# Power from Algae

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It is becoming more and more necessary to find an alternative fuel to petroleum. In the last few years crops, waste oil, coffee grounds and different seeds have been studied to produce biodiesel, but these substances cannot support the global fuel demand. Only a microorganism that grows quickly and contains a large quantity of oil can compete with petroleum: microalgae. This project is focused on production of biodiesel and other high value materials (such as carotenoids and polyunsaturated fatty acids) from microalgae and some possible improvements in cultivation and harvesting methods. The project propose a mass cultivation of Nannochloropsis sp, a marine microalgae, in photobioreactors: closed containers where microalgae can grow without contaminations but with the disposal of CO2 from the atmosphere. Have been studied and experimented different parameters that can influence reproduction speed and lipid composition first in a 2 L fermenter and then in a 25 L tubular photobioreactor. Has been considered also the economic sustainability of the plant and the possibility to decrease the production costs by selling EPA (eicosapantaenoic acid), an important polyunsaturated fatty acid substance that can have medical and cosmetic applications. To further lower the price has been decided to extract carotenoids from the exhausted biomass and then to digest it to produce biogas that can be used to produce electricity for the plant and sell the digestate as a fertilizer.

**Awards Won:**