Office *of the* Vice President *for* Research

2013 ANNUAL REPORT

A Letter from the Former Interim Vice President for Research

Dear colleagues, research partners, friends, benefactors and alumni of Texas Tech:

The 2013 fiscal year has brought mixed news for the university. Texas Tech continues on the path to become a true national research university. The good news, our faculty continue to receive recognition for their teaching and research excellence, and we continue to put new infrastructure in place to grow our research enterprise. On the other hand, some of our research metrics have declined.

While our total research expenditures increased slightly, our restricted research numbers are down. The number of proposals submitted, the number received and the value of those proposals are all down, however our federal research awards are up over the preceding year.

This Annual Report shows not only a picture of our research metrics, but also celebrates some of our accomplishments during 2013. Those bright spots include:

- Ten of our faculty members received Fulbright grants to expand their research and scholarship, tying Texas Tech for first in the nation for number of awards received.
- We now have four National Academy members who are all focused on energy and water research.
- Cayuse, the electronic proposal submission system, has been installed and deployed across the university.
- A Guide to Research was published to help our faculty navigate the research proposal process.
- A new Chemical Hygiene Plan that outlines the roles, responsibilities and procedures of laboratory, studio and workplace safety has been installed.
- Texas Tech has formed research partnerships with major industry and governmental groups, including Bayer CropScience and Sandia National Laboratories.

I have been honored to serve as interim vice president for research. As of Jan. 1, 2014, Robert V. Duncan took over as vice president for research, and I am confident that he will bring the vision, passion and expertise to help Texas Tech maximize its potential as a research university with national acclaim.

Thank you,

Michael San Francisco
Former Interim Vice President for Research (2012-2013)
Dean of the Honors College

Introduction

There are many ways to measure a university's research success. While Texas Tech places great importance on the scholarship and creative activity of our faculty and students, most of the accepted research metrics are weighted heavily toward competitive funding, something that is not readily available in the humanities, some social sciences and the creative arts.

This report will outline a number of the traditional metrics of Texas Tech's research and economic engagement in 2013 including:

- Economic Engagement
- Annual Institutional Research Metrics
- Federal Research Awards and Expenditures
- Federal R&D Agency Research Funding Activity
- Sponsored Program Activity by College

In addition to the numbers, the 2013 Annual Report of the Office of the Vice President for Research (OVPR) highlights some of the outstanding research underway at Texas Tech.

Texas Tech's research enterprise is guided by Strategic Priority 3 (Appendix 1) of *Making it possible…2010-2020 Strategic Plan*.

> ***Expand and Enhance Research and Creative Scholarship:*** We will significantly increase the amount of public and private research dollars in order to advance knowledge, improve the quality of life in our state and nation, and enhance the state's economy and global competitiveness.

FIRST-RATE FACULTY

Texas Tech prides itself on first-rate faculty. The university is the academic base for a growing class of National Academy members, and faculty members are achieving further acclaim in research through the Fulbright U.S. Scholar Program.

Since the start of 2013, three National Academy members have joined the faculty in the Whitacre College of Engineering. Danny Reible is the inaugural holder of the Donovan Maddox Distinguished Engineering Chair, Fazle Hussain serves as the President's Distinguished Engineering Chair, and Chau-Chyun Chen is holder of the Jack Maddox Distinguished Engineering Chair in Sustainable Energy. The three join Kishor Mehta, the former director of what is now Texas Tech's National Wind Institute.

Election to the National Academy is considered one of the highest professional honors among engineers.

Also in 2013, 10 Texas Tech faculty received Fulbright scholarships, tying with Ohio State and the University of Illinois for the most awards among U.S. universities.

"The Texas Tech faculty selected as Fulbright Scholars exemplify the work we do here every day as a national research university," said Texas Tech President M. Duane Nellis. "These awards reflect this commitment to academic excellence through scholarly research activities. We are proud of the work our faculty has accomplished and look forward to what they can achieve as they travel the world."

The Fulbright U.S. Scholar Program is funded by the Department of State and provides grants for U.S. scholars to conduct research, lecture and network with other scholars and institutions abroad.

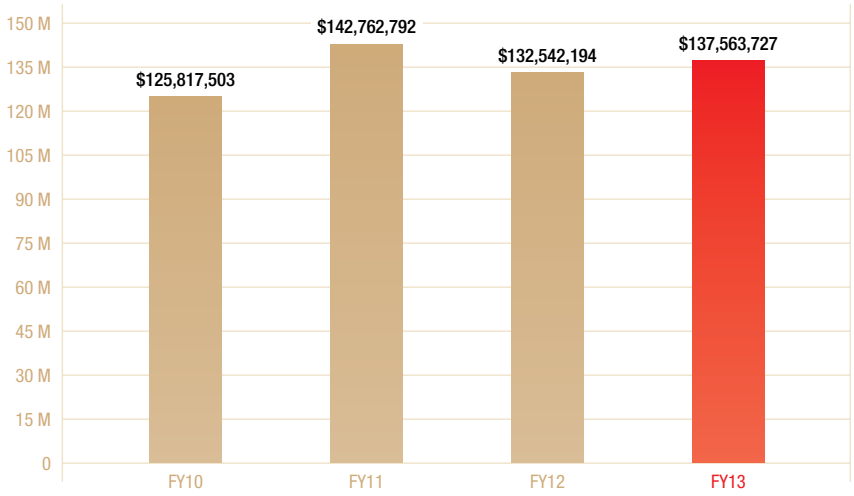
Statistics

This report features a variety of statistics that present a number of measures that describe the sponsored research enterprise at TTU. Data are provided for (i) annual institutional research metrics about proposals submitted, the monetary value of the proposals submitted, the number of awards made to TTU, and the monetary value of the awards, (ii) annual institutional metrics for federal research awards and expenditures, (iii) annual institutional metrics for research expenditures, (iv) annual institutional federal R&D agency research funding activity, and (v) annual research metrics for sponsored program activity by college.

