

ALG-TERNATIVE - ALGae Towards Energy and Recycling Nutrients in wAstewaTer and CO2-rich gases for Increasing ValuE



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Introduction

The increase in energy demand in the last decades leads to the interest in sustainable resources for bio-fuel production. Microalgae are recognized as a renewable fuel crop and a valuable raw material for the bioeconomy. However, the main economic factor for biofuel production from microalgae is the feedstock. So, it is viable to use wastewater (WW) as a cheap source of growth medium.

Furthermore, the economic feasibility of microalgae-based products is limited by the harvesting process and, mainly, the dewatering step. The drying process may take up to half of the total energy involved in oil production, and, sometimes, can be more energy demanding than the total returned energy in biofuel. So, it is economically and energetically interesting to avoid the drying phase. In this sense, Hydrothermal Liquefaction (HTL) process converts biomass into bio-oil, in its own water under subcritical conditions of temperature and pressure, becoming the reaction medium during the degradation of the whole biomass polymers.

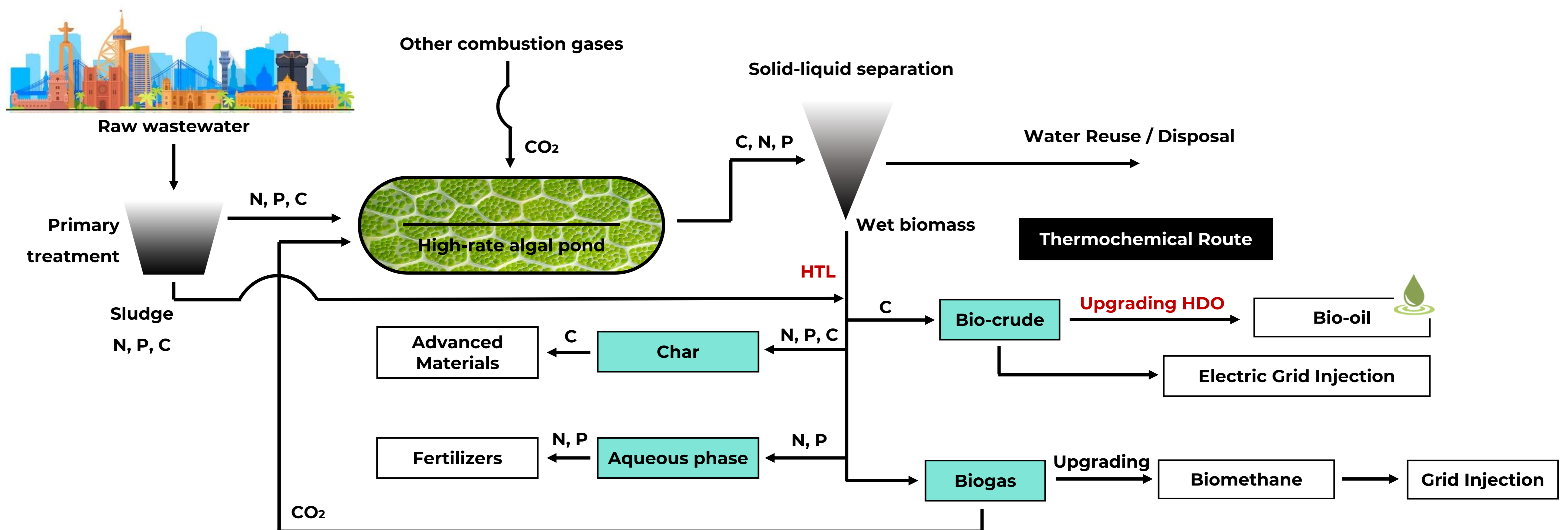
Despite the advantages of HTL process, high quantities of N, S and O remain in the final bio-oil. These compounds should be eliminated before utilization in engines in order to avoid high NOx emissions upon combustion. Thus, hydrotreatment processes are an interesting technology to improve the stability of the bio-oil by removing oxygen. In this scenario, the most promising process is Hydrodeoxygenation (HDO) which combines hydrogenation and oxygen-removal processes, with an improvement in the properties of the HTL product.

Thus, a low carbon, simple, technically feasible, cheap and environmentally friendly solution is expected to be reached with ALG-TERNATIVE, aiming a process with zero waste.

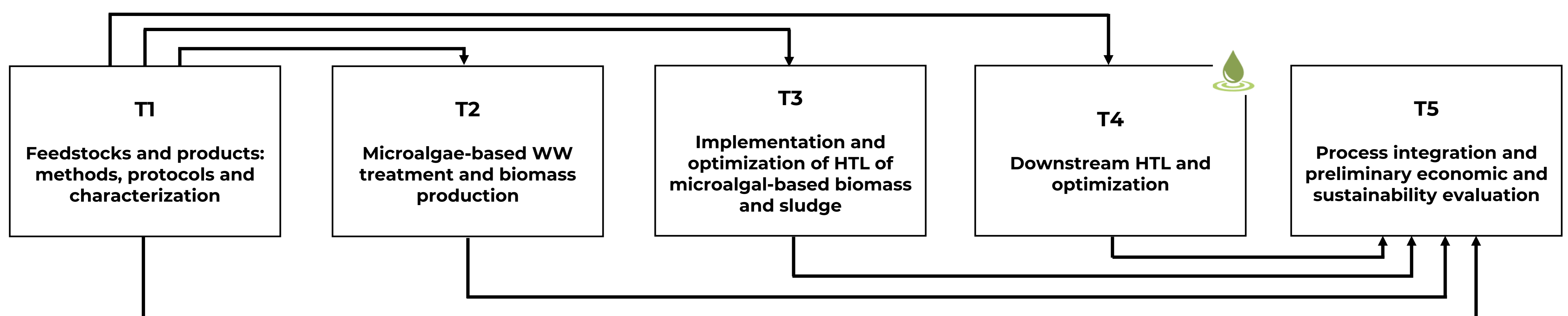
Objectives

This project aims to use urban wastewater as a source of carbon and nutrients for microalgae growth. The directly conversion of biomass into drop-in liquid biofuels and bio-based products will be carried out through HTL process, without the need to dry the biomass slurry. The treatment of the biocrude through HDO will be performed in order to avoid the pollutant emissions during fuel combustion.

Overview



Workplan – Task interaction



Funded by: