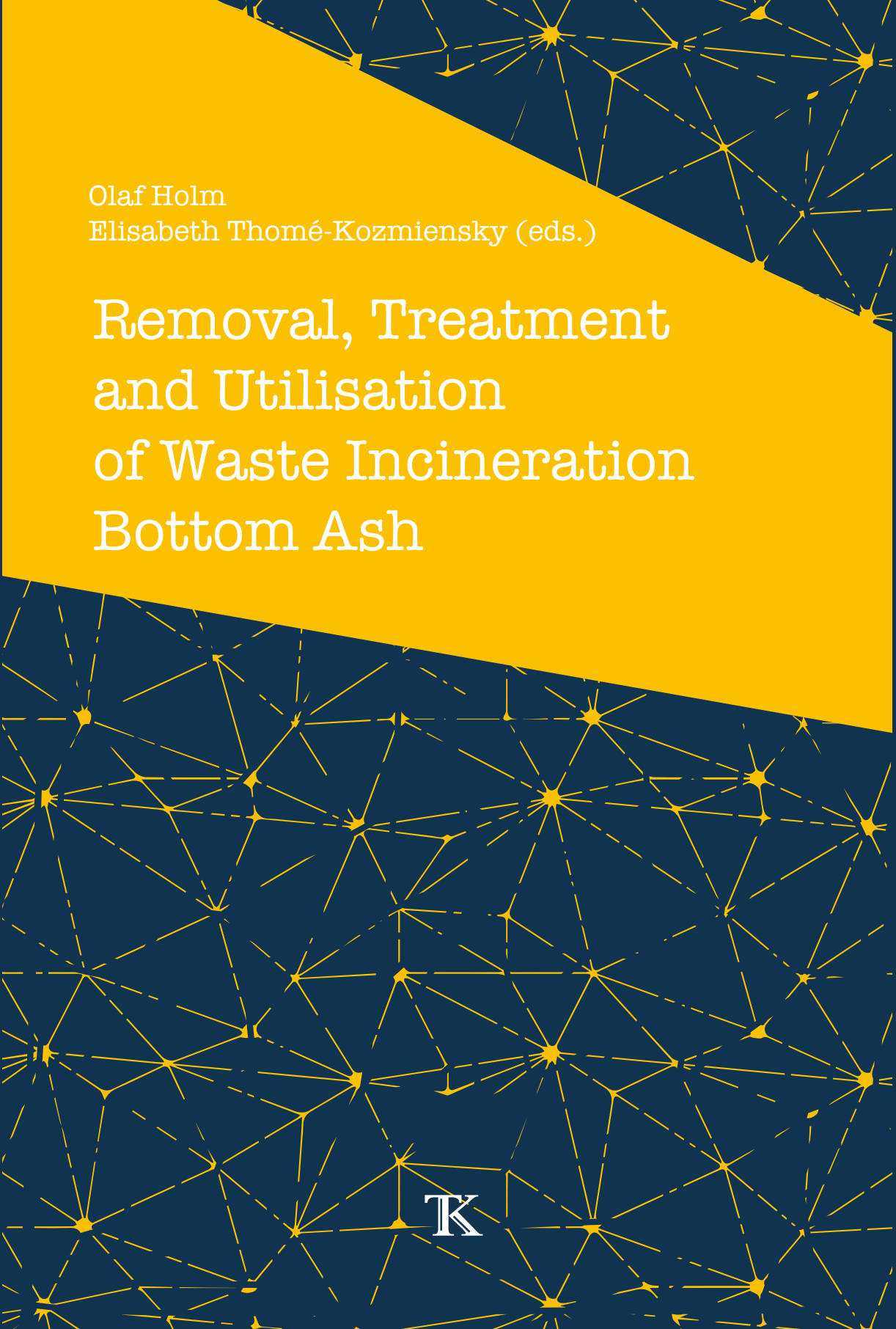
Olaf Holm
Elisabeth Thomé-Kozmiensky (eds.)

Removal, Treatment and Utilisation of Waste Incineration Bottom Ash



Olaf Holm • Elisabeth Thomé-Kozmiensky

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Preface

In the industrial sector for treatment of incineration bottom ash (IBA) from municipal solid waste (MSW) there is a familiar phrase stating: There is no treatment plant like the other!

