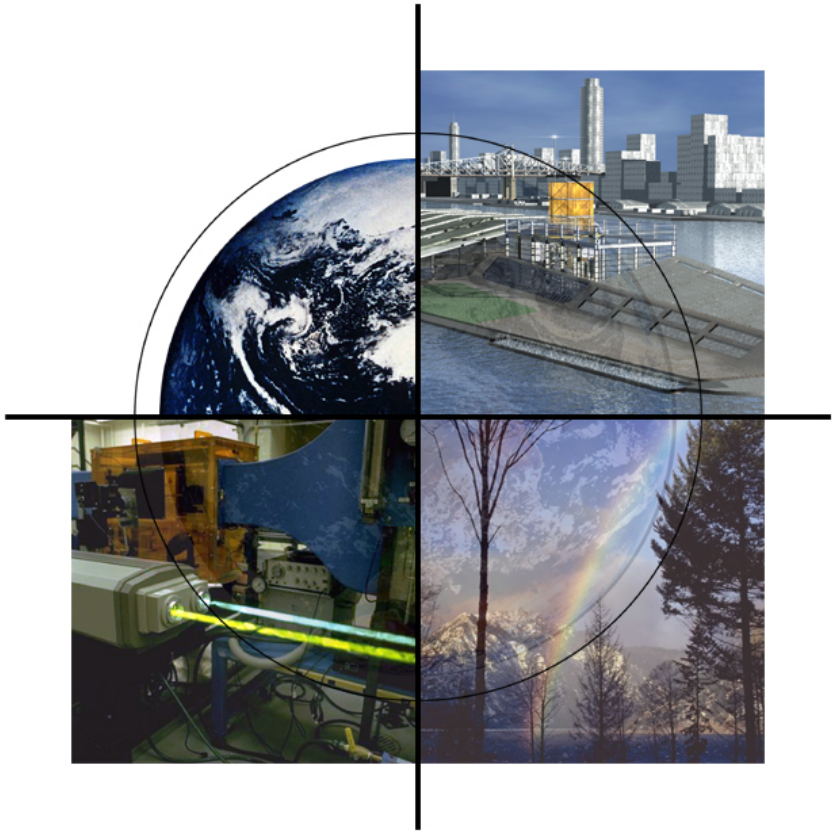
UCR and HBCU/OMI Research Programs



UCR/HBCU Program Review Meeting

Pittsburgh, PA
June 6-7, 2006

Robert R. Romanosky, Technology Manager
National Energy Technology Laboratory

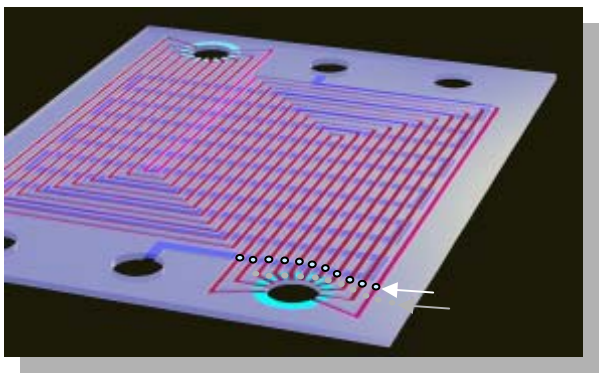
Advanced Research

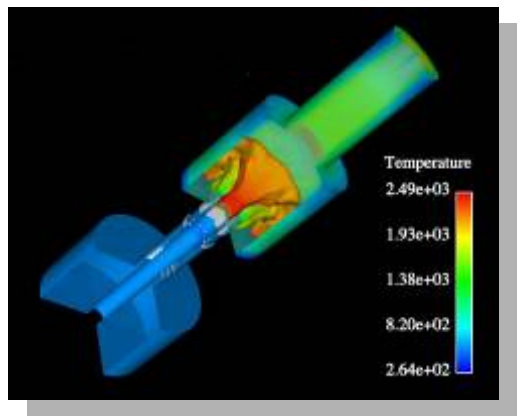
Mission

Extend state of knowledge in fossil energy technology by supporting development and deployment of innovative systems capable of improving efficiency and environmental performance while reducing costs

