

Annual Update

**Kentucky Experimental Program to Stimulate Competitive Research
(EPSCoR)**

Submitted to:

Kentucky Council on Postsecondary Education

Submitted for:

The Kentucky Statewide EPSCoR Committee

by the

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KENTUCKY EXPERIMENTAL PROGRAM TO STIMULATE COMPETITIVE RESEARCH (EPSCoR)

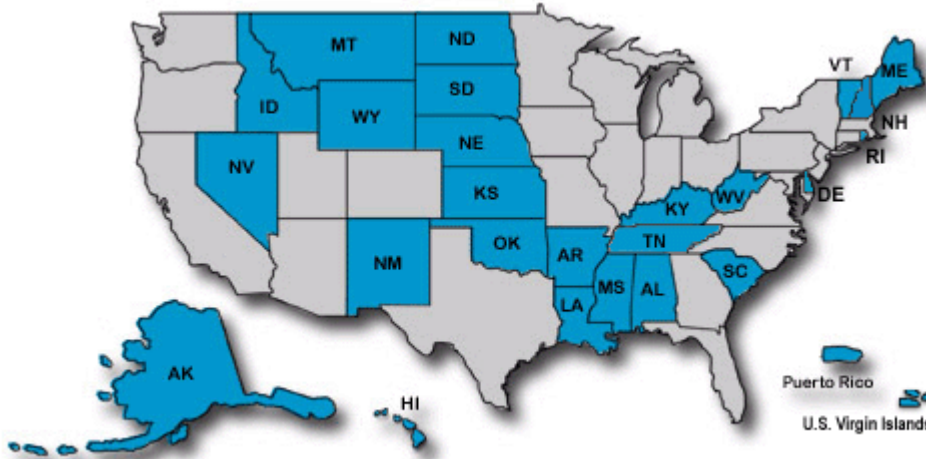
Program Description and Priorities

The Kentucky Statewide EPSCoR (KY EPSCoR) Program’s mission is to enhance the research and intellectual capacity of universities and colleges by building and coordinating strategic investments in human capital and physical infrastructures necessary for Kentucky to excel in federal R&D funding competitiveness. The Statewide Program is divided into two programmatic areas: the **Federal Agency EPSCoR Program** which with some exceptions requires state matching funds, and the **KY EPSCoR Infrastructure Seeding Program** which generally requires institutional matching funds and a commitment to submit a proposal for federal R&D funding. The Federal Agency Program receives the majority of KY EPSCoR’s budget and is the primary program through which KY EPSCoR receives research funding support. A discussion of each of the two programmatic areas follows:

Federal Agency Program

There are seven federal agencies participating in federal EPSCoR-type programs. The federal EPSCoR program has become popular and federal funding for the program has grown from \$147 million in FY 2000 to \$402.3 million for FY 2008. There are now 25 states eligible to participate plus the Virgin Islands and Puerto Rico. (See Figure 1.)

Figure 1. EPSCoR States/Territories



source: NSF EPSCoR

The National Science Foundation pioneered the EPSCoR concept, and it is the second largest funding contributor to the national program. The National Institutes of Health’s EPSCoR-type program, called an Institutional Development Award (IDEA), has now become the largest funding contributor.

Each federal agency program has similar objectives but differ in program structure and proposal award process. Table 1 and 2 provide insight into the different agency EPSCoR programs. Each agency has different reporting requirements and fiscal years which complicate fiscal tracking. Further more, agencies are structuring their EPSCoR Programs to involve multiple awards with varying performance periods, rather than a single award. As noted, the matching requirement for federal funds varies per agency program. A match requirement of 2 to 1 means that for every \$2 federal dollars received, KY EPSCoR must match with \$1 state dollar.

Table 1. Funding Guidelines

Federal Agency or State Program	Grant Fiscal Year	Period of Performance	Match Requirement
NSF	6/1 – 5/31	6/2005 – 5/2008	2 to 1 (<i>Reinstated Effective FY09</i>)
NASA	Varies	Varies	1 to 1
DOE	7/15 – 7/14	7/2007 – 3/2011	1 to 1
EPA	Varies	Varies	1 to 1
NIH	Varies	Varies	None
DoD	Varies	Varies	2 to 1
USDA	Varies	Varies	None
Infrastructure Support (State)	7/1 – 6/30	Varies	Varies

Table 2. EPSCoR Proposal Application Entities

EPSCoR Agency	KY Subcommittee	Chairs	University Faculty apply directly to the:	Funding Available:
NSF	Yes	John Connolly, University of Kentucky	KY EPSCoR Subcommittee	Proposals accepted for three award types under the Research Infrastructure Initiatives (RII): Infrastructure - large 3 -5 year awards to develop an institutions research capacity in a specific area of science or technology, Research Enhancement Grants (REG) - seed funding to support faculty and acquisition of needed research instrumentation, Research Scholars Program (RSP) -support for under-represented students in scientific research. Federal applications are also eligible for Co-funding
DoD	Yes	George Pack, University of Louisville		Proposals accepted for Basic and Applied Research & Instrumentation
NASA	Yes	Karen Hackney, Western Kentucky University		Proposals Accepted for Research Implementation, Research Infrastructure
DOE	Yes	Eric Grulke, University of Kentucky		Proposals Accepted for Research Implementation, Lab-State Partnership
NIH / IDeA	no		Federal Agency	Federal applications for: Centers of Biomedical Research Excellence (COBRE) , IDEA Networks of Biomedical Research Excellence (INBRE) , and other proposals are eligible for Cofunding
USDA	no			Federal applications for: Research Career Enhancement Equipment , Seed Grants , and Strengthening Standard Research
EPA	no			Federal applications are eligible for Co-Funding
Infra-structure Support	no		Statewide EPSCoR Program Office	Proposals currently accepted for 3 award types: Research Start-up Fund (RSF) - to help incoming faculty readily establish a research program , Collaborative Research Development Program (CRDP) - grants to foster the development of large-scale multi-investigator research programs, centers, or institutes in Kentucky, National Laboratory Initiative (NLI) - travel assistance to develop relationships with national laboratories and stimulate collaborative research

In FY 2009, NSF will reinstate mandatory cost sharing for the EPSCoR Program. In 2004, the National Science Board eliminated the cost sharing requirement in part due to concerns that some institution’s limited ability to provide cost sharing, could inhibit their ability to complete for funding. Due to award timing, FY2008 is the only year that NSF’s elimination of its match requirement had any bearing on the KY EPSCoR Program.

No state matching dollars are currently required by the NIH program. The Kentucky Statewide EPSCoR Program interacts with federal legislators, with the assistance of the EPSCoR Coalition, to continue the expansion of the increasingly important NIH program from which Kentucky is receiving significant funding.

Subcommittees have been established by KY EPSCoR for four of the federal agency programs. These Subcommittees, as identified in Table 2 above, managed the proposal process for their respective agency program for the reporting period.

The Statewide Committee supervises and directs the activities of Kentucky’s federal agency subcommittees. Policy of the Statewide Committees is for each agency subcommittee to have two Statewide Committee representatives.

The federal agency and infrastructure programs collectively had 178 active projects for FY08 and provided new funding for 62 of those projects during the fiscal year period. These projects included funding support for academic researchers pursuing specific research topics, as well as funding for scientific instruments and equipment, and other infrastructure building activities. Currently four of the federal agencies (NSF, NIH, DOE, and NASA) have infrastructure building components within their program.

KY EPSCoR Infrastructure Seeding Program

Consistent with its mission, KY EPSCoR has seeding initiatives to help build human capital, increase the state’s science and technology infrastructure, improve cooperation among researchers in the state, and promote multi-institutional cooperation in key areas. These initiatives are varied but include activities to stimulate major research initiatives, identify emerging research arenas promising accelerated funding growth, foster relationship development with federal agencies, and build research infrastructure at the comprehensive universities. The KY EPSCoR Infrastructure Seeding Program provided funding for 19 projects during the reporting period. The number of projects per infrastructure seeding initiative is listed below:

<u>Program</u>	<u>FY 08 Awards</u>
Research Start-up Funds (RSF)	Eleven Awards *
National Laboratory Initiative (NLI)	One Award
Collaborative Research Initiation Grants (CRIG)	One Award
Collaborative Research Development Grants (CRDG)	Two Awards
EPSCoR Conference Planning Grant	Three Awards
Outreach	One Award

* The number of RSF awards funded in FY2008 is abnormally high, as five of the awards were actually made in FY2007, but were not eligible for funding until this reporting year. In addition, the delay in initiation of new NSF funding delayed KY EPSCoR's match requirements, thereby allowing all pending RSF awards to be funded. No new RSF awards are anticipated during FY2009.

KY EPSCoR does not necessarily fund all infrastructure seeding programs each year. The Statewide Committee attempts to identify those seeding programs that will provide the greatest benefit for the budget period funding available. Table 3 below highlights the criteria for our four primary infrastructure grants.

Table 3. KY EPSCoR: Infrastructure Seed Funding Grants

Grant Categories		Grant Terms		Cash Matching	Eligibility	Award Requirement for Advancing Research	
Full Name	Abbrev	Purpose	Period	Max Amounts	EPSCoR:Univ.		
Research Start-up Fund	<u>RSF</u>	To provide funding to attract high quality applicants for the establishment of new faculty positions.	1 - 2 years	\$10,000 - \$50,000 Total for award term	2:1	KY's 6 Comprehensive Universities : EKU, KSU, MoSU, MuSU, NKU, WKU	Must submit a research proposal(s) for federal funding
Collaborative Research Initiation Grant	<u>CRIG</u>	To bring groups together to discuss the possible formation of multi-investigator programs, centers, or institutes	up to 1 year	\$10,000	None Required	Faculty members or researchers from any of KY's state supported universities	Pursue federal funding
Collaborative Research Development Grant	<u>CRDG</u>	To seek extramural funding for a major research initiative.	up to 1 year (renewable for a 2nd yr)	\$30,000 / year	None Required	Faculty members or researchers from any of KY's state supported universities	Must submit a proposal(s) seeking funding for a major research initiative
National Laboratory Initiative	<u>NLI</u>	Travel funds to develop strong individual and institutional relationships with national laboratories and research centers	up to 1 year	\$1,500 for a visit \$5,000 for residence up to 1 year	None Required	Faculty members or researchers from any of KY's state supported universities	Pursue federal funding

A description of each of the infrastructure seeding programs follows:

1. The Research Start-Up Fund (RSF) assists Comprehensive Universities in Kentucky by providing competitive research start-up packages for new faculty hires. These packages establish support levels commensurate with those offered by academic institutions in non-EPSCoR states and assist recruiting the strongest faculty. An institutional cash match of fifty percent is required. It further requires recruitment to be in areas consistent with EPSCoR and institutional interests, and gives proposers priority weighting if they are aligned with the Commonwealth's economic development focus areas.

