The 18th Annual ACERC Conference February 12-13, 2003 Provo, Utah

History of the Advanced Combustion Engineering Research Center (ACERC)

• Founded by the NSF in 1986

- Founding Director: L. Douglas Smoot
- Brigham Young University & University of Utah
- Initial Mission: Clean and Efficient Use of Fossil Fuels
 Initial research was aimed at improving the comprehensive 3-D entrained flow coal combustion model (PCGC-3)
- **NSF base support** funding (~\$2 M/yr)
- Successful completion of 11 years of NSF funding!
- Results:
 - Industry using CFD now
 - Many students placed in industry
 - Numerous publications and computer software products



Current ACERC Mission

To develop advanced combustion technology through fundamental engineering research and educational programs aimed at the solution of critical national problems



Current Research Interests

Industries

- Electric power
- Chemical processes
- Forest products
- Solid Waste
- Transportation
- Cement
- Glass
- Military (safety)

Fuels

- Coal
- Biomass
- Black liquor
- Petroleum coke
- Live fuels
- Municipal solid waste
- Natural gas
- Jet & diesel fuel
- Metallurgical coke
- Soot/model hydrocarbons
- Foams

Subjects

- Organic reactivity
- Ash
- Deposition
- Corrosion
- Soot formation
- NO_x, SO_x
- Mercury emissions
- Heat transfer (convective, radiative)
- CFD
- Parallel computing

ACERC Research Funds 1987-2002



Over \$75 million in research over 17 years!

Range of Research Interests in ACERC

Field Tests/Demonstrations

- Data Maps for Code
 Evaluation
- New Concepts

Comprehensive Modeling

- Incorporate Latest
 Submodels
- Accessible to Industry

Bench and Pilot Scale Testing

- Probe Measurements
- Laser Diagnostics
- Submodel Development

Fundamental Scientific Research

- Chemistry
- Mechanisms
- Ideas



Membership Benefits

- Access to students
- Joint proposals
- Influence direction of large & energetic research program
- Receive rapid feedback regarding current work
- Use of facilities/computers as visiting scientist
- Copies of theses and dissertations
- Publication lists
- Student resumes
- Highly discounted license for software
- Coordination of student internships/co-ops
- Tax deductible
- Reduced fees to annual ACERC conference
- Voice at members' luncheon



Current Industrial Members*

- Adapco
- Air Liquide
- Alliant Energy Corporation
- Alstom Power
- Babcock & Wilcox
- Reaction Engineering International
- Weyerhaeuser

*Companies that are official members



Industrial Participants

(Participated in the ACERC annual conference in 2002 or 2003)

- ADAPCO/CDa-access
- Air Liquide*
- Alliant Energy*
- Babcock & Wilcox
- Coal Tech LLC
- Cofiring Alternatives
- Columbian Chemicals
- Combustion Resources
- Detroit Stoker Company
- Dynergy Midwest Generation
- EDF R&D
- Electric Power Research Institute
- Energy & Environmental Research Center
- ExxonMobil Research & Engineering
- Foster Wheeler
- Fuel Tech, Inc.
- International Applied Engineering
- ISG Resources, Inc.

- KEMA
- Kvaerner Pulping Inc.
- N.S. Harding & Associates
- Plasma Inc.
- Praxair
- Reaction Engineering International*
- Reliant Energy Power Generation
- Sandia National Laboratories
- SINTEF Energy Research
- Southern Company Services
- Southern Research Institute
- SP Swedish National Testing and Research Institute
- Stanwell Corporation
- Tennessee Valley Authority
- The John Zink Company
- **TNO**
- VTT Processes
- Weyerhaeuser*
- Wheelabrator Shasta Energy Co.

***ACERC Industrial Members**





Change in Organization

- New Institute formed at the University of Utah
 - The Institute for Combustion and Energy Studies (ICES)
- This increases the visibility of the combustion group at the University of Utah (i.e., internal \$\$ and space)
- University of Utah personnel will no longer be referred to as "part of ACERC"
- ACERC will continue as a center at BYU only
- We anticipate continued collaboration and joint functions (conferences, short courses, technical meetings, etc.)
- JoAnn Lighty will be the first Director of ICES

Advanced Combustion Engineering Research Center (ACERC) Institute for Combustion And Energy Studies (ICES)



Professors Involved

ChE

ChE

ME

CS

CE

CE

ChE

ChE

CE

CS

ME

ME

Chem

Phys

ChE

- Calvin Bartholomew ChE
- Larry Baxter
- Merrill Beckstead
- Jeffrey Bons
- Mark Clement
- Tom Fletcher
- Fernando Fonseca
- Spencer Guthrie
- Hugh Hales
- Bill Hecker
- Matt Linford
- Warren Lucas
- Justin Peatross
- Quinn Snell
- Dale Tree
 - Brent Webb

- Eric Eddings JoAnn Lighty
- Dave Pershing
- Ron Pugmire
- Adel Sarofim
- Phil Smith
- Kevin Whitty

- ChFE
- ChFE
- VP
- ChFE
- ChFE
- **ChFE**
- ChFE







- ~ 30 Graduate Students
- ~ 45 Undergraduate Students
- ~ Research Faculty (at U of Utah)
- Visiting Scientists

ACERC & ICES secretaries:

- Jessica Higginbotham
- Trang Tran



Upcoming Events

Applied Combustion Short Course

- March 15-17, 2004
- University of Utah

AFRC Meeting

- March 18-19, 2004
- University of Utah



2004 Conference Agenda

Thursday Morning Chair: *Eric Eddings*

• NO_x Reduction

Thursday Afternoon Chair: *JoAnn Lighty*

Mercury Issues

Thursday Evening

Student Posters

Friday Morning Chair: *Larry Baxter*

Comprehensive Modeling

Friday Noon Member Luncheon

Friday Afternoon Chair: *Tom Fletcher*

 Fuel Characterization and Soot Formation

Announcements