

# Whether will the usage of microalgae as a biofuel feedstock affect their traditional applications?

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**Abstract**—In response to energy crisis, global warming and global climate changes, microalgae, which have the competence to use water, sun-light and CO<sub>2</sub> to synthesize biomass through photosynthesis, have received a great deal of interest as a biofuel feedstock. Microalgae can provide the biomass feedstock for the flexible production of several different types of renewable and sustainable biofuels such as biodiesel, bioethanol, biogas, and biohydrogen among others via thermochemical and biochemical conversion processes. However, there are a lot of voiced concerns related to the impacts of microalgal biofuels production on the conventional applications, such as cosmetics, pharmaceuticals and nutritious feed. It is therefore questionable whether the microalgal biofuels production will affect the original functions. On the other hand, the microalgal biofuels also witness an obvious and serious dilemma, where it is found that there is no commercial production at a large scale for bulk application due to the overwhelming investments in capitals and operation. From a sustainability point of view, the authors of this paper explore the current challenges in algal applications, and map out the solutions to realizing the microalgal biofuels production without compromise of other traditional applications. Afterwards, four microalgal biorefinery options have been proposed, after which a net energy ratio assessment and cost-effectiveness assessment have been highlighted to testify their feasibilities. Finally, some crucial actions, including optimal culture technologies, considerate marketing strategies, successful integration of technologies in corporate and efficient government policies, have been suggested to help establish the microalgal biorefinery process in a prosperous manner.

**Keywords**—microalgae; biofuels; traditional application; microalgal biorefinery; challenge