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## Advancements in energy recovery from waste plastic material for sustainable environment and circular economy

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## ABSTRACT

Food packaging and other plastic waste measure by about 31% of global waste in terms of plastic. The major use for plastic packaging is to preserve food and make it last more and prevent it from external damages. Unfortunately, most of the plastic food packaging is used and thrown away and cannot be reused or recycled. From chocolate wrappers to chips wrappers to cloth bags, plastic packaging is used everywhere and cannot be avoided. The accumulation of waste plastic is serious threat to the environment; including pollution of the air and water and harm to wildlife and human being. One of the main reasons for the increase in plastic waste is the widespread use of disposable plastic products, such as single-use bags, bottles, and utensils. Plastic waste have a negative impact on the environment, including pollution of the air and water and harm to wildlife. Pyrolysis is one of the efficient methods to convert plastic waste into useful form of energy and solves these issues. The discussion in the current research include about the pyrolysis technology, important factors which affect the process parameters and utilization of plastic pyrolysis oil as a substitute of diesel. The paper also discusses about the challenges and future scope of pyrolysis of waste plastic.

### 1. Introduction

Waste plastic is a major environmental concern. In the past few decades, the accumulation of plastic waste, tyre waste and other non-biodegradable waste have increased around the world [1]. It takes hundreds of years to break down in the environment and can cause a range of problems, including litter, marine pollution, and habitat destruction. It is estimated that over 8 million tons of plastic waste ends up in the oceans every year, where it can be ingested by marine life and enter the food chain [2].

India is one of the largest producers of plastic waste in the world, with millions of tons of plastic waste generated every year. This waste is generated by a variety of sources, including households, industries, and

commercial establishments etc. [3]. Much of this waste ends up in landfills or is improperly disposed of, leading to environmental pollution and other problems [4]. According to the previously published reports, in India, only 60% of these plastic waste is recycled [5]. The major issues with plastic waste are absence of waste collection centres, segregation at source and its proper disposal [6]. Some of the main challenges and issues related to waste plastics in India include:

(a) Lack of infrastructure: India has a limited capacity for managing plastic waste, with many areas lacking the necessary infrastructure for recycling or disposal. This can lead to waste being improperly disposed of, contributing to pollution and other problems.

(b) Absence of waste segregation at source: Segregation of plastic waste by hand is one of the easy methods. However, to accelerate the

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