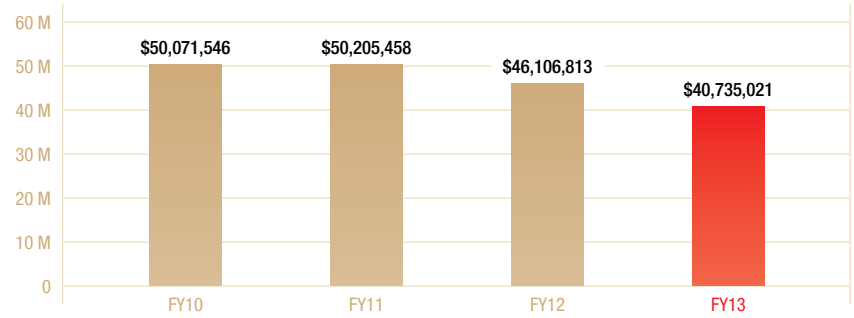
Total Research Expenditures topped $137.5 million in FY13, up from FY12, but down from a record high of $142.7 million in FY11. While total research expenditures are up, restricted research expenditures are showing a downward trend, something that the OVPR is taking steps to correct.

The majority of Texas Tech's research expenditures are from federal agency funding awards, most of which are won in competition with top public and private universities across the country. Nonprofit organizations are usually foundations. Federal pass through means dollars that come from a non-federal entity to Texas Tech, which is serving as a sub-awardee on those grants.

Total Research Expenditures
(As Reported to the Texas Higher Education Coordinating Board)



Restricted Research Expenditures
(As Reported to the Texas Higher Education Coordinating Board)



Economic Impact

A key indicator of the success of a university is its economic impact on its community, state and the nation. According to a 2012 economic impact study, Texas Tech returns more than $23 to the Texas economy for every dollar the state invests in the system, a return on investment reached by few public or private entities.

Texas Tech University's economic impact on the state was $6 billion in 2012 and projections indicate the impact will reach $9.6 billion statewide by 2020.

In 2012, there were 21,791 Texas Tech graduates working in Texas and contributing $3.7 billion to the state's economy. The impact is projected to grow to $6.3 billion by 2020.

Another indication of the university's economic engagement is the amount of new knowledge that is generated by faculty, staff and students and then transferred into practical applications. Faculty and students also are creating new businesses that have the potential to bring jobs to the region and are offering their considerable talents and expertise to act as consultants and advisers to our industry and community partners.

Texas Tech's economic engagement can be measured in intellectual property licenses, and number of patents filed and issued.

The university is making a major commitment to our industry partners with the approval of phase one of a research park that will provide space for collaborative partnerships with private companies, incubator businesses and student startup ventures.

	2011	2012	2013
Invention Disclosures	30	52	58
Gross License Revenue ($000)	$193	$191	$377
Active License Agreement	22	25	28
Nonprovisional Patents Filed	2	10	11
Provisional Patents Filed	9	8	12
Startups Formed	2	0	5

NSF GRANT PROVIDES COMMERCIALIZATION OPPORTUNITY

A National Science Foundation (NSF) grant has given Siva Vanapalli, assistant professor in the Department of Chemical Engineering, and graduate student Deepak Solomon a crash course in business.

The pair received a $50,000 Innovation Corps (I-Corps) grant from NSF, a first for Texas Tech, to aid in moving a new technology developed in Vanapalli's lab to the marketplace. The pair, along with business adviser David Harmon,

participated in an eight-week course in entrepreneurship. The program focused not on selling their product, but talking to potential customers to figure out where their product might fit in the marketplace.

The technology is a microfluidic device that could have a transformative impact on society by accelerating the process of drug screening and drug discovery. The technology has the potential to significantly benefit the pharmaceutical industry by reducing drug development cycle times and costs.

The Texas Tech team was tasked with contacting 100 potential customers in the eight-week period.

"We learned that it may not always be obvious where your technology would work," said Solomon. "The end user can turn out to be someone very different than what you expected at the beginning."

Harmon, a longtime banker and businessman, believes the I-Corps project is extremely beneficial for university researchers.

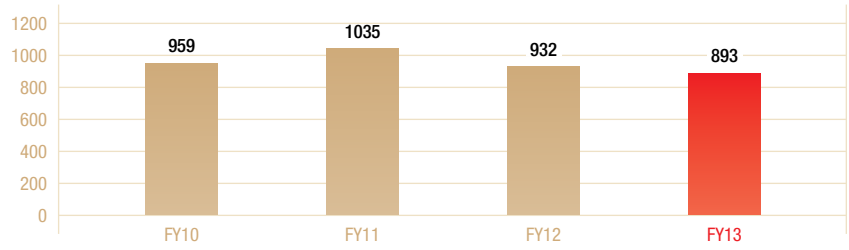
"One problem I've seen over and over in dealing with inventors over the years as a banker is that they believe people will line up to buy their product," said business adviser David Harmon. "That's just not the way it works. This program has them talk to the end user, to find out if the product can solve the problems the users have. The biggest part of sales is listening to the user."

While Solomon is much more confident in his ability to launch a startup company after he receives his doctorate in May 2014, Vanapalli has learned he's much happier in the lab than the business world.

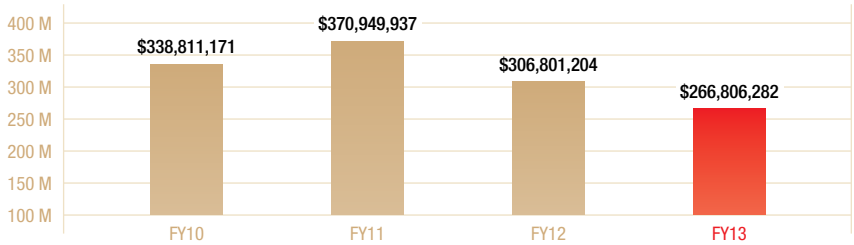
"In my lab I can control the risk," he said. "But outside, who knows–and it makes me nuts. I'm very happy to be the scientist and not the CEO. I'm carved from different material than Deepak and David. They like to take risks. I'm just happy to see an idea that started in my lab find its way to market."

