U.S. DEPARTMENT OF ENERGY

Introducing the U.S. Department of Energy Experimental Program to Stimulate Competitive Research (DOE EPSCoR)

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Office of Basic Energy Sciences

Office of Science

US Department of Energy

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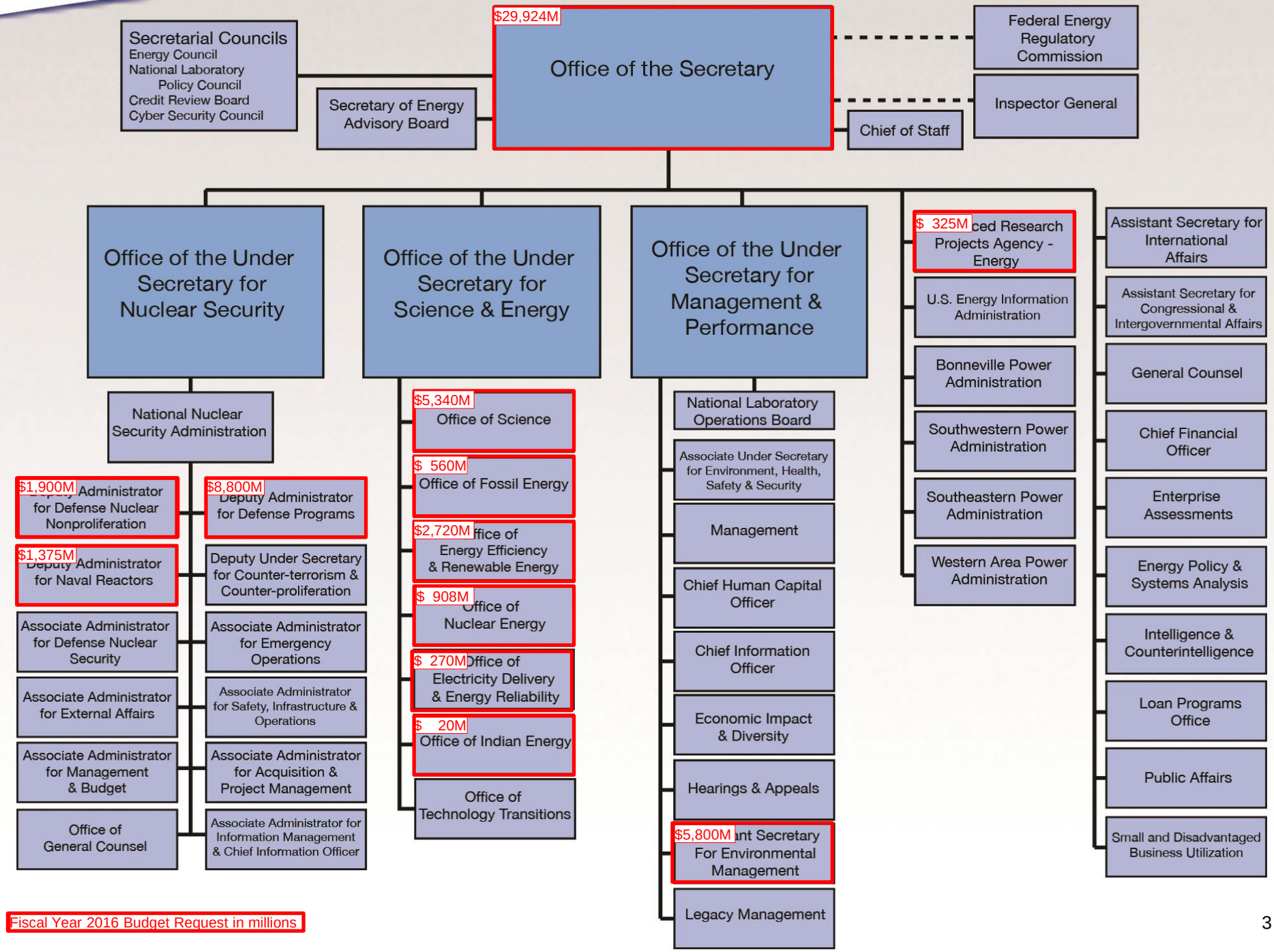
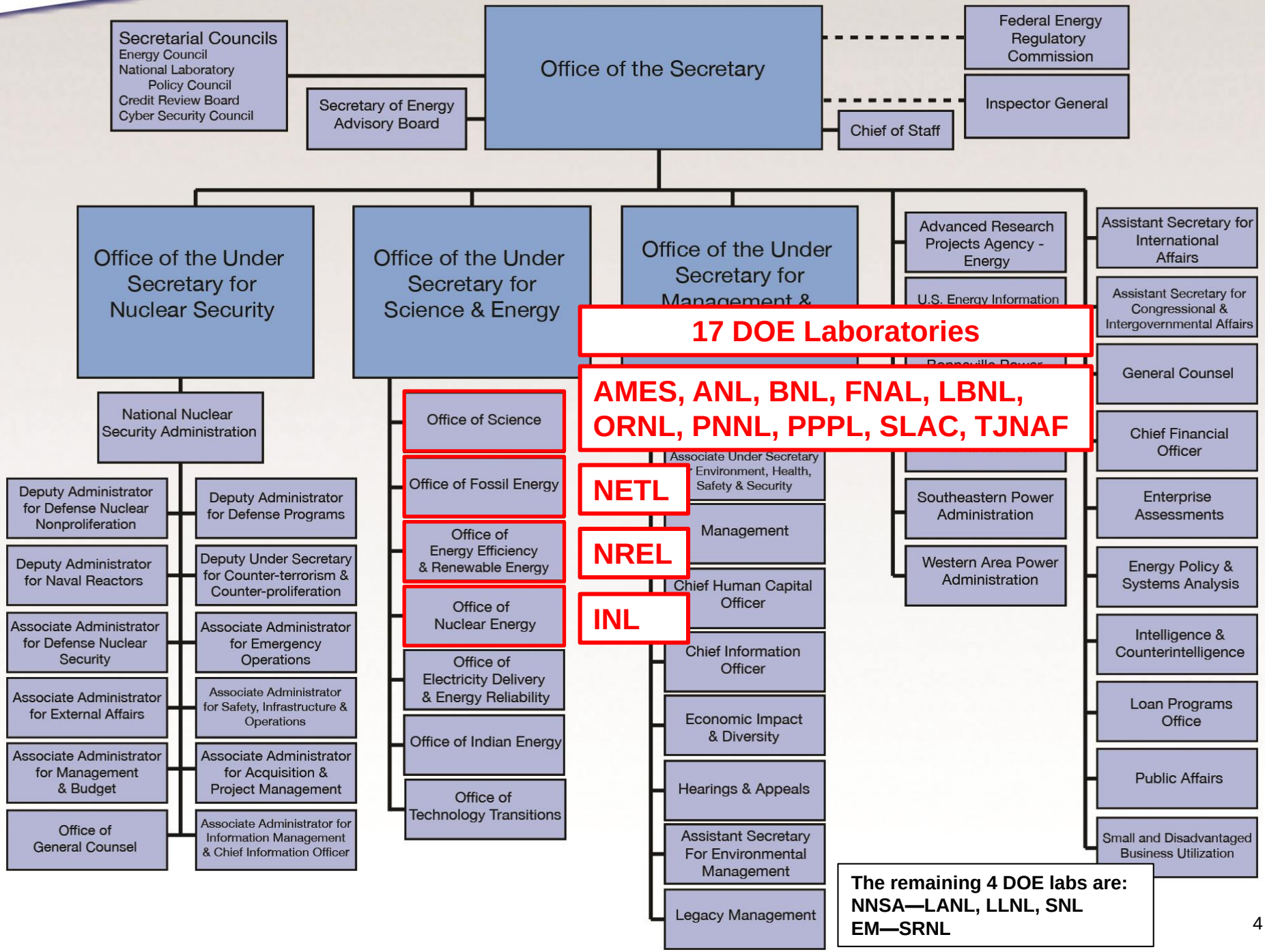
Outline