2. Collaborative Research Development Program (Phase I = CRIG; Phase 2 = CRDG). The Collaborative Research Development Program initiative is intended to foster the development of large-scale multi-investigator research programs, centers, or institutes within the Commonwealth that will become competitive for federal Research & Development funding through agency, interagency, and multi-agency programs (NSF, EPA, DOE, DOD, NIH, USDA, NASA, etc.).

Collaborative Research Initiation Grants (**CRIGs**) provide support to enable groups of researchers to assemble and to explore the creation of a large-scale research initiative. Funds can be used for workshops, electronic meetings, seminar speakers, travel or other reasonable expenses associated with bringing Kentucky researchers and nationally known experts together to discuss emerging areas of national importance, common interests, and possible research initiatives. Respondents should view this RFP as an opportunity to establish a prominent presence in an emerging research area before the field becomes highly populated. Phase 1 **CRIGs** are up to one year in duration and may not exceed \$10,000.

Groups that have evolved to the point where they have identified a research direction are eligible for a Phase 2 Collaborative Research Development Grant (**CRDG**). **CRDGs** are intended to support the organization and initiation of collaborative group activities, to establish the requisite advisory board or panel defined by the targeted funding institution, and to support the preparation and submission of a proposal to establish a major research program, center, or institute. **CRDGs** are up to one year in duration and may not exceed \$30,000.

3. Research Enhancement Grants (REG) – are intended to encourage talented faculty to remain in the Kentucky education system and to strengthen undergraduate teaching and research. The **REG** program enables faculty from Kentucky’s public and private undergraduate colleges and comprehensive universities to develop their research programs and to increase the participation of undergraduate students in research. While University of Kentucky and University of Louisville faculty are not eligible to receive **REG** awards, collaboration between Kentucky’s undergraduate and research institutions is encouraged and consistent with EPSCoR goals and objectives. Funds are provided to assist in covering costs related to research, including recipient faculty’s summer salary, undergraduate student support, fringe benefits, travel, materials and supplies, and equipment.

4. National Laboratory Initiative (NLI) supports initiatives to develop and nurture strong individual and institutional relationships with national laboratories, and to enhance the likelihood that Kentucky will acquire a national laboratory or a branch center of excellence. This program is also intended to support faculty researchers as they pursue opportunities to utilize highly sophisticated facilities and equipment not available in Kentucky for their research. Program funding can be used to acquaint faculty, graduate-level students and postdoctoral fellows with R&D opportunities at national laboratories, and conversely, to familiarize national laboratory personnel with the R&D capabilities of Kentucky universities, in general, and faculty, in specific.

5. The Conference Program (CP) provides the Statewide Committee funds to organize and conduct conferences which will promote the mission of KY EPSCoR. Conference activities focus upon emerging areas of high growth research opportunity and areas expected to benefit from increased federal funding. The annual KY EPSCoR Conference is funded through a Conference Program award.

6. The Pipeline Program (PIP) connects faculty and students at non-doctoral granting institutions with researchers at either the University of Kentucky or the University of Louisville. The faculty/student team commits to research at one of these institutions during two summers, and maintains contact throughout the year. Students matriculating to graduate school must apply to either the University of Kentucky or the University of Louisville. The faculty member must submit a research proposal for a federal grant jointly with the host faculty.

KY EPSCoR has traditionally viewed its main priority to be the capture of federal R&D funding for the Commonwealth’s academic community. Corollary priorities are to increase the competitive posture of junior researchers, and provide for additional research capacity through equipment purchases and other infrastructure building activities. KY EPSCoR has enlarged this view to encompass a pronounced interest and promotion of the new economy focus areas when such interest is amenable to the EPSCoR-type federal agency programs.

7. Outreach Funding supports the development of communication tools (brochures, CD’s, websites, etc.) to communicate KY EPSCoR Program opportunities and results to a variety of audiences.

Program Oversight and Award Process

The Kentucky Statewide EPSCoR Committee supervises and directs KY EPSCoR. The Committee is composed of three group segments: senior university administrators responsible for research activities, senior research faculty from academic institutions, and public sector members who have senior level business and/or research backgrounds. Representation is sought from the Commonwealth’s two main research universities plus the comprehensive universities. Figure 2 identifies the Committee membership for the reporting period.

FIGURE 2
Kentucky Statewide Committee Membership

Wimberly Royster, Chairman Vice President for Research, Emeritus University of Kentucky	Tim Ramsey SureGene, LLC Louisville, Kentucky
Richard Alloo General Manager, Production Engineering Plant Toyota Motor Manufacturing, NA	Shivendra Sahi Assistant Director, Applied Research and Technology Program Western Kentucky University
Blaine Ferrell Dean Ogden College of Science and Engineering Western Kentucky University	Phil Schmidt Director, Center for Integrative Natural Science & Mathematics Northern Kentucky University
Eric Grulke Associate Dean for Research and Graduate Studies University of Kentucky	Chuck Staben Associate Vice President for Research University of Kentucky
Rob Keynton Professor and Chair, Department of Bioengineering University of Louisville	Bob Stout, Professor and Chair, Deptment of Microbiology and Immunology University of Louisville
T.S. Kochhar Professor Department of Biology Kentucky State University	Edwin Tivol Vice President, Intelligence Operations and Homeland Security Electronic Warfare Associates, Inc.
Ben Malphrus Director, Space Science Center Morehead State University	James Tracy Vice President for Research University of Kentucky
Manuel Martinez-Maldonado Executive Vice President of Research University of Louisville	Sam Varnado CEO National Institute for Hometown Security Somerset, Kentucky
John Mateja Director, Undergraduate Research and Scholarly Activities Office, Murray State University	David White Director, Hancock Biological Station Murray State University
Tom Otieno Associate Dean for Administrative Affairs and Research Eastern Kentucky University	Mickey Wilhelm Dean, J.B. Speed School of Engineering University of Louisville

The award process for each of the Subcommittees is prescribed by its solicitation policy and procedures for proposal review and evaluation. A discussion of the award process for the following agencies follows:

KY NSF Subcommittee Award Process

SOLICITATION POLICY:

The KY NSF EPSCoR maintains a contact list to notify potentially interested parties of currently available funding opportunities. This list generally includes the following groups of people at all Kentucky colleges and universities:

- Presidents
- Research Office Personnel
- Department Heads (Deans) in science and technology related departments
- KY EPSCoR Committee members
- KY NSF EPSCoR Sub-committee members
- Individual Researchers in science and technology fields
- Individuals that have contacted us and requested that they be added to our mailing list.

In addition, the KY NSF EPSCoR maintains a publicly available website (www.kynsfepscor.org), which announces all of our funding opportunities

POLICIES AND PROCEDURES FOR PROPOSAL REVIEW AND EVALUATION:

Proposals are submitted to KY NSF EPSCoR for three award types under NSF's Research Infrastructure Initiatives (RII) Program: Infrastructure Awards (5-year awards); Research Enhancement Grants (REGs), which are "seed funding" awards that support regional faculty in Kentucky and also the acquisition of needed research instrumentation; and the Research Scholars Program (RSP), which supports underrepresented student populations in scientific research.

Infrastructure Awards: account for about 90% of the program's distributed funding. These large, focused projects seek to develop research infrastructure in specific science and technology areas at institutions across the state. Brief "idea papers" are submitted by faculty and are reviewed by an outside panel of experts (contracted through the American Association for Advancement of Science – AAAS). The field of "idea papers" is then narrowed to the most promising and full proposals are developed and mail reviewed by experts and also (again) by the AAAS panel. The final recommendations of the AAAS panel are forwarded to the KY NSF EPSCoR Subcommittee members. The Subcommittee ultimately decides which ideas will be included in a RII proposal submitted to NSF and makes its recommendation to the KY EPSCoR Statewide Committee..

The REG program: accounts for about 5%–7% of the program's distributions. REG awards are submitted by interested faculty in response to an annual solicitation and are then competitively awarded. A panel of experts from the two research universities in the state, the University of Kentucky (UK) and the University of Louisville (UL) is formed annually to evaluate these proposals and determine funding levels. Panel members are invited to review as part of this committee at the request of the KY NSF EPSCoR Director. Note that these awards are not offered to research university faculty. Only faculty members from regional Kentucky colleges or universities are eligible to receive this funding.

The RSP: is a relatively new program started in 2006 and implemented to replace and expand upon the success of Summer Program Awards from previous years. These small awards (about 15 have been made to date) target supporting underrepresented students in scientific research projects. The students and a mentor faculty submit a jointly developed research plan of student activities. The proposals are accepted year round and the funding is awarded on a first come, first serve basis provided the students meet all program requirements. The KY NSF EPSCoR Director and Assistant Director review the RSP proposals.

KY DOE Subcommittee Award Process

SOLICITATION POLICY:

The DOE EPSCoR Subcommittee administers the Kentucky DOE EPSCoR Program for the Statewide EPSCoR Committee. It responds to DOE requests for proposals, each of which requires adherence to specific DOE-defined guidelines and protocols. For assembling a Program that is responsive to a DOE EPSCoR solicitation, the Subcommittee, in cooperation with universities and industry, assesses energy-related R&D strengths and needs within Kentucky. The Subcommittee then requests pre-proposals from universities throughout Kentucky which are reviewed strategically with respect to innovation and their potential impact on R&D competitiveness. Fully developed proposals are requested and, upon university-approved submittal, peer reviewed. These proposals are assembled into a comprehensive program that is submitted to the DOE for funding.

POLICIES AND PROCEDURES FOR PROPOSAL REVIEW AND EVALUATION:

Proposals submitted to the DOE EPSCoR Subcommittee are evaluated in an extramural mail peer review. Proposals are submitted to at least five 'experts-in-the-field', identified by their publication and research records. The Subcommittee also requests names of reviewers from the proposal respondents, specifically stating that no person who has potential affiliation or participation in the project should provide a review of a proposal nor should anyone who could financially gain by reviewing the proposal provide a review. After receiving at least three scientific reviews, the technical aspects of the proposals are ranked according to the reviewers' comments. They are also assessed relative to the extent to which they: add value to existing or new and innovative energy research in Kentucky; stimulate systemic change and advancement; and produce demonstrated achievements during the course and beyond the term of the award.

