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Air capture, algae and bioenergy for carbon capture and storage Can it be done?

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The International Panel on Climate Change (IPCC) has concluded that to limit increases in mean global surface temperature to below 2°C, net human-driven carbon emissions must be eliminated by the end of this century. One carbon mitigation strategy is bioenergy with carbon capture and storage (BECCS). BECCS consists of the growing of trees and crops that extract CO₂ from the atmosphere, burning their biomass in power plants, stripping the resultant CO₂ from the waste gas and storage via injection into geological formations. However, implementing BECCS at the required scale would have vast ecological consequences, would compromise food production and create a carbon debt. Use of algal biotechnology potentially avoids these problems. So far, algae have mainly been explored for production of higher value products and transportation fuel. Low energy returns, poor economic feasibility and lack of robustness are presently the main barriers to applications for fuels. Arguably, bioenergy adds even less economic value than fuel. Here, I will show that production of bioenergy enables a radically different approach to algal biotechnology, with substantial opportunities for avoiding costs and reducing energy consumption. This leads to a new vision on how algal biotechnology could find a place in the future energy mix, and eventually create the negative emissions needed to limit global climate change.

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