Annual Institutional Research Metrics

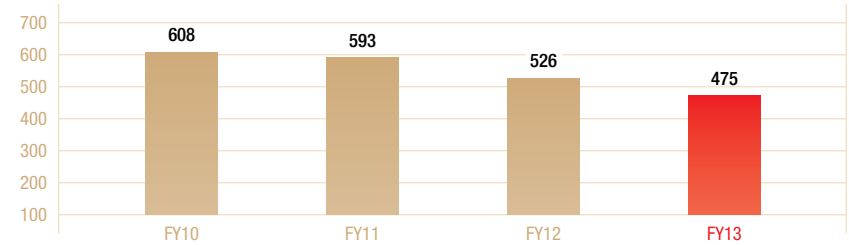
Number of Proposals



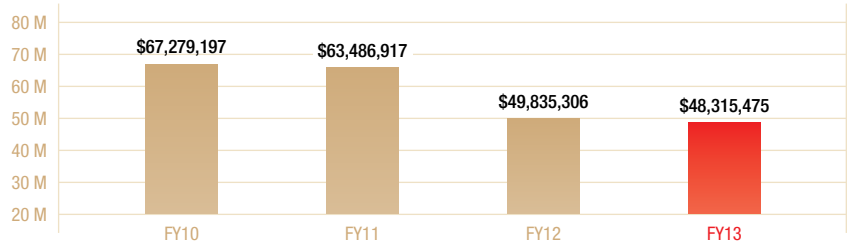
Proposal Value



Number of Awards Received



Award Value



EAST LUBBOCK PROMISE NEIGHBORHOOD

Texas Tech has made great strides in community outreach and engagement. Among its standout projects of 2013 is the East Lubbock Promise Neighborhood (ELPN).

Supported by a $24.5 million grant from the U.S. Department of Education, ELPN is a five-year program geared to reform four target schools, revitalize a distressed East Lubbock community, foster significantly improved student learning and break the cycle of poverty.

The program began with the fall 2013 semester in Dunbar College Preparatory Academy, a junior high school. The program provides tutoring and mentoring programs and a variety of extracurricular activities such as dance, art and theatre.

"This project isn't about doing research and writing papers," said Scott Ridley, dean of the College of Education and principal investigator on the ELPN grant. "This is getting out into these schools and being accountable for how the students perform. We are testing our knowledge in real-world settings."

The grant also provides funding for two health-care clinics in East Lubbock to stay open until 10 p.m., creating a medical home for children and their families. In addition to improved health-care access, the program offers nutritional education for the families as well as parenting classes for students with children.

The program also has offered a course to help East Lubbock residents gain a food safety certification and perhaps better job opportunities.

Looking ahead, the project is on pace to incorporate Ervin Elementary School in 2014, Alderson Elementary School in 2015, and Estacado High School in 2016.

"We want to create a new model of American education that fosters innovation and entrepreneurship," said Ridley. "This community-based service learning approach to education combined with a strong community-school-university-business partnership will place Lubbock, Texas, at the front of a state and national movement."

NATIONAL WIND INSTITUTE: ALL THINGS WIND

Not just a leader, Texas Tech is an innovator in the realm of wind science, engineering and energy. Indeed, 2013 proved to be a busy year for "all things wind."

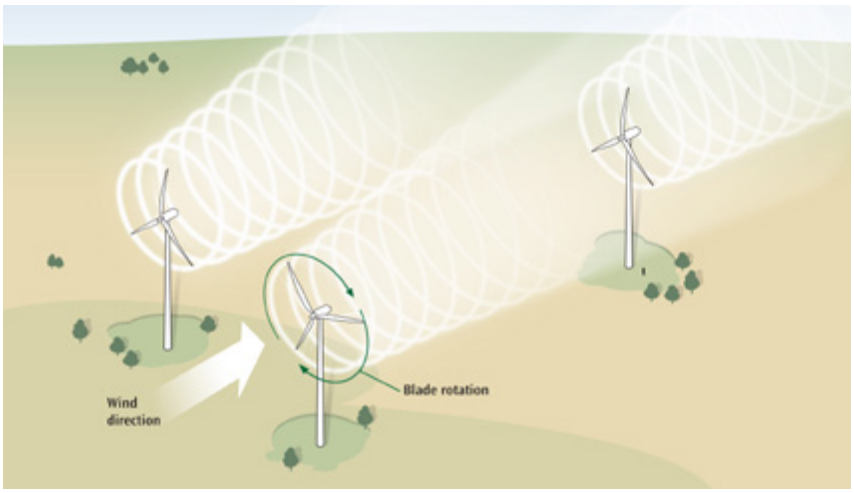
Interdisciplinary, educational and research opportunities have long been central to the university's approach to studying the wind, and they guide Texas Tech's course into the future. To that end, Texas Tech established the National Wind Institute (NWI) in May 2013, combining the former Wind Science and Engineering Research Center and the Texas Wind Energy Institute.

NWI saw a major milestone in July, when university officials, along with representatives from the Department of Energy, Sandia National Laboratories, Vestas and Group NIRE, commissioned the Scaled Wind Farm Technology (SWiFT) facility at Texas Tech's Reese Technology Center. SWiFT is the first public facility of its kind to use multiple wind turbines to measure turbine-to-turbine interaction in a wind farm setting. Another positive effect from the research: Any revenue generated from the SWiFT turbines benefits the institute's research and educational programs.

NWI also completed upgrades to the TTUKa research radars, the only radars in the world to investigate the complex flows within and surrounding operational wind farms.

Aside from wind turbines, NWI operates the Debris Impact Facility, which earned recognition as one of Popular Science's "10 Most Awesome College Labs of 2013."

Texas Tech has been invested in the study of wind for more than four decades. A group of professors banded together after observing the destruction of an F-5 tornado that swept through Lubbock in 1970. The disaster left 26 people dead and destroyed parts of the city. Yet the professors were determined to turn around the tragedy and find a way to make positive changes in people's lives through research and education.



