

PROJECT FACTS

UNIVERSITY OF KENTUCKY CENTER FOR APPLIED ENERGY RESEARCH

PARTICIPANTS

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Research
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SPONSORS

KY Energy and
Environment Cabinet,
Dept. of Energy
Development and
Independence.

PROJECT VALUE

\$2,000,000

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BIOFUELS & ENVIRONMENTAL CATALYSIS

Development of an Algae-based System for CO₂ Mitigation from Coal-fired Power Plants

Atmospheric carbon dioxide levels have risen since the industrial revolution due to fossil fuel combustion. These elevated levels of CO₂ have been cited as a significant cause of climate change. However, fossil fuels, especially coal, will remain the main source of electric power for at least several more decades. Hence, there is a need for technologies to curb CO₂ emissions into the atmosphere while burning fossil fuels in order to allow use of these fuels in more carbon neutral ways. One avenue for controlling the CO₂ concentration in the atmosphere involves CO₂ capture and long term storage underground. Another avenue involves using plant-based organisms to utilize CO₂ by conversion to biomass. In the latter approach, there is the potential to obtain valuable co-products at the end of the process. Due to favorable climate and native coal resources, this second CO₂ mitigation strategy is an attractive option for Kentucky.

This project will demonstrate the potential of using waste CO₂ and heat from a coal-fired power plant to cultivate algae, which can then be processed into value-added products. While the mitigation of CO₂ emissions from coal-fired power plants is the main focus of the project, in order to determine the most economically favorable strategy, the production of biofuels or bioproducts from the algae will also be investigated.



Figure 1 (Left). 1000 L
Tubular Photobioreactor



Figure 2. 2700 sq ft greenhouse containing
photobioreactors