

# Portable Biodiesel Production System

TEAM: 74

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## Elevator Pitch

We're creating a future where transportation is clean and doesn't depend on fossil fuels. By turning waste cooking oil into high-quality biodiesel, we're cutting emissions and saving money. Join us in making transportation better for the environment. Together, we can build a cleaner and healthier world for everyone.

## Objectives

To develop an efficient, scalable, and cost-effective biodiesel production system that converts waste cooking oil into renewable fuel with over 90% efficiency, meeting ASTM standards and reducing CO<sub>2</sub> and NO<sub>x</sub> emissions by 30%.

## Problem Statement

The increasing demand for clean energy highlights the environmental and economic challenges of relying on fossil fuels. Waste cooking oil, often improperly discarded, poses a significant waste management issue. There is a need for a cost-effective, scalable solution to convert waste oil into biodiesel, addressing both energy sustainability and waste reduction while meeting stringent international quality standards.

## Constraints

**Feedstock Quality Variability:** The quality of waste cooking oils may vary, affecting the efficiency and consistency of biodiesel production.

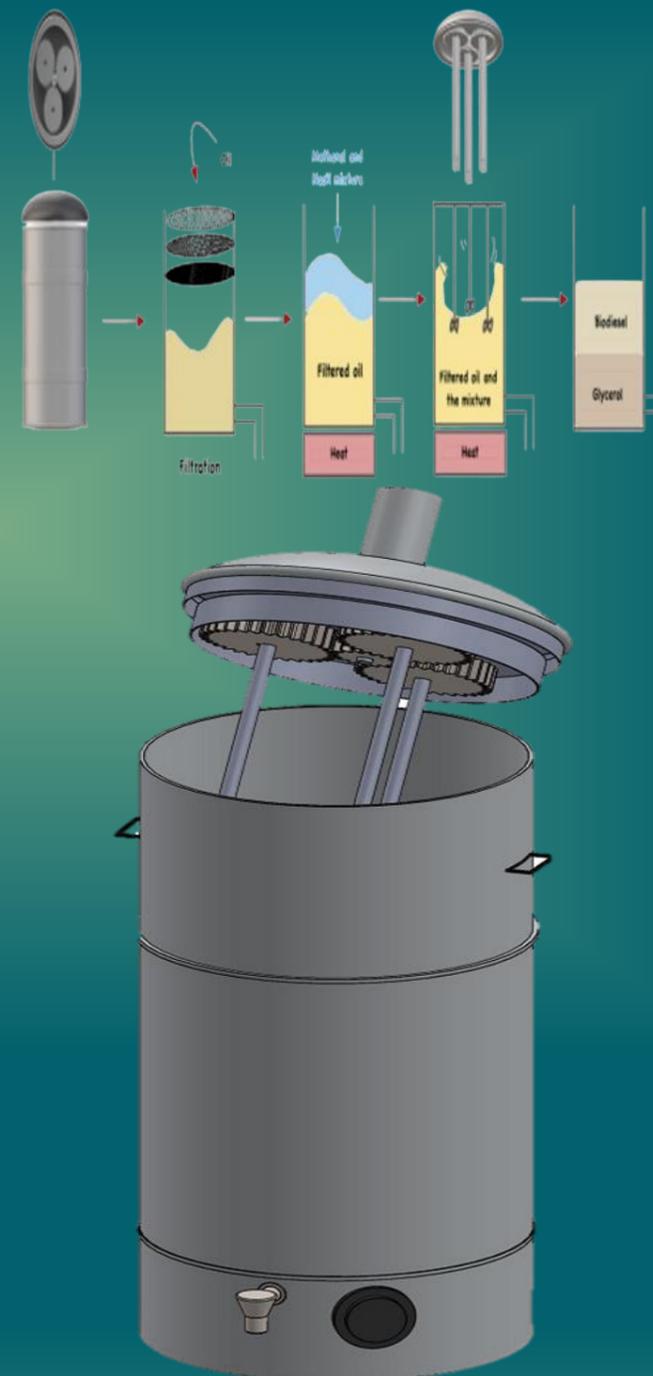
**Meeting Regulations:** Ensures biodiesel production complies with relevant environmental and safety regulations to maintain sustainable operations and avoid legal issues.

**Production Capacity and Flexibility:** The system must handle varying production scales and adapt to demand fluctuations without compromising efficiency or quality.

## Specification

Metric	Unit	Accepted value
Conversion to biodiesel	%	90%
Temperature	°C	55-60 C
Batch reactor Hight (prototype)	cm	100cm
Batch reactor Dimeter (prototype)	cm	55-65 cm
reduce CO <sub>2</sub> emissions by	%	30%
Volume Of oil (Prototype)	L	100L

## Prototype Design



## Validation

Specification	Target Value	Result Value
Reaction Time	≤ 1 Hr	55min
Conversion Efficiency	≥ 90%	90%
Temperature	55–60°C	55–60°C
Batch Reactor Height	100 cm	57 cm
Batch Reactor Diameter	55 cm	28.5 cm
Volume of Oil	100 liters	26 liters

## Project Impact

**Economic:** Lowers production costs, creates jobs, and boosts affordability.  
**Societal:** Improves air quality, public health, and energy security.  
**Environmental:** Reduces waste, emissions, and environmental risks.

## Conclusion

Our innovative biodiesel production system efficiently transforms waste cooking oil into high-quality, renewable fuel. Designed for portability and scalability, this solution addresses the urgent need for sustainable energy sources while reducing environmental impact. As we continue to refine and enhance our system, we remain committed to advancing renewable energy solutions for communities and industries worldwide.