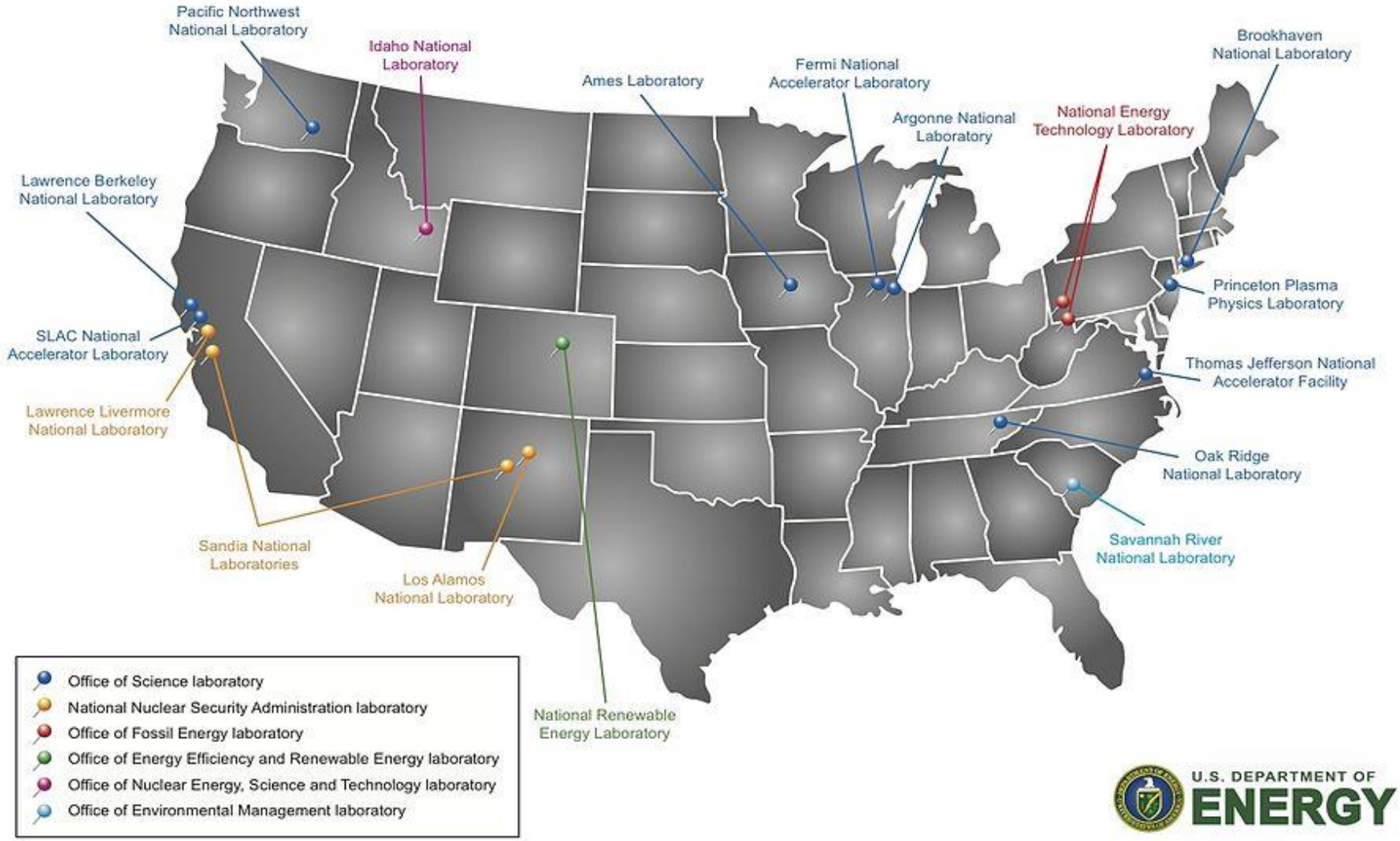
- DOE and its National Laboratory System
- Office of Science (with emphasis on the Basic Energy Sciences programs)
- EPSCoR



