BIOFUELS FROM MICROALGAE

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Microalgae production for biofuels is now a major, worldwide, research and development enterprise, with about ten thousand scientists and engineers directly engaged in this field, working for hundreds of companies and projects. In principle, microalgae could exceed, by over ten-fold, the productivity the most productive of oil crops, while using land, water and nutrient resources not useful in conventional agriculture. Microalgae can recycle the CO2 from fossil fuel power plants and similar sources. In practice, algae biofuels are not yet produced commercially, although pilot and demonstration projects plan to soon start delivering commercial biofuels. Many types of microalgae species, cultivation systems and biofuels are being developed, using sunlight with closed photobioreactors or open ponds, or dark fermentations fed sugars or starches, or combinations thereof. Genetic engineering and synthetic biology are being used to develop superior algal strains with higher productivity and producing novel biofuels. Published, peer-reviewed, techno-economic analyses and life cycle assessments, in particular for CO2 reductions, are overwhelmingly favorable, though with exceptions. Resource assessments generally project enormous potential, suggesting that microalgae could make a major contribution to a future sustainable, decarbonized global energy system. This presentation will provide a critical assessment of the current status and future prospects of microalgae biofuels research and development as well as commercial activities and projects.