

## **Lifecycle Assessment of rubber seed oil (RSO) case study of Thailand**

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### **Abstract**

Increased demand for fossil fuels leads to increased environmental impacts, both in terms of depletion of natural resources and greenhouse gas emissions, a major cause of climate change. Biodiesel from non-edible plant has been considered a suitable option for substitute of fossil fuels. Non-forest tree resources like para-rubber (*Hevea brasiliensis*) present dual-purpose systems capable of supplying both timber and secondary agricultural commodities like rubber seed oil (RSO). Thailand is the world's leading producer and exporter of natural rubber. Rubber seed are abundant and discarded as waste from rubber plantation in Thailand. Rubber seed biodiesel shows a significant carbon mitigation potential, to reduce greenhouse gas emissions, however, the environmental impact throughout the life cycle are important consideration. The study aims to develop an LCA framework specifically for RSO highlights the environmental advantages of shifting toward non-forest, byproduct-derived oil resources. The system boundary cover from seed collection, transportation, extraction, and refining. This system provides a robust baseline for evaluating RSO offering strategic insights for industrial supply chains and bio-polymer policy integration.

Keywords: Rubber seed oil; Life Cycle Assessment (LCA); Eco-efficiency.