Fiscal Year 2016 Budget Request in millions


Secretarial Councils
Energy Council
National Laboratory Policy Council
Credit Review Board
Cyber Security Council
Secretary of Energy Advisory Board
Office of the Secretary
Federal Energy Regulatory Commission
Inspector General
Chief of Staff
Office of the Under Secretary for Nuclear Security
Office of the Under Secretary for Science & Energy
Office of the Under Secretary for Management &
Advanced Research Projects Agency - Energy
U.S. Energy Information
Assistant Secretary for International Affairs
Assistant Secretary for Congressional & Intergovernmental Affairs
General Counsel
Chief Financial Officer
Enterprise Assessments
Energy Policy & Systems Analysis
Intelligence & Counterintelligence
Loan Programs Office
Public Affairs
Small and Disadvantaged Business Utilization
17 DOE Laboratories
AMES, ANL, BNL, FNAL, LBNL, ORNL, PNNL, PPPL, SLAC, TJNAF
National Nuclear Security Administration
Deputy Administrator for Defense Nuclear Nonproliferation
Deputy Administrator for Naval Reactors
Associate Administrator for Defense Nuclear Security
Associate Administrator for External Affairs
Associate Administrator for Management & Budget
Office of General Counsel
Deputy Administrator for Defense Programs
Deputy Under Secretary for Counter-terrorism & Counter-proliferation
Associate Administrator for Emergency Operations
Associate Administrator for Safety, Infrastructure & Operations
Associate Administrator for Acquisition & Project Management
Associate Administrator for Information Management & Chief Information Officer
Office of Science
Office of Fossil Energy
NETL
Office of Energy Efficiency & Renewable Energy
NREL
Office of Nuclear Energy
INL
Office of Electricity Delivery & Energy Reliability
Office of Indian Energy
Office of Technology Transitions
Associate Under Secretary Environment, Health, Safety & Security
Management
Chief Human Capital Officer
Chief Information Officer
Economic Impact & Diversity
Hearings & Appeals
Assistant Secretary For Environmental Management
Legacy Management
Southeastern Power Administration
Western Area Power Administration
The remaining 4 DOE labs are:
NNSA—LANL, LLNL, SNL
EM—SRNL

Department of Energy National Laboratories



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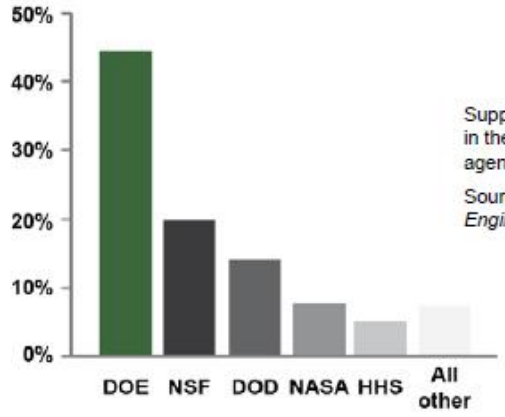
is a portion of SLAC's two-mile-long linear accelerator (or linac), which
es the electron beam for the new Linac Coherent Light Source (LCLS) –
rld's first hard x-ray, free-electron laser. For nearly 50 years, SLAC's linac
oduced high-energy electrons for physics experiments. Now researchers
e very intense X-ray pulses (more than a billion times brighter than the
owerful existing sources) much like a high-speed camera to take stop-
pictures of atoms and molecules in motion, examining fundamental
ses on femtosecond timescales.

SC delivers scientific discoveries and tools to transform our understanding of nature and advance the energy, economic, and national security of the U.S.

Research

- Support for 47% of the U.S. Federal support of basic research in the physical sciences;
- ~22,000 Ph.D. scientists, grad students, engineers, and support staff at >300 institutions, including all 17 DOE labs;
- U.S. and world leadership in high-performance computing and computational sciences;
- Major U.S. supporter of physics, chemistry, materials sciences, and biology for discovery and for energy sciences.



Support for basic research in the physical sciences by agency.

Source: *NSF Science and Engineering Indicators 2012*

Scientific User Facilities

- The world's largest collection of scientific user facilities (aka research infrastructure) operated by a single organization in the world, used by 31,000 researchers each year.

https://science.energy.gov/user-facilities/

FY 2016
28 user facilities

OLCF

ALCF

NERSC


ESnet


EMSL


ARM

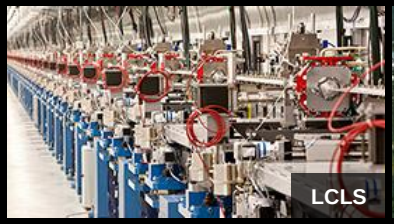

JGI


SNS


HFIR


ALS


APS


LCLS


NSLS-II


SSRL


CFN


CINT


CNM


CNMS


TMF


DIII-D

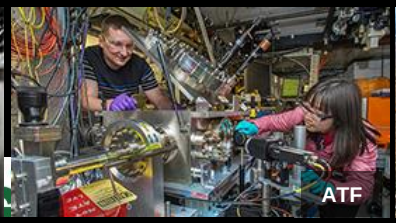

NSTX-U


C-Mod


ATLAS

RHIC


FACET


ATF


Fermilab AC


CEBAF

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Basic Energy Sciences: Scientific User Facilities