Annual Institutional Research Metrics for Federal Research Awards & Expenditures

INTERDISCIPLINARY RESEARCH INTO OBESITY

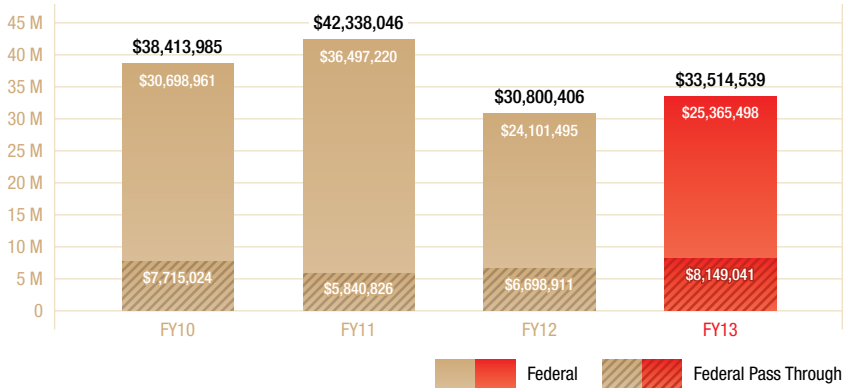
Naima Moustaid-Moussa, nutritional sciences professor in the College of Human Sciences, has developed an interdisciplinary Obesity Research Cluster (ORC) designed to translate basic science to clinical and community-based research and prevention. This initiative is expected to make a significant impact regionally and nationally, given the high prevalence of obesity in Texas, nationwide and globally.

The research group includes a dozen departments at Texas Tech and three schools at the Texas Tech University Health Sciences Center.

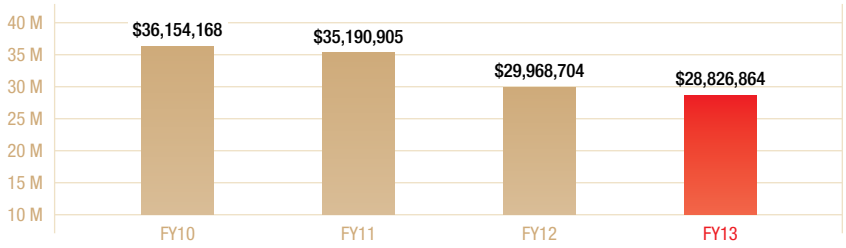
Texas Tech recruited Moustaid-Moussa to achieve national leadership in obesity research and education. Her transdisciplinary approach to nutrition and obesity research exemplifies Texas Tech's commitment to bringing people together to explore questions that have global impact in obesity and related chronic diseases, such as diabetes and cancer.

Moustaid-Moussa's own research highlights a critical role for adipose (fat) tissue expansion and inflammation in obesity-related metabolic disorders, such as diabetes and cardiovascular disease, and contributes to our understanding of important roles of adipose tissue in obesity, diabetes and hypertension. The research uses molecular tools, cells, clinical specimens and animal models to identify mechanisms by which food and plant bioactive components with anti-inflammatory properties (such as omega-3 fatty acids and phytochemicals in the bioenergy crop switchgrass) reduce obesity, insulin resistance and inflammation. Moustaid-Moussa is co-principal investigator, with colleagues at the University of Tennessee, on two U.S. Department of Agriculture-funded grants focusing on the switchgrass research. She also has received a patent license in using switchgrass extracts as antimicrobial and anti-inflammatory factors.

Federal Research Awards



Federal Research Expenditures

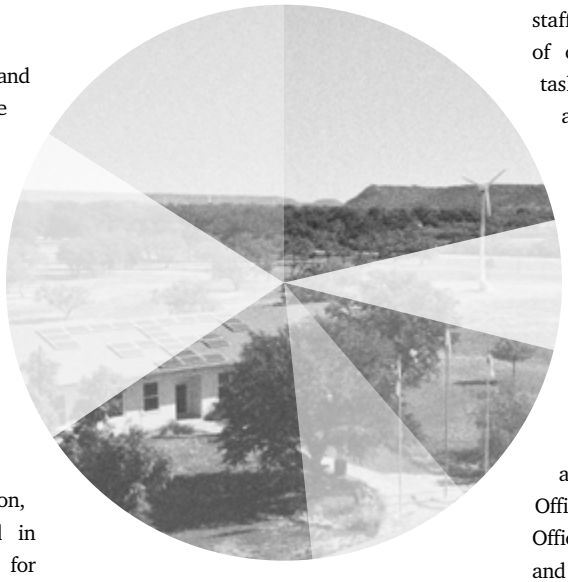


LLANO RIVER FIELD STATION GOES GREEN

Texas Tech's Llano River Field Station (LRFS) has received a $230,000 Innovative Energy Demonstration Grant from the Office of the Texas State Comptroller's Energy Conservation Office to help fund the installation of solar panels and a wind turbine. The field station also received a $50,000 matching grant from Texas Tech, which will pay to replace inefficient single-pane windows.

This project makes the administration and academic buildings at the field station the first at Texas Tech to run on renewable energy using sun and wind. These two buildings were selected because they account for 25 percent of the overall electrical usage at the center. It is estimated that the solar panels and wind turbine will supply 100 percent of the energy requirements of the two buildings and save $500,000 in utility costs during a 25-year period.

Located on Texas Tech's 411-acre Junction, Texas campus, LRFS was established in June 2003 to provide a new direction for the campus as a field station. LRFS has multipurpose, multidisciplinary research, education and engagement programs directed toward recognition, understanding and solutions to natural resource, education and regional problems with national and international implications in watershed and range science, freshwater systems and environmental education/engagement. LRFS enjoys a strategic geographic position in the Texas Hill Country, a critical region recognized by E. O. Wilson, an internationally known biologist and environmental advocate, as a biodiversity hotspot worldwide and by the Nature Conservancy as one of the last great ecosystems worthy of preservation.



The solar panels and wind turbine will be part of a Discovery Point Trail under development at the field station. The trail will feature best management practices and demonstration stops. Researchers also are developing a renewable energy and conservation curriculum unit for a holistic, adaptive, standard-based natural resource, science and GLOBE K-12 education program at the Outdoor School at the field station. The Outdoor School is a state and national award-winning program that has taught science technology, engineering and mathematics courses to 15,000 students and hundreds of teachers in the past 10 years.

