

Waste-to-soap device

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INTRODUCTION

Every day each of us produces large amounts of waste. A part of it consists of vegetable oil waste, mainly produced during household and commercial activities related to food preparation. The improper handling and disposal of the so called used cooking oil (UCO) leads to environmental damages to groundwater and water bodies. It also increases the costs in water treatment plants and the risk of clogging sewage systems. According to the European project "RECOIL", the amount of used domestic waste oil in European countries varies from 0.7 to 10 million tones/year. Although different initiatives are addressing this problem, an effective and definitive solution has not been yet proposed.

The work during the course of Chemical and Biochemical Product Design resulted in the development of a device's prototype which could provide an innovative and valuable way to deal with this problem, in comfort at home.

THEORY

The device helps the users to collect and recycle the UCO by transforming it into homemade soap. The operational principle is a quantitative chemical reaction, which gives no by-products and runs under safe conditions. Apart from the collected UCO, the saponification reaction requires a lye solution, mild heating and stirring. Since the oil might contain impurities, a filtration system is required upstream. The reaction occurs in a saponification chamber and the obtained product is transferred to internal moulds for cooling and ageing.

METHODS

Interviews to potential customers from different countries were done to assess a real need for such a device and specify it according to customer's desires. Experiments with UCO were carried out to determine the feasibility of the reaction and to optimize the reaction parameters. A prototype was modeled in SolidWorks to define the layout of the elements in the machine. An estimation of production costs, energy consumption of the device were performed and a market analysis.

RESULTS AND CONCLUSIONS

The project's resulted in the design of an automated device which provides a potential solution to the problem of UCO disposal. The product would be affordable, compact and easy to use for everyone. With an energy consumption of a common house appliance, it produces a valuable, customizable output while providing an answer to the disposal issue.