More than14,000 users in FY 2015

- ✸ **Available to all researchers *at no cost* for non-proprietary research, regardless of affiliation, nationality, or source of research support**
- ✸ **Access based on external peer merit review of brief proposals**
- ✸ **Coordinated access to co-located facilities to accelerate research cycles**
- ✸ **Collaboration with facility scientists an optional potential benefit**
- ✸ **Instrument and technique workshops offered periodically**
- ✸ **A variety of on-line, on-site, and hands-on training available**
- ✸ **Proprietary research may be performed at full-cost recovery**

Neutron Sources

- High Flux Isotope Reactor (ORNL)
- Spallation Neutron Source (ORNL)

Light Sources

- Advanced Light Source (LBNL)
- Advanced Photon Source (ANL)
- Linac Coherent Light Source (SLAC)
- National Synchrotron Light Source-II (BNL)
- Stanford Synchrotron Radiation Laboratory (SLAC)

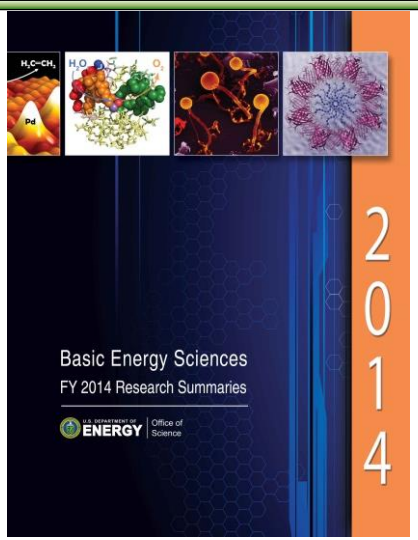
Nanoscale Science Research Centers

- Center for Functional Nanomaterials (BNL)
- Center for Integrated Nanotechnologies (SNL & LANL)
- Center for Nanophase Materials Sciences (ORNL)
- Center for Nanoscale Materials (ANL)
- Molecular Foundry (LBNL)

http://www.science.doe.gov/bes/suf/user-facilities

Online Resources

- **BES Research Summaries**
  - Report describing over 1200 BES-supported research projects in FY 2014
  - Each entry includes the title, senior investigators, number of students and postdocs, institutions, funding level, program scope, and FY 2014 highlights.
- **BES 2014 Summary Report**
  - http://science.energy.gov/bes/research/
  - Overview of BES, how BES does business, descriptions and representative research highlights for 3 BES divisions, EFRCs, and Energy Innovation Hubs
- **Links to Further information**
  - http://science.energy.gov/bes/
  - http://science.energy.gov/bes/funding-opportunities/



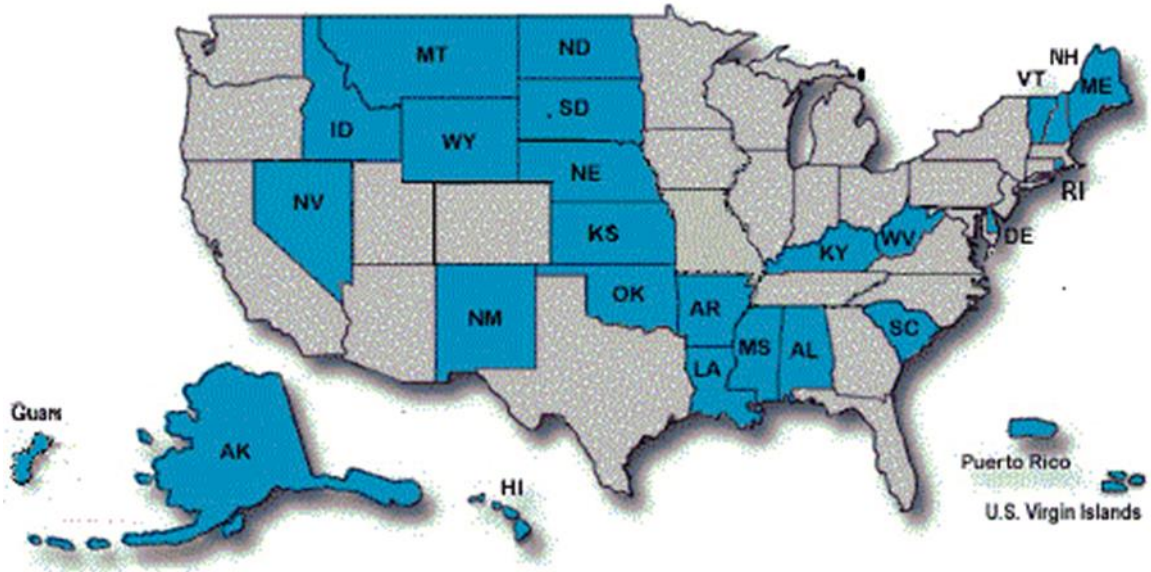
EPSCoR?

