

PROJECT FACTS

UNIVERSITY OF KENTUCKY CENTER FOR APPLIED ENERGY RESEARCH

PARTICIPANTS

University of Kentucky
Center for Applied Energy
Research
2540 Research Park Drive
Lexington, KY 405011

University of Kentucky
Department of Biosystems
and Agriculture
Engineering
128 CE Barnhart Building

Duke Energy

SPONSORS

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

PROJECT VALUE

\$ 1,827,312

CONTACT

Rodney Andrews
UK CAER
Tel.: (859) 257-0306
rodney.andrews@uky.edu
Mark Crocker
UK CAER
Tel.: (859) 257-0295
mark.crocker@uky.edu
Czarena Crofcheck
Dept. of Biosystems &
Agricultural Engineering
Tel.: (859) 257-3000
crofcheck@uky.edu



BIOFUELS & ENVIRONMENTAL CATALYSIS

Demonstration 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 source of electric power for at least the next several 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 a 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. A 50,000 gallon photobioreactor will be installed at Duke Energy's East Bend Station located near Rabbit Hash, KY to demonstrate the feasibility of an algae based CO₂ mitigation process. While the mitigation of CO₂ emissions from coal-fired power plants is the main focus of the project, the production of biofuels and other bio-products will also be examined in order to determine the most economically favorable strategy.



Figure 1 (left): Current photobioreactor installed at East Bend Station



Figure 2 (below): Artist's rendition of potential CAER photobioreactor installed at East Bend Station