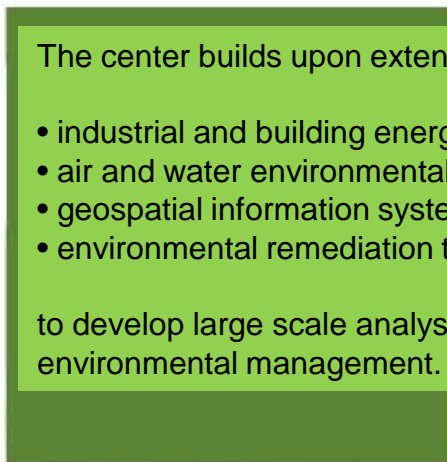
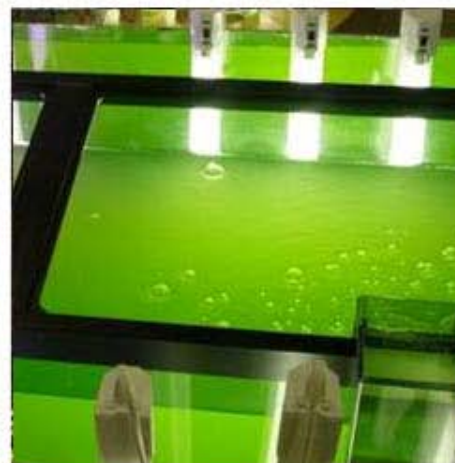
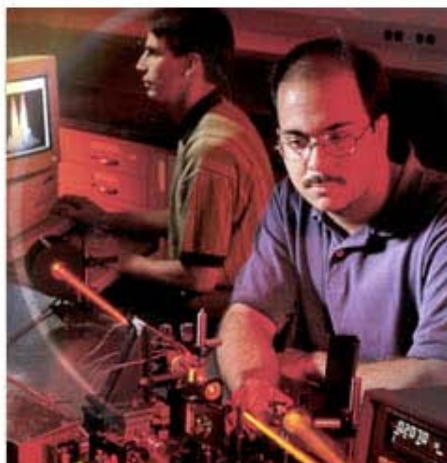




Center of Excellence for Strategic Energy & Environmental Informatics



The center builds upon extensive capabilities in:

- industrial and building energy informatics
- air and water environmental impact analyses
- geospatial information systems
- environmental remediation technology

to develop large scale analysis tools for strategic energy and environmental management.





Principal Investigators



- **Dr. Kelly Kissock**, Director: Industrial Assessment Center and Building Energy Center
 - 2003 DOE Center of Excellence Award
 - 2006 Ohio Governors Award for Energy Efficiency
 - Midwest Governors Midwest Governors' Energy Efficiency Advisory Group
 - Over 80 peer-reviewed publications
- **Dr. Sukh Sidhu**, Sustainable Environmental Technologies Research Group Lead
 - George Noland Researcher of the Year 2003 (Sigma Xi)
 - Invited lecturer nationally and internationally
 - Organizer and co-chair (since 2000) of the International F.W. Karasek Conference on Organic Pollutants from Fuel/Waste Combustion
 - Over 60 peer-reviewed publications
- **Dr. Phil Taylor**, Environmental Engineering Group Lead
 - Internationally recognized expert in emissions from thermal disposal of hazardous wastes
 - Invited lecturer nationally and internationally
 - EPA STAR Award in 1991 and 1993
 - Program chairman of International Congress on Combustion By-products in 1997
 - Over 200 peer-reviewed publications
- **Dr. Robert Brecha**, Leonard A. Mann Chair in the Sciences
 - Visiting scientist, Max-Planck Institute for Quantum Optics and University of Munich
 - Visiting scientist, European Laboratory for Nonlinear Optics, Florence, Italy
 - Visiting scientist, National Inst. for Applied Optics (INOA), Art Diagnostics Group, Florence, Italy
 - Visiting Scientist, Potsdam Institute for Climate Impact Research
- **Dr. Kevin Hallinan**, Director, Graduate program in Renewable and Clean Energy
 - Chair: Department of Mechanical and Aerospace Engineering
 - Over 80 peer-reviewed publications



Programs & Capabilities



- **Department of Energy sponsored Industrial Assessment Center**
 - 30 year continuous funding
 - Savings to Ohio manufacturers of over \$500M during the past 15 years
 - Research has supported companies including Ford Motor Company, Cargill, Delphi, Corning, Johns Manville, Scotts, and also the California State University System and many of the nation's largest companies
- **Environmental Engineering Capabilities**
 - Automated laboratory for evaluating emissions from waste-to-energy technologies
 - Thermal decomposition/gasification studies of new biomass materials
 - Life cycle analysis of greenhouse gases produced from new technologies for production of transportation fuels
 - Analytical support for environmental impact studies of substitution of renewable synthetic fuels for petroleum-based fuels
 - Analytical support for studies of coal/biomass to liquid technologies for production of synthetic transportation fuels
- **Sustainable Environmental Technologies Research Group**
 - CO₂ sequestration technologies – Algae, Cryo Cell etc.;
 - Development of carbon neutral fuels; research in biomass fermentation and catalytic pyrolysis of biomass feedstock;
 - evaluation of carbon footprint of facilities and development of strategies for reduction of carbon footprint (land management, process changes, increase in energy efficiency etc.)
 - evaluation and development of alternate non-hydrocarbon fuel based energy generation technologies waste to energy technologies – plastic waste to fuel, municipal waste to electricity/steam generation
 - life cycle analysis of environmental and economic impacts of energy production