42 USC13503 [Title 42 U.S. Code Chapter 134, Subchapter X, section (§) 13503. Supporting research and technical analysis]:

- Subsection (a) authorizes Basic Energy Sciences, Subsection (b) authorized the former University and science education program which included under item (3) DOE EPSCoR. DOE EPSCoR was transferred to BES in November 1995.
  - (3)(A)(i) ***The Director of the Office of Science shall operate an Experimental Program to Stimulate Competitive Research*** (in this paragraph referred to as "EPSCoR") as part of the Department of Energy's University and Science Education Programs.
    - (ii) ***The objectives of EPSCoR shall be-***
      - (I) to enhance the competitiveness of the peer-review process within academic institutions in eligible States; and
      - (II) to increase the probability of long-term growth of competitive funding to investigators at institutions from eligible States.
    - (iii) In order to carry out the objectives stated in clause (ii), EPSCoR shall provide for activities which may include (but not be limited to) ***competitive research awards*** and graduate traineeships.
    - (iv) ***EPSCoR shall assist those States that-***
      - (I) historically have received relatively little Federal research and development funding; and
      - (II) have demonstrated a commitment to develop their research bases and improve science and engineering research and education programs at their universities and colleges.
    - (B) For purposes of this paragraph, the term "eligible States" means States that received a Department-EPSCoR planning or traineeship grant in fiscal year 1991 or fiscal year 1992.
    - (C) No more than $5,000,000 of the funds appropriated to EPSCoR in any fiscal year, through fiscal year 1997, are authorized to be appropriated for graduate traineeships.
  - Ref.: Pub. L. 102–486 (Energy Policy Act of 1992), title XXII, §2203, Oct. 24, 1992, 106 Stat. 3087;
    Pub. L. 105–245, (Energy and Water Development Appropriations Act, 1999) title III, §309(b)(2)(F), Oct. 7, 1998, 12 Stat. 1853 – renamed the Office of Energy Research as the Office of Science.

Eligibility

DOE EPSCoR has traditionally followed NSF EPSCoR eligibility determinations while reserving the right to create its own eligibility criteria



NSF RII criteria: 0.75% or less than a running 3 year average of NSF awards—exluding ARRA & large scale logistical operations.

Ref.: http://www.nsf.gov/od/oia/programs/epscor/Eligibility_Tables/FY2016_Eligibility.pdf

State eligibility changes with time: In FY 2012 Guam and Missouri became eligible to participate in NSF and DOE EPSCoR. Iowa, Tennessee and Utah became ineligible in 2013. Missouri became ineligible in 2015.

Distinguishing Features of the DOE EPSCoR Program- I

DOE EPSCoR is one of the seven National programs authorized by Congress to address the need to improve research competitiveness states and territories that have been less successful in competing for Federal research support.

- Nation's only program in collaboration with EPSCoR states/territories with a specific focus on energy-related research
- Research partnership between the EPSCoR jurisdictions and DOE in energy-related research

The DOE EPSCoR Program addresses its objectives through:

- Conducting and promoting competitively awarded energy-related research on single PI through large group collaborations in the EPSCoR jurisdictions and
- Developing science and engineering manpower to meet current and future needs in energy-related areas

Portfolio and its Distinguishing Features - II

These objectives are attained through three types of competitive awards: Implementation Grants, Laboratory Partnership Grants, and the Office of Science Early Career Research Program

- **DOE EPSCoR is located in BES but serves and collaborates across the Department**
- **DOE *program offices* provide co-funding* as a concrete measure of DOE mission relevance**
  - DOE *program offices* are involved in external mail review
  - Partnering *program offices* are requested to invite and involve PIs/Co-PIs in their annual program meetings
  - Subsequent support at the discretion of DOE *program office(s)* and their competitive solicitation process

* 10% total co-funding requested. Multiple offices may partner on co-funding.

