Chapter 11
Designing Eco-Friendly Tourist Facilities With Waste-to-Energy Systems

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ABSTRACT

This chapter explores integrating Waste-to-Energy (WTE) systems into eco-friendly tourist facility designs, focusing on technologies such as incineration, anaerobic digestion, gasification, and pyrolysis. It addresses site selection, system integration, and economic feasibility, illustrated through case studies of resorts, lodges, and hotels utilizing various WTE methods. The chapter discusses technical, regulatory, and social challenges, offering strategies for overcoming these obstacles. It also examines future trends in WTE technologies, the role of smart systems, and global best practices. By highlighting the environmental, economic, and social benefits of WTE systems, this chapter provides valuable insights for advancing sustainability and operational efficiency in the tourism industry through innovative waste management solutions.

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1. INTRODUCTION

Background: An Overview of Tourism's Environmental Challenges

The tourist industry, which has a significant influence on the expansion of the economy, is one of the sectors that is expanding at the fastest rate in the world. Nevertheless, this expansion also creates significant environmental issues, particularly concerning the management of garbage disposal. As tourism activities increase, there is a corresponding increase in the amount of garbage that is created, which includes waste, hazardous chemicals, food waste, and solid waste. The rise in the amount of rubbish poses a significant risk to the environment's ability to remain functional in the long term.

According to the United Nations Environment Programme (UNEP, 2022), there has been a considerable increase in the quantity of trash generated as a result of activities associated with tourism. This may be attributed to the proliferation of worldwide travel and consumption, which has led to an increase in the amount of waste generated. As a result of the rapid increase in trash output, the intrinsic capacities of regional waste management infrastructure are frequently exceeded, which results in a wide range of environmental challenges. According to the findings of Kuehnel et al. (2023), the management of trash is a substantial challenge for big tourist destinations. This is because the rate at which waste can be efficiently processed frequently exceeds the rate at which it accumulates within these locations. Environmental contamination, a decrease in the aesthetic appeal of the area, and negative effects on the native flora and fauna as well as ecological systems are all outcomes that result from this scenario. According to Gossling et al. (2018), insufficient waste management contributes to the ongoing escalation of these problems, which in turn leads to negative impacts on health and deterioration of the environment.

The waste that is produced by tourism has a wider environmental impact that goes beyond how it pollutes the environment immediately. Landfills, which are a common approach for waste management, are known to be a contributor to the release of greenhouse gas emissions, particularly methane, which is a particularly powerful greenhouse gas. Furthermore, the improper disposal of hazardous waste has the potential to result in the contamination of soil and water, which will affect not only the communities that are located nearby but also on the biological systems that are present. It is vital to prioritize the resolution of waste management challenges to guarantee the long-term viability of the tourism industry. This is because the tourism industry is continuing to expand, and this expansion is expected to continue.