



## Algae 101

**Algae are the new sustainable super-ingredients that are poised to transform several large industries.** Algae are fast-growing plant organisms that convert sunlight, CO<sub>2</sub>, and nutrients into organic matter that can replace many commonly used oils (e.g., fossil, fish, palm) and proteins (e.g., animal, plant). It is an effective carbon sink, water nutrient filter, and land/water-efficient source of food and fuel energy that is quickly being recognized as a sustainability solution around the globe.

**There is a broad and diverse set of algal species that fall into two broad categories: micro- and macro-algae.** Microalgae are single-cell organisms (e.g. chlorella, spirulina) that are grown mostly in controlled industrial facilities, and require advanced processing and scientific capabilities. Macroalgae, on the other hand, are larger aquatic plants (e.g. seaweed, kelp) that can be grown artisanally, which makes them great economic development tools for communities in the global south.

**Microalgae have application in biofuel, bioplastics, fertilizers, pharmaceuticals, cosmetics, and nutritional supplements, as well as in animal and fish feeds.** High in protein and omega-3 fatty acids, algal oil is an ideal alternative to increasingly scarce and expensive fish oil, and it is in high demand in the aquaculture industry, especially at shellfish hatcheries that often have to produce their own. In response, specialist algal feed producers with expertise and scale are emerging to produce more cheaper and better feeds.

**Macroalgae** are chiefly used in high-value categories such as cosmetics, pharmaceuticals, and food additives (e.g., carrageenan) or as trendy superfoods. While macroalgae are relatively easy and cheap to grow, most economic value is added during the processing and extraction of their beneficial compounds. Macroalgae growers therefore are focused on refining their production methods and vertically integrating with value-added processing in order to further their economic development and profit objectives.

## Global Markets and Values for Algae Products - 2015

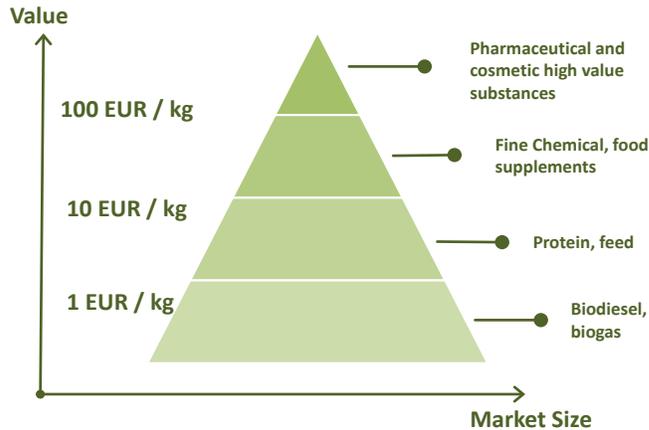


Diagram source: Subitec GmbH

The market for algae products is expected to reach **US\$ 44.7B by 2023**, growing at a CAGR of more than 5.2% during the forecast period 2016-2023.\*

## Winning growth strategies for algae producers

### Smart co-location

Production of algae, which need CO<sub>2</sub> and nutrients for growth, offers obvious potential for symbiotic coproduction systems with other producers that generate large amounts of waste carbon and nutrients. Microalgae production could be co-located with wastewater treatment, ethanol production, or coal power generation, whereas macroalgae could feed off nutrients from agricultural runoff in coastal waters.

### Co-product strategies - the yin to the yang

Potential markets for algae range from high-value/low-volume categories such as cosmetics, nutritional supplements, and medicines to more low-value/high-volume categories such as biofuel, foods or feed. For start-ups, entering the algae market with a differentiated high-value/low-volume product could be easiest, thereby providing the cash flow needed to build scale so they can expand to increasingly higher-volume categories.

### Specialization, customization, optimization

Algae as a group remain relatively unexplored and uncultivated, and thus offer huge opportunity for performance and functionality enhancement against various desired parameters. Because of their high species diversity, algal products could be selected for highly specialized requirements. Differentiating on functionality, rather than competing on price, will be key to establishing algae as a viable alternative to some of the high-volume commodities in feed, food and cosmetics.

### A small plant with big impact

With relatively low requirements for capital and expertise, seaweed farming is ideal for developing economies. Competitive advantage comes from growing locations that have desirable conditions for certain species. To capture more value, growers should do some basic processing on-site to increase product quality/price and reduce spoilage. Moreover, building supply chains and relationships with high-value customers is key.

#### Sources:

Emerging Markets Online, Algae 2020, 2011; FAO, Social and economic dimensions of carrageenan seaweed farming, 2013; \* Credence Research, Global Algae Product Market, May 2016

Authors:  
 Jana Hennig  
 Monica Jain

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