycle analysis of PV products will be subjected to a large-scale test and datasets will be generated for future production and technology concepts, which can form the basis for future design of the regulatory framework of a sustainable PV product policy in the EU (ecodesign, ecolabelling). In the wastewater treatment and resource recovery from liquid media, comprehensive experimental investigations are to be carried out in the laboratory for value-adding recovery.

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