Bridge the gap between fundamental and applied technologies

Reflective of industry needs and responsible for driving new technologies

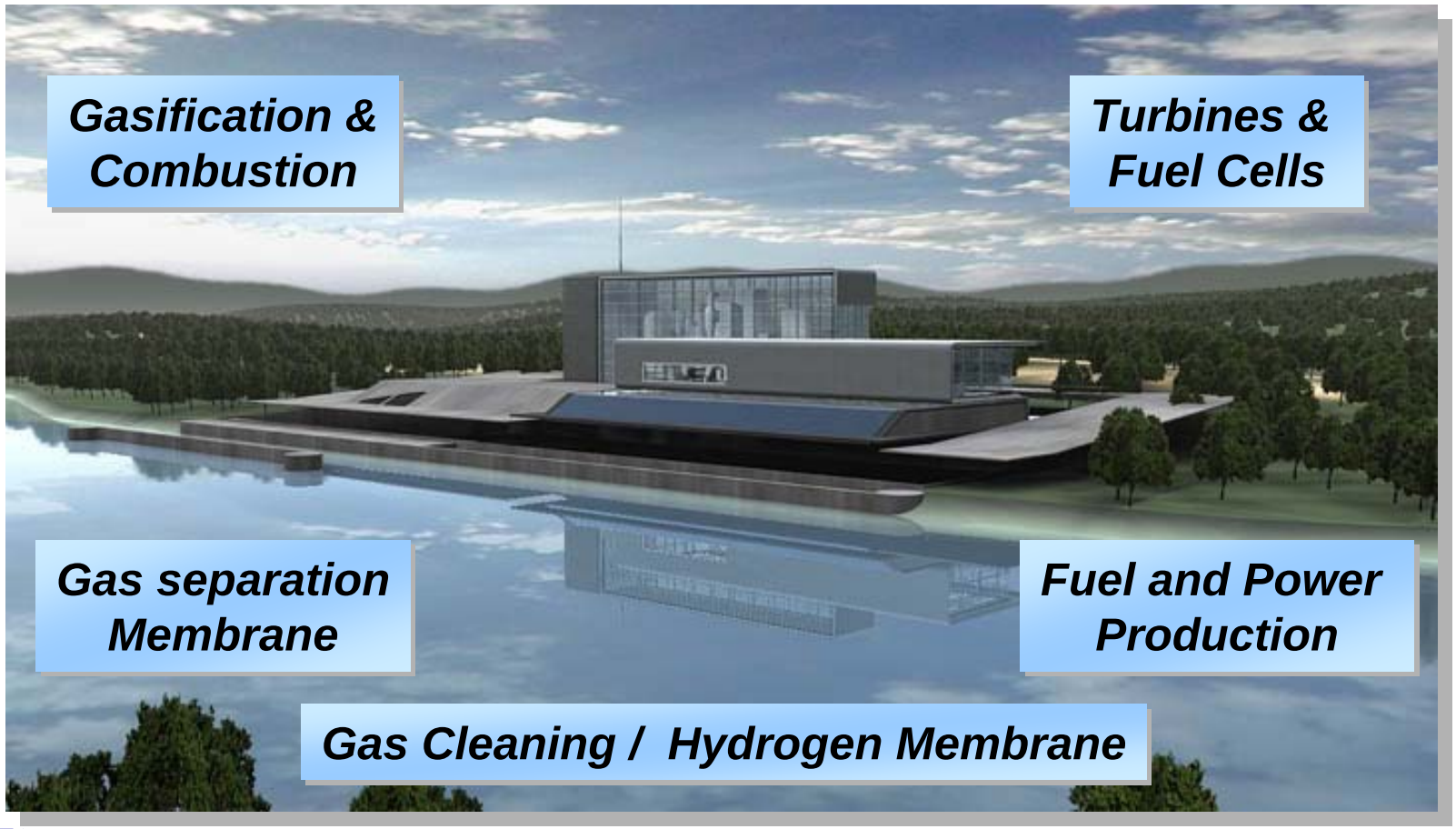




Develop technologies that address critical needs in Fossil Energy Programs

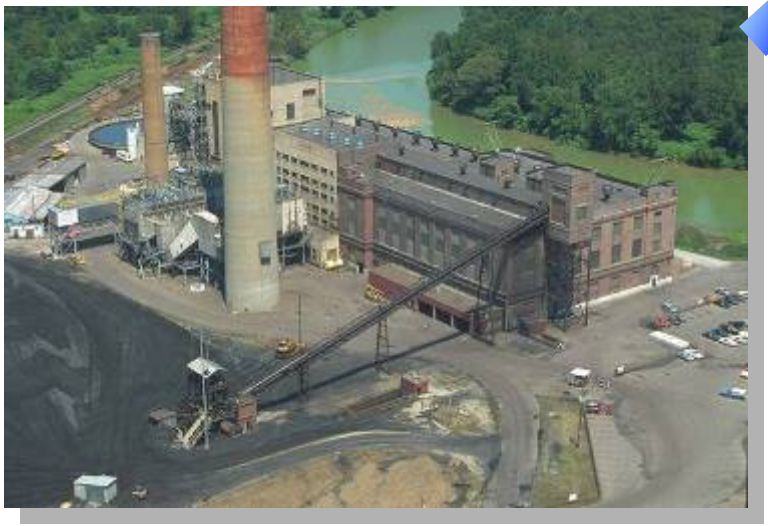
Program Strategic Performance Goal

By 2010, develop a suite of enabling technologies that support the goal of zero emission energy (FutureGen) systems through Advanced Research cross-cutting programs.