KY NASA Subcommittee Award Process

SOLICITATION POLICY:

Solicitation is made statewide via announcements transmitted electronically to research/academic affairs offices at all Kentucky universities and colleges for distribution to all eligible faculty on the campuses. The e-mail distribution is based on the directory maintained and provided by the Kentucky Council on

Postsecondary Education. The announcement provides instructions for accessing the website that contains the full request for proposals and the forms needed for submission of proposals. Access for all eligible participants is facilitated by downloadable proposal instructions and forms.

POLICIES AND PROCEDURES FOR PROPOSAL REVIEW AND EVALUATION:

Proposals are reviewed and evaluated both by an independent External Review and Advisory Panel and by the members of the NASA EPSCoR Subcommittee. At a joint meeting of the Subcommittee and Panel, the advice of the Panel is provided for consideration by the Subcommittee. The Subcommittee decides on the awards, based on their own reviews, and full discussion of the Advisory Panel reviews with the Advisory Panel members and makes its recommendation to the KY EPSCoR Statewide Committee.

KY EPA Subcommittee Award Process

SOLICITATION POLICY:

US EPA has changed the way it administers its EPSCoR program. It no longer has a separate solicitation for EPSCoR awards, but stipulates that a percentage of its general research award programs go to EPSCoR states. Accordingly, the KY EPA EPSCoR subcommittee is no longer needed and has been disbanded.

KY DoD (DEPSCoR) Subcommittee Award Process

SOLICITATION POLICY:

In anticipation of the BAA (Broad Agency Announcement) from DoD, the subcommittee solicits white papers and letters of intent from researchers at various colleges and universities in the Commonwealth. Communications with the research deans and announcements to the research administrators, as well as the KY EPSCoR web page, are utilized extensively to notify potential applicants. The subcommittee evaluates the white papers and letters of intent received and encourages the investigators to share their research ideas with government researchers and program managers at DoD laboratories. When the BAA is issued, the subcommittee notifies the investigators as well as research offices at the colleges and universities and requests that proposals be submitted to the subcommittee prior to the federal DEPSCoR deadline.

POLICIES AND PROCEDURES FOR PROPOSAL REVIEW AND EVALUATION:

The proposals are sent for review to the subcommittee and also to an external group of three panelists. External reviewers are selected who have DoD experience either in an academic environment or in a federal research laboratory that is involved in DoD-related research. This external group then convenes at a central location to discuss, evaluate and rate the proposals. The following day the Kentucky DEPSCoR Subcommittee meets with the External Panel to receive its rankings. The subcommittee then meets in closed session to determine which proposals will be forwarded to DoD. The DEPSCoR Subcommittee may accept the External Panel rankings or revise them in light of the state DoD research goals.

Finally, the Chairman of the DEPSCoR Subcommittee is required to write an executive summary of the proposed projects that explains the relevance of the individual proposals to the DoD mission, as well as to the research infrastructure of the universities. The complete proposal package and summary statement is then forwarded to DoD for review.

Performance Measure

Federal Funding Awarded

The primary goal of Kentucky EPSCoR is to secure federal research dollars and the required matching funds for the Commonwealth's academic institutions. Accordingly, the prime performance measure is the total aggregated federal and other funding received from competitive awards. Table 3 provides the aggregated funding by source for the reporting period.

The KY EPSCoR program was responsible for channeling approximately \$29.4 million in R&D funding for the Commonwealth's academic research community in FY 2008. This represents a fairly consistent amount compared to last year's \$29.5 million in funding, but still a decrease of \$3.5 million compared to FY 2006 funding levels. Per Table 3 below, we are pleased that each of the Federal agency programs (with the exception of EPA) has received new or continued funding in FY08.

Table 4. KY EPSCoR Program Funding by Source for FY 2008

Federal Agency Program					
<u>Program</u>	<u>KY EPSCoR (Actual)</u>	<u>Federal (Budget)</u>	<u>Institutional (Budget)</u>	<u>Other (Budget)</u>	<u>Total</u>
DOD	200,000	\$943,748	\$342,678	\$0	\$1,486,426
DOE	250,000	\$500,000	\$127,565	\$0	\$877,565
EPA	0	\$0	\$0	\$0	\$0
NASA	250,000	\$682,144	\$844,657	\$0	\$1,776,801
NIH	0	\$13,377,034	\$621,000	\$0	\$13,998,034
NSF	907,451	\$3,000,000	\$1,366,221	\$0	\$5,273,672
NSF-Match**	0	\$2,962,758	\$0	\$0	\$2,962,758
USDA	0	\$2,098,985	\$0	\$0	\$2,098,985
Sub-total:	\$1,607,451	\$23,564,669	\$3,302,121	\$0	\$28,474,241

KY EPSCoR Infrastructure Seeding Program					
<u>Program</u>	<u>KY EPSCoR (Actual)</u>	<u>Federal</u>	<u>Institutional (Budget)</u>	<u>Other (Budget)</u>	<u>Total</u>
RSF	413,667	*	\$206,833	\$0	\$620,500
CRDG	35,708	*	\$0	\$0	\$35,708
CRIG	10,000	*	\$0	\$0	\$10,000
NLI	1,283	\$0	\$0	\$0	\$1,283
CP	14,065	\$0	\$0	\$0	\$14,065
Outreach	15,000	\$0	\$0	\$0	\$15,000
Sub-total:	\$489,723	\$0	\$206,833	\$0	\$696,556

KY EPSCoR Administration					
<u>Program</u>	<u>KY EPSCoR (Actual)</u>	<u>Federal</u>	<u>Institutional (Budget)</u>	<u>Other (Budget)</u>	<u>Total</u>
KY EPSCoR Admin	227,731	\$0	\$0	\$0	\$227,731
Sub-total:	\$227,731	\$0	\$0	\$0	\$227,731

KY EPSCoR Program					
FY Total:	\$2,324,905	\$23,564,669	\$3,508,954	\$0	\$29,398,528

* Recipients are required to submit proposals for Federal funding.

** This co-funding amount covers the period from October 1, 2006 - September 30, 2007.
(FY07-08 amounts will not be available until after EPSCoR's CPE Annual Report is due.)

Highlights for each of the programs are noted below:

- NIH continues to provide the most significant level of federal funding (\$13.4 million for FY08) through seven Institutional Development Awards (IDeA) to researchers at UK and UofL. Five of the seven IDeA awards have received renewals extending their average project periods to 10 years. The remaining two awards will be up for renewal in 2009.
- Although the future of the DoD EPSCoR program was in jeopardy last year, KY researchers won two new DoD EPSCoR awards totaling just under \$1 million in federal support, matched by \$200 k in KY EPSCoR Program support.
- Kentucky researchers benefitted greatly through the USDA EPSCoR program this year as well, showing over a \$1 million increase in funding compared to last year.

- KY DOE EPSCoR began its first year of a three year, \$1.9 million federal award on nanoscale materials for energy conversion that will be matched by \$750 k in KY EPSCoR Program support.
- KY NASA EPSCoR has experienced funding growth through both its Research area I, II and Core programs as well as through the KY Space Grant Consortium.
- The KY NSF EPSCoR program successfully closed out its current 3 year award and has received a new 5 year, \$12.5 million award that will begin in August 2008. However, NSF co-funded awards (see NSF-Match in Figure 4) were down nearly \$1 million from last year. NSF supports co-funded awards out of their primary budget, by giving preference to proposals from EPSCoR States which score near the cut off line for funding.
- Through the Conference program, KY EPSCoR supported two symposiums on nanotechnology this fiscal year and began the planning of our annual conference.
- Program budget cuts will affect our ability to make more infrastructure awards in FY09 and have raised concerns about our ability to meet anticipated match obligations.

KY – EPSCoR Historical Performance

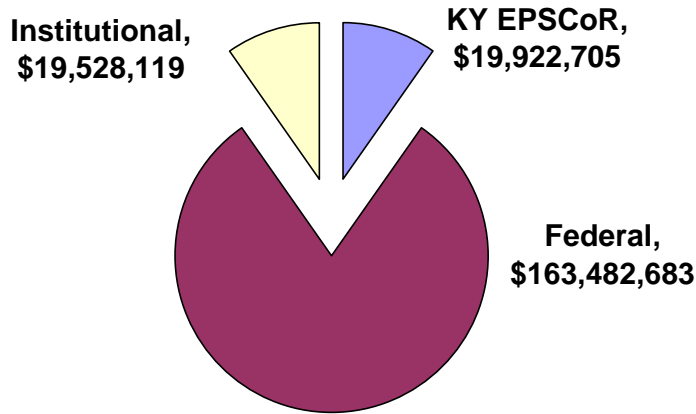
Figure 5 shows in tabular form the progression of research funding obtained by the Commonwealth since the inception of the KY EPSCoR Program. The Program has grown in great part due to the work of the EPSCoR Coalition and support of Kentucky’s federal legislators. The EPSCoR Coalition has successfully lobbied for larger EPSCoR-IDEA agency budgets and the KY Statewide EPSCoR Committee maintains a dialogue with Kentucky’s Congressional offices on the importance and opportunities captured by the Commonwealth due to the EPSCoR agency programs. **Moreover, the Commonwealth’s eight-year investment of \$19.9 million has been leveraged over eight fold to channel over \$163.5 million in federal research dollars to Kentucky over the past eight years.** Total funding (all participating sources) has channeled over \$313 million to Kentucky researcher’s since KY EPSCoR’s inception.

