

Introduction to Advanced Coal

Worldwide, coal-fired power plants contribute to approximately 25% of the world's primary energy but impart 40% of the CO₂ emissions. Coal resources are widely distributed worldwide, inexpensive, and used extensively for electric power generation in the US, China, and India, for example. As a result, the challenge of reducing greenhouse gas emissions associated with use of coal is a significant one.

In recent decades, most of the attention on advanced coal combustion has shifted from university-based research to private sector development. Therefore GCEP is interested in advanced coal research that addresses conceptual approaches to coal conversion that go beyond incremental improvements towards systems and processes that emphasize CO₂ emission reductions.

GCEP currently supports a program on coal energy conversion with aquifer-based sequestration led by Professor Reginald Mitchell. The process involves CO₂ capture in inherently stable forms through supercritical oxidation of coal in aquifer-derived water. The products of reaction, including CO₂, are returned in the aqueous solvent to the aquifer. The research includes systems analysis, materials, reactor and combustor development, and aquifer compatibility.