Technology Challenges

- Zero emissions
- Integrated systems
- Controllable and reliable designs
- Tight tolerances & operating margins
- High temperatures & pressures

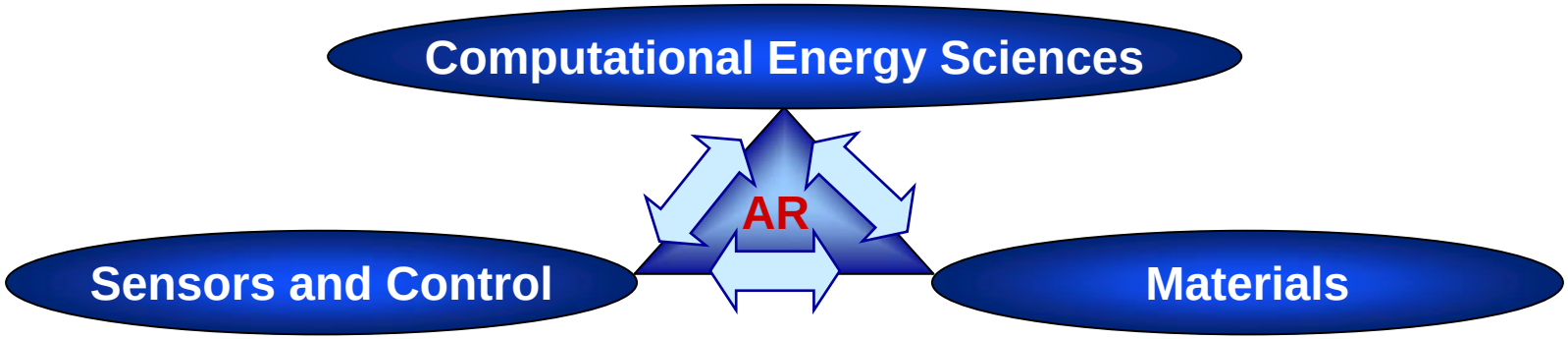


Mid 20th Century Plants

Near/Zero Emission Advanced Power Generation System

- Plant design
- Process modeling and control
- Operations monitoring (efficiency, emission, equipment)
- Dynamic and transient mode management
- Structural, separation, coatings, and sensing materials for harsh environmental

