Biodiesel Production from closed-algae growing systems using wastewater of Ethanol Plant in Vietnam

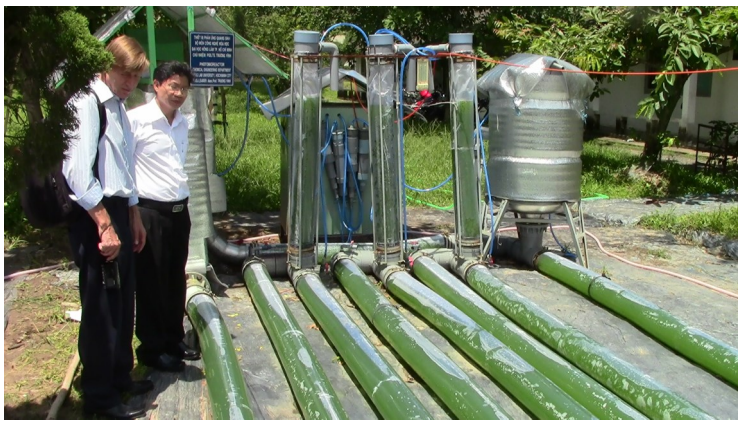
Project Background

Fossil fuels are the major source of energy in the world but their combustion resulted in an increase in the atmospheric CO2 concentration leading to global warming. Biofuels are renewable resources of energy that could sustainably replace petroleum reserves which are expected to be depleted by years 2050. For this, and other reasons, fuels derived from renewable plants have become an attractive and promising alternative to fossil fuels.

Experiments at the laboratory of Chemical Engineering and Processing Department of Nong Lam University in Ho Chi Minh city, Vietnam, found that the algae Chlorella Vulgaries may be a potential source of biofuels in the future.

The objective of the project was to develop efficient and feasible technologies, among others downstream growing and upstream extraction, for microalgae cultivation for final biodiesel production.

Comprehensive testing in different conditions were carried out in small, middle and big scale laboratory and outdoor experiment rigs which were built up by the project partners during the project.



Algae growing facilities in the university

Project Highlights

Project ID:	3-V-053
Country:	Vietnam
Lead Partner:	Nong Lam University (NLU)
Partners:	Dong Xanh Company (GFC) Finnish Environment Institute (SYKE) Universite Libre de Bruxelles (ULB)
Total Project Cost:	€ 124,054
EEP Financing:	€ 80,157 (65%)
Technical Focus:	Bio-fuels
Activity:	Pilot Project
Duration:	15 Months

Project Description

The project built a 400 litter photo bioreactor to experiment optimum growing algae under different conditions including stress treatments. The pilot algae biodiesel system is used for consideration of application to larger land in Dong Xanh company and other ethanol plants as well as demonstration to policymakers and related agencies.

The project has achieved its overall objective by using wastewater and CO2 of ethanol plant to grow microalgae in a tubular bioreactor and assess ithe cost of its production as an alternative source of vegetable oil for biodiesel.

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Project Outputs

The following results have been achieved in the project:

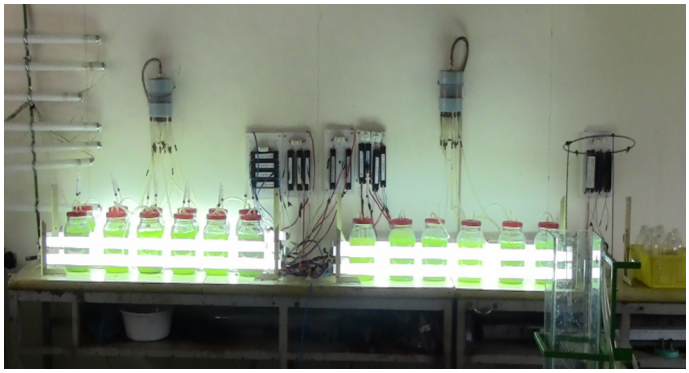
1. Low cost photo bioreactor simple in construction, easy to operate and with low energy consumption.

2. Algae grown in tubular photo bioreactor.

3. Three new technologies for oil enhancement in algae a) spectral light treatment of the algae before growing b) nutrient stress under LED light and c) improvement factors of 1,45 and 2,87 and 2,6 respectively.

4. Pilot biodiesel processing unit.

5. Biodiesel from micro algae.



Laboratory photo reactor

Beneficiaries

The direct beneficiaries are the researchers involved in the project. Long-term beneficiaries are users of biodiesel from micro algae, if everything goes as assumed .

Tubular photo reactor

Innovation and Knowledge transfer

Innovation solutions have been utilized both in the algae growing and in further extraction and refining of oil.

Sustainability and Replicability

The project results will form a platform for further development and is thus sustainable. However, solutions to improve the technologies to produce algal biodiesel economically require step by step actions and cannot be done quickly.

Some of the (open and available) results and findings can, probably, be of value for other research groups and are, at least partly and in some form, replicable.

Dried algaes

MINISTRY FOR FOREIGN AFFAIRS OF FINLAND

EEP ENERGY AND ENVIRONMENT PARTNERSHIP / MEKONG

NDF Nordic Development Fund