



Bio-based Industries Consortium



Horizon 2020 European Union Funding for Research & Innovation



ALGAE FOR A BIOMASS APPLIED TO THE PRODUCTION OF ADDED VALUE COMPOUNDS

# NEWSletter

Issue n° 5  
MAR. 2021

## In this issue-----

- Previously in ABACUS project
- Focus on WP7

### As a reminder...

Identification of market specifications of terpenes and carotenoids

Roadmap : 5 scenarii to grow cyanobacteria and microalgae strains and develop innovative extracts



Screening of 150 candidate microalgae/cyanobacteria  
Engineering of 17 GM-cyanobacteria (light terpenes).

Pilot scale cultivation of 7 algae strains  
New devices for online monitoring  
Commercial demonstrator



Industrial scale cultivation for 4 scenarii:  
- 200kgs of biomass ; multiple-week runs  
- Carotenoids productivity (1g/L/day) and high biomass concentration (~10g/L)

Green extraction and fractionation/purification procedures employing innovative compressed fluids developed to increase yields (>20%) and purities (15% total carotenoids).

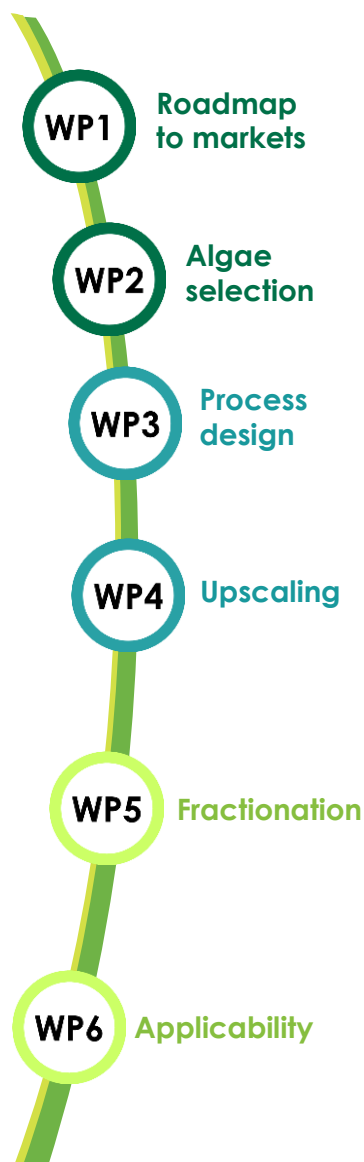


In addition, an integrated green biorefinery process yielding multiple active fractions from one single biomass developed at pilot scale.



A physico-chemical characterisation of purified products and technical acceptability and applicability of the algae-based ingredients were assessed for the targeted markets.

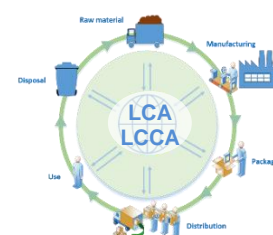
Formulation and preservation strategies for active extracts to be used in cosmetics were elaborated and tested experimentally.



## WP7: Product and market acceptances

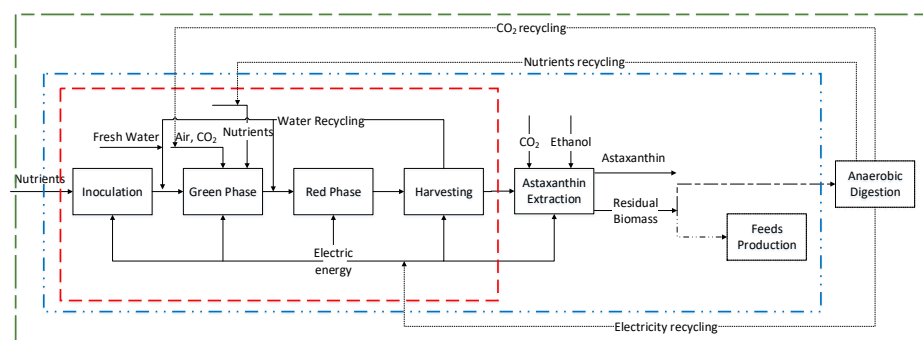
WP7 assessed the **whole value chain of production** to provide **life cycle analysis (LCA)**, **technico-economic analysis (TEA)** and **regulatory review**, which are required for **market acceptance**.