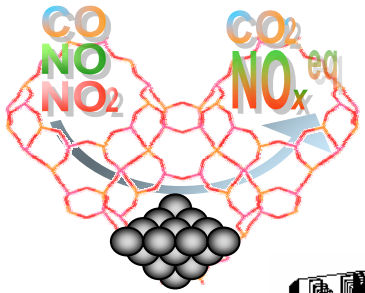
Realignment of AR Technology Focus

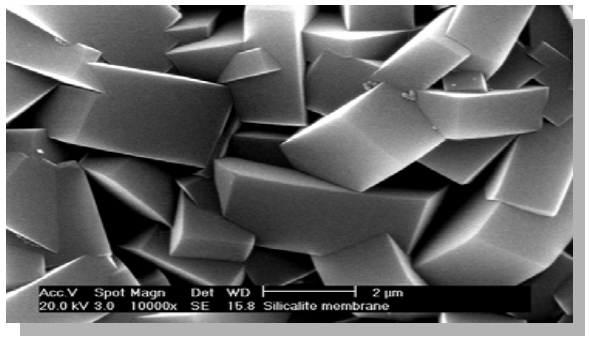


- **Essential and enabling technology development programs for the Strategic Center for Coal and Power R&D**
- **Focused effort will contribute to deployment of feasible technologies in the 5-15 year timeframe as well as contribution to the FutureGen Initiative**
- **Enhancement of individual subprograms by expanding collaboration, range of developers, and integrated technology efforts**

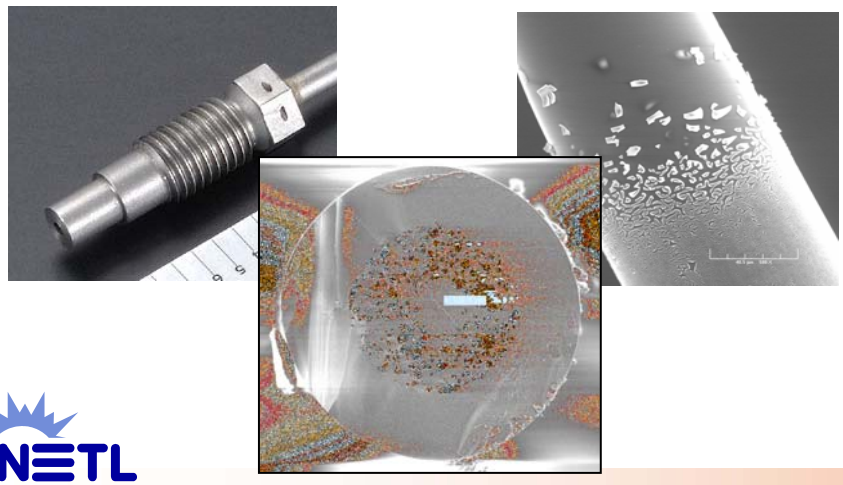
Advanced Research Crosscutting Technologies