One would say this is due to the fact, the branch is in transition facing the political and social tasks that go along with the aim of building an almost circular economy. On the other hand, the regional frameworks for the operators vary in some essential points. For instance, the costs for landfilling and the transport distances are highly relevant for a reliable economic concept of a treatment plant. However, in my opinion the recent and intense transitions in the branch are not promoted by technical innovations but vice versa.

During my own (scientific) workings I was faced by the question of how a totally new treatment plant for IBA from MSW should be planned or look like, taking the highly topical developments into account. I used to avoid a clear statement about this but rather ask in return about the frameworks, which are in most cases highly complicated. Probably, it is more a question of about to take fundamental decisions and pursue the chosen concept well and truly.

One thing is clear however, as IBA from MSW holds an enormous potential to substitute natural raw materials, it is unquestionable that further developments are of public interest and should be promoted much more by the authorities.

The expert forum on the Removal, Treatment and Utilisation of Waste Incineration Bottom Ash was established to bring people with different backgrounds and from regions with an unequal development status together to have a sophisticated and lively discussion. This book was published to document the scientific/technical speeches of the forum and gives an overview on the different approaches and the practical experiences in implementing those.

A great debt of gratitude is owed to all experts either for their technical contributions to the book and/or for their willingness to participate in the expert forum. I would also like to thank the Martin GmbH for adding an advertisement to this book. Sincere thanks are due to all individuals from the TK Verlag GmbH, who either had promoted the idea of this project and/or had helped selflessly to perform it.

September 2018

Dr.-Ing. Olaf Holm

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Resource Recovery from Incineration Bottom Ash: Basics, Concepts, Principles

Michal Šyc, Franz-Georg Simon, Laura Biganzoli, Mario Grosso and Jiří Hykš

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Waste-to-energy (WtE) is one of the leading technologies for municipal solid waste (MSW) treatment in Europe. According to Eurostat data, in 2015, 27 % of MSW was utilized in WtE plants, which represents more than 80 million tons per year. Therefore, the European annual production of incineration bottom ash (IBA) is about 20 million tons, as it is about 25 wt% of input MSW [5]. In the European List of Waste, IBA is listed as *mirror entry* (i.e. waste materials which should be classified as either non-hazardous or hazardous, depending on its hazardous properties and/or content of hazardous substances) under codes 19 01 11 and 19 01 12.

Recent trends indicate that WtE allows, apart from utilization of the energy content of waste, also the recovery of various valuable components. Hence, WtE can be included in the key technologies that can put the circular economy concept into practice. Secondary raw materials in the case of WtE are solid residues, especially IBA, as it is a secondary source, particularly of ferrous metals (Fe) and non-ferrous metals (NF) and glass. Moreover, the residual mineral fraction can be used for various applications in the construction industry, i.e. as aggregates substitute for bound or unbound applications, in cement manufacturing or, as indicated by recent research, also in more sophisticated applications, e.g. for ceramics production. Recovery of these metals can also cause huge greenhouse gas savings. Alone in Europe, metal recovery from IBA reduces greenhouse gas emissions by approximately 3.2 million tonnes of CO_2 equivalent [2].

A significant development in technologies for metals or glass recovery during the last decade can be noted. These technologies have become common part of WtE plants all over the Europe.

1. Incineration bottom ash recovery potential

Incineration bottom ash production in Europe is about 20 million tons per year. IBA is a very heterogeneous material. Its composition is determined mainly by the composition of incinerated waste that could be very variable depending on national consumer's habits and the performance of separate collection system. The overall IBA material composition is shown in Table 1.

	Range wt%	Particle size distribution
iron scrap (Fe)	6 – 13	approx. 80 % in particles > 10 mm
non-ferrous metals (NF)	1.3 – 4.0	spread in all size fractions
glass shards	9 – 26	majority in fraction 4-16 mm
unburnt organic matter	1 – 5	
mineral fraction	50 – 70	

Table 1:

IBA material composition

Sources:

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The recovery efficiency of various techniques is determined strongly by the particle size of recovered material, hence, the particle size distribution of metal particles together with their total content in IBA and liberation are essential knowledge for recovery potential evaluation.