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Biofuel production from tropical marine algae

Marine algae comprising both microalgae and the seaweeds, serve as important sources of a wide variety of useful products which find applications in nutrition, chemical and pharmaceutical industries, waste bioremediation and recently as feedstock for renewable energy. Biofuel in the form of biodiesel, bioalcohol, biomethane, hydrogen and hydrocarbons are obtainable from algae. The advantages of algae as feedstock for biodiesel over other oil crops such as oil palm, rapeseed, soybean and jatropha, are well documented and based mainly on the high biomass productivities, non-competition with use as food, tolerance to habitats not suitable to other crops and the lower environmental impacts of algal biodiesel use. Much of the same may be said of bioethanol resulting from fermentation of algal carbohydrate, available from seaweeds and as a co-product after lipid extraction from microalgae for diesel production. In Malaysia, renewable energy (RE) may be sourced from: Biomass (biodiesel, bioethanol, biogas, biohydrogen); Solar Energy (photovoltaic & hybrid technologies); Wind and Wave. Malaysia's energy requirement is dominated by the transport sector (40%). Of the potential RE sources, biodiesel and bioethanol give good competition to solar power, as the solution to the increasing demands of the transport industry. It is here that biofuels from algae may contribute best. Tropical Malaysia, with its long coastlines and numerous islands, presents a suitable environment for mass production of marine algae as feedstocks for biofuel production. In this presentation, I will briefly review the efforts in developing an algal biofuel industry in Malaysia, identify the research gaps and describe the way forward with respect to the opportunities and challenges in tropical Malaysia. Our experience from working with tropical algae in the University of Malaya, shall be used in discussion of some of the above aspects.