

Algae-based biofuels Applications and Co-products

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FAO activities on ABB

- The FAO Inter-Departmental Working Group (IDWG) on Bioenergy established in September 2008 a working group on algal biomass for bioenergy to review the state of knowledge in this field with a view toward its relevance and potential applications in developing countries:



Aquatic Biofuels Working Group (ABWG)

- Informal group
- Voluntary basis

Scope of the ABWG

- To understand the current state of aquatic biofuels research and technologies and their relevance to being applied and managed in developing countries, taking into account investment and environmental issues;
- To facilitate linkages between regional organizations, private sector and governments as well as promoting a north-south and south-south collaboration;
- To disseminate knowledge about bioenergy production from algae and fish waste and its suitability in poor areas to improve energy access.

Algae-based Biofuels: A review of challenges and opportunities for developing countries (2009)

- Focus on technology options for biofuel production from algae and their suitability for developing countries.
- ABBs hold promise for developing countries (income, jobs, energy mix, suitable regions)... but probably not in short- or medium-term
- ABB requires capital investment, technology capacity (economy of scale, foreign investments, engineering expertise)
- Capacity requirements (productivity gains, industrial processes)
- Knowledge gaps (viability, lack of data consistency)

Broadening the scope

- Most significant obstacles are the high production costs and the fact that ABB initiatives (typically R&D) are still predominantly based in developed countries.
- Broader scope to include the co-production of fuel, food and other valuable co-products to break through the barrier of economic viability, while at the same time producing a new protein source for human, livestock and fish consumption.

IS THIS AN OPTION?

- ➔ Overview of practical options available for co-production from algae.

Algae-based Biofuels: Applications and Co-products (2010)

- Overview of possible co-products and integrated systems using algae as a feedstock and their viability and suitability for developing countries
- Staple food, Health foods and pharmaceuticals, Ingredients for processed foods, Algae for livestock, fish and shellfish consumption, Chemical industry, Cosmetics, Fertilizer, Fibres for paper
- Production of energy, and other products by transforming the by-products of one production system into the feedstock for another, hence intensifying the overall production on the same land and contributing to alleviate pressure on natural resources
- IFES (Integrated Food and Energy Systems)

Algae-based Biofuels: Applications and Co-products (2010) – Key findings 1/3

- USD 0.60 – 7 /kg with current production efficiencies. Production cost of algal biodiesel is higher (usually > USD 6/liter)
- With policy support and incentives, the algal biofuel industry will continue to develop and costs will decrease following technology cost trends of other REs
- Could contribute to the alleviation of a number of energy/environmental problems
- Still require significant investments to become commercially viable
- Co-production of multiple products to generate additional revenue would speed viability and sustainability, hence competitiveness

Algae-based Biofuels: Applications and Co-products (2010) – Key findings 2/3

- Market compatible products are fertilizers, inputs for the chemical industry and alternative paper fiber sources. But market value similar to biofuels and, while a continued rise in fossil oil price can be expected, the production costs of algae products are projected to drop.
- Commercial production and harvesting of natural algae populations (microalgae and seaweed) predominantly take place in developing countries, indicating available experience, good environmental and economical conditions.
- For poor rural communities, small-scale IFES approaches are most suitable, potentially reducing ecological impact. Capital inputs have to be minimized for this group: open raceway pond, constructed in an area with an easily accessible, sustainable water supply; or *in situ* collection of macroalgae.

Algae-based Biofuels: Applications and Co-products (2010) – Key findings 3/3

- Novel technologies are contributing to develop a wider range of novel foodstuffs and renewable non-food commodities from algae
- Viable algae-based IFES concept are more complicated than agriculture-based
- Technology for large scale algal biofuel production is not yet commercially viable
- Algal production systems can contribute to rural development through diversification to integrated systems by efficiently co-producing energy together with valuable nutrients, animal feed, fertilizers, biofuels and other products
- Products can be customized on the basis of the local needs

Thank you!

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