

## ABSTRACT

Used cooking oil (UCO) or waste frying oil is a common household waste that can be converted into alternative energy, thereby reducing environmental impact and dependence on fossil fuels—especially for small and medium enterprises (SMEs) that require heat sources. However, due to its high flash point, UCO is not easily combustible, making it necessary to design a dedicated combustion stove equipped with a preheating system to ensure optimal ignition and flame quality. This study aims to determine the appropriate materials and methods for developing a waste cooking oil combustion stove that is efficient, portable, and easy to operate using appropriate technology.

The methodology includes a literature review of existing research to compare available materials and determine suitable specifications. Several design variations were developed, particularly for the burner tip, to identify an ideal configuration for achieving a stable flame. The prototype stove features an integrated electric preheating system to help the UCO reach its flash point more quickly, making it easier to ignite. In addition, the burner tip is designed to be interchangeable with different shapes and hole sizes, allowing users to select the optimal flame pattern based on their needs.

This combustion stove provides a practical and sustainable solution for utilizing used cooking oil as an alternative fuel source, especially for SMEs.

**Keywords:** used cooking oil, combustion stove, preheating system, alternative energy, thermal efficiency, UCO stove, appropriate technology.