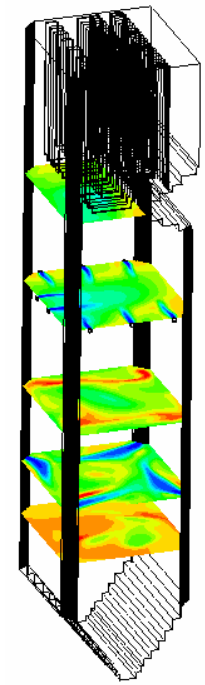
Materials

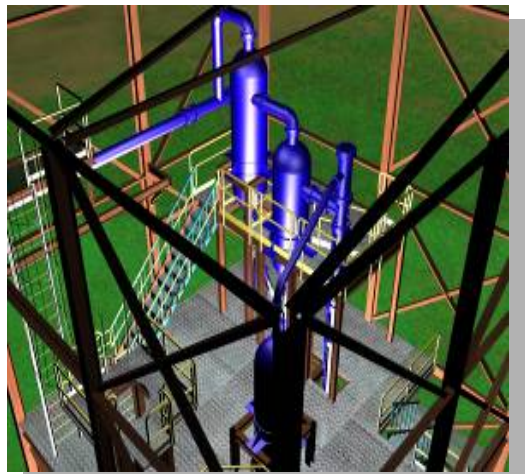




Instrumentation, Sensors, & Controls







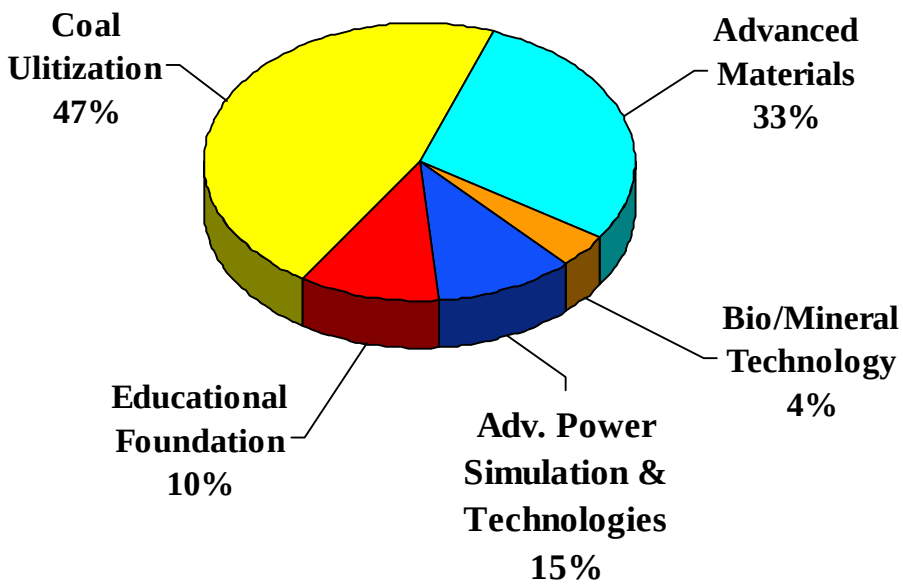
Computational Energy Sciences

Advanced Research Program

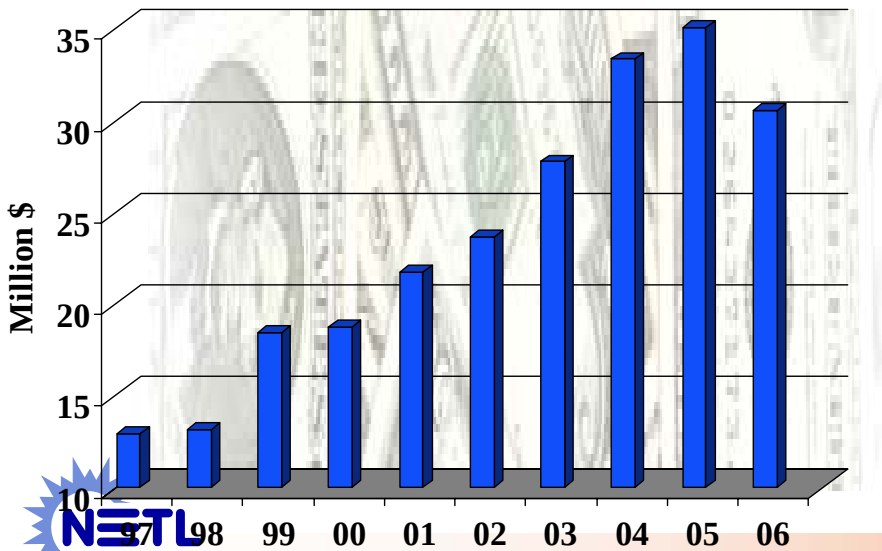
Projects by Organization

• Industry	21
• University	89
• National Laboratories	13
• Non-Profit	7
Total	130

