



2021

Report of Waste to Energy in Selected Regions of the World



**International Consultant Committee
of Waste to Energy**



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Foreword

The municipalities over the world have become seized by the volume of solid waste that must be properly processed to assure the human health and environmental safety. Developed countries have already established mature waste management system. In recent years, China has also accumulated a wealth of related experiences and advanced technologies in waste to energy industry. However, most developing countries are still facing enormous challenges in handling with municipal solid waste. It is important to understand comprehensively the present situations of municipal solid waste management and treatment in different countries. Furthermore, sharing successful experiences of waste to energy is valuable to solve the problems of municipal solid waste disposal in developing countries.

This publication entitled '*2021 Report of Waste to Energy in Selected Regions of the World*' essentially addresses the country-specific status reports of eight regions from four continents, including the national solid waste status, the current situation and challenges involved in technologies and policies. This report is supported strongly by the International Consultant Committee of Waste to Energy (ICCWtE) and the International Training Program of Waste to Energy (ITPWtE). ICCWtE is an international and non-profit committee that consists of experienced professors, researchers, and engineers in the field of waste to energy from both developed and developing countries, who are willing to voluntarily and unrewardingly offer consultancy to developing countries to advance the application of waste to energy for a sustainable MSW management, based on their expertise and experience. ITPWtE, sponsored by Department of International Cooperation, Ministry of Science and Technology of China, intends to share the advanced technology and practical experience concerning waste to energy of China, helps the participants including technicians, researchers, and officers from developing countries to improve their academic and engineering skills and promote international communication and cooperation. Four training workshops of ITPWtE have been successfully conducted since 2016, involving over 90 participants from 19 developing countries.

This report gives an overview of waste management in selected regions of the world, with main focus on WtE technologies and their applications. We hope this report can help those involved in waste management better understand and promote waste to energy application in developing countries in the future.

Due to the time constraint, inadequacies inevitably exist in this report, your valuable comments and suggestions are therefore appreciated to further improve this report.

On behalf of the International Consultant Committee of Waste to Energy:

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Abstract

Municipal solid waste (MSW) treatment is a global challenge as the generation of MSW reached up to 1.9 billion tons in 2020 and is estimated to increase by 70% to 3.4 billion tons until 2050 unless urgent action is taken. Amongst various methods adopted to tackle this problem, waste to energy (WtE) is applied as one of the most popular treatment technologies in developed countries. WtE technology could also be an effective way for developing countries to decrease landfilling quickly, and such a way to reduce drastically both littering and greenhouse gas emissions. Simultaneously, it can contribute to the sufficiency of energy generation. Moreover, WtE can be developed together with the material recovery of waste to achieve sustainable waste management. In developed countries like the European Union (EU) countries and Japan, as well as in China, where WtE has been applied over 30 years, a wealth of related experiences and advanced technologies have been accumulated. Nevertheless, in most of other developing countries WtE application is still very limited. The various situations in different countries make the global technical communication and cooperation essential for a better waste management especially in developing countries.

This report introduces the generation and disposal of MSW, WtE technologies and their applications, regulations and standards in MSW management in selected regions of the world, covering the situations in China, the EU, Malaysia, Indonesia, Thailand, Pakistan, Nigeria and Brazil, which vary significantly in different countries or regions. For example, in China 99.2% of MSW was harmlessly treated in 2019, among which 50.7% was treated by incineration; in the EU WtE is less popular than recycling. In other Asian countries such as Malaysia, Indonesia, Thailand and Pakistan the main treatment method is still landfill. However, increasing attention is paid on WtE and the development and application of WtE is already ongoing in these countries. In African and South American countries such as Nigeria and Brazil waste management is not well-coordinated and still has a long way to go.

This report is a result of the hard works and contributions made by the members and assistants of International Consultant Committee of Waste to Energy (ICCWtE, www.iccwte.org). Since this report covers a worldwide range of aspects and countries in the field of WtE as the result of the joint effort of experts from four continents, the ICCWtE sincerely hopes this report could be an important reference to the application of WtE in developing countries.

Key words: Municipal Solid Waste, Waste Management, Waste to Energy, Selected Regions, Developing Countries

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