



Executive Summary

The traditional expertise of CAER originated with the direct and indirect liquefaction of coal and shale oil upgrading about a quarter of a century ago. These skills have been honed and redirected as the demands of our stakeholders changed and are described on our web site (www.caer.uky.edu) in some detail. The ongoing challenge for us is to define thrust areas where our research can advance the state-of-the-art and can make it into the market place.

Areas of focus we have developed more recently and are planning to grow include: a greater interest in carbon products from pitch; the coking of pitch and coal; novel applications for composite materials containing carbon nanotubes; applying our catalysis skills for increased hydrogen production at milder conditions via the water gas shift reaction; catalysis related to NO_x and SO_x formation; tracking mercury and its fate in solid wastes as well as investigating mercury capture on coal-derived materials; and moving into the area of biomass use for valuable products.

Besides these, we will be upgrading solid materials in ash ponds at a commercial scale. This is part of our effort to build expertise along

the full value chain from fly ash through cement, concrete and into ready-mix applications. The items above may look like a laundry list, but are all items related in a coherent way to our three main technical areas: Clean Fuels and Chemicals, Environmental and Coal Technologies and Carbon Materials.

In each of the activities, we are strengthening our ties with industries that can take the concepts further and we are working shoulder-to-shoulder to accomplish our mission of "focusing on the optimal use of Kentucky's and the Nation's energy resources for the benefit of its people."

These lofty goals can be reached with the continuing dedication and proven excellence of our staff and collaborators: both in industry and academia. We sincerely thank all of our partners for their enthusiastic support of our people and our results.



ARI GEERTSEMA, DIRECTOR