Figure 5. Approximation of Research Funding Secured Through the KY EPSCoR Program

Fiscal Yr	KY EPSCoR	Federal	Institutional	Other	Total	Accumulated Total
85/86	\$25,000	\$75,000	-	\$0	\$100,000	\$100,000
86/87	\$932,162	\$837,458	\$2,769,598	\$0	\$4,539,218	\$4,639,218
87/88	\$825,582	\$909,856	\$2,423,594	\$0	\$4,159,032	\$8,798,250
88/89	\$641,970	\$672,929	\$1,770,903	\$13,000	\$3,098,802	\$11,897,052
89/90	\$660,136	\$437,441	\$1,429,476	\$0	\$2,527,053	\$14,424,105
90/91	\$544,290	\$351,392	\$1,333,161	\$0	\$2,228,843	\$16,652,948
91/92	\$1,327,078	\$1,649,314	\$2,524,988	\$0	\$5,501,380	\$22,154,328
92/93	\$1,317,836	\$2,046,139	\$2,717,427	\$146,000	\$6,227,402	\$28,381,730
93/94	\$1,195,000	\$2,680,162	\$2,797,656	\$0	\$6,672,818	\$35,054,548
94/95	\$764,999	\$2,481,391	\$2,974,975	\$0	\$6,221,365	\$41,275,913
95/96	\$1,530,000	\$4,443,707	\$6,291,125	\$416,000	\$12,680,832	\$53,956,745
96/97	\$1,547,691	\$5,593,868	\$5,254,401	\$0	\$12,395,960	\$66,352,705
97/98	1777500	\$5,945,291	\$5,267,851	\$153,539	\$13,144,181	\$79,496,886
98/99	\$1,978,300	\$13,526,306	\$2,691,050	\$153,540	\$18,349,196	\$97,846,082
99/00	\$2,550,700	\$9,360,845	\$479,784	\$153,540	\$12,544,869	\$110,390,951
Subtotals	\$17,618,244	\$51,011,099	\$40,725,989	\$1,035,619	\$110,390,951	
00/01	\$2,564,600	\$11,618,087	\$137,275	\$0	\$14,319,962	\$124,710,913
01/02	\$2,521,600	\$17,069,950	\$1,956,547	\$0	\$21,548,097	\$146,259,010
02/03	\$2,751,000	\$19,080,909	\$2,684,092	\$40,000	\$24,556,001	\$170,815,011
03/04	\$2,440,900	\$19,059,724	\$2,395,422	\$13,493	\$23,909,539	\$194,724,550
04/05	\$2,439,900	\$21,947,452	\$2,528,768	\$33,000	\$26,949,120	\$221,673,670
05/06	\$2,439,900	\$27,116,701	\$3,365,052	\$33,000	\$32,954,653	\$254,628,323
06/07	\$2,439,900	\$24,025,191	\$2,952,009	\$36,600	\$29,453,700	\$284,082,023
07/08	\$2,324,905	\$23,564,669	\$3,508,954	\$0	\$29,398,528	\$313,480,551
Subtotals	\$19,922,705	\$163,482,683	\$19,528,119	\$156,093	\$203,089,600	
FY08 Leverage Multipliers =		10.1			11.6	
Cummulative (FY01-08) Leverage Multipliers =		8.2			9.2	
TOTALS	\$37,540,949	\$214,493,782	\$60,254,108	\$1,191,712	\$313,480,551	

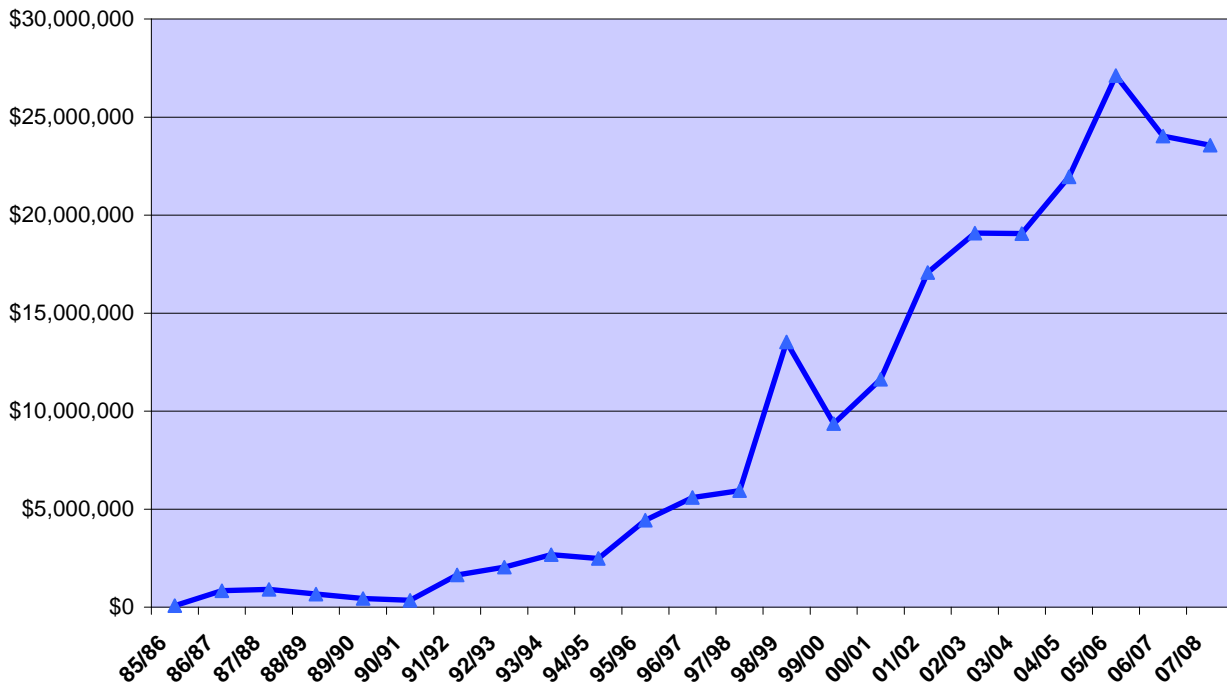
The pie-chart below (Figure 3.) further emphasizes the substantial leveraging of Kentucky EPSCoR funds in the last eight years per the table details above:

Figure 3. EPSCoR Funding to Kentucky 2000-2008



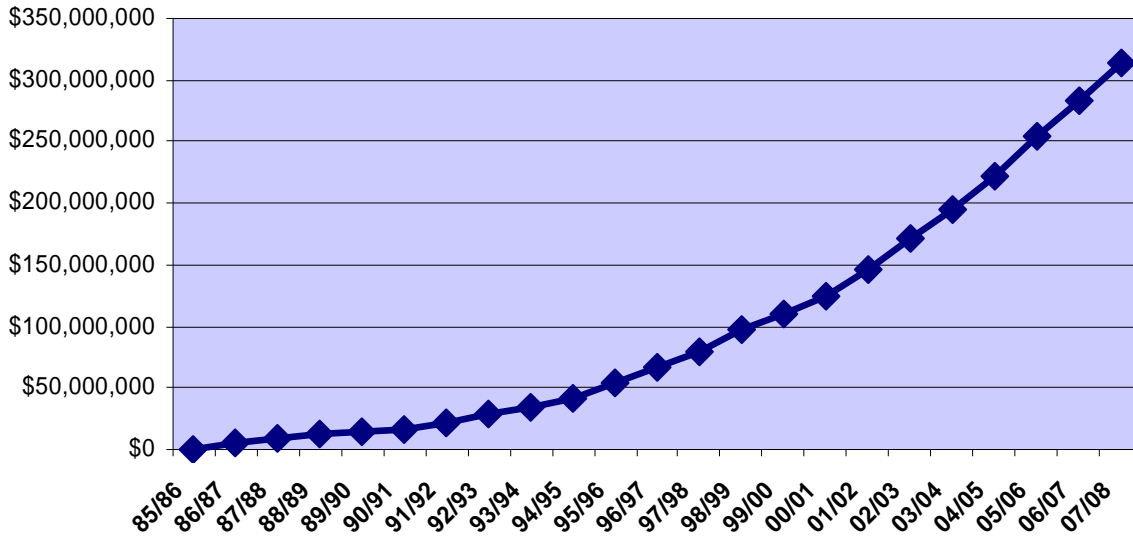
Figures 4 and 5 illustrate the growth of the KY EPSCoR Program and the increased competitiveness of Kentucky's academic researchers. Kentucky continues to perform well in the EPSCoR agency programs even though federal R&D budgets are in general decline and are projected to remain in decline for the remainder of the current administration's term.

Figure 4. Annual Federal Research Funding Secured thru KY EPSCoR Per Year Since Inception



Per Figure 4 above, decelerating the dip in federal funding experienced two years ago, KY EPSCoR's annual federal research funding remained nearly steady this fiscal year despite the challenging economic conditions. Figure 5 below demonstrates that we surpassed our target mark of securing over \$300 million in accumulated funding since the KY EPSCoR Program's inception in 1986.

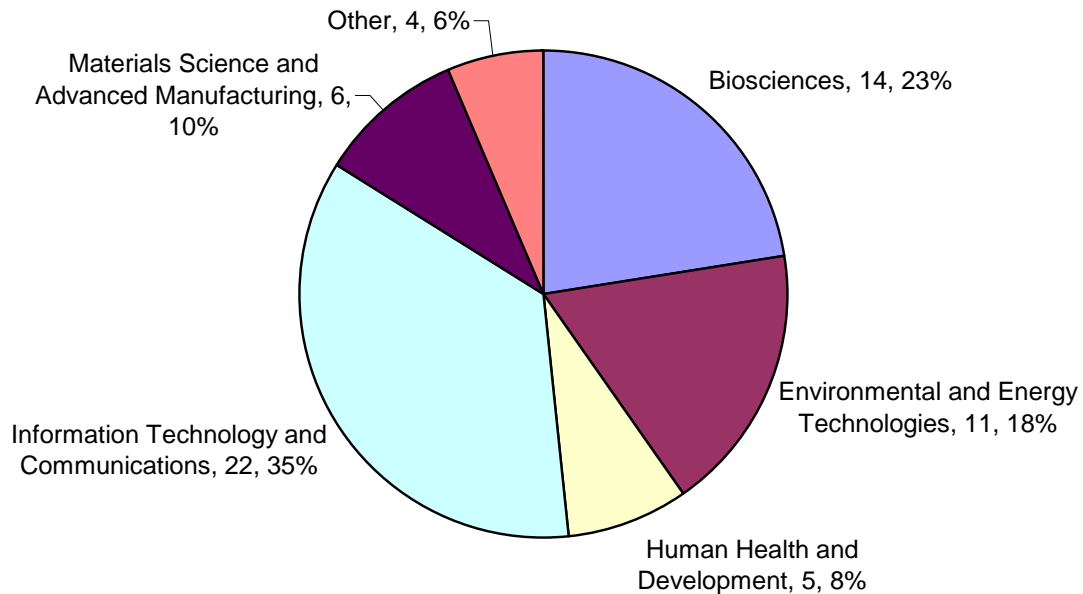
Figure 5. Accumulated Research Funding Secured thru KY EPSCoR Per Year Since Inception



