

Newsletter

Issue #1 - July 2019



MEWLIFE

**MicroalgaE biomass from phototrophic-heterotrophic
cultivation using olive oil Wastewaters**

PROJECT SUMMARY

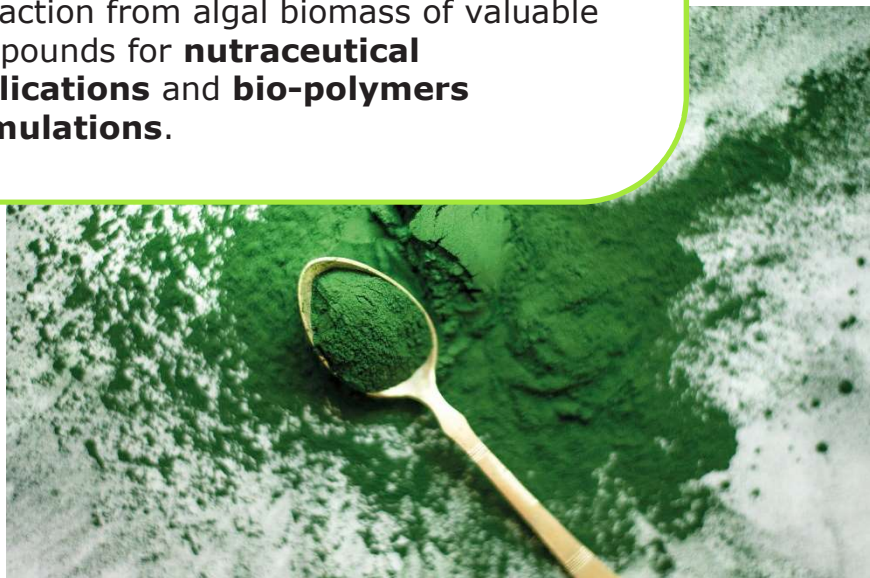
MEWLIFE is a 3-years LIFE project aiming to demonstrate the environmental benefit and economic feasibility of an innovative approach to produce microalgal biomass in an integrated phototrophic-heterotrophic cultivation system using preconcentrated (in a membrane filtration plant) olive oil wastewaters as carbon source for growing algae, thus contributing to waste reuse and valorization.



The main pillars of the MEWLIFE project are:

1. Treatment, re-use and valorization of **wastewaters from agri-food industry** as input for algae cultivation.
2. Costs reduction in **microalgae cultivation** step due to the integrated phototrophic-heterotrophic system.
3. Extraction from algal biomass of valuable compounds for **nutraceutical applications** and **bio-polymers formulations**.

Check out the
MEWLIFE
brochure and video



Olive oil wastewaters

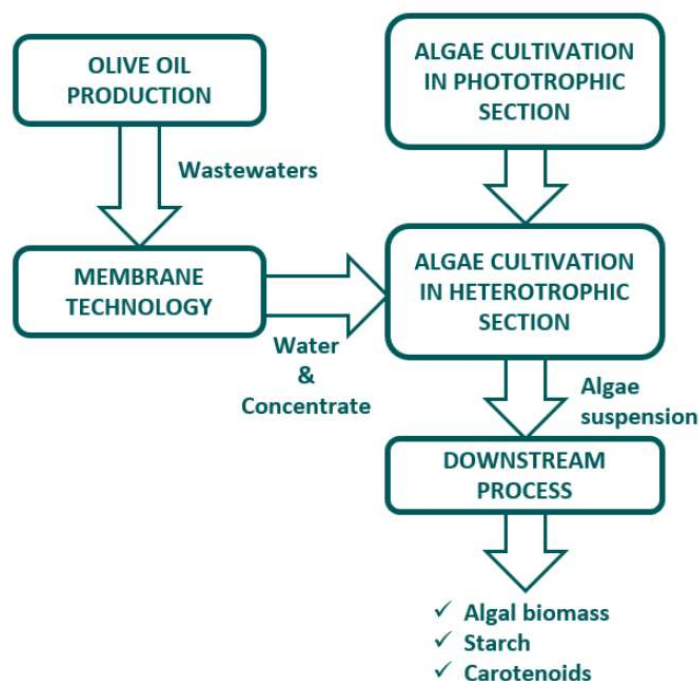
Europe produces about 70% of the global olive oil (Spain, Italy and Greece as main producers). Wastewaters from olive oil production plants cannot be treated in conventional biological depuration plants due to the toxic effect of antioxidants (polyphenols) on active sludge.

As results, these wastewaters are discharged in the environment acting as anti-microbial and phytotoxic agents.

The 3-years MEWLIFE project aims to overcome these hurdles with the development and validation on pilot scale of an integrated set of technologies for olive oil wastewaters remediation based on both physical and biological treatments.

