Successful project in partnership with LGem

All piping components of the photobioreactor system (PBR system) are based on GF Piping Systems products.

LGem is the first Dutch company to use closed photobioreactors to produce microalgae on a commercial scale. Since 2007 freeze-dried algae powder has been produced and sold all over the world as a food supplement. The innovative cultivation process has been steadily improved, resulting in a stable, robust and easy-to-operate production platform. In 2009, GF Piping Systems joined the development team, introducing new components. As a result of this fruitful collaboration, the tubular PBR has evolved into a cleverly designed system, with low operating costs. Top quality made affordable without compromises. All piping components of the PBR system products, ensuring highest possible quality for growing various algae strains. Essential elements have been patented.

Since 2010 more than 10 systems have been sold. We offer; Global sales and installation; Technical support; R&D feasibility programs; Training and education.

Easy-to-operate production platform with a moderate price tag

The Bubblebrush allows longer loop length. The prevention of light losses and the contaminating debris of sticky biomass leads to significantly increased productivity.

GemTube is the first commercially available "turn-key" PBR system complying with all relevant requirements. After a training period, you could be producing algae according to our standards.
Innovative tubular photobioreactor for cultivation of microalgae

REFERENCE
ENERGY
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LGem GemTube
Advantages of algae

Microalgae have been intensively studied as potential organisms for the generation of biomass and well-defined fine chemicals or biofuel.

Algae cultivation technology will play an important role in the future regarding the global provision of food, nutritional aids, fertilizer and energy. There is intensive research in progress on how to modify and increase the build-up of well-defined chemical components (e.g. selected lipids, proteins, carbohydrates and fine chemicals) in the algae organism.

Why using tubular photobioreactors (PBR)?

- It is a closed system for a high hygienic level and biomass product quality;
- Effective illumination for higher yield of biomass compared to open ponds;
- Ideal for research and development;
- Lower operating costs and reduced carbon footprint;
- Proven commercial value on an economic scale;
- Relatively easy to scale to large production farms.

Why Algae?

- Algae are fast growers, some species are able to double their biomass in a couple of hours, using solar energy/light, CO\(_2\), phosphates and nitrates;
- Algae do not require arable land or additional water for growing; hence, cultivation of microalgae is not in competition with agriculture for food;
- Algae grow in saltwater hence in places where drinking water and food are scarce;
- Some specific “marine” strains contain lots of EPA & DHA which is necessary for the brain, eyes, reducing risk of cardiovascular disease and much more;
- Many algae contain more than 50% in proteins;
- Algae can contain up to 70% of oils that can be used for making biodiesel, dietary fats, special lubricants;
- Other algae have a high carbohydrate content, that can be used for instance for biopolymers.
Markets of the future

There is a strong need for robust design and ease of operation. This novel technology will be dependent on highly efficient PBR systems.

The easy-to-operate GemTube system makes it possible for anyone to produce algae at a low cost. It uses a revolutionary patented combined technology with waves and a high velocity air stream that resembles the surf in the ocean (Wavywind™). The bubbles accompanying the waves (Bubblebrush™) keep the wall clear of fouling, which is an important feature. The groundbreaking Wavywind technology allows a stream of air to travel twice the velocity of culture fluid. The fast air stream creates eddies on the surface and a unique stirring effect that gives the desired light-dark cycle, under 1 Hertz.

Advantages of GemTube PBRs

The LGEM-PBR technology can be adapted to your individual PBR plant design, even large scale operations. The advantages of the GemTube system and its unique technology are:

- Prevention of fouling by using our revolutionary Bubblebrush technology;
- No growth inhibition as a result of excessive amounts of dissolved oxygen;
- Very large tube lengths are possible, efficient and unlimited upscaling;
- Extremely low energy consumption (< 200 W/m³); option to operate even without a circulation pump for fragile species (*"dual operation mode");
- Very thin-walled tubes and simple jointing contribute to easy installation and outstanding cost-performance ratio;
- Simple and robust process control (optional remote control), just pH control in the basic version;
- Easy to operate and to clean via CIP, low operating costs;
- Efficient use of available light as a result of the Wavywind effect, resulting in a light-dark cycle under 1 Hertz;
- >5 years life expectancy for use in greenhouses (not for outdoor solutions);
- Very high productivity due to short downtimes for maintenance/cleaning; CIP cleaning;
- We offer training in order to achieve our production standards and yield.