FOSTERING A CULTURE OF SAFETY

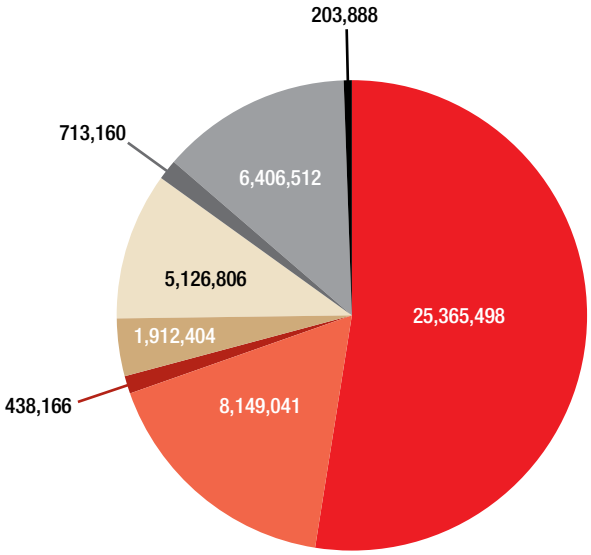
Whether in a chemistry lab, art studio, workshop, or another type of space devoted to teaching and research, Texas Tech is focused on strengthening its safety culture. Key in accomplishing this initiative has been the Institutional Laboratory Safety Committee (ILSC), composed of faculty, staff and administrators from an assortment of colleges and offices. ILSC has been tasked with improving safety awareness and safety practices across campus, and members have accomplished much in that regard over the past year.

Among the committee's notable achievements has been the revised Chemical Hygiene Plan (CHP). Completed in early 2013, the improved CHP defines roles, responsibilities and procedures around laboratory and workplace safety at Texas Tech. ILSC collaborated with the Office of the Vice President for Research, the Office of Environmental Health and Safety, and chemical safety officers to develop guidelines for working with chemical and physical hazards. Further, the committee recognized that safety knowledge is vital to the university's scholarly and creative output. Later in 2013, ILSC launched an online assessment system in an effort to ensure that current faculty, staff and students are familiar with practices, guidelines and other information contained in the reworked plan.

"Safety as a cultural mindset cuts across every level of work conducted at the university," said Dimitri Pappas, ILSC chair and associate professor of chemistry and biochemistry. "The ILSC works to integrate these levels of effort together into a cohesive vision that will ultimately lead to a tradition of laboratory safety at Texas Tech."

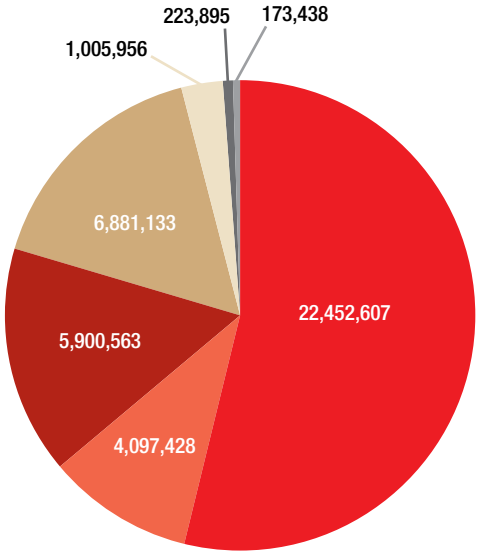
FY13 Annual Research Award and Expenditures by Sponsor Type

Awards by Sponsor Type

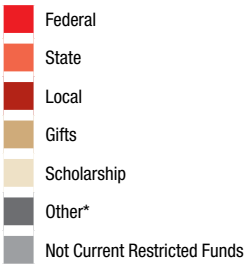


Total = $48,315,475

Expenditures (RRE) by Sponsor Type



Total = $40,735,021

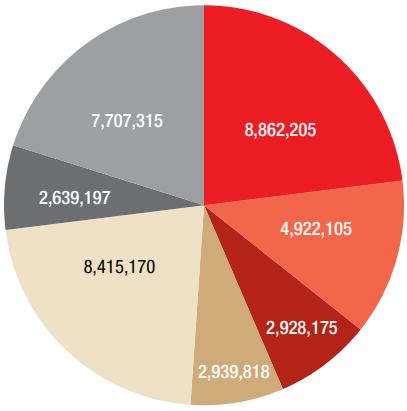


* The remaining federal and federal pass-through agencies in the Texas Tech OVPR database.

