Title: Preview of a detailed techno-economic analysis of diesel from algae: economic feasibility under sustainability constraints requires sustained unrealistically high algae yields if public subsidies are absent.

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A detailed economical analysis of producing algae-derived biodiesel via open-pond aquaculture has been performed and is in peer-review for publication. Due to the significant interest and research efforts in this field we felt that pre-publication of highlights from the economic study may be of interest. The economic study is based on a technological analysis (Pfromm, P. H., Amanor-Boadu, V., Nelson, R. G., "Sustainability of algae derived biodiesel: a mass balance approach", Bioresource Technology , 102(2), 1185-1193, 2011). The technological analysis showed that diesel from terrestrial open-pond algae aquaculture can be produced in a technologically largely sustainable way if CO_2 as a nutrient is supplied from renewable sources such as from bio-ethanol facilities. 50 million gallons (1.89×10^8 l) per year of ethyl algeate diesel was the base case (about 0.1% of the annual diesel consumption in the U.S.), resulting in about 11 square miles (about 28 square kilometers) of pond area needed (with the optimistic yield assumption below). Use of fossil fuel derived CO_2 as algae nutrient renders the process rigorously unsustainable. The marketable fuel output is reduced by more than 16% to account for the energy to operate the entire algae diesel production process. The technological assumptions were extremely optimistic with for example 50 g bone dry algae biomass produced per square meter of pond area and day (500 kg/(hectare day)) as annual average productivity, 38.8wt% of bone dry algal biomass being triglycerides useful for diesel production, and algae oil extraction using hexane similar to soybean oil recovery from soybeans.

The results of the economical analysis confirm the critical limitation of economic feasibility by achievable and fundamentally plausible biomass yields. The extent of policy interventions necessary for the project's economic feasibility are illustrated in the forthcoming paper. A minimum algal yield of 50 g algae biomass produced per square meter of pond area and day (500 kg/(hectare day)) and a combination of different public subsidies sustained over long periods are necessary for economic feasibility of the defined project. In the absence of such subsidies, a non-stochastic yield of 75 g algae biomass produced per square meter of pond area and day (750 kg/(hectare day)) is at minimum necessary for economic feasibility. While a sustained annual average yield of 50 g/(m^2 day) and other technological assumptions (see previous paper) are already extremely optimistic, a 50% yield increase appears highly unlikely and indeed approaches the practical limits put on algae yields in general by available sunlight and the fundamentals of biochemical conversion of CO_2 to chemicals using light.