FY06 Budget Allocation

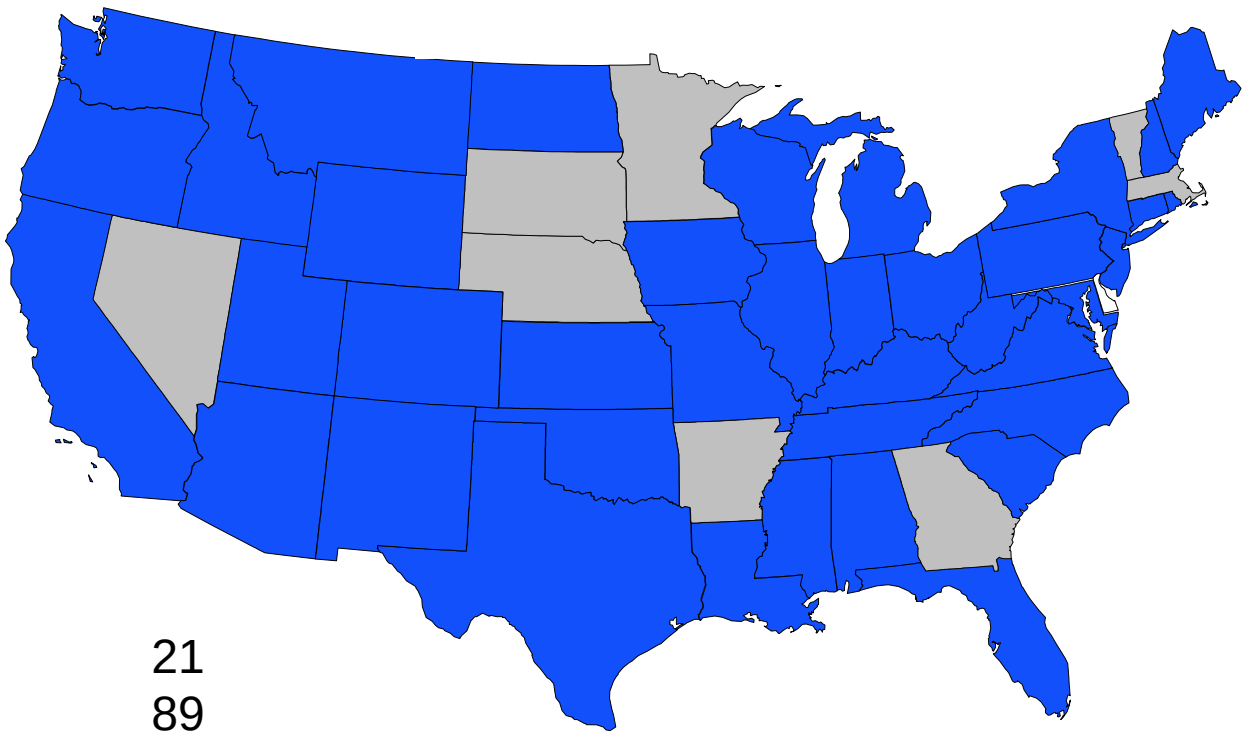


Annual Budget



Advanced Research Congressional Breath

FY2006 Projects by State



States with AR Projects

Organizations

• Industry	21
• University	89
• National Laboratories	13
• Non-Profit	7
Total	130

University Coal Research Statistics

- **During the Past Eight Years:**
  - 172 institutional grants awarded
  - 1130 technical papers published
    - Technical Awards
      >7
    - Patents Issued
      >9

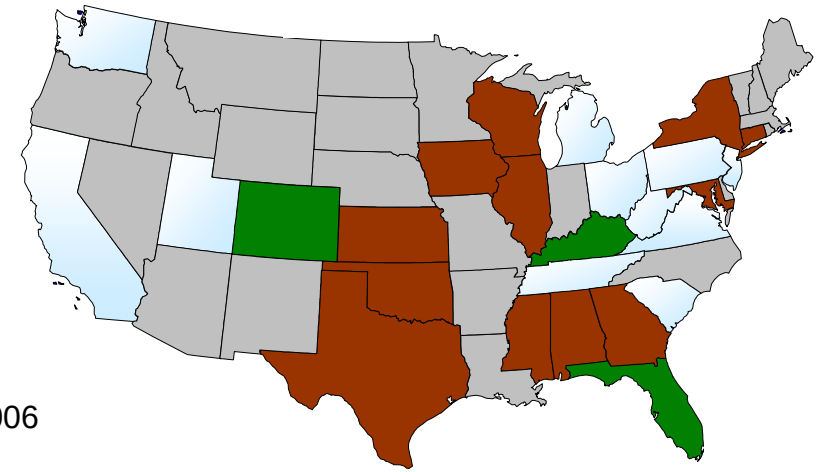
Educational Benefits

- Numerous B.S., M.S., Ph.D. Graduates
- Post-doctoral Research
- Interns

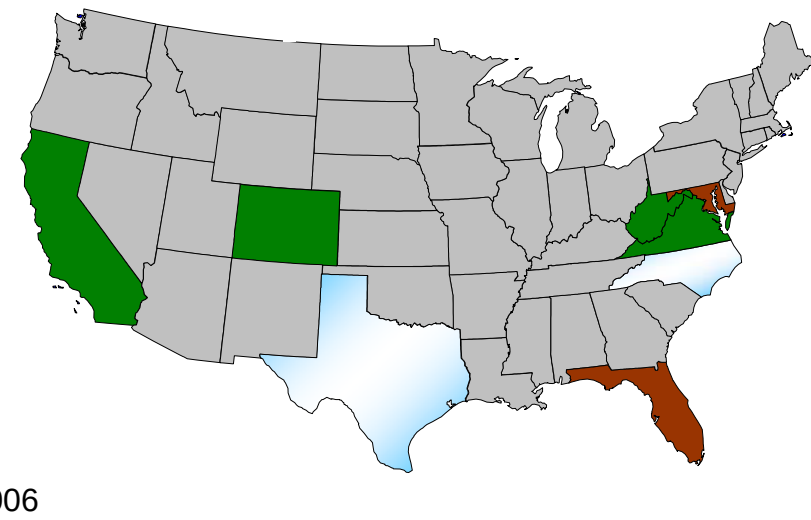
<u>Economic Benefit</u>
Over $12 million in Annual Salary Return