Firstly, KIT-ITAS carried out a comprehensive and in-depth **research analysis** and **review** on **microalgae cultivation**, **microalgal carotenoid extraction techniques** and **LCA studies** on carotenoid extraction process from microalgae. From this, a generic **LCA model** was designed and system boundaries, processes and technologies involved were defined.



Assessment of the whole value chain.

Based on data mainly provided by WP3, WP4 and WP5, a **comparative LCA** was performed for the production of **astaxanthin** from *Haematococcus pluvialis* with **three different technological** (FPA-PBR, UHT-PBR, GWP PBR) and **geographical** (Portugal, France, Germany) options, including the **downstream process** of extraction done by SFE with SC-CO<sub>2</sub>. In parallel, **TEA** was also provided based on GWP PBRs technology (Portugal).



LCA comparative assessment: example of astaxanthin production from *H. pluvialis* with main inputs and outputs. [Onorato & Rösch \(2020\)](#).

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LCA on microalgae cultivation process were also performed for **two other scenarii** - *Tisochrysis lutea*/fucoxanthin and *Dunaliella salina*/β-carotene.

CEA reviewed **risks & regulations** associated to microalgae biomass biorefinery installations. Industrial and environmental safety measures associated to the cultivation of microalgae, from strain management (including GMOs) to cultivation operations and treatment of biomass product and waste were taken into account. A **review of European regulations** was done based on the five final upscaling scenarii associating the candidate species and the related target ingredients. These data are directly relevant to the production and subsequent market introduction of the products studied within ABACUS project.

### KIT – Karlsruhe Institute of Technology, leader of WP7



Located in Karlsruhe, Germany, KIT is one of the biggest research and education institutions worldwide. KIT's Institute for Technology Assessment and Systems Analysis (ITAS) is an interdisciplinary research institute covering technical, economic, environmental and social aspects. With more than 130 scientists, ITAS has long lasting experience in sustainability assessment and LCA as well as in risk assessment. ITAS is part of the algae community. [www.kit.edu](http://www.kit.edu)

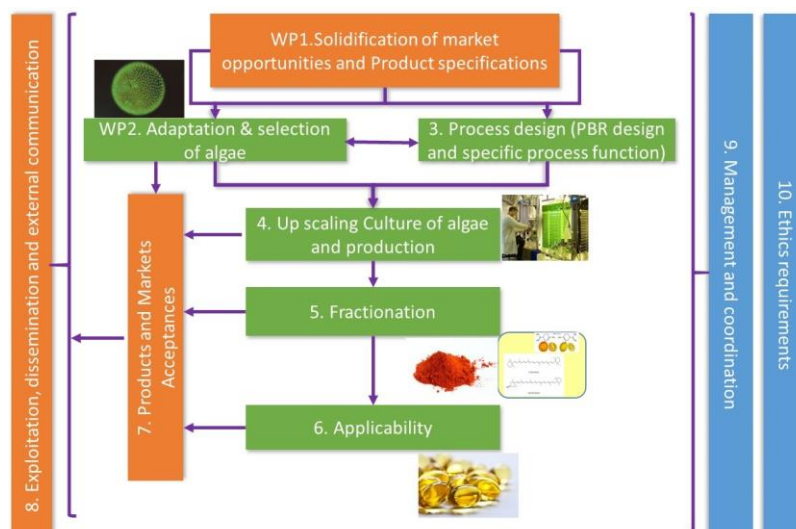
Role in the project: As leader of WP7, KIT carried out sustainability assessment including LCA/LCCA.

## In the next and last issue

Summary of the entire project:

- ⇒ Key features of the ABACUS BBI-JU project
- ⇒ Main results and achievements of all WPs

As a reminder...



Project structured in 10 WPs

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