KY EPSCoR Program Investments by Research Focus Area and Kentucky Universities

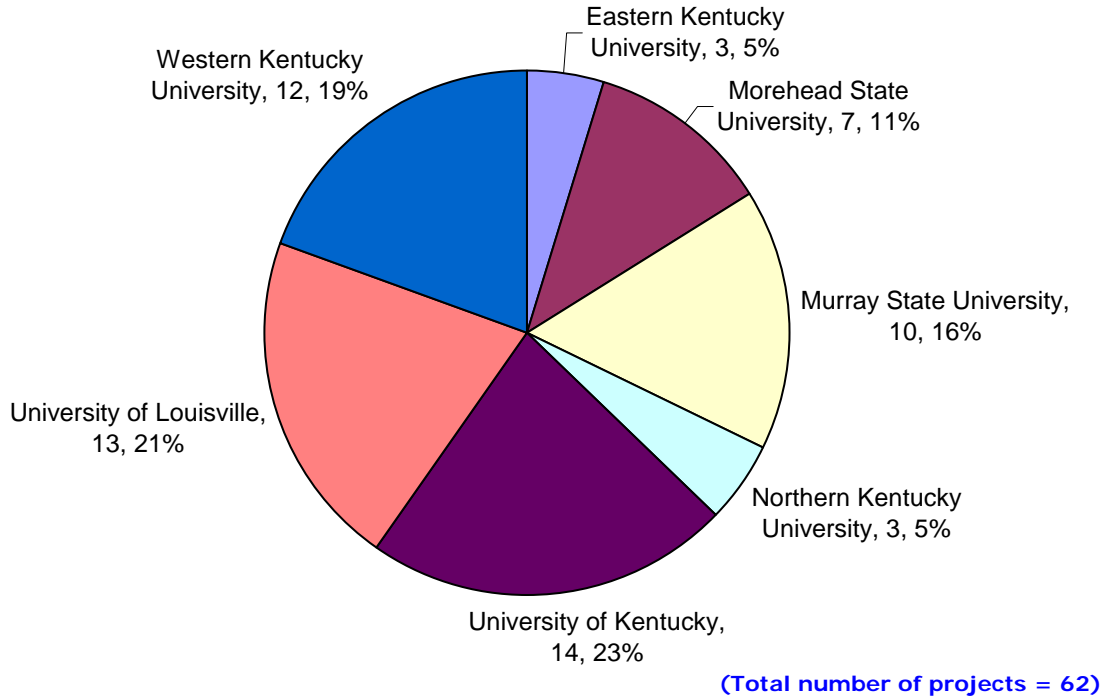
The following pie charts show a breakout of the number of new projects awarded in FY08 by Research focus area (Figure 6) and by Organization (Figure 7).

Figure 6. Number of KY EPSCoR Projects by Research Focus Area (FY08)



(Total number of projects = 62)

Figure 7. Number of KY EPSCoR Projects by Kentucky University Award Recipients (FY08)



The following four pie charts, Figures 8, 9, 10, and 11 show a distribution of the number and funding amount of KY EPSCoR projects by their research topics and University recipients from the time period of 2001 thru 2008. Although the number of awards documented for FY03-08 is accurate, the number of projects that we were able to identify for FY01 and 02 are under reported due to the data collection methods. With that caveat noted, the following pie charts show the characteristics of 423 KY EPSCoR projects for which we are able to account.

Figure 8. Number of KY EPSCoR Projects by Research Focus Area (FY01-08)

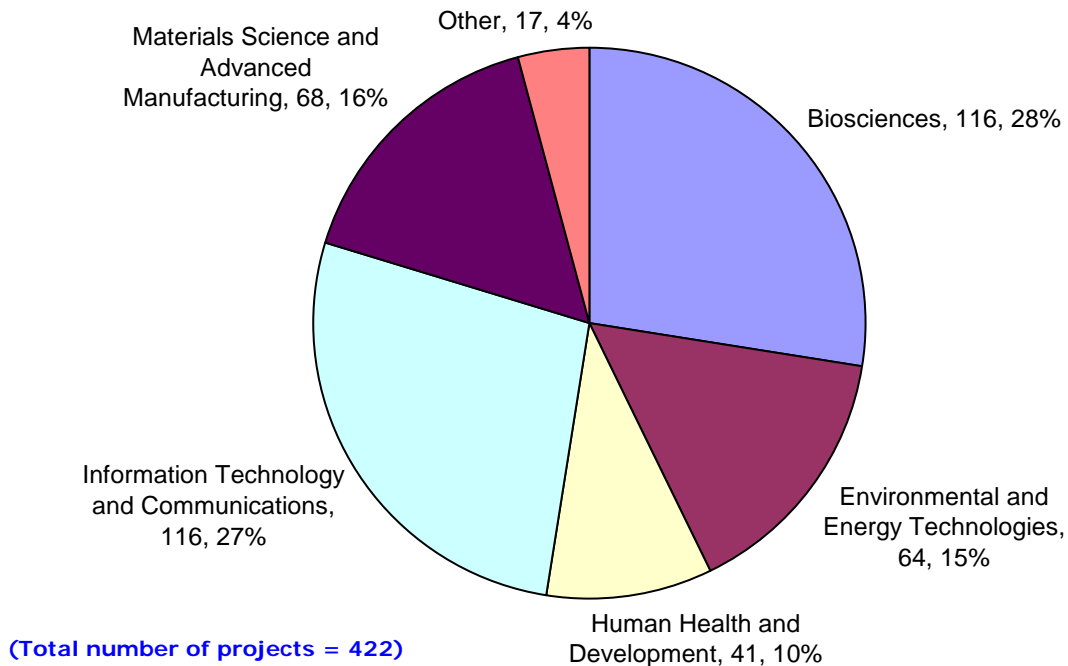
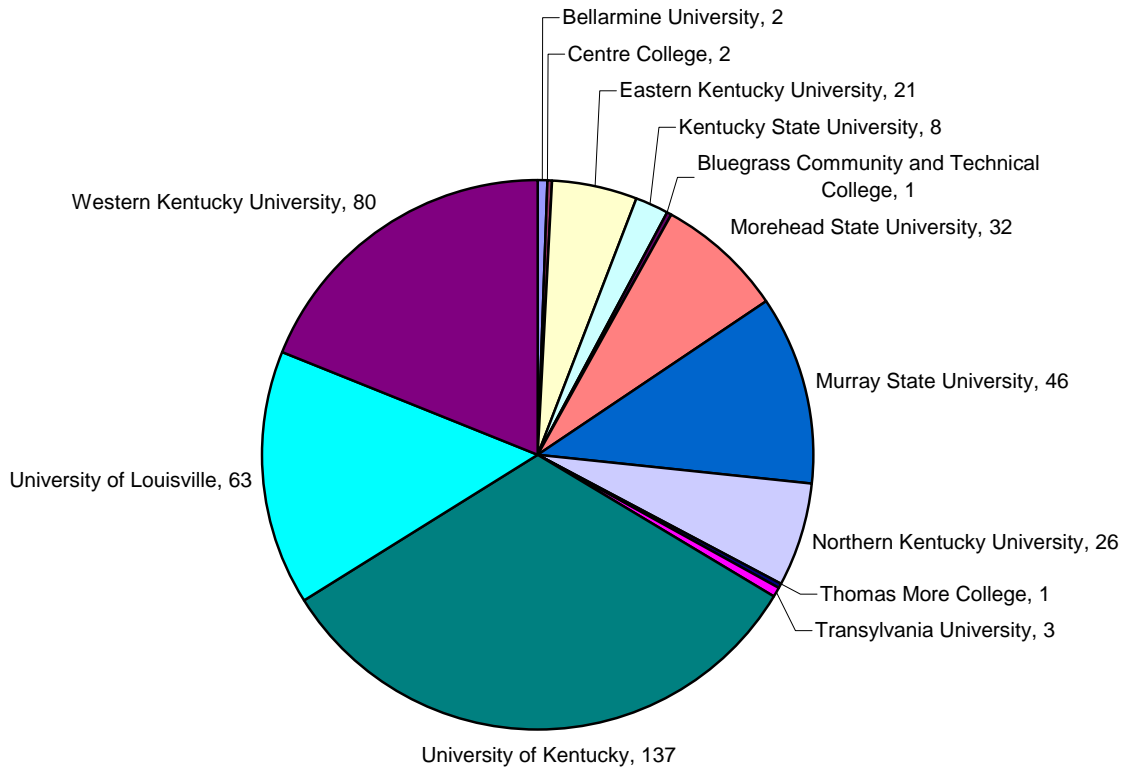
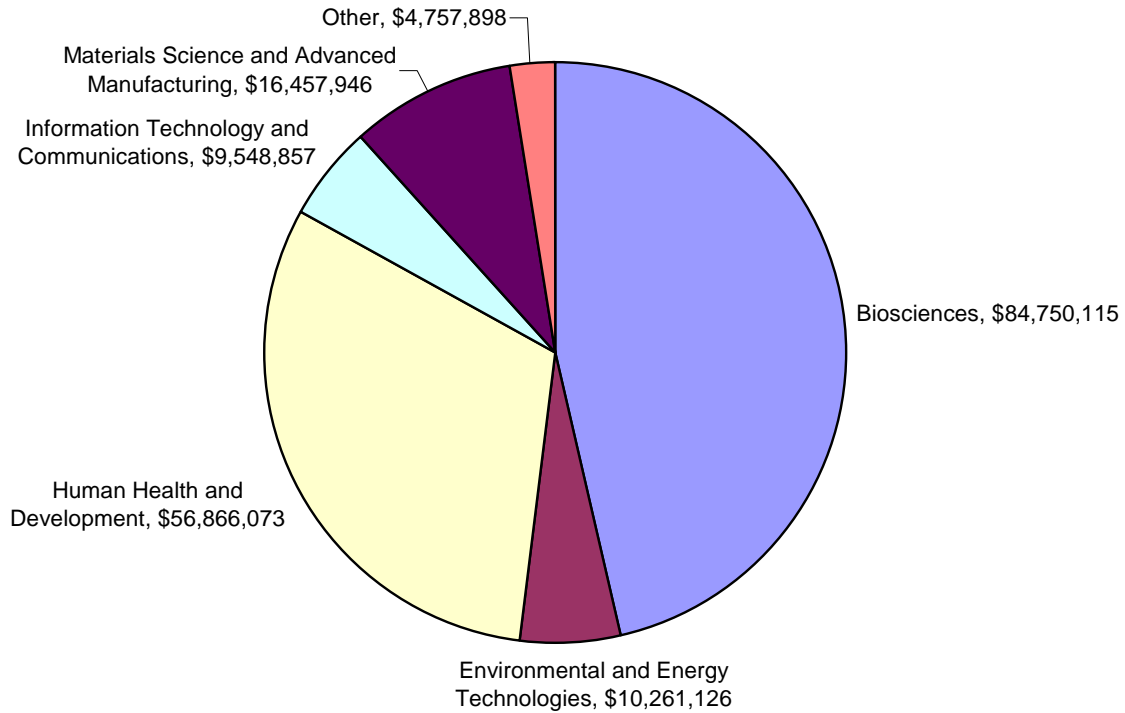


