

## Algal Biofuels: The Future of Bioenergy

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With a constantly increasing population and due to heavy load on arable lands for growing commercial crops the large scale and economically viable biofuel production on land seems a challenge to meet the huge and increasing global energy demand. The use of "bioenergy crops" for generating biofuels is a recent notion and full of potentials. Nevertheless, the use of arable land and clearing of forest for generating biofuel negates the greener aspects of this technology by enhancing greenhouse gas emission [1], making the process less sustainable. The challenge of generating cleaner and economically viable fuel can be sought by employing algae as feed-stock instead of bioenergy crops.

Use of algae has competitive advantages over other bioenergy crops. Algae are efficient photosynthesizers (3 - 8%) compared to plants (0.5%) [2]. Their cultivation does not disturb the arable land. Seaweeds poses high productivity, broader working temperature and salinity range, high nutrient content and have no strive with land crops [3,4]. Algal farming does not require the application of herbicides and pesticides. Apart from that, the residual biomass left after oil extraction can be used as a protein source for animal feed. Algal biomass can be used as fertilizer or can be fermented to get biomethane or bioethanol. Bioethanol production from algae has the additional advantage of being lower in lignin and hemicellulose components, compare to plant cells [5].

Nevertheless, the full potential of this wonderful organism cannot be fully tapped on land. Thus, it is becoming increasingly relevant to explore additional resources like Oceans to meet our future energy demands. The use of marine algae for biofuel generation can turn the process more sustainable. Due to multiple advantages, the seaweeds and microalgae hold the promising future for generating cleaner, greener and economically viable fuel. Such technologies, when applied with genetic engineering, can make the process commercially viable.

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