Institutional Federal R&D Funding Activity

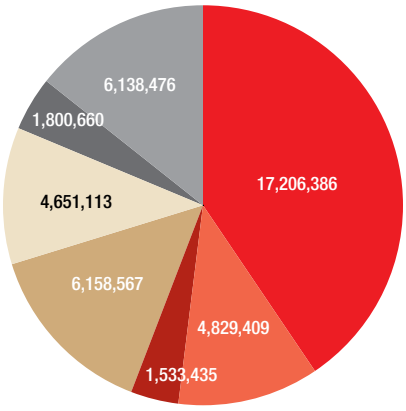
Award Values by Funding Agency

FY10



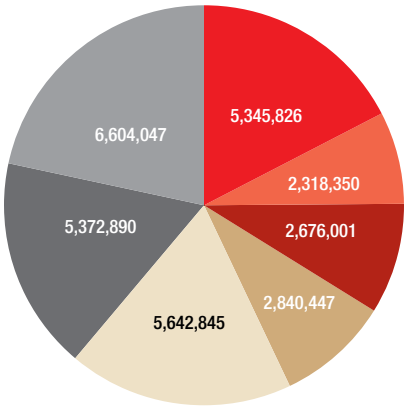
Total = $38,413,985

FY11



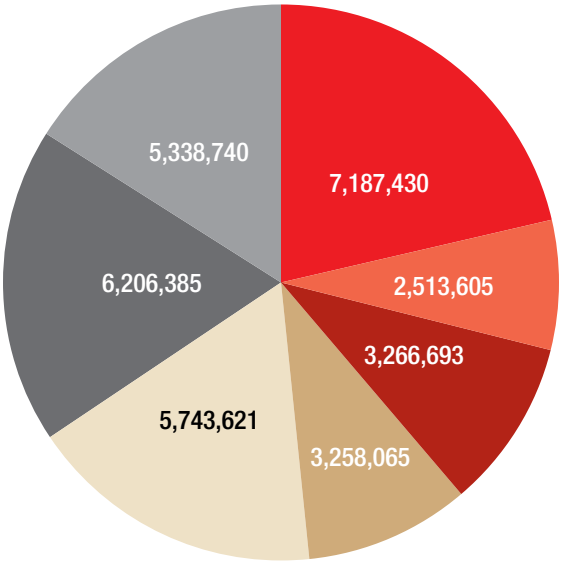
Total = $42,338,046

FY12

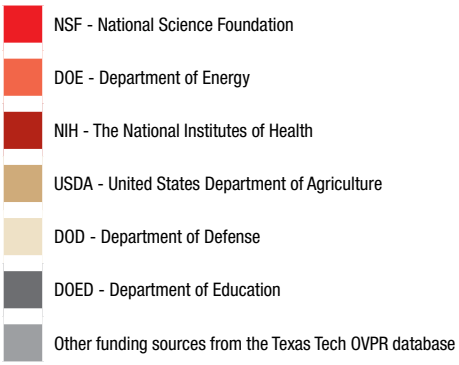


Total = $30,800,406

FY13

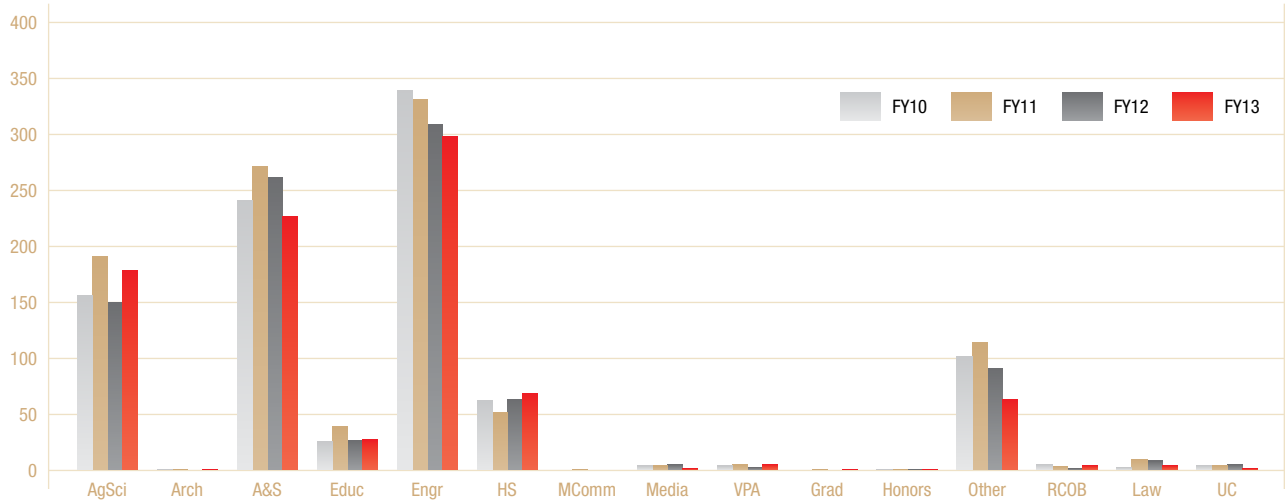


Total = $33,514,539



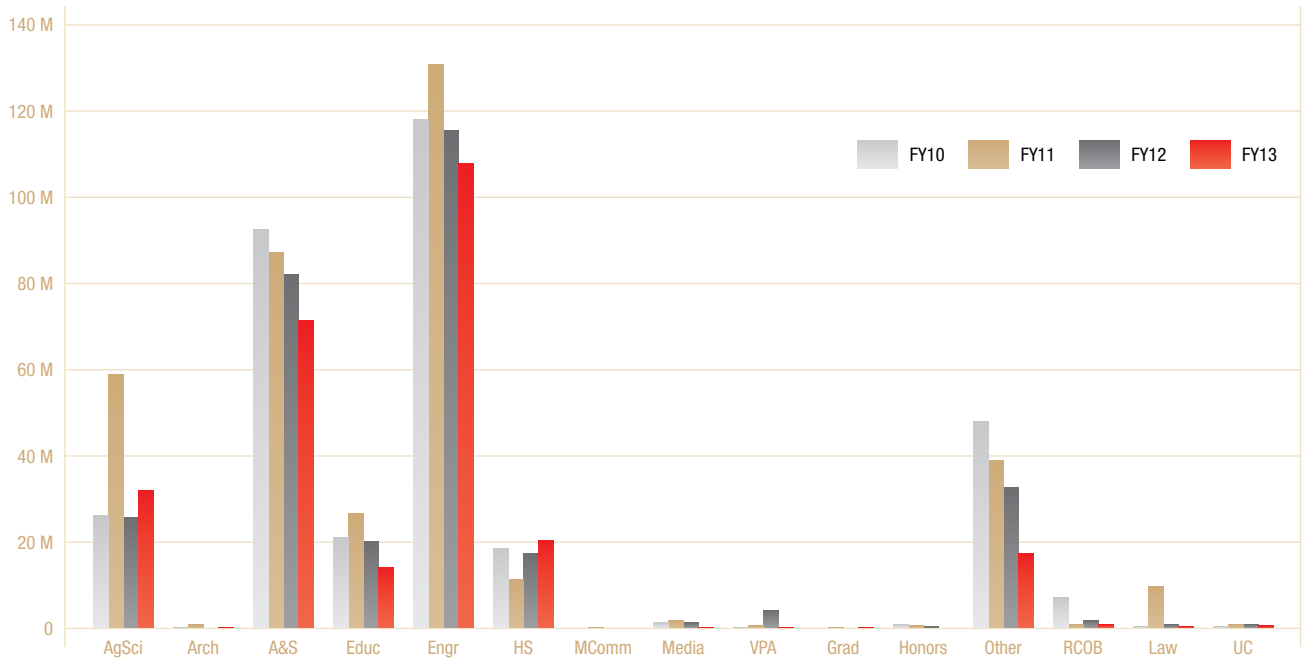
Annual Sponsored Program Activity by College

