Decentralized Green Algae Production in Urban Spaces

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The carbon levels in the urban areas around the world are exponentially augmenting, metropoles around the globe suffer from the highest concentrations in carbon dioxide due to different factors including but not limited to (factories emissions, vehicles running on fossil fuels, poor management of waste..). The environmental strategies in place have been incapable of significantly reducing the CO2 concentrations in the air and no breakthroughs in recent technologies have been able to face this issue.

It is estimated that green algae produce up to 60 percent of the oxygen in the atmosphere since they have photosynthetic machinery ultimately derived from cyanobacteria that produce oxygen as a by-product of photosynthesis, hence the idea of searching for a method to increase the general biomass of Spirulina in the urban areas. By analyzing the current urban layouts, we find that most of the sunlit space is present over buildings rooftops, from where came the idea of creating a closed autonomous and partially automated system for harvesting spirulina in these spaces, The system, called Unitex would be able to incubate the spirulina biomass and pump it through tubes and containers using an pump and regulators powered by a solar panel. The spirulina growth rate is very high, it multiplies at 2/1 ratio in a 24h cycle, which allows to produce up to 10kg of spirulina per month per Unitex. Thus the production would be decentralized and cover vast areas of the urban spaces.

After a thorough examination of the hypothetical sustainability of the project, I came to the conclusion that upon implementation of the decentralized spirulina production system, a 500 percent increase in green algae production will occur over the first 5 years. with thousands of units operating, more than 1000 million tons of oxygen will be produced and twice the quantity of CO2 absorbed and bio-recycled. the harvested spirulina is edible and transformable into biofuel on the long run, and given a surplus in production the economies of scale would make it possible for an alternative energy source to be affordable. The sustainability of this strategic implementation of a scalable and sustainable urban farming model will rely primarily on engaging in the outstanding emerging market of spirulina in a first phase, and then in a second phase it would rely on the revenues from transforming the harvested algae into biofuel which is completely feasible but expensive at the moment due to the lack of raw material and the high price of algae. The conclusion of this study is promising to say the least, if applied, such a system would not be able to drastically reduce the effects of global warming but also by creating a viable and clean energy source on the long-run.