Figure 9. Number of KY EPSCoR Projects by Kentucky University Award Recipient (FY01-08)



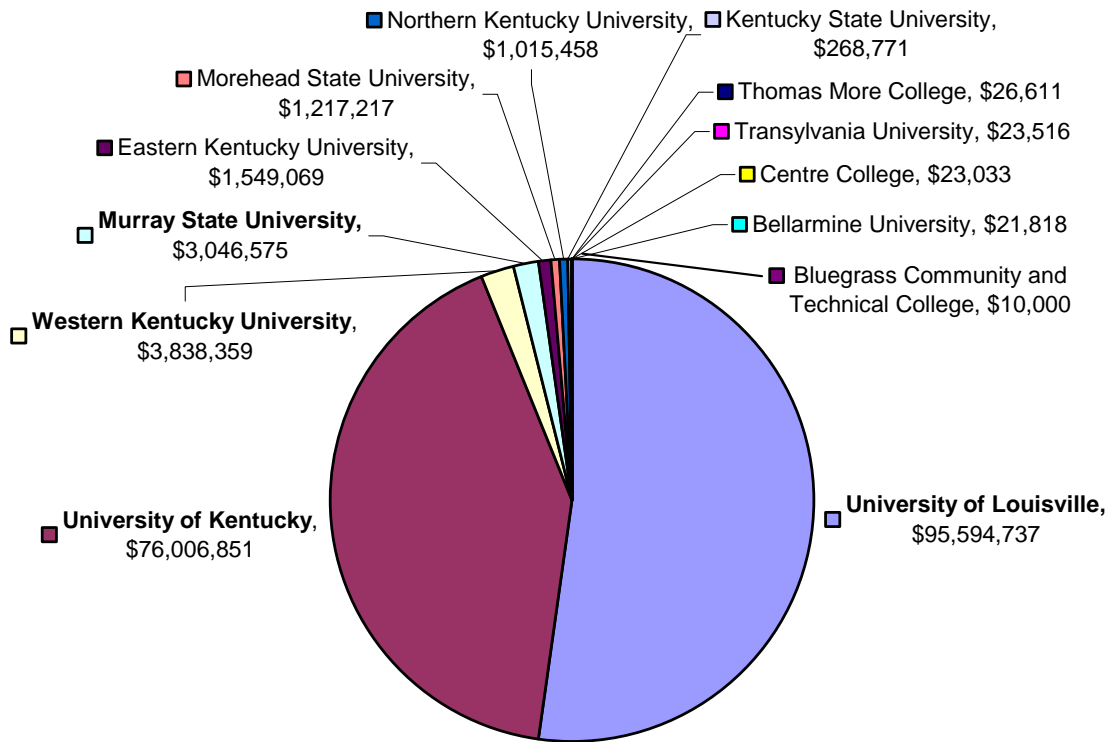
(Total number of projects = 422)

Figure 10. Funding Amount by Research Focus Area for 422 Trackable Projects (FY01-08)



(Total Funding for 422 Trackable Projects = \$182.6 million)

Figure 11. Funding Amount by KY Award Recipients for 422 Trackable Projects (FY01-08)



(Total Funding for 422 Trackable Projects = \$182.6 million)

AWARD IMPACTS

KY EPSCoR continued actions in FY 2008 to collect additional data to better understand the value of KY EPSCoR programs and to aid future decision making by the Statewide Committee. A web-based data collection system called KERS (Kentucky EPSCoR Reporting System) http://kyepscor.kstc.com/kyepscor18/login_form.cfm was initiated in FY 2005 to help capture budget and impact data for all programs including the highly important and rapidly growing NIH IDeA Program. The impact data collected reflects responses from all the EPSCoR programs except USDA. Below is a summary of the impacts collected to date.

Follow-on Funding

The Statewide Committee is highly interested in the ability of EPSCoR awardees to competitively seek and receive follow-on funding. Moreover, follow-on funding is deemed a measure of how well KY EPSCoR is fulfilling its mission of enhancing the research and intellectual capacity of Kentucky's universities and building research infrastructure. Figure 12 presents data reported by KY EPSCoR awardees under both the Infrastructure and Federal Agency Programs with the exception of USDA. The data below is encouraging as it shows over \$444.5 Million in additional research dollars have been secured by KY EPSCoR awardees.

Figure 12. Follow on Funding (FOF)*
(KY EPSCoR Impact Information Reported for FY2008)

KY EPSCoR Agency	Amount Requested	Amount Awarded	Number of Grants Funded	Not Funded	Pending	Total Reported
NIH	\$243,987,988	\$166,172,762	340	61	241	642
NSF	\$374,226,498	\$105,750,694	295	201	118	614
NASA	\$141,509,348	\$86,450,031	149	94	35	278
KY EPSCoR Infrastructure	\$153,322,344	\$31,732,628	128	147	21	296
DOE	\$38,521,971	\$28,357,888	31	14	8	53
DOD	\$49,507,457	\$25,186,801	30	35	7	72
EPA	\$1,084,000	\$919,000	6	2	1	9
USDA	**dna	**dna	**dna	**dna	**dna	**dna
Totals:	\$1,002,159,606	\$444,569,805	979	554	431	1964

* Proposal submission and award dates primarily range from 2002 to 2008 with funding periods from 2002 to 2015.

** Data Not Available

Jobs Created

The infusion of research dollars into Kentucky’s universities does create jobs. Including the impact of a major funding source (NIH-IDEA), the KY EPSCoR awardees reported in Figure 13 the number of research related jobs that resulted in part or full due to the award. The numbers below cover job creation reported from FY04 thru FY08.

Figure 13. Jobs Created as a Result of KY EPSCoR Awards*
(KY EPSCoR Impact Information Reported for FY2008)

KY EPSCoR Federal Agency	Full Time	Part Time	Total Jobs
NIH	194	37	231
NASA +	73	106	179
NSF	31	82	113
KY EPSCoR Infrastructure	19	36	55
DOE	9	1	10
DOD	2	6	8
EPA	3	4	7
USDA	**dna	**dna	**dna
Totals:	331	272	603

** Data Not Available

* Data reported from FY03-04 - FY07-08

+ numbers under review

Publications

Publications and presentations represent a classical measure of research productivity. Since primarily 2003, nearly twenty-five hundred articles have been written and published to communicate the results of the project outcomes to the public at large. Awardees report an impressive number of 125 new book chapters which support the concept that through our research we are playing a roll in re-writing our knowledge base.

Beyond the published works listed in Table 14, EPSCoR awardees reported 176 pending manuscripts.

Figure 14. Number of Manuscripts Published by Type*
(KY EPSCoR Impact Information Reported for FY2008)

Manuscript Type	Published Works *
Journal Article	1655
Abstract	340
Conference Proceedings	134
Book Chapter	125
Conference Paper	115
Thesis	57
Dissertation	28
Other	16
Book	8
TOTALS	2,478

* Publication dates range primarily from 2003 to 2008 with a few works prior to 2003.

Presentations: In addition to the publications above, EPSCoR investments have contributed to the development of 2,743 scientific presentations to local, regional, national, and international audiences between primarily 2003 – 2008.

Patents: Investments have generated a total of 76 patent related activities including 34 invention disclosures and 29 patent applications and provisional patent filings reported by the NASA, NSF, DOD, NIH subcommittees that have led to 9 patents being issued and 3 being licensed. The reported patent activity covers a time period from 2002 – 2008.

Equipment: From the awards given, KY EPSCoR researchers are able to build infrastructure for the state. Figure 15 below shows that between 2002-2008 the purchase of over \$14.8 million dollars in scientific equipment has contributed to this aim.

Figure 15. Equipment Purchased by KY EPSCoR Awardees*
(KY EPSCoR Impact Information Reported for FY2008)

University Awardee	Equipment Total Cost	Number of Items Purchased
University of Louisville	\$7,112,207	102
University of Kentucky	\$6,375,508	247
Murray State University	\$457,476	18
Western Kentucky University	\$437,448	40
Morehead State University	\$170,840	19
Northern Kentucky University	\$169,061	20
Eastern Kentucky University	\$102,652	35
Totals:	\$14,825,192	481

* Equipment primarily purchased between 2002 - 2008

The Impact of People:

The impact of the KY EPSCoR program has extended its reach both within the local community and out to the global community of researchers. Between 2001 – 2008, 534 principle investigators including PI’s and Co-PI’s have received EPSCoR awards. From these awards collaborations have been formed with 867 researchers located in 28 different countries and 39 of the 50 United States plus Washington DC. Additionally, over 2,240 personnel including undergraduates, graduates, post-docs, faculty, staff and others have supported these projects. Tables 16 -18 below summarize these connections.

Table 16. Total Number of People Impacted by KY EPSCoR Funding

People	Number ***
Principal Investigators	534
Collaborators	867
Project Personnel	2243
Total	3,644

*** Reporting Period 2001 - 2008

Table 17. Project Personnel

Personnel Position	Number *
Undergraduate	946
Graduate Student	615
Faculty/Research Scientist	279
Research Associate/Post-Doc	176
Staff/Technician	166
Other	50
Private Sector/Industry	11
Total	2243

* Reporting period 2001-2008

Table 18. Research Collaborations

Number of Collaborations **	
Global	86
USA	781
Total	867

Locations of Collaborating Researchers	
Australia	Kazakhstan
Austria	Mexico
Belgium	Portugal
Canada	Romania
Chile	Russia
China	Singapore
Egypt	Slovakia
France	Slovenia
Germany	Spain
Greece	Sweden
India	Switzerland
Israel	Taiwan
Italy	United Kingdom
Japan	Venezuela

** Reporting Period 2003-2008

Research Highlights

The collective impacts of EPSCoR are impressive and noteworthy. Many EPSCoR successes, however, are better told in brief story format. A few recent and relevant highlights are summarized below for each of the EPSCoR Federal agencies. In Fall 2008, we will be publishing a brochure for the KY EPSCoR Program that will contain additional stories describing the impact of select projects at the eight state supported academic institutions across the commonwealth (UK, UofL, Murray, Morehead, WKU, EKU, NKU, and KSU).