Microalgal biomass

Microalgae are a promising feedstock for the sustainable supply of commodities and specialties for food and non-food products. Despite this potential, implementation to date is limited, mainly due to unfavorable economics. Major bottleneck is the lack of available biomass at acceptable costs. In the MEWLIFE project a new integrated microalgal cultivation strategy has been developed, reducing costs associated with the cultivation system and using the organic carbon content of olive oil wastewaters to enhance microalgal biomass growth.



Extraction of high-added value products

The microalgal biomass produced in the MEWLIFE project will be tested for application in nutraceuticals (by extracting the lipid fraction and carotenoids: astaxanthin, lutein and beta-carotene) and for bio-polymer production (by extracting starch and other carbohydrates).

INSIDE_{COORDINATOR}



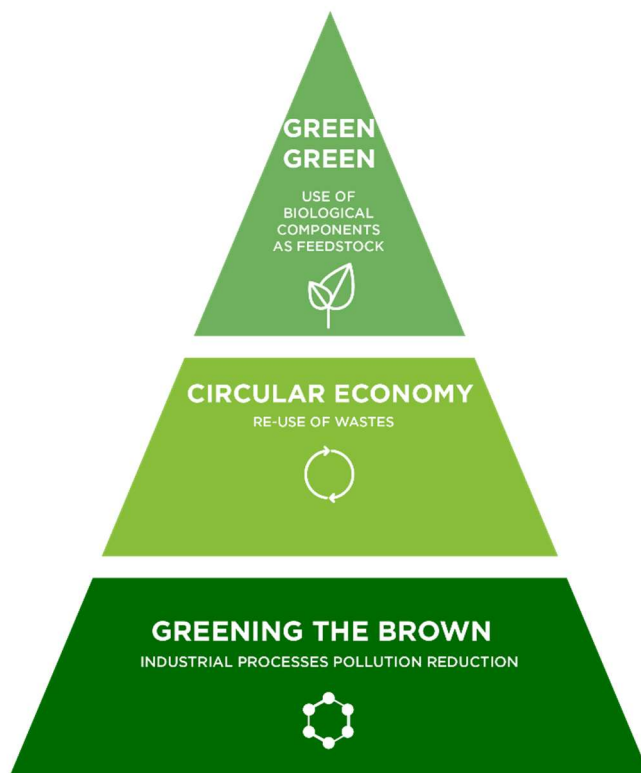
NextChem is Maire Tecnimont company dedicated to Green Chemistry and energy transition which will manage technological initiatives to best address new market dynamics.

The company is active in a series of initiatives aimed at: **Carbon Footprint Reduction**, mitigating the environmental impact of the technologies used for oil and gas processing; **Circular Economy**, implementing mechanical recycling of plastics and promoting chemical recycling; **Bio-fuels**, identifying oil substitutes to produce bio and renewable fuels from biomass feed-stocks.

NextChem portfolio of technologies includes a catalyst process to convert H₂S rich gas into sulphur and hydrogen, a dual pressures cryogenic process to separate CO₂ from natural gas and a catalytic/thermal process to convert natural gas into olefins.

NextChem has developed proprietary technology to reuse urban and industrial solid wastes to methanol, synthetic natural gas and hydrogen. The production of such bio-chemicals is integrated within the bio-fuels, bio-ethanol and bio-diesel line.

NextChem is acting as a technologist and engineering contractor, able to develop, industrialize and commercialize new technologies and then filling the gap between the lab and the market.

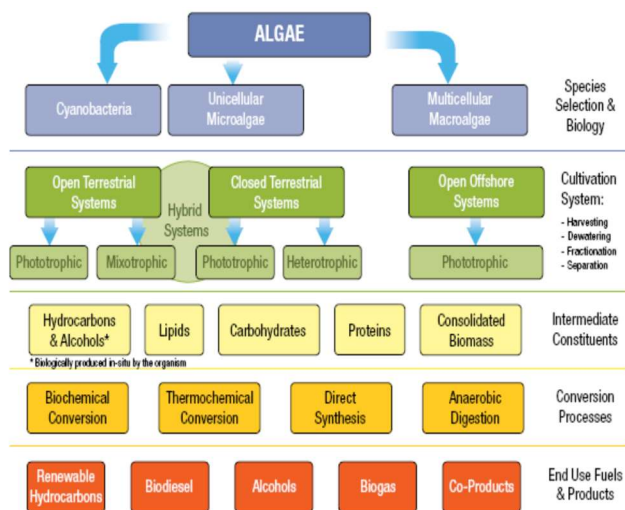


For more information visit the company website: www.nextchem.it

INSIDE PARTNERS

BIO-P

Bio-P is a start-up company of the Maire Tecnimont Group dedicated to R&D activities on frontiers research topics.



The company is active in the NextChem segment named "Green Green" with several projects to valorize different biological matrix, i.e. microalgae, for the production of high value products for nutraceutical sector by green processes.

