Algae Harvest and Concentration

Vibro Membrane Filtration (VMF) offers excellent efficiency in an environmentally friendly solution

There are many factors and challenges to consider when you design a manufacturing plant for microalgae, incl. process time, recovery rate, energy consumption, costs and complexity.

Vibro Membrane Filtration **(VMF)** turns the challenges of harvesting and concentration upside down and offers a solution capable of unlocking the true power of algae.

VMF makes it possible to optimize harvest and concentration and replace conventional technologies like centrifugation, tangential flow filtration and flocculation.

- Low energy consumption
- High recovery / yield
- Reuse of water and nutrients
- Gentle product handling
- Single step operation
- Simplicity
- Enables very high concentrations
- Low CO_2 footprint

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Challenges of harvesting/dewatering algae

Energy and Water consumption:

Conventional harvesting and dewatering technologies have high energy requirements which can undermine the carbon-negative potential of algae. Additionally, conventional technologies do not enable reuse of spent water.

Product loss:

Regardless of algae species, product loss through cell death is a threat for all technologies processing live organisms. This is often due to ungentle processing or long processing time.

Cost and Complexity:

Some technologies are complex and maintenance-intensive due to their extensive peripheral equipment. This equipment can be difficult to install and prone to wear and tear, affecting both CAPEX and OPEX

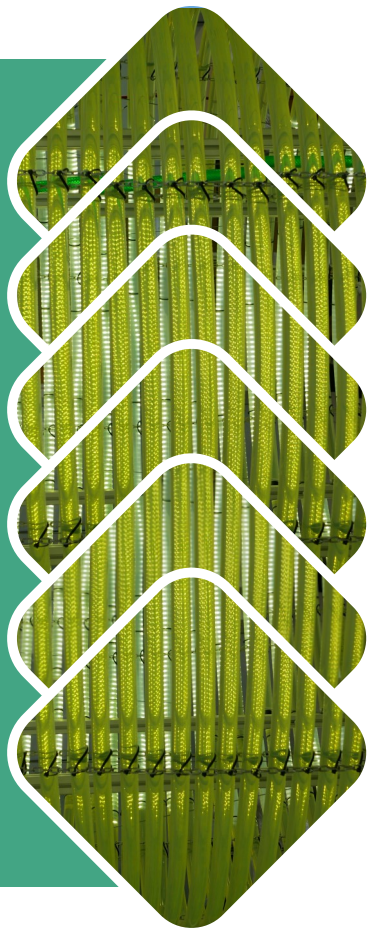
Vibro Membrane Filtration (**VMF**)

VMF is a membrane separation process, where the membrane is kept clean by vibrations creating turbulence on the membrane surface.

This creates a gentle and efficient filtration process with high yield, 100% retention, less fouling, no cell damage and very little energy consumption. Additionally, VMF is able to reach very high concentrations/viscosities, e.g. ***Nannochloropsis spp.*** **> 190 g/l and** ***Chlorella spp.*** **> 290 g/l**

These factors make VMF a superior technology for harvesting/dewatering and concentrating algae. With VMF, product loss is minimized, no harmful chemicals are involved in the process, higher concentrations can be reached and nutrients are kept intact in the permeate and can be recirculated back to the bioreactor for continuous sustainable cultivation.

VMF reduces energy consumption by as much as 95% compared to conventional crossflow filtration, further reducing the CO_2 footprint. This is due to VMF utilizing vibrations to create turbulence, only at the membrane surface, instead of a high linear flow induced by a crossflow pump like conventional crossflow technologies.



Substitutable Technologies

Tangential flow filtration (TFF)

TFF is a separation process based on particle size and works by passing liquid through a membrane, allowing smaller molecules and particles to pass through while retaining larger particles. TFF has high energy consumption and is limited to low-viscosity liquids.

The high-speed crossflow pump required can also damage algae cells.

Flocculation

Flocculation works by adding chemical flocculants to the medium to make cells adhere to each other, making cells easier to remove. It is a process that often uses environmentally harmful chemicals which also needs subsequent steps for removal.

This method requires more processing time and is therefore more prone to cause product loss through cell death.

Centrifugation

Centrifugation separates particles by density, dividing the medium into a light fraction and a heavy fraction. It is an energy-intensive and complex process that is maintenance intensive and requires high CAPEX and OPEX. The ”clean” fraction will still contain cells, cell debris and bacteria, in addition to product loss based on cell damage.

10-20% of product is lost when using centrifugation.

Read more at sanimembranes.com