Program Awards

- **UCR**
  - FY2005 had 20 awards in 15 states
  - FY2006 had 26 awards in 20 states



- **HBCU/OMI**
  - FY2005 had 7 awards in 6 states
  - FY2006 had 7 awards in 4 states



UCR Project Statistics

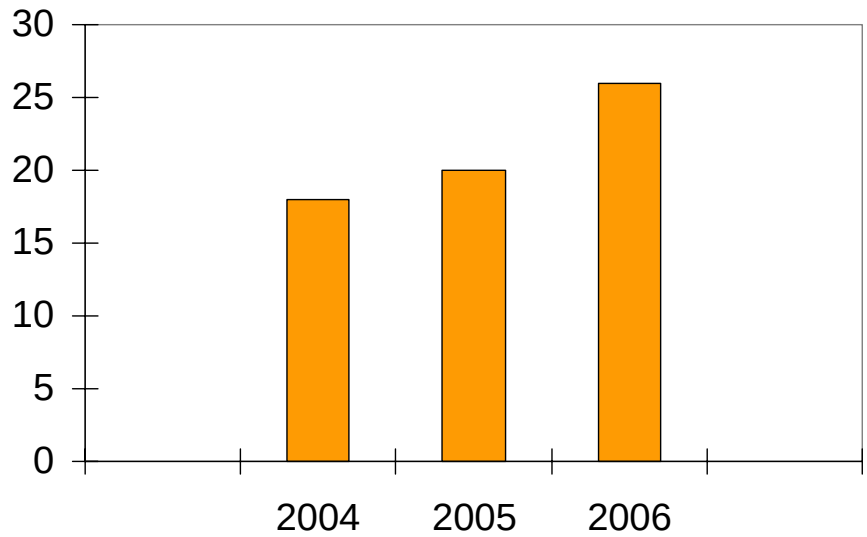
2006 Projects by UCR Focus Areas

• Materials	17
• Sensors	3
• Modeling	6
Total	**26**

Projects by Year

• 2004	18
• 2005	20
• 2006	26

UCR Projects by Year



Current UCR/HBCU Program

- Solicitation date changed from late fall to April timeframe
- Award date changed to end of calendar year
- Programs have mortgages rather than full funding at award
- The program has been re-structured with research emphasis on top priorities in fossil energy program needs
- UCR award values increased and collaboration encouraged

University Coal Research Program

The University Coal Research (UCR) Program has maintained three specific goals since its inception in 1980 (by Congressional direction):

- Sustain a national university program of research in energy and environmental science and engineering related to coal that focuses on innovative and fundamental investigations pertinent to coal conversion and utilization;

- Provide a future supply of coal scientists and engineers through research exposure in coal technologies while advancing the science of clean energy from coal; and

- Improve our fundamental scientific and technical understanding of chemical and physical processes involved in the conversion and utilization of coal, one of our nation's most abundant natural resources and by-products from coal processing.

Historically Black Colleges & Universities/ Other Minority Institutions (HBCU/OMI)

The HBCU/OMI Program emphasizes improving energy/environmental capabilities in advanced coal, oil, gas, and environmental technology concepts, and supports the education of scientists and engineers from diverse backgrounds by sponsoring research in support of NETL's technology lines at schools designated as HBCU/OMI. The Advanced Research Technology Team strives to accomplish the following goals:

- Provide and promote opportunities for HBCU/OMI in science and engineering.
- Foster private sector participation and interaction with HBCU/OMI in fossil energy-related programs.
- Provide a forum to facilitate technology transfer, strengthen educational training, and develop/enhance the research infrastructure capabilities of HBCU/OMI.