Many Kansas scientists focusing on KNE’s major research project, *Climate Change and Energy: Basic Science, Impacts and Mitigation*

In the ten months since the *Climate Change and Energy: Basic Science, Impacts and Mitigation* project at Kansas NSF EPSCoR was officially launched, more than 175 Kansas scientists (faculty, students and other personnel) have rolled up their sleeves and begun work.

The scientists represent many disciplines and four institutions: Kansas State University, the University of Kansas, Wichita State University and Haskell Indian Nations University.

The *Climate Change and Energy* project is a major endeavor, in which the scientists will collaborate through September, 2014, targeting solutions for a cleaner environment by advancing the science of renewable energy sources. The project was funded by the National Science Foundation, with matching funds contributed by the Kansas Technology Enterprise Corporation (KTEC).

The scientists are working in teams on interrelated research initiatives:  
- Nanotechnology for Renewable Energy;  
- Biofuels and Climate Change;  
- Climate Change and Mitigation; and  
- Climate Change in Indigenous Communities. (See inset at right.)

An early key accomplishment of NRE is progress that has been made in growing algae for biofuels in outdoor bioreactors (see “Growing high-yield algae in treated wastewater,” P. 3).

NRE also had an ambitious Research Experiences for Undergraduates program over the summer. One of the REU students was a Workforce Development intern in summer 2009 (see story, P. 2).

**Biofuels and Climate Change**

Led by Dietrich Earnhart, professor of economics at KU, this project has a diverse group of scientists, including many social scientists, who are examining farmers’ values and attitudes to determine what goes into farmers’ land-use decisions.

The project has also generated a comprehensive land-use land cover dataset (see “Mapping tool developed for crop decision research,” P. 3).

**Climate Change and Mitigation**

Led by Charles (Chuck) Rice, University Distinguished Professor of Soil Microbiology at K-State, CCM has three subprojects:

- Modeling Climate Change Variables: focusing on improving climate change modeling specific to Kansas and the central Great Plains.
- Kansas Farmlands: assessing climate change adaptation strategies. Initial interviews of farmers have been completed (see “Interviewing some of the climate change stakeholders,” P. 3).
- C- Sequestration: currently, a baseline for soil organic carbon is being established.

The HERS interns were mentored by KU graduate students from the NSF IGERT, C-Change (Integrative Graduate Education and Research Traineeship: Climate Change, Humans, and Nature in the Global Environment.)

**HERS students present research at “Living Earth Festival”**

Undergraduate interns from the Haskell Environmental Research Studies Institute (HERS) were invited to present their research at the Smithsonian’s National Museum of the American Indian (NMAI), Aug. 6–8, as part of the “Living Earth 2010 Festival.”

HERS is a 10-week summer program directed by Joane Nagel, University Distinguished Professor of Sociology, KU, and Dan Wildcat, HERS director.

All 13 of the HERS interns presented posters at the NMAI. One student, Abigail Jones, also served with Wildcat on a panel at the event.

HERS is funded by Kansas NSF EPSCoR as the Climate Change in Indigenous Communities project that is part of the Climate Change and Energy initiative.

The HERS interns were mentored by KU graduate students from the NSF IGERT, C-Change (Integrative Graduate Education and Research Traineeship: Climate Change, Humans, and Nature in the Global Environment.)
Greetings from Kansas NSF EPSCoR!

It is very exciting to be able to watch the launching of our new and highly promising research projects. This includes our Track 1 major initiative Climate Change and Energy: Basic Science, Impacts and Mitigation (P.1), and our joint project with Oklahoma, Collaborative Research: EPSCoR RII Track 2 Oklahoma and Kansas: A cyberCommons for Ecological Forecasting. Both of these initiatives are now well on their way. The first annual cyberCommons for Ecological Forecasting symposium was held in Lawrence on September 3, 2010.

The just breaking news is that our C2 proposal Prairie Light: Next Generation Optical Networking for Mid Continent Science was funded! The award goes to the three major research universities in Kansas, Kansas State University (Daniel Andresen, co-PI), Wichita State University (Ravi Pendse, co-PI), and the University of Kansas (Donald F. (Rick) McMullen, co-PI). However, its influence will reach far beyond to other institutions of higher learning, including Emporia State University, Pittsburgh State University, and Johnson County Community College. The project partners with KanREN (Kansas Research and Education Network), a non-profit consortium of learning institutions and other organizations in Kansas that facilitates inter-institutional communication, and will allow for an upgrade of KanREN’s network from 2 to 10 Gbytes. The result will be a vastly improved data network that will directly impact a number of educational and research initiatives throughout Kansas. More will follow in the next newsletter.

I am also delighted to report that this summer’s internship program at Haskell Indian Nations University has been a tremendous success (P.1). This year, in addition to students from Haskell, students from Diné College attended the summer program. What is particularly appealing with this program, is that it is truly a “pathway” in the sense that former trainees return to mentor new interns and to help to lead them along the path. We also have two graduates of the program, Michael Dunaway and Paula Smith, now both graduate students in Geology at KU.

