

Center for Advanced Energy Studies

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BOISE STATE
UNIVERSITY



Idaho State University



Idaho National Laboratory

University of Idaho

CAES

Center for Advanced
Energy Studies



Center for Advanced Energy Studies

A public/private partnership

- Universities
- Private Industry
- National Laboratories

Integrate resources, capabilities and expertise

- Improve access to research facilities & equipment
- Expand researcher-to-researcher collaborations
- Enhance student educational opportunities

Deliver innovative, cost-effective, credible research

- Nuclear Energy
- Fossil, Renewable, and Alternative Energy
- Energy Policy Studies



**A new multi-institution
resource focused on
energy education and
secure sustainable
energy solutions**

CAES resources expand University & DOE Energy-focused Programs

Form multi-institutional research teams

- 12 projects underway involving 40 researchers and 20 students

Enhance Educational Programs

- Expand faculty pool through joint appointment and affiliate faculty programs
- Enrich curriculum with shared courses, infrastructure, and hands-on research
- Engage students in the INL Internship Program and research assistantships
- Administer DOE-NE UP (FY09)

Professional/Educational exchanges

- Promote researcher-to-researcher collaborations
- Host visiting scientists, staff, faculty, students

Industrial Partnerships/Consortia

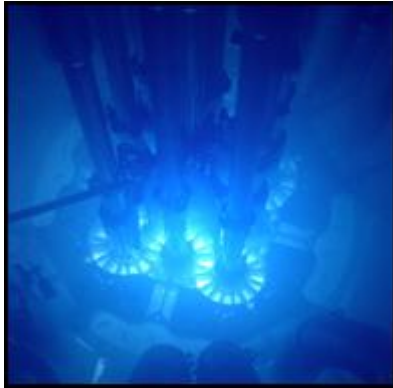
- Link researchers, companies, and capital
- Build a “critical mass”

Create government, university, and private industry collaborations



CAES research initiatives and affiliated programs

Nuclear Science and Engineering



ATR User Facility

Center Nuclear Space Research

Center Nuclear System Design/Analysis

Material Science



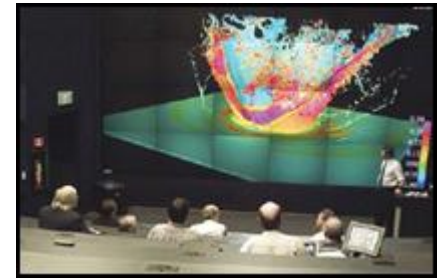
Materials Joining Initiative

Public Policy and Law



Energy Policy Institute

Modeling & Simulations



Control Room Simulator
Center for Advanced Modeling

Energy/Water



Carbon Management



Southwest & Big Sky CO₂

Bioenergy



Cellulosic Ethanol

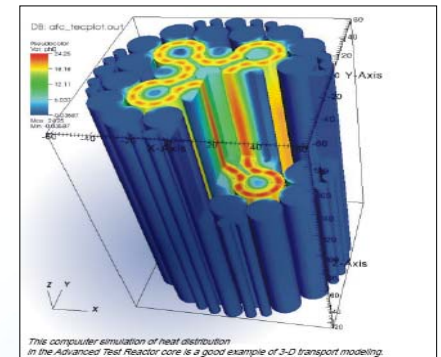
Idaho Strategic Energy Alliance

Center for Advanced Energy Studies



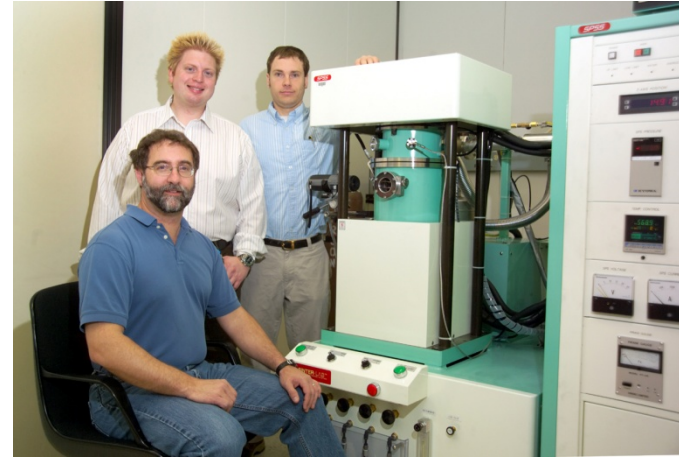
Business Focus Area: Nuclear Science and Engineering

- Partners: AREVA, Energy Northwest, GEH, GA
- Research Directions: Fuels and materials, advanced reactor designs, fuel cycle
- Current Awards: \$1,286K NRC, \$250K AREVA, \$150K I-NERI, \$900K DOE NE/AFCI
- Proposals: NASA-ID EPSCoR, DOE AFCI, NRC
- Expected Funding: Additional \$2M in the next year



Business Focus Area: Advanced Materials

- Partners: AMET; Los Alamos National Lab; Utah State University Mechanical and Aerospace Engineering Dept.; Premier Technology; Technology Management; Areva; Metal Processing Systems; Solidica; Energy Solutions; Ceramtec; Optomec; Advanced Dynamics; Scrypt.



