



From Landfill Gas to Energy Technologies and Challenges

Vasudevan Rajaram
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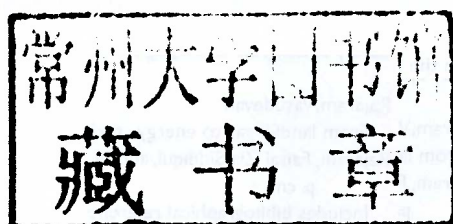
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From Landfill Gas to Energy – Technologies and Challenges

Preface

Landfill Gas (LFG) recovery is a key element of an integrated solid waste management. The use of landfills for solid waste disposal will continue to be the predominant method worldwide. The U.S. EPA tracks approximately 2,400 landfills that collectively contain more than 7 billion tons of waste. Even if all of these landfills are closed tomorrow, the waste currently in the ground would still be generating LFG. This LFG can be used as a source of energy where technically and economically feasible to do so. While significant efforts have been made to formulate viable LFG to energy projects, there is still more energy that can be tapped from the existing landfills. EPA's database shows that there are currently 515 landfills for new LFG to energy projects. These landfills have a total LFG generation potential of 1,170 MW.

This book is an attempt to share the information on how LFG to energy technologies worldwide can be implemented to extract the energy locked up in landfills. The book contributes to the consolidation of knowledge in the field of LFG, so that current state-of-the-art can be accessed easily. The book is presented in a concise, simple and integrated manner. The contents of this book originated mainly from the background research material and resources collected and developed for my PhD dissertation. It also follows from a timely suggestion by Dr Raj Rajaram, and my dissertation supervisor, Prof Mohd Emran Khan, that the information could be useful in a book form.

It is our professional hope that the technologies for the management of LFG will be understood and embraced by the reader. This book has been organized into the following chapters:

- Chapter 1** provides an overview of the status and prospects of LFG worldwide including the technical aspects and benefits of LFG recovery.
- Chapter 2** focuses on the planning and design approach of LFG to energy recovery system with focus on pump test methodology.
- Chapter 3** summarizes various LFG modeling approaches used worldwide and deals with the uncertainties in LFG model predictions, validation and customization of LFG models. Refinement of LFG models can be the subject of future efforts.
- Chapter 4** enlightens the reader on approaches to LFG monitoring and evaluation of economic feasibility of LFG to energy projects.
- Chapter 5** describes the various LFG flaring, treatment and upgrading technologies and provides a comparison of technologies in terms of their impacts on the environment and ease of operation.

- Chapter 6** outlines the emerging LFG utilization technologies and compares their advantages and disadvantages in terms of their applicability; however, it does not recommend a particular technology.
- Chapter 7** covers the remediation of landfill sites, including remining the landfill to recover the land and utilize the waste. Operation and maintenance of key components of the LFG recovery system is also described.
- Chapter 8** contains selected case studies from around the globe as examples to demonstrate the viability of LFG to energy projects worldwide.
- Chapter 9** discusses the barriers to the utilization of LFG as a source of energy and proposes an action plan for LFG management including a framework for implementation of the action plan.

The final section includes nine appendices that will be useful to the reader.

Faisal Zia Siddiqui

Acknowledgement

We would like to dedicate this book to our parents who instilled in us the curiosity to learn and encouraged us to share our knowledge with others. We would like to acknowledge the complete support of our wives and children who encouraged us and allowed us to spend many weekends getting the book completed.

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