Number of Proposals Submitted by Submitting Unit



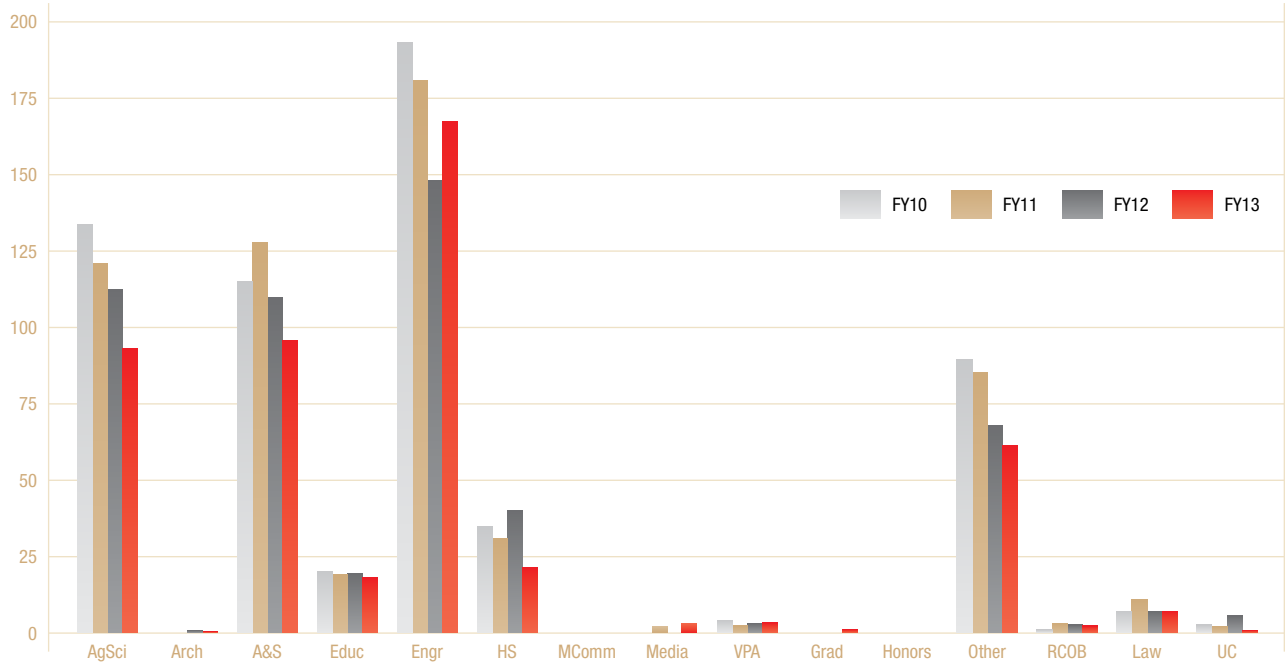
Submitting Unit	FY10	FY11	FY12	FY13
(AgSci) College of Agricultural Sciences & Natural Resources	157.61	191.87	150.96	178.42
(Arch) College of Architecture	0.40	1.50		1.50
(A&S) College of Arts & Sciences	243.95	269.73	261.70	227.98
(Educ) College of Education	26.06	39.01	27.05	28.20
(Engr) College of Engineering	338.72	332.26	308.36	298.19
(HS) College of Human Sciences	62.71	52.50	63.79	70.92
(MComm) College of Mass Communication		0.15		
(Media) College of Media & Communication	5.60	4.68	6.80	2.00
(VPA) College of Visual & Performing Arts	4.90	6.00	3.17	6.50
(Grad) Graduate School		1.00		1.00
(Honors) Honors College	0.25	0.20	1.00	0.50
(Other) Other Units & Activities	103.67	115.38	91.55	65.22
(RCOB) Rawls College of Business	6.35	4.83	2.50	5.42
(Law) School of Law	3.50	10.98	9.10	5.00
(UC) University College	5.28	4.91	6.02	2.15
Total	**959**	**1,035**	**932**	**893**

Proposal Value by Submitting Unit



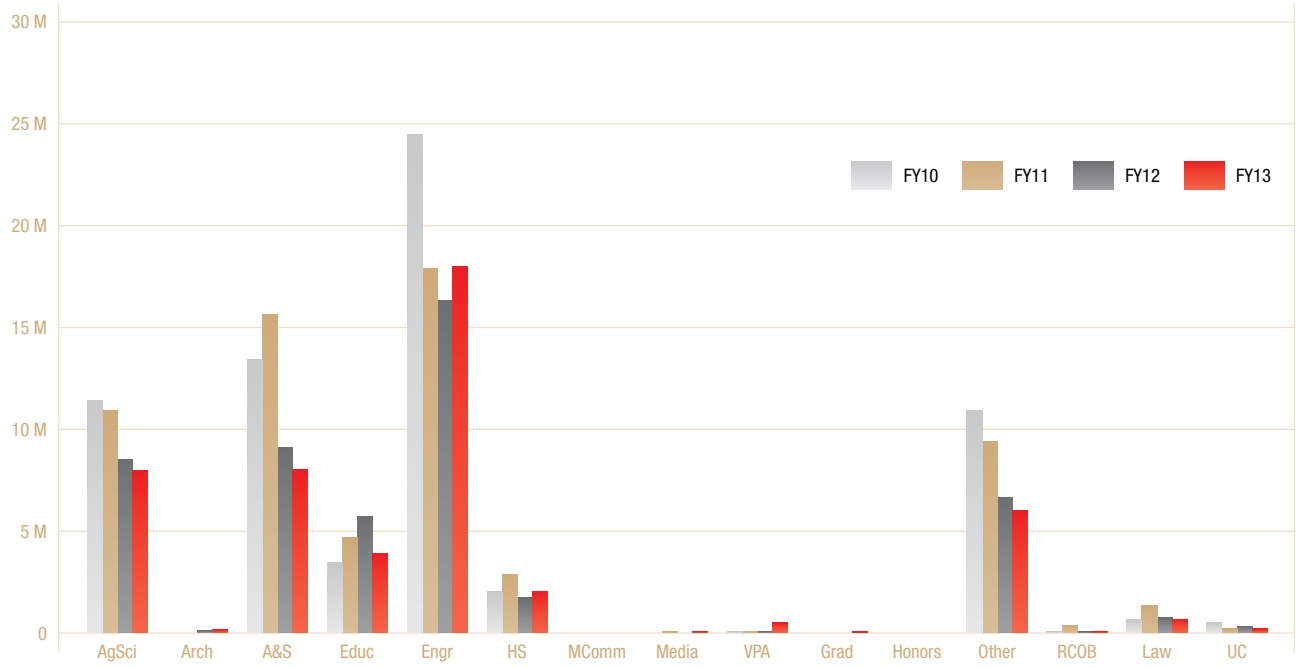
Submitting Unit	FY10	FY11	FY12	FY13
(AgSci) College of Agricultural Sciences & Natural Resources	26,872,280	58,027,018	26,515,246	32,787,793
(Arch) College of Architecture	79,928	730,981		13,694
(A&S) College of Arts & Sciences	93,318,873	87,619,060	82,722,189	71,884,668
(Educ) College of Education	21,526,152	27,117,137	20,314,738	14,160,770
(Engr) College of Engineering	118,308,113	131,289,310	115,785,267	107,565,276
(HS) College of Human Sciences	18,613,820	11,784,664	17,489,532	20,537,615
(MComm) College of Mass Communication		37,499		
(Media) College of Media & Communication	2,040,191	2,504,806	1,847,383	45,000
(VPA) College of Visual & Performing Arts	187,200	452,389	4,215,720	130,719
(Grad) Graduate School		100,000		126,000
(Honors) Honors College	784,146	433,081	37,456	0
(Other) Other Units & Activities	48,629,322	39,108,944	33,506,046	17,714,083
(RCOB) Rawls College of Business	7,494,687	857,570	2,024,745	1,018,637
(Law) School of Law	417,123	9,834,280	1,357,201	770,369
(UC) University College	539,337	1,053,198	985,680	401,660
Total	**$338,811,171**	**$370,949,937**	**$306,801,204**	**$267,156,283**

