Introduction to Completed Project Reports

Eight GCEP research projects reached completion in 2007 in the areas of Hydrogen, CO_2 Storage, Advanced Combustion, and Integrated Assessment.

In the area of Hydrogen, Professors Alfred Spormann and James Swartz studied hydrogen production from bacterial systems and developed two different strategies to overcome hydrogenase inactivation by molecular oxygen. Also in the area of Hydrogen, Professor Mark Jacobson simulated the potential impact on the environment of enhanced hydrogen concentration in the atmosphere due to the replacement of fossil-fuel motor vehicles and electric power plants with hydrogen fuel cell vehicles and power plants.

In the area of CO_2 Storage, Professor Mark Zoback examined the feasibility of CO_2 storage in sub-bituminous coal beds and in deep saline aquifers. In this same area, Professor Jerry Harris studied various seismic methods to monitor subsurface CO_2 for leak detection.

In the area of Advanced Combustion, Professor Christopher Edwards investigated the potential to design and implement internal combustion engines with improved efficiency by reducing entropy generation in the engine cycle. In the same area, Professor Ronald Hanson developed various sensor technologies allowing the optimization of combustion processes and the minimization of pollutant emissions, and Professor Reginald Mitchell developed and validated models that accurately describe the behaviors of coal and biomass char particles for the development of robust combustors and gasifiers.

In the area of Integrated Assessment, Professors James Sweeney and John Weyant developed a comprehensive analysis system to evaluate the impact of novel energy technology options and to serve as a basis for assessments designed to accelerate their global deployment.