KY DOE EPSCOR

Using Nanomaterials to convert Light Heat and Water into Energy

With support from a three year \$2.65 million grant, the Kentucky DOE EPSCoR Program has established an energy oriented research cluster in nanomaterials.

The research explores the use of conducting materials with exceptionally small architecture for the conversion of solar radiation and residual thermal energy into electrical energy and hydrogen. Through the initiative, new collaborations have been launched between the University of Louisville, the University of Kentucky, the National Renewable Energy Lab in Golden, Colorado, Oak Ridge National Lab in Tennessee and the Notre Dame Radiation Laboratory in Indiana.



Graduate students Vivekanand Kumar (left) and Boris Chernomordik (right) demonstrate the UofL patented, atmospheric plasma jet reactor that can make kilogram quantities of nanowires out of a variety of metal oxide materials.

One of the projects underway, led by University of Louisville Chemical Engineering Professor, Dr. Mahendra K. Sunkara, focuses on the use of sunlight for the photolysis (or splitting) of water to produce hydrogen. Because the efficiency of this process is currently less than 1%, the development of new semiconductors are needed that can harvest more solar energy and remain stable against corrosion. Sunkara's team is developing several different types of nanowire based materials to accomplish these goals. Once characterized, the new materials will be useful for producing other solar chemicals beyond hydrogen.

The energy conversion research facility within the Institute for Advanced Materials and Renewable Energy (IAM-RE) at the University of Louisville is equipped to perform both electrochemical and photoelectro-chemical characterization of developed materials. This facility includes solar light sources, UV-Vis-NIR spectroscopy, electrochemical equipment, oxygen-free glove boxes for Li battery testing, and several instruments for electrode fabrication.



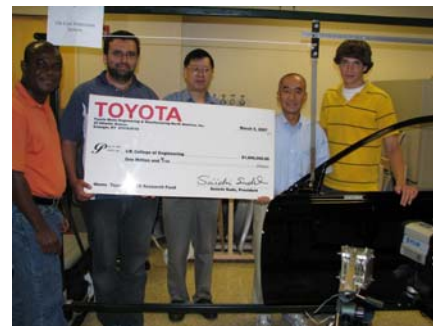
In addition to funding advanced research ideas, the grant provides for the mentoring of junior faculty and hiring of new faculty in nanoscale energy materials. Four post doctorates and nine graduate students compliment the research team. Kentucky's expanding nanomaterial research capacity will help the Commonwealth to become preeminent in energy research and generate new economy jobs important to the state.

KY EPSCoR Infrastructure Program

Collaborative Research Grant Leads to Funding for Industrial Engineering Institute

University of Kentucky Engineering professor Kozo Saito received a \$20,000 Research Collaboration Grant from KY EPSCoR for the purposes of expanding UK's existing Industrial Application and Engineering Science (IAES) group activity to an International Center. Saito's group was able to achieve this goal through several additional steps.

With the EPSCoR funding, they sponsored an annual Painting Technology Workshop which was attended by over 70 executives from major automobile companies, the Navy, aerospace design firms, and paint equipment suppliers. Secondly, they sponsored a UK executive luncheon during World EXPO 2005 in Aichi Japan where over 50 executives from Major Japanese companies attended. As a result, several Japanese companies provided research grants to UK's IAES group; and Toyota Headquarter Japan also increased their funding. Thirdly, Toyota Motor Engineering and Manufacturing North America Inc. (TEMA) gave \$1 Million to the group to upgrade IAES to the new Institute of Research for Technology Development (IR4TD). The institute utilizes both an international research team and an international network system to effectively deliver solutions to complex industry problems. To match Toyota's grant, the state of Kentucky's Research Competitive Trust Fund (RCTF) also known as the Bucks for Brain Program, provided \$1 million in funding. In 2007, TEMA connected IR4TD to Toyota's top 25 suppliers in order to enhance win-win-win collaboration among the state, UK, and Toyota.



(Lf to Rt) Doctoral Student Nelson Akafuah, Post Doc Belal Gharaibeh, Research Faculty Tianxiang Li, R4TD Director Dr. Kozo Saito and High School Intern Michael Brown pose in the paint inspection lab with a copy of Toyota's \$1M award.

The outcome of Dr. Saito's relatively small grant demonstrates the potential of the KY EPSCoR infrastructure program for creating an interactive environment out of which collaborations can lead to multi-million dollar, international success stories.

KY DOD EPSCOR

Improved Technology to Detect Landmines

University of Louisville researcher Dr. Hichem Frigui received an additional \$400,000 award from DoD to continue his work on technologies for improved detection of landmines. The KY EPSCoR program matched the award with an additional \$100,000. With the funding provided, Frigui will continue to develop algorithms to work in conjunction with Ground Penetrating Radar (GPR) technology. The work continues his collaboration with the countermine division, US Army Night vision lab, and the industries NIITEK inc. and BAE systems. These collaborations have resulted in the development of software that has been integrated in GPR landmine detection systems such as the Minestalker seen at the right. Some of these systems are being field tested, while others have already been deployed in hostile regions of the world for both humanitarian and military applications. NIITEK cites over 80 million landmines buried around the world. The results of this research will help to save lives and lessen the destruction caused by these deadly devices.



NIITEK Minestalker™
Detects anti-tank landmines, explosives, and buried anomalies through remote subsurface visualization.

KY NSF EPSCOR

Visualization & Virtual Environments

UK's Center for Visualization and Virtual Environments, also known as the VisCenter, received a \$2.3 Million KY NSF EPSCoR grant awarded to UK professors Kevin Donohue (Electrical and Computer Engineering) and Brent Seals (Computer Science) to further develop the Center's infrastructure and support two new projects. Research at the VisCenter deals with immersion into a virtual scene- called the Metaverse - created with front-projected computer images. The technology allows a person to interact in a realistic way with three-dimensional scenes being projected within the space of a room.



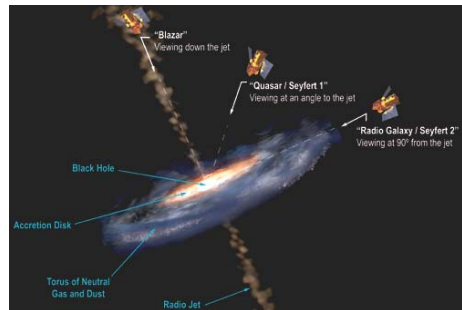
A researcher at the VisCenter works on software to remove shadows cast by users on the display surface in the Metaverse Portal.

The success of the metaverse environment has since provided the platform for a number of applications in teleconferencing, scientific modeling, virtual art exhibits, wide area video surveillance, digital fingerprinting, 3-dimensional image reconstruction, digital library collections and virtual surgery. The EPSCoR funding, specifically, has been used for projects in the areas of ambient visualization and multi-modal scene acquisition. The Center returns its investment through education and training programs, partnerships with industry and governmental agencies, and commercialization of intellectual property produced by the research. Commercially, the Visualization Center has also born fruit with the creation of a start-up company called Mersive Technologies by one of its former members, Chris Jaynes. Dr. Jaynes won a \$100,000 SBIR Phase I grant to initiate the company which employs Kentucky scientists to develop large, affordable, high resolution, visual displays.

KY NASA EPSCOR

Shining a Light on the Mystery of Black Holes

In anticipation of the launch of NASA's Gamma Ray Large Area Space Telescope (GLAST), WKU Physics and Astronomy Professor Michael Carini has been conducting research on Blazars to determine which ones will be prime candidates for the observational studies using the telescope.



An artist's conception of an active galaxy.

With KY NASA and NSF EPSCoR funds amounting to \$280,000 over five years, Dr. Carini and his team have been conducting research to quantify the brightness variation of Blazars that are believed to be correlated with gamma-rays, the shortest wavelength and highest energy parts of the electromagnetic spectrum. To collect his data, Carini has access to WKU's network

of powerful telescopes including: the 0.6m telescope at WKU's Bell Observatory, the 1.3m Robotically Controlled Telescope (RCT) at Kitt Peak National Observatory outside Tuscon, Az and an agreement with the Crimean Astrophysical Observatory in the Ukraine which provides observation time on their 1.3 m AZT-11 telescope.

By quantifying the Blazers brightness and wavelength characteristics beforehand, Dr. Carini has laid the groundwork necessary to focus the study of these objects for NASA's earth orbiting telescope GLAST. The results of this collaborative effort will not only help to unlock the mysteries of the relativistic jets and their corresponding black holes, but have also involved numerous WKU undergraduate students in the use of scientific hardware and software, providing them with valuable technical skills to compete for positions in graduate school and/or employment in technological fields.

KY NIH IDeA Program

The NIH IDeA program stands out as KY EPSCoR's largest EPSCoR related federal research program bringing \$13.4 million into the state this fiscal year through 7 awards received between the Universities of Louisville and Kentucky. Five of the awards have been successful enough to win competitive renewals giving an average award period of 8 plus years for these multi-million dollar awards. Collectively, the anticipated total budget of these 7 awards over their projected terms comes to \$108.2 Million. The 7 awards and their FY08 funding levels are summarized below:

6 COBRE:	<u>Centers of Biomedical Research Excellence:</u>					
At the University of Louisville:			At the University of Kentucky:			
<u>Focus</u>	<u>FY08 Budget</u>	<u>Term</u>	<u>Focus</u>	<u>FY08 Budget</u>	<u>Term</u>	
• Spinal Cord Injury (\$2.0 Million,	2000 – 2010)		• Oral Health (\$2.1 Million,	2000 – 2010)		
• Cancer Targets (\$2.1 Million,	2003 – 2013)		• Human Disease (\$2.0 Million,	2004 – 2009)		
• Birth Defects (no-cost extension yr,	2002 – 2013)		• Women's Health (\$2.0 Million,	2000 – 2010)		

1 INBRE:	<u>KY-IDeA Networks of Biomedical Research Excellence</u>		
At the University of Louisville:			
<u>Focus</u>	<u>FY08 Budget</u>	<u>Term</u>	
• Collaborative Network of Biomedical Researchers from 13 institutions in KY	(\$3.2 Million,	2001 – 2009)	



Scott Whittemore, Ph.D., Christopher Shields, M.D., and Susan Harkema, Ph.D., comprise the leadership team of UofL's KY Spinal Cord Injury Research Center (KSCIRC)

COBRE -Spinal Cord Injury

In the area of Spinal Cord Injury (SCI) research, the University of Louisville delivers a three-pronged approach to the problem. Scientific Director, Scott R. Whittemore, Ph.D., Clinical Director, Christopher B. Shields, M.D., and Rehabilitation Research Director, Susan J. Harkema, Ph.D. lead UofL's Kentucky Spinal Cord Injury Research Center (KSCIRC) which has grown in large part through \$36.5 million in grants from the NIH including a ten-year \$18.9 Million NIH Centers of Biomedical Research Excellence (COBRE) award.