- Research focus on processing and joining advanced materials, characterizing performance limits, and automating the processing, joining, and characterizing of advanced materials.

- Awards: \$428K INL LDRD; \$60K Premier Technology donation; \$20K Planning Grant: National Science Foundation Industry University Research Consortium

Business Focus Area: Carbon Management

- Partners
 - Big Sky Regional Carbon Sequestration Partnership
 - Southwest Regional Carbon Sequestration Partnership
 - Lamont Doherty Earth Observatory
 - Oklahoma State University
 - BRGM/CO 2GeoNet (France)
- Research Directions
 - Support Idaho Strategic Energy Alliance
 - Geologic sequestration in reactive rocks (Idaho relevant basalts, oil shale, black shale, and un-mineable coal beds)
- Current Awards: \$280K Regional partnership



Business Focus Area: Carbon Management (cont.)

- Proposals
 - DOE Energy Frontiers Research Center Proposal lead by CWRU ~ \$25 million
 - Shell Oil \$680K
- Expected Funding (FY 2009)
 - Regional Partnerships (\$620 K)
 - Shell Oil \$280K
 - EFRC \$450K
- Faculty (8): UI – 2; ISU – 2; BSU – 2; INL – 2
- Students (5): 1 MS completed, 2 MS underway, 2 PhD underway



Business Focus Area: Bio-energy

- Partners
 - Westway Terminals (ED&F Man)
 - Idaho Office of Energy Resources
- Research Directions
 - Bio-ethanol production from regionally available agricultural feed stocks; bio-methane production from dairy and food processing waste.
- Current Awards
 - FY09 LDRD (\$150K) with matching in-kind bio-ethanol contributions from industrial partner



Business Focus Area: Bio-energy (cont.)

- Proposals
 - FY 09-Feasibility study to evaluate bio-methane use at bio-ethanol production facility (private industrial partner)
 - FY 10 funding for anaerobic digester research associated with Idaho Center for Livestock and Environmental Studies (DOE).
- Expected Funding
 - FY 09 \$100K; FY10 \$500K
- Students/Faculty
 - ISU, 1 faculty partial support + 1 M.S. student summer support;
 - BSU, 1 faculty partial support + 1 M.S. student summer support;
 - U of I , 1 faculty partial support + 1 Ph.D. student support



Business Focus Area: Policy

- **Providing Support for:**
 - Idaho Office of Energy Resources (OER – MOU established)
 - Idaho Strategic Energy Alliance
- **Collaborating Partners**
 - Idaho Small Business Development Center
 - American Association of State Colleges and Universities (AASCU)
 - American Democracy Project (ADP)
- **Research Directions**
 - Analysis of Washington State Renewable Energy Bills - complete
 - Idaho Energy Development Projects - underway
 - Identify Evaluation Models
 - Capture University Education/Training needs
 - Investigate Methods of Public Discourse re Idaho Electricity Alternatives – underway
 - Conduct CAES/EPI Policy Summit to Identify Energy Research Needs - March 2009
- **Students/Faculty/Staff**
 - Two dedicated Faculty
 - Four MPA Graduate Assistants
 - Administrator and Project Manager to grow Institute



Establish Industrial Partnerships/Consortia

- National Science Foundation membership model
- Align research initiatives with entrepreneurs and companies
- Leverage Intellectual Assets
- Link to Industry and Capital
- Foster Entrepreneurialism
- Technology Transfer & Commercialization



Studsvik



Emerging Partnerships/Consortia

- Resilient “Smart Grid” test bed.
- Legacy building HVAC infrastructure wireless sensors and intelligent controls
- Energy saving opportunities in data centers based on a large eddy simulation technique using multi-graphics processing units.
- Green building certification approach driven by high-fidelity thermal and fluid transport simulations.
- Spark plasma sintering advanced material fabrication and characterization
- Radiochemistry laboratory equipment:
 - Radiochemistry separations glove box
 - Ultra-violet visible spectrophotometer
 - Molten salt/tube furnace glove box

Emerging Partnerships/Consortia

- Conservation markets: GIS-based multi-DB modeling of environmental assets and liabilities to support market-based land-use decisions, SAS
- Carbon sequestration technology investigation and policy development
- Wind energy education and demonstration programs: Sky Stream and Blackhawk generators installed at CAES, multi-site generator monitoring and data analysis
- Cyber security education programs: INL Control System Analysis Center
- RPSEA Forum: Unconventional Gas Development in the Western Energy Corridor: May 12, Idaho Falls Hilton Garden Inn
- High-Temperature Thermo-physical Properties and Evolved Gas Analysis Workshop: June 24, CAES
- Industry Center for Advanced Radioactive Material Processing Planning Grant Workshop: June 25-26, CAES
- Regionally-based venture capital relationships

Summary

- **CAES integrates resources, capabilities and expertise to enhance:**
 - Researcher-to-researcher collaborations
 - Educational opportunities
 - Research and educational capabilities
- **CAES fosters technical collaboration**
 - Aligns government, university, and private industry partnerships
 - Co-locates research teams and equipment
 - Promotes entrepreneurialism and technology-based economic development

Bringing together resources, capabilities, and expertise to achieve sustainable energy solutions while preparing next-generation energy experts