Distinguishing Features of the DOE EPSCoR Program- III

Laboratory Partnership Grants (Most recent FOAs DE-FOA-0001432 and DE-FOA-0001572 in 2016)

- Promotes interactions between the EPSCoR Community and unique scientific capabilities at the DOE National Laboratories in conducting collaborative research and training students
- Visit by Lab scientist to EPSCoR states encouraged
- Individual principal investigator originated
- One three-year grant per topic per PI (not renewable)
- Maximum funding of $600,000 over three years

Distinguishing Features of the DOE EPSCoR Program- IV

Implementation Grants (Most recent FOAs—DE-FOA-0001087 in 2014)

- Maximum funding of $2,500,000 per year for up to six years
- One research cluster (group of scientists working on a common theme) per application
- Program coordination and human resource development closely coupled with research cluster
- Funding is provided to institutions in EPSCoR jurisdictions. Subcontracts to National Laboratories are strongly discouraged but may be used for necessary expertise on a *limited* basis

Distinguishing Features of the DOE EPSCoR Program- V

Office of Science Early Career Research Program

- The recent addition of early career awards in the DOE EPSCoR portfolio (FY2011) provides a mechanism to strengthen the attachment of well qualified early career faculty with EPSCoR institutions
- DOE EPSCoR participates in the Office of Science Early Career Award process on a funds available basis
- Consideration is limited to applications to the DOE Office of Science Early Career Award FOAs received from academic institutions in EPSCoR jurisdictions
- General information and investigator eligibility for the Early Career Award application process may be found at the Early Career Award website
- The DOE Program Office may nominate meritorious applications that would not have been otherwise funded for joint funding consideration with DOE EPSCoR
- DOE EPSCoR supports approximately 2/3 of the award. The remaining support is to be provided by the partner DOE Program to start the transition to their competitive opportunities for future support

DOE EPSCoR Budget

(Dollars in Thousands)

FY 2014*	FY 2015*	FY 2016*
9,953	9,951	14,776

* The President's budget request is approximately $8,520 per year

Relevance

DOE EPSCoR – Focus on Maximizing Science while bringing:

- Emphasis on university research in high priority/high visibility areas critical to the Department of Energy mission
- Attention to the geographic distribution of awards
- Partnerships with diverse organizations
- Offers *program offices* the opportunity to investigate and support high-risk research and junior or less well known investigators

Breadth of the Current EPSCoR Portfolio

Condensed Matter & Materials Physics

- **Nanoscale science** (U Kentucky-Strachan, West Virginia U-Holcomb)
- **Mechanical Behavior** (U Alabama-Li, U Vermont-Sansoz)

Materials Discovery, Design & Synthesis

- **Synthesis & Processing Science**(Louisiana State U-Jin)
- **Biomolecular Materials** (U Oklahoma-Mao)

Scattering & Instrumentation Sciences

- **Growing the Neutron, X-ray and Electron/Scanning probe microscopies communities** (Louisiana State U-DiTusa, U Kentucky-Hastings, U Nebraska-Hong)

Theoretical Condensed Matter Physics & Theoretical Chemistry

- **Nanoscale science** (U Arkansas-Barraza-Lopez, U New Hampshire-Zang, U Nebraska-Kovalev, NDSU-Kilina)

Chemical Transformations

- **Geoscience** (U Arkansas-Shaw, U Wyoming-Zhu)
- **Heavy Element Chemistry/Subsurface Biogeochemical Research (BER)** (Clemson-Powell)
- **Sustainable Ammonia Synthesis** (U Delaware-Xu, Kansas State U-Pfromm)

Fundamental Interactions

- **Atomic, Molecular, and Optical Sciences** (U Nebraska-Fuchs)

Photochemistry & Biochemistry

- **Solar Photochemistry** (Montana State U-Grumstrup, U New Hampshire-Li)

Energy Technologies

- **Energy storage** (Brown U-Guduru)
- **Solid State Lighting** (U New Mexico-Feezell)
- **Wind energy** (U Wyoming-Parkinson/Naughton)
- **Grid reliability** (again U Wyoming-Parkinson/Naughton, U Arkansas-Chen)
- **Nuclear Energy/Radiation Damage** (Boise State U-Chinnathambi)

EPSCoR PIs/Co-PIs Successfully Compete for DOE Office of Science Core Research Funding

State – National Laboratory Partnerships (EPSCoR Support Dates) followed by core program name (dates)*