Number of Awards Received by Submitting Unit



Submitting Unit	FY10	FY11	FY12	FY13
(AgSci) College of Agricultural Sciences & Natural Resources	135.59	122.45	114.38	93.11
(Arch) College of Architecture			1.50	1.00
(A&S) College of Arts & Sciences	117.41	129.12	111.76	96.47
(Educ) College of Education	21.41	20.38	20.95	19.05
(Engr) College of Engineering	193.01	180.90	148.98	166.28
(HS) College of Human Sciences	34.92	32.05	41.50	19.77
(MComm) College of Mass Communication				
(Media) College of Media & Communication		2.00		3.00
(VPA) College of Visual & Performing Arts	4.00	2.00	3.00	3.17
(Grad) Graduate School				1.00
(Honors) Honors College				
(Other) Other Units & Activities	90.63	86.74	68.53	61.25
(RCOB) Rawls College of Business	1.30	3.66	3.00	2.90
(Law) School of Law	7.00	11.25	7.10	7.00
(UC) University College	2.73	2.45	5.30	1.00
Total	**608**	**593**	**526**	**475**

Award Value by Submitting Unit



Submitting Unit	FY10	FY11	FY12	FY13
(AgSci) College of Agricultural Sciences & Natural Resources	11,611,951	10,876,333	8,627,005	8,046,671
(Arch) College of Architecture			92,318	105,179
(A&S) College of Arts & Sciences	13,473,747	15,602,992	9,198,372	8,200,193
(Educ) College of Education	3,278,984	4,821,859	5,633,490	3,941,243
(Engr) College of Engineering	24,589,601	17,850,067	16,237,831	17,978,036
(HS) College of Human Sciences	2,070,945	2,782,410	1,863,494	2,091,925
(MComm) College of Mass Communication				
(Media) College of Media & Communication		67,644		36,700
(VPA) College of Visual & Performing Arts	60,000	30,500	40,500	595,344
(Grad) Graduate School				44,000
(Honors) Honors College				
(Other) Other Units & Activities	10,842,530	9,469,092	6,786,184	6,190,986
(RCOB) Rawls College of Business	83,524	360,272	91,828	108,909
(Law) School of Law	673,299	1,406,531	876,092	746,289
(UC) University College	594,616	219,217	388,192	230,000
Total	**$67,279,197**	**$63,486,917**	**$49,835,306**	**$48,315,475**

APPENDIX 1

PRIORITY 3: EXPAND AND ENHANCE RESEARCH AND CREATIVE SCHOLARSHIP

We will significantly increase the amount of funded and non-funded research and creative scholarship to advance knowledge, improve the quality of life in our state and nation, and enhance the state's economy and global competitiveness.

Goals/Source	2012	2013 Target	2013 Actual	2014 Target	2015 Target	2020 Target
INCREASE ENROLLMENT						
Total Research Expenditures (THECB)	$132.54 M	$145 M	$137.56 M	$145 M	$152 M	$200 M
Total Research Expenditures (NSF)	$138 M	$150 M	$143 M		$152 M	$200 M
Restricted Research Expenditures (THECB)	$46.1 M	$50 M	$40.7 M	$45 M	$50 M	$65 M
Federal Research Expenditures (NSF)	$29.97 M	$40 M	$28.8 M	$30 M	$33 M	$70 M
Federal & Private Research Expenditures per Faculty Full-Time Equivalent (THECB)	$55,579	$77,500	$47,995	$55,500	$58,000	$90,000
NSF Awards (NSF)	$5.4 M	$18 M	$7.2 M	$10 M	$24 M	$40 M
NIH Awards (NIH)	$2.7 M	$8 M	$3.3 M	$4 M	$12 M	$22 M
Ph.D. Research Assistantships on Externally Funded Awards (VPR)	364	400	322		550	800
New Invention Disclosures (R&C)	52	54	57.5	68	75	120
Number of New Collaborative Research Projects between TTU and TTUHSC (VPR)	2	5	2	5	6	10
Proposals Submitted* (OVPR)	929	1,150	891	930	1,000	1,500
Research Space in Square Feet (Operations)	490,015	520,000	431,406	510,000	550,000	700,000
Post Doctorates (NSF and CMUP)	n/a	n/a	101		150	200
SCHOLARLY PRODUCTIVITY						
Published Intellectual Contributions (Peer Reviewed/Refereed)	947	1,200	1,215		1,400	2,000
International and National Presentations	973	1,000	981		1,200	1,600

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