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Annual Report of Research Activity

OFFICE OF THE VICE PRESIDENT FOR RESEARCH / FISCAL YEAR 2016



PennState
Vice President for Research



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Penn State realized a **4.5 percent increase** in research expenditures in fiscal year 2015-2016, for a total of more than **\$836 million** derived from a variety of federal, state and private sources, once again reflecting a broad base of expertise that transcends disciplinary boundaries. In fact, the most recent NSF expenditures tally puts Penn State within the nation's top 5 institutions in six different disciplines and within the top 10 in ten, solidifying our place among the country's best.

Expenditures of federal funds increased by 4 percent, accounting for 63 percent of our research total. The Department of Defense led the way, followed by the National Institutes of Health, the National Science Foundation, Department of Energy, Department of Agriculture, and the National Aeronautics and Space Administration.

A sampling of new federal awards amply demonstrates the breadth of Penn State talent. An NSF Partnerships in International Research and Education (PIRE) Award is enabling Paola Dussias and a host of collaborators to examine the cognitive consequences of bilingualism. Chunshan Song is leading a DOE-supported coalition aimed at enhancing the efficiency of fossil fuels while minimizing their environmental impacts. Linda Collins secured her fifth renewal of an NIH Center Award with a current aim of developing new interventions for substance abuse. And a team led by Joan Redwing was awarded one of only two NSF Materials Innovation Platform (MIP) grants to advance the development and application of new 2D materials.

Support from the Commonwealth, foundations and private industry grew 8 percent this year, partly due to the university's renewed focus on partnering with companies. Notable awards from this sector include: Matt Ferrari's novel approach to preventing measles transmission in Africa, supported by the Gates Foundation; Thomas Wood's collaborative investigation of microbial biofilms with Dow Chemical; and Karen Thole's work with Pratt and Whitney to improve turbine efficiency.

It is indeed my honor to help support the work of such talented investigators.



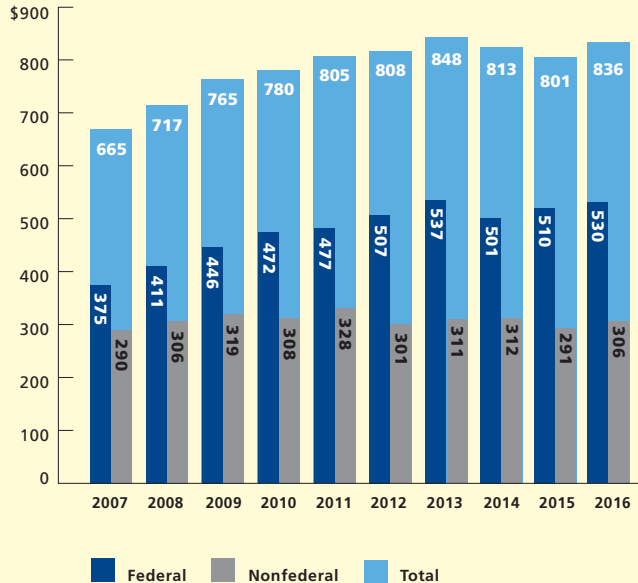
NEIL SHARKEY
Vice President for Research



Total Research Expenditures, 2007–2016
(Federal and Nonfederal)

Expenditures for fiscal year 2016 totalled **\$836 million**, with federal support leading the way at **\$530 million**.

In millions of dollars

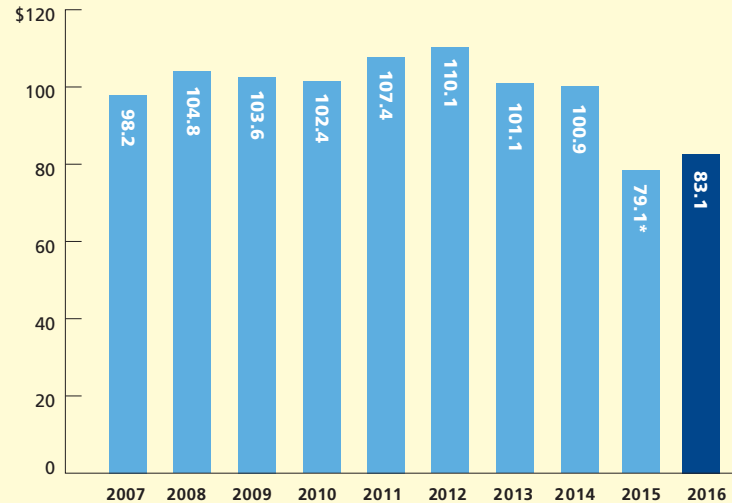


Research sponsored by industry, private foundations, and related sources, 2007–2016

Penn State typically partners with more than **400** companies annually.

