

# Biorefining: Breakthroughs/challenges

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## Breakthroughs in refining

- **New Products** are being designed for existing and new markets
  - Food/Feed, fertilizer, coating, paints...
  - Functionalities are being studied, understood, valued
- **Process for micro-algae biorefining plants** are being designed using sound methodologies, engineering tools, specialized and experienced companies
- **Key issues** have been identified, risks start to be quantified
- **Mature technologies** are being applied on a routine basis within microalgae biorefining: membrane, supercritical fluids
- **Eco-conception and Life cycle analysis** are routine practices

## Challenges for biorefining

- Economics of micro-algae based products still unfavourable in comparison to other resources: improve revenues, decrease costs
- Cell de-construction technologies are not mature
  - cell wall structure and variability is not known to a sufficient level: no specific enzymes with selective extraction capacity
  - more research required both on physiology under optimised production parameters and de-construction
- Process integration just at its beginning far from large industry standards. Bring more experience into larger projects to develop engineering capabilities, up-scaling knowledge. Develop demonstration units.
- Integration with biomass production not achieved in terms of biomass specification and concentration.
- Develop WET extraction to decrease cost, especially for commodities and energy
- Large bio-refineries will decrease cost: need markets and biomass