

Evaluation of Environmental Impacts from Macroalgae-based Bioethanol Production

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Macroalgae have been considered one of promising feedstocks and seem to have the potential to replace terrestrial biomass for bioethanol production. Among various macroalgae species, *Laminaria japonica* (brown algae) recently seems to be a very positive candidate due to their fast growing rates, high photosynthetic efficiency, and well-established mass cultivation technology. To achieve sustainable bioethanol production systems based on the seaweed, lifecycle impacts of seaweed-to-biofuel process should be considered for process design. In this study, we analyzed the potential environmental impacts from *L. japonica*-based bioethanol production by using life cycle assessment. Data such as materials and energy uses in the cultivation, transportation, and ethanol production stages were collected from field survey and literature. The evaluation results showed that quantitative environmental impacts of climate change and water depletion on each stage. This study can be used to develop sustainable seaweed bioethanol production processes.