** Starting in FY15, in order to enable precise tracking of industry sponsorship moving forward, federal flow-through dollars were removed from industry awards and allocated back to the prime federal sponsor.*

In millions of dollars



Expenditures from Federal Agencies

1 Department of Health and Human Services \$131,582,000

2 National Science Foundation \$68,572,000

3 NASA \$11,377,000

4 Other \$46,038,000

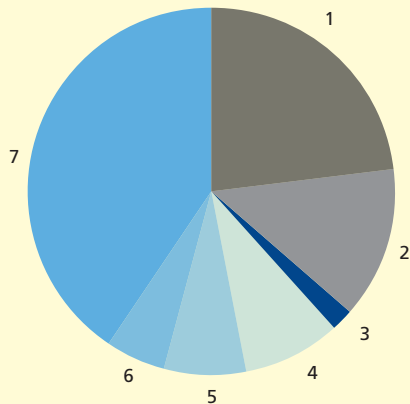
Commerce \$4,529,000
 Education \$5,411,000
 EPA \$1,565,000
 Interior \$1,119,000
 Transportation \$6,000,000
 Other Federal \$27,414,000

5 DOE \$32,025,000

6 USDA \$28,228,000

7 Department of Defense \$212,537,000

Total \$530,359,000



Expenditures by Performing Unit

1 Agricultural Sciences \$108,938,000

2 Defense-Related Research Units \$204,637,000

Applied Research Lab \$194,079,000
 Electro-Optics Center \$10,558,000

3 Earth and Mineral Sciences \$69,378,000

4 Eberly College of Science \$101,424,000

5 Education \$7,506,000

6 Engineering \$127,734,000

7 Health and Human Development \$46,144,000

8 Information Sciences and Technology \$8,322,000

9 Liberal Arts \$28,261,000

10 Medicine \$109,006,000

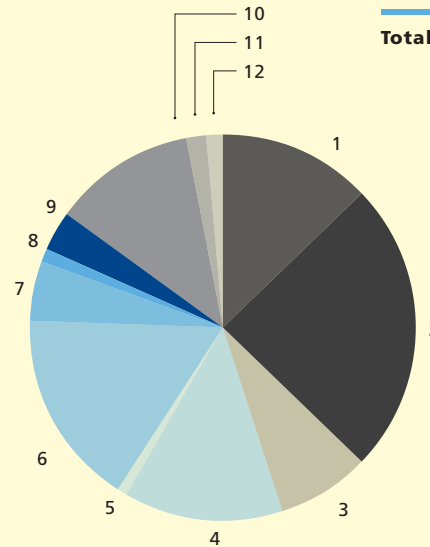
11 Other Campuses \$16,530,000

Altoona College \$1,012,000
 Behrend College \$6,062,000
 Berks College \$385,000
 Capital College \$2,962,000
 Great Valley \$226,000
 Other Commonwealth Campuses \$5,883,000

12 Other Schools and Colleges \$8,473,000

Arts and Architecture \$1,424,000
 Communications \$337,000
 International Programs \$692,000
 Law \$647,000
 Nursing \$910,000
 Smeal College of Business \$4,463,000

