

Preface

The author of this book has been motivated in his writing by long-term systematic efforts to combine results of research and development with real applications. Waste-to-energy approach is a topical issue and therefore deserves to be discussed. Until the economic situation of humankind reaches satisfactory levels, people are determined to produce various types of waste, and this waste has to be processed somehow. For that reason, waste may be considered as a renewable source of energy and waste-to-energy (WtE) as an eligible way of processing.

There are many established methods of waste processing and their hierarchy which differ from country to country. If thermal processing (waste-to-energy) is considered an eligible way of processing, environmental protection must be our priority. Since the environmental limits are more and more stringent, the technology has to be designed accordingly. Take, for example, dramatic changes in attitudes towards the environment in socialist countries when the political regime was overthrown; or the current situation in developing countries. Nowadays, it is vital to equip WtE technologies with an up-to-date flue gas (off-gas in the case of incineration) cleaning system. Therefore tailor-made technologies should be involved.

Real progress in the said area necessitates a convenient combination of a sophisticated approach, experience and know-how. This approach enables to introduce all the latest novel technologies based on continuous research and development. This complies with the SpringerBriefs specifications presenting concise summaries of cutting-edge research and practical applications in the said field.

The vision behind this book is to cover WtE from a primary idea to final products based on recent results of strategic planning, selection and design of up-to-date technologies and equipment. One of the aims is also to debunk the common fallacies about minimum economic capacity of incinerators, to suppress a conservative approach, to show the progress made by small and medium enterprises, benefits of design flexibility, etc. All of this may sound a little too provocative; however, the motivation is fuelled by real life as well as by excellent work and efforts of many colleagues and specialists both from academia and industry. These are the people that helped write this book. Of course, the WtE

approach described in the book has to be considered as an open system which will be continuously extended.

The philosophy behind the WtE approach called for new terminology related to the basic steps in design. NERUDA system represents an original approach for investment planning and reliability of WtE projects on various levels, REGION system takes into account the fact that a potential WtE unit is an integral part of a region/microregion, and EVELINE system means that the selected technology must be tailor-made. All these new terms will be explained in detail later in the book.

The current need for maximum utilization of energy from wastes, biomass and fuel mixes along with related environmental protection (flue gas cleaning) initiates applied research in the area of waste-to-energy (WtE). Users of the research results and technological discoveries include operators of waste incinerators, heating plants, power plants, industrial plants producing large amounts of pollutants, municipalities and also small decentralized operations. The main goal and motivation is to offer research and development results which consequently provide remarkable competences in terms of design and implementation of units for energy recovery from wastes and other secondary energy sources based on methodical research, revamping of existing technologies and feedback from actual applications. The aim of the up-to-date WtE approach is to consolidate experience, “know-how”, up-to-date computational approaches and experimental procedures, along with technical-economic analysis and its relationship to market analysis.

The principal advantage of implementation of research results is the ability of the WtE to apply a complex approach “from an idea to implementation” that respects needs of the market, as established via a thorough market analysis. As an example, one might mention the design of an advanced unit for combined heat and power production from a mixture of municipal solid waste and contaminated biomass. In the course of designing of this unit, a whole range of research results is utilized; such as up-to-date computational methods for investment planning, methods based on CFD (Computational Fluid Dynamics) for simulation of combustion, flue gas cleaning system with a new filtration material, etc. Research activities of the WtE will greatly contribute to the increase in application and implementation potential in the said area.

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