- Talat Rahman, Kansas State (1999-2001); ThCMP(2000-2003, 2003-2007); Catalysis (2003-2008) – moved to Central Florida U as Physics Department Chair (2006) (Fellow APS 1998 – prior to EPSCoR support)
- Xincheng Xie, Oklahoma State (1999-2001); ThCMP (2001-2004; 2010-2013). Fellow APS (2008)
- Randall Headrick, U Vermont (2003-2007); X-Ray Scattering (2011-2014)
- Uwe Bunz, U South Carolina (2003-2005); moved to Georgia Tech & grant co-PI Biomolecular Mtls (2010-2013); moved to U Heidelberg
- Laurent Bellaiche, U Arkansas, (2004-2008); ThCMP (2009-2012). Fellow APS (2010)
- Dean Roddick, U Wyoming (2004-2008); Solar Photochemistry (2008-2011)
- Jason Cassibry, U Alabama-Huntsville (2006-2009); Fusion Energy Sciences (2010-2012)
- John Neumeier, Montana State (2006-2009); Physical Behavior (2016-2018) Fellow APS (2013)
- Alan Landers, Auburn U (2007-2010); Atomic, Molecular & Optical Sciences (2011-2014)
- Zhiqiang Mao, Tulane University (2007-2011), Synthesis & Processing Science (2015-2018), Fellow APS (2014)
- Marcy Litvak, U New Mexico (2008-2012); Climate and Environmental Sciences/Terrestrial Ecosystem Science (2012-2015)
- Ryszard Jankowiak, Kansas State (2008-2012); Photosynthetic Systems (2011-2014)
- Svilen Bobev, U Delaware (2009-2012); Materials Chemistry (2012-2015)
- Alberto Striolo, U Oklahoma (2009-2012); Geosciences (2011-2014)
- Alexi Gruverman, U Nebraska (2010(7/1)-2013); E&SPM (2010(9/1)-2013) Fellow APS (2013)

Implementation Awards (EPSCoR Support dates), (Core program support dates)

- Madhu Menon, co-PI on Univ. Kentucky Grant (2007-present), ThCMP (2009-2012).
- Vincente Guiseppe, co-PI on U South Dakota Grant (2010(7/1)-present), Nuclear Physics (2010(9/1)-2013)
- Kai Germaschewski, co-PI on U. NH Grant (2007-2015) selected for DOE Early Career Award by Fusion Energy Sciences (2011-2016)
- John Xiao, PI on U Delaware Grant (2007-2014), Expt. CMP (2016-2018) Fellow APS (2011)

* Select PI Honors are noted as is the (year of award): Fellow APS, Fellow ACS, Fellow AAAS

Honors/Awards*

- Hans-Conrad zur Loye, U South Carolina (State-Lab Partnership 2004-2007). Fellow ACS (2011)
- Bharat Ratra, Kansas State University (Implementation Grant co-PI 2000-2005). Fellow AAAS (2005)
- Barrett Rogers, Dartmouth College (Implementation Grant co-PI, 2007-2015), Fellow APS (2011)
- John Mateja, Murray State University (IPA – DOE EPSCoR late 1990s), Fellow APS (2011)
- Ralph E. White, U South Carolina (Implementation Grant PI, 1991-2002), Fellow AAAS (2013)
- Ken Czerwinski, U Nevada, Las Vegas (Implementation Grant PI, 2006-2010), Fellow AAAS (2013)
- Ram Katiyar, U Puerto Rico (Implementation Grant PI, 2008-2016), Fellow: APS (2009), MRS (2013)
- Jimmy W. Mays, U Tennessee (Implementation Grant co-PI, 2008-2015), Fellow AAAS (2013)
- Alexei P. Sokolov, U Tennessee (Implementation Grant co-PI, 2008-2015), Fellow AAAS (2013)
- Qian Wang, U South Carolina (State-Lab Partnership 2009-2011), Fellow AAAS (2013)
- John Schlueter,(Detailee to EPSCoR program 2010-2011), Fellow APS (2014)
- Joshua Pak, Idaho State University (Implementation Grant co-PI, 2004-2011), Fellow ACS (2015)
- Eric Furst, U Delaware (State-Lab Partnership 2009-2013), Fellow ACS (2014)
- Ilya Vekhter, Louisiana State University (State-Lab Partnership 2009-2011), Fellow APS (2015)

- Select PI Honors are noted as is the (year of award):
  - Fellow APS, Fellow ACS, Fellow AAAS , Fellow MRS

Thank you