We have also reinstituted what was previously a very successful program known as First Awards (P.4). While this award was discontinued in the previous Phase, it was brought back by huge demand. I am especially pleased that this year the awards are rather equally distributed among our three major research universities and across a breadth of disciplines, including the biological and physical sciences, engineering, and possibly for the first time mathematics.

In all, it has been a very eventful year and kudos go out to the active researchers who have been responsible for the success of these projects.

Work is continually underway to build links between the four interrelated research initiatives for Climate Change and Renewable Energy.

For the Calendar

Kansas NSF EPSCoR Statewide Conference
Monday, October 4, 2010 • Adams Alumni Center, KU
www.nsfepscor.ku.edu/2010-stateconference.html

NSF Day
Tuesday, October 5 • Kansas Union, KU
www.rgs.ku.edu/nsf

Building links and making connections through an REU program

Workforce Development and Climate Change in Indigenous Communities, at Haskell Indian Nations University and Nanotechnology for Renewable Energy, with scientists based at KU, KSU and WSU, has connected through an ambitious Research Experiences for Undergraduates (REU) program. One of the REU students this summer is a recent Haskell graduate who participated as in intern in Workforce Development in summer 2009. Michael Dunaway will pursue a master’s degree in geography at the University of Kansas. He and the other 21 REU students spent the summer studying alternative energy.

Dunaway’s research focuses on projects that could have significant impact to the economy and culture of tribal lands.
Growing high-yield algae in treated wastewater

Algae promise to be a major renewable energy problem-solver. They grow fast, trap carbon dioxide and have the potential for high lipid contents which can result in high oil yields. Algae can also grow on land not suitable for agriculture, and don't displace food crops.

There are hurdles to mass algae production that science must still address. It is difficult to grow algae in outdoor settings and still get consistently high oil yields. Lots of fresh water must be used, so environmental costs could potentially outweigh the benefits.

Kansas NSF EPSCoR researchers Belinda Sturm, assistant professor of environmental engineering, Val Smith and Jerry deNoyelles, professors of ecology and evolutionary biology, and Susan Williams, associate professor of chemical and petroleum engineering (all of KU) are partnering with the Lawrence, KS water treatment plant. They are looking at ways to develop sustainable and consistently high oil yields from algae grown in outdoor bioreactors filled with treated wastewater (sewage).

Initial results have been promising and both the scientists and the wastewater plant professionals are pleased about yet another environmental benefit. The wastewater-grown algae consume the nitrogen and phosphorus in the wastewater, and these pollutants are removed when the algae is harvested. This is a big plus, because the Midwest’s water treatment plants are under pressure to send less nitrogen and phosphorus downstream to the Gulf of Mexico.

Interviewing some of the climate change stakeholders in Kansas: farmers and ranchers

John Harrington Jr., professor of geography at Kansas State University, believes that the response of farmers and ranchers to ongoing climate change now will lead to new agricultural practices. This will help farmers and, also, help us all through the food they produce.

Harrington and his team of student researchers embarked this summer on a project to figure out what, exactly, farmers and ranchers are observing and thinking about the weather, climate and other environmental changes.

The students interviewed about 50 farmers/ranchers in the northern Flint Hills and the Smoky Hills of Kansas, about
First Awards fund young faculty members’ research

An important component of the EPSCoR mission is encouraging and assisting young faculty members in their quest for research funding. Earlier this summer, KNE made awards to eight Kansas faculty members, through our First Awards Program. The awardees are:

Caroline Chaboo, KU, assistant professor of entomology, for *Phylogenetic Research in the Hyperdiverse Leaf Beetle Family, Chrysomelidae (Coleoptera).*

Christopher Depcik, assistant professor of mechanical engineering, KU, for *Adaptive Lean NO Trap Kinetics for Lean Phase Operation and Cost Savings.*

Gregory Houseman, assistant professor of biological sciences at WSU, for *Can Spatial Variability Created by Dispersal Explain the Accumulation of Biodiversity?*

Andrew Ivanov, assistant professor of physics, K-State, for *Towards New Discoveries at the Energy Frontier.*

Preethika Kumar, assistant professor of electrical engineering and computer science, WSU, for *Investigating and Evaluating the Effects of Relative Phase in Different Architectural Layouts of Qubits for Different Quantum Systems.*

Tianshi Lu, assistant professor of mathematics and statistics, WSU, for *Modeling and Algorithms of Multiphase Magnetohydrodynamics in Tokamaks.*

Gregory Rudnick, assistant professor of physics and astronomy, KU, for *Isolating the Environmental Effects on the Evolution of Galaxies over Cosmic Time.*

Richard Todd, assistant professor of plant pathology, K-State, for *The Mechanism of Regulated Nuclear Export of the Aspergillus nidulans Nitrogen Transcription Factor AreA.*

For more information on these First Award projects, visit [www.nsfepscor.ku.edu/first-awards.html](http://www.nsfepscor.ku.edu/first-awards.html)