Programs & Capabilities



- **World Class Carbon Sequestration and Bio Fuel Laboratory**
 - two 2500 liter photo bioreactors that are being used to investigate the use of microalgae for sequestering CO₂
 - clean room for storage and transfer of algal cultures, and measurement of algal growth, CO₂ fixation rates
- **World Class Emissions Research Laboratory**
 - Internationally recognized capability for evaluating the environmental impact of converting wastes to energy
 - Nation's only fully automated laboratory-scale apparatus with waste feed system, steady-state fuel injection, and state-of-the-art continuous emissions analysis capabilities
 - Multiple EPA STAR awards for developing unique research tools
- **World Class Collaborations**
 - Sustainable Energy Ireland
 - AlgaeLink, Netherlands
 - Algae growth and harvesting; University of Seville, University of Almeria and University of Alicante, Spain
 - Thermochemical treatment of algae to generate oil, Seambiotics Ltd., Tel Aviv, Israel
 - GIS based carbon foot printing: University of Oslo and European Environmental Agency, Copenhagen, Denmark
 - Waste to Fuel: EnvoSmart Technologies, Netherlands; Ozmotech Technologies, Australia; ALPHAKAT, Germany
 - Climate Change and Economics: Potsdam Institute for Climate Change Impact Research



Academic Contributions



- **Graduate Programs:**
 - PhD degrees in Mechanical and Chemical and Materials Engineering with Energy Systems emphases
 - One of only two Masters Programs in Renewable and Clean Energy in the US and jointly established with Wright State University and in collaboration with the Air Force Institute of Technology.
- **Integrated Sustainable Engineering Undergraduate Engineering Programs**
 - Established undergraduate program featuring sustainable engineering throughout most engineering courses
 - Energy systems concentration responsible for increasing enrollment
- **Design and Innovation Clinic:** more than 40 sponsored projects for Ohio industries oriented toward sustainable energy annually
- **NSF Sustainable Engineering Scholars Program:**
 - \$750K over 5 years
 - Need based undergraduate scholarships for women and minority students.
- **Climate Change Impact of Fuels Conference to be hosted by** University of Dayton October 2009
- **International Appropriate Technology:** ETHOS: 25-30 international internships in Latin and South America, Africa, and Asia in sustainable energy.
- **K-14 Connections:** Strong connection to Dayton Regional Stem Center / Sinclair Community College Energy Program / Dayton Early Academy



ETHOS
project



Economic Impact to Ohio



- US economic competitiveness relies on low cost energy
- Ohio's energy intensity is the 4th highest among all states
- Manufacturing, an Ohio strength, is more energy intensive than most economic sectors
- Ohio carbon emissions among the highest in the US
- The US will likely impose a carbon tracking system and possibly even a carbon tax
 - Energy costs, especially those associated with a large carbon footprint sources like coal fired electricity plants, would rise
 - Individual industries or even companies could become regulated based on their carbon footprint
 - Ohio could become disadvantaged because of its reliance on manufacturing, coal derived electricity and strong need for space heating and cooling
- Strategic statewide energy and climate impact reduction for EVERY building, residence, and manufacturer in Ohio will be important for maintaining and growing Ohio's economic base
- Strategic CO2 mitigation will also be important for maintaining and growing Ohio's economic base
- A 10% reduction in energy use would save Ohio \$3.8B per year
- Established partnerships with Ohio based companies that will leverage UD developed technologies to provide unique energy management services nationwide and internationally.



Growth Strategy & Comments



- UD combined long-term, well established strengths in energy and environment to focus on future research needs in sustainable energy
- Growth plans include:
 - Development of On-Line Masters in Renewable and Clean Energy Being Developed...Much international interest)
 - Long term plan to develop Doctoral Level Energy and Climate Informatics Curriculum
 - Planned Chaired Professor in Strategic Energy Management
- Recent Investments Include:
 - 3000 sq. ft. lab devoted to CO2 capture and reuse
 - Hiring of algae fuels expert
 - Hiring of new faculty (Geothermal energy/heating/cooling)
- Energy and carbon management are vital to the nation's competitiveness and security which will require substantial research to achieve



Contact Information

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