Other aim of Bio-P is the study and development of new biopolymers production based on vegetable and/or microorganism biomasses.

Bio-P has developed proprietary technology to cultivate vegetable microorganisms in unconventional operative modes and to extract high-value compounds for food supplements formulation. The production of such biochemicals is integrated within the biopolymers production.



Megara Resins is a specialty chemical company focused on the creation of **novel processes** for the cost advantaged production of **chemicals** from renewable feedstocks and important **building blocks** for a wide range of functional materials.



The concept of sustainable development has gained attention locally, nationally, and internationally to guide planning and policy in the transition to the sustainable development. With emphasis on reducing environmental degradation caused by unnatural polymers, the company's goal is to produce the same chemicals that are currently produced from petroleum, but to do so from **renewable feedstocks**, at **lower cost**, by **employing sustainable, low carbon footprint, environmentally friendly process technologies**.

MEWLIFE fits perfectly with the company's strategy to continuously targeting new markets and developing novel products as it transforms into a renewable materials company for the cost advantaged production of chemicals from renewable feedstocks.

The implementation of MEWLIFE will accelerate some of the developments Megara Resins is working on and will provide a solid platform to move further in building a portfolio of sustainable bio-based solutions for its customers. The company's objective is in line with the European Commission's bioeconomy policy that significant growth is expected to arise from sustainable primary production and industrial biotechnology and biorefineries, which lead to new bio-based industries, transform existing ones, and open new markets for bio-based products.

INSIDE*FIRST 12 MONTHS ACTIVITIES'*

Integrated system design & overall mass and energy balance definition

Tests at laboratory scale were carried out to provide the required information for the scale-up of the integrated process.

Energy and material balances, for both start-up and operative phase of the prototypes, have been defined by starting from laboratory data.

Basic and detailed design of the phototrophic-heterotrophic cultivation and downstream units have been developed, also considering all the procedures for a correct prototype operation.



Existing prototype unit revamping

The membrane technology upstream process of the vegetation waters produces a concentrated side stream useful to recover the organics to be used in heterotrophic growth of microalgae. To such purpose LABOR is adapting its already existing pilot plant in order to fit the purpose of the MEWLIFE project.

The revamping of the plant is in progress according to the following main activities: substitution of the broken parts; purchasing and installation of new items (pumps, valves, sensors); disconnection of obsolete sections such as flocculation and photocatalysis and revamping of the useful ones (ultrafiltration, nanofiltration and reverse osmosis).

The activities will end with the implementation of an advanced control system based on the boundary flux model that will assist the automated operation of the plant to avoid irreversible fouling of the membranes.

New prototype units' installation

New prototype units for microalgal biomass cultivation and drying will be installed at NextChem site in Rome. Critical equipment for microalgae integrated phototrophic-heterotrophic cultivation and downstream processing (photobioreactors, microalgal fermentors, centrifuge, spray dryer) have been already purchased. NextChem is now finalizing the purchase of other minor equipment, instruments and control system.

A 3d model of the new MEWLIFE prototype units is under development and will be available soon.

In early September, in parallel with the completion of the algal biomass heterotrophic cultivation and downstream processing prototype units, the phototrophic cultivation section will be started, to have the overall microalgae cultivation plant ready to start in October.

MEWLIFE Kick-off meeting September 12th, 2018



The Kick-off meeting of MEWLIFE project took place in Rome, Italy.

Partners presented their organizations and project activities were reviewed and discussed, also through parallel sessions, for a good start.

Dissemination activities

1. F. Di Caprio, P. Altimari, G. Iaquaniello, L. Toro, F. Pagnanelli, (2019). *T. obliquus* Cultivation Under Heterotrophic Conditions: Determination of Growth Parameters. *ICheaP 14 (14th International Conference on Chemical and Process Engineering)*, Bologna, Italy (Oral presentation).

In May 2019 NextChem and BIOP met representatives from **FEDERALIMENTARE** (FEDERAZIONE ITALIANA DELL'INDUSTRIA ALIMENTARE) and **ASSITOL** (ASSOCIAZIONE ITALIANA DELL'INDUSTRIA OLEARIA) to share the Mewlife Project objectives.

The MEWLIFE consortium & project contributed to **the Summer School (Making business with green chemistry&sustainable energy)** held in **Sarteano** (Italy) on 22-26 July 2019. BIO-P installed a tubular photobioreactor in collaboration with HTR where the MEWLIFE microalga species *Chlorella vulgaris* was cultivated. PBR was installed in the city hall building.



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You are in this list because of the interest in the MEWLIFE project

Website: www.mewlife.eu



The project "MicroalgaE biomass from phototrophic-heterotrophic cultivation using olive oil Wastewaters – MEWLIFE" is co-funded by the LIFE Programme of the European Union (LIFE17 ENV IT 000180).