Total \$836,353,000



Sources of Research Funding

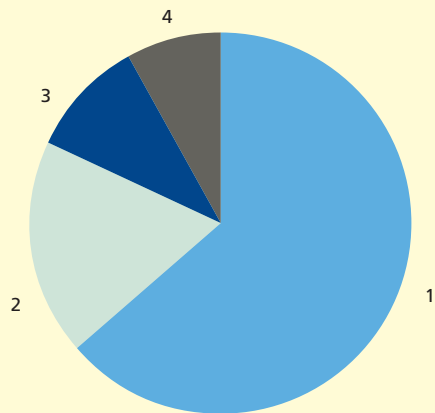
1 Federal \$530,359,000

2 University \$151,080,000

3 Industry and other \$83,119,000

4 Commonwealth of Pennsylvania
\$71,795,000

Total \$836,353,000



Penn State derives its research funding from a broad base of sources, depicted at left, reflecting a diversity of initiatives across academic disciplines. The **\$530 million** in federal support is especially noteworthy because it represents public dollars flowing back to Pennsylvania.

Federal and all other research funding provides an important economic boost to the Commonwealth, having direct and indirect impacts of approximately **\$2 billion** annually, according to a 2009 University-sponsored report, in such forms as new technologies, job creation and retention, and state and local tax revenues.

PENN STATE TECHNOLOGY TRANSFER AT A GLANCE

Total revenue: \$2.6 million

144

**INVENTION
DISCLOSURES
RECEIVED**

36

**U.S. PATENTS
ISSUED**

8

**START-UP
COMPANIES
FORMED**

21

**LICENSES
AND OPTIONS
EXECUTED**

Technology transfer data provided by Penn State's Office of Technology Management are for the period January–December 2015.

The Breadth and Depth of Research and Discovery at Penn State

A SAMPLING OF MAJOR GRANTS AND AWARDS RECEIVED IN 2015-16

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— The **U.S. DEPARTMENT OF ENERGY** selected Penn State to administer the multi-institution University Coalition for Fossil Energy Research (UCFER), with objectives to identify, select, execute, review and disseminate knowledge that will significantly contribute to improving the efficiency of production and utilization of fossil energy resources while reducing environmental impacts.

— The **U.S. DEPARTMENT OF TRANSPORTATION** continued essential operational funding for the Penn State bus testing facility that provides essential testing to ensure that new bus designs meet Federal Transit Administration requirements.

— **PRATT & WHITNEY** provided major funding to continue testing configurations that will include cooling and aerodynamic enhancements to improve efficiency of gas turbines.

— Funding from **NATIONAL INSTITUTE ON DRUG ABUSE** will enable Penn State's Center for Complex Data to Knowledge (CD2K) in Drug Abuse and HIV Behavioral Science to complete analyses enabling a new generation of highly effective interventions for drug abuse and HIV.

— Penn State researchers received a second consecutive Partnerships for International Research and Education Research (PIRE) grant in the fields of language and learning sciences from the **NATIONAL SCIENCE FOUNDATION**.

— The **PATIENT-CENTERED OUTCOMES RESEARCH INSTITUTE**, an independent nonprofit, nongovernmental organization authorized by Congress, funded a trial on the benefits of exercise coaching for enhancing feelings of accountability and patient adherence to physician-prescribed activity.

— The **NATIONAL HEART, LUNG AND BLOOD INSTITUTE** began funding AsthmaNet in September 2009 and its research continues with support from the Data Coordinating Center at the Penn State College of Medicine, addressing important clinical management questions in asthma.

— The **BILL AND MELINDA GATES FOUNDATION** provided supplemental funding for measles prevention in Africa through decision-support for supplemental vaccinations, measles outbreak response and the introduction of rubella-containing vaccine.

— Recognizing Penn State's leadership in the field of two-dimensional materials, the **NATIONAL SCIENCE FOUNDATION** made a major award to support a new user facility — the Penn State Materials Growth Laboratory.

— The overall goal of recent **USDA** funding for the Penn State Clearinghouse for Military Family Readiness is to provide practical resources to address the needs of service members and their families.

— Research funded by **DOW CHEMICAL COMPANY** will enable the oil and gas industry to develop and market biosensor tools and novel control solutions to eliminate the expensive burden of microbial biofilms.

— Penn State's Applied Research Lab (ARL) continues to provide national leadership in naval defense-related research activities with a major new award from the **NAVAL SEA SYSTEMS COMMAND** supporting the national Cyber Operations Research and Data Analytics (CORDA) program and ongoing support for engineering design and development activities such as those supporting torpedo defense.

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