About a quarter of a million people in the US live with paralysis due to SCI and approximately 11,000 new injuries occur each year. In the face of this challenge, KSCIRC is one of only twelve centers of its kind in the United States. The center

is dedicated to its mission of "finding successful spinal cord repair strategies in the laboratory that can be taken to the clinic in a timely and responsible fashion."



Physical Therapists work with a treadmill and harness to rehabilitate SCI patients.



COBRE – Oral Health

The College of Dentistry at UK has been awarded an \$11 million grant to study how oral diseases affects other health problems including HIV, atherosclerosis, gestational diabetes, dementia, and viral/bacterial interactions in chronic disease. Lead by UK’s Associate Dean for Research and Graduate Studies Dr. Jeffrey L. Ebersole, the Center for Oral Health Research supports 10 investigators who will be awarded their first major grant, working collaboratively with established research faculty.

Left: Dr. Jeffrey Ebersole, Associate Dean for UK Research & Grad Studies

COBRE- Molecular Targets for Cancer

The James Graham Brown Cancer Center at the University of Louisville received a five-year, \$11 million grant awarded to Center Director Dr. Donald Miller to fund five research projects aimed at identifying new molecular 'targets' for anti-cancer drugs. As these junior investigators obtain national funding for their research, they rotate off the grant and new scientists who fit the criteria will be recruited.

Photo Right: Researchers working in UofL’s JG Brown Cancer Center; Director, Donald Miller (inset)



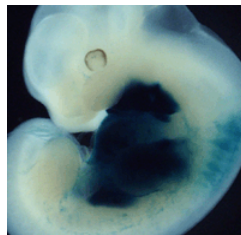
Dr. Louis Hersh, Professor and Chair, Department of Molecular and Cellular Biochemistry talks with a student.

COBRE- Molecular Basis of Human Disease

The University of Kentucky Department of Molecular and Cellular Biochemistry, under the direction of Professor Louis Hersh, received a \$10.7 million COBRE award to support five young faculty and their research investigating prevention and treatments for degenerative muscular affliction in the elderly, diabetes, lung cancer, leukemia, and Huntington’s disease. In addition to the COBRE award, UK’s Biochemistry department received two NSF EPSCoR Infrastructure grants in genomics and proteomics awarded to Dr.’s Brian Rymond and Tom Vanaman, respectively. These three awards totaling over \$13 million significantly contributed to the department’s success in being ranked 12th nationwide among public medical schools according to the National Institutes of Health (NIH).

COBRE- Birth Defects

The University of Louisville Birth Defects Center is a collaborative effort of more than 30 researchers and physicians from multiple departments in the Schools of Medicine, Dentistry, Nursing and Arts and Sciences. A five year \$8.2 million COBRE grant awarded to the Center’s Director Dr. Robert Greene supports researchers whose mission is to improve the diagnosis, treatment and prevention of biological abnormalities associated with the development of the human embryo.



A human embryo at approximately 1 month



Baby approximately 11 months after birth



UofL Birth Defects Center Director Dr. Robert Greene and Laboratory of Molecular Craniofacial Development Research Director, Dr. Michele Pisano



Dr. Tom Curry, Vice
Chair of Research in UK's
OB/GYN department

COBRE-Women's Health

The University of Kentucky received a \$21.2 Million award to create a Center for Women's Health research under the direction of Dr. Tom Curry, Vice Chair of Research in UK's OB/GYN department. The two primary goals of this COBRE are to 1) further understanding of the unique role of gender and female reproductive hormones in the manifestation of health and disease and 2) to use this focus as a platform to develop promising junior investigators and enhance their success at competing for NIH grant support.

KY-IDeA Networks of Biomedical Research Excellence (INBRE)



In addition to the COBRE awards, the KY-IDeA Networks of Biomedical Research Excellence (INBRE) award, directed by Nigel Cooper, Professor in Anatomical Sciences and Neurobiology at UofL's School of Medicine, expands biomedical research activities across the state. The principle goal of this five year, \$16.4 million award is to increase capacity for biomedical research in the primarily undergraduate universities (PUIs) in KY to a level where undergraduate students will obtain enhanced training and career development in this field. Currently, the institutions in the network include: Morehead State University, Northern Kentucky University, Western Kentucky University, Eastern Kentucky University, the University of Louisville and the University of Kentucky. So far, nine investigators at the PUIs have become competitive for federal funding since the inception of the INBRE award, making us one of the top achievers in this category among the IDeA states.

In addition to the focused research projects of the junior faculty, the INBRE award also promotes development of critically important bioinformatics infrastructure which helps researchers to quantify large volumes of data produced through genomic techniques. The University of Louisville and the University of Kentucky are building bioinformatics infrastructure and capacity as well as promoting statewide development in this field. For example, an annual Bioinformatics Summit supported by the award has approximately 200 registrants from KY and neighboring states. The INBRE objectives are a continuation of programs initiated through the previous three year NIH award called KBRIN (Kentucky Biomedical Research Infrastructure Network). The KBRIN acronym continues to be used to promote a consistent identity and website (<http://www.kbrin.louisville.edu>) for the state's biomedical research network. Together the KBRIN and INBRE awards have totaled \$24.7 million to these institutions over eight years.

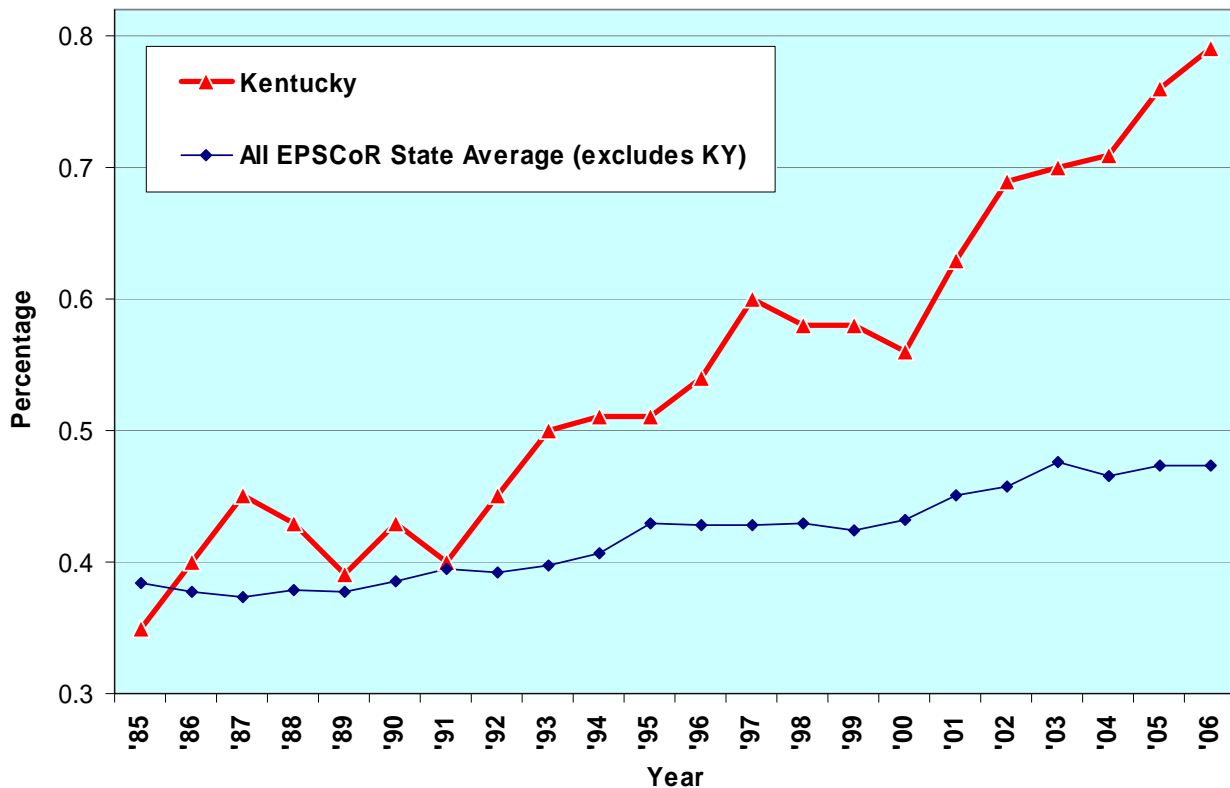
The Bottom Line

Kentucky is among the Top EPSCoR States in Science and Engineering Dollars and Research and Development Funds

Kentucky continues to show marked improvement in attracting federal science and engineering (S&E) dollars to its colleges and universities. Recent data from the National Science Foundation (NSF) documents Kentucky's rise in overall state national rankings, by 5 positions, from 33rd in 1998 to 28th in 2005. Kentucky was the only state ranked in the top 30 to have advanced as many positions. A retrospective look from 1998 to 2005 shows that Kentucky's growth is all the more exceptional considering only two other states in the top 30 advanced more than one position during this time. (Tennessee advanced 3 positions and Ohio advanced 2 positions.) (For complete NSF data from which these rankings were derived, go to <http://www.nsf.gov/statistics/nsf07333/> .)

In figure 19 below, an additional NSF survey details federally financed academic research and development (R&D) expenditures at universities and colleges within EPSCoR states. The chart shows that KY has significantly exceeded the average growth rate of the other EPSCoR States by increasing its share of federal academic R&D monies from .35% in 1985 to .79% in 2006, the most current year for which data is available. This consistently strong upward trend over the last 15 years demonstrates that the Kentucky EPSCoR Program is helping to make a difference.

Figure 19. Comparison of the EPSCoR States Federally Financed Academic R&D Expenditures
(Shown as a percentage of the total annual federal funding for all academic R&D)



Data Source: NSF Survey of R&D Expenditures at Universities and Colleges, Federally Financed Academic R&D Expenditures (webcaspar.nsf.gov).