## Index to Charts: Guidance to DOE Funding

Information garnered from DOE Budget Submission Presentations & Detailed Justifications and webpages

<table>
<thead>
<tr>
<th>Chart #s</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 - 11</td>
<td>DOE Overview</td>
</tr>
<tr>
<td>12 - 45</td>
<td>Basic Research - Office of Science (SC)</td>
</tr>
<tr>
<td>13 - 18</td>
<td>SC Overview</td>
</tr>
<tr>
<td>19 - 21</td>
<td>Advanced Computing for Scientific Research</td>
</tr>
<tr>
<td>22 - 29</td>
<td>Basic Energy Sciences</td>
</tr>
<tr>
<td>30 - 34</td>
<td>Biological and Environmental Research</td>
</tr>
<tr>
<td>35 - 37</td>
<td>Fusion Energy Science</td>
</tr>
<tr>
<td>38 - 39</td>
<td>High Energy Physics</td>
</tr>
<tr>
<td>41 - 43</td>
<td>Nuclear Physics</td>
</tr>
<tr>
<td>44 - 45</td>
<td>Workforce Development for Teachers and Scientists</td>
</tr>
<tr>
<td>46 - 63</td>
<td>Applied Research - Office of Energy</td>
</tr>
<tr>
<td>47 - 49</td>
<td>Electricity Delivery and Energy Reliability</td>
</tr>
<tr>
<td>50 - 55</td>
<td>Energy Efficiency and Renewable Energy</td>
</tr>
<tr>
<td>55</td>
<td>Advanced Manufacturing Office</td>
</tr>
<tr>
<td>56 - 59</td>
<td>Fossil</td>
</tr>
<tr>
<td>60 - 63</td>
<td>Nuclear</td>
</tr>
<tr>
<td>64 - 71</td>
<td>ARPA-E</td>
</tr>
<tr>
<td>72 - 74</td>
<td>National Nuclear Security Administration (NNSA)</td>
</tr>
</tbody>
</table>
The DC Office of Research Advancement has created the Federal Mission Agency Program Summaries (MAPS) website to:

1. Connect PIs with appropriate funding agency programs/program officers
2. Assist in development of white papers/charts/elevator pitches

The website can be accessed using one’s USC NetID and Password.

It has the following resources:

1. **Search Tab** for a searchable database of programs/program officers
   At that website one can do keyword searches to locate the associated mission agency (DHS, DOD, DOE, DOT, ED, EPA, INTEL, NASA, NIST, NOAA and USDA) programs and program officers.

2. **Mission Agency Tab** (DHS, DHHS, DOD, DOJ, DOE, DOT, ED, EPA, INTEL, NASA, NIST, NOAA, USDA)
   Guide to Agency Funding for FYXX
   Agency Research Program Charts
   Agency Planning Documents
   Chart numbers in the text above reference the Agency Research Program Chart files.

3. **Presentation Tab** for charts from recent USC Center of Excellence in Research workshops

4. **Proposal Tab** for report / guides on writing proposals

5. **Email Alerts Tab** for URLs at which one can arrange for automatic solicitation updates

6. **Grantee Tab** for URLs at which one can find previous agency awardees

7. **Visiting DC Tab** for information about DC Office services
FY2015 shows the President’s Budget Request
Continuum of Research, Development, and Deployment

Office of Science

- Discovery Research
  - Goal: new knowledge/understanding
  - Focus: phenomena
  - Metric: knowledge generation

- Use-Inspired Basic Research
  - Basic research to address fundamental limitations of current theories and descriptions of matter in the energy range important to everyday life—typically energies up to those required to break chemical bonds.

- Applied Research
  - Basic research for fundamental new understanding, usually with the goal of addressing scientific showstoppers on real-world applications in the energy technologies.

- Technology Maturation & Deployment
  - Proof of new, higher-risk concepts
  - Prototyping of new technology concepts
  - Explore feasibility of scale-up of demonstrated technology concepts in a "quick-hit" fashion.

- Applied Programs
  - Research with the goal of meeting technical milestones, with emphasis on the development, performance, cost reduction, and durability of materials and components or on efficient processes.
  - Scale-up research
  - Small-scale and at-scale demonstration
  - Cost reduction
  - Manufacturing R&D
  - Deployment support, leading to market adoption
  - High cost-sharing with industry partners

ARPA-E*

* ARPA-E: targets technology gaps, high-risk concepts, aggressive delivery times
Priority: Science and Discovery: Invest in science to achieve transformational discoveries
   – Organize and focus on breakthrough science
   – Develop and nurture science and engineering talent
   – Coordinate DOE work across the department, across the government, and globally

Priority: Change the landscape of energy demand and supply
   – Drive energy efficiency to decrease energy use in homes, industry and transportation
   – Develop and deploy clean, safe, low carbon energy supplies
   – Enhance DOE’s application areas through collaboration with its strengths in Science

Priority: Economic Prosperity: Create millions of green jobs and increase competitiveness
   – Reduce energy demand
   – Deploy cost-effective low-carbon clean energy technologies at scale
   – Promote the development of an efficient, “smart” electricity transmission and distribution network
   – Enable responsible domestic production of oil and natural gas
   – Create a green workforce

Priority: National Security and Legacy: Maintain nuclear deterrent and prevent proliferation
   – Strengthen non-proliferation and arms control activities
   – Ensure that the U.S. weapons stockpile remains safe, secure, and reliable without nuclear testing
   – Complete legacy environmental clean-up

Priority: Climate Change: Position U.S. to lead on climate change policy, technology, and science
   – Provide science and technology inputs needed for global climate negotiations
   – Develop and deploy technology solutions domestically and globally
   – Advance climate science to better understand the human impact on the global environment
## Special Program Features
*(Dr. Dehmer’s Interpretation)*

from Dr. Patricia Dehmer’s presentation to Energy Sciences Coalition, 19 May 2009

<table>
<thead>
<tr>
<th>Energy Innovation Hubs</th>
<th>Investigators and their institutions</th>
<th>Central location for investigators?</th>
<th>Diversity of Disciplines</th>
<th>Period of Award and Management</th>
<th>Award Amount</th>
<th>Core Motivation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Large set of investigators spanning multiple science and engineering disciplines and possibly including other non-science areas such as energy policy, economics, and market analysis. May be led by Labs or universities. The model is the three existing SC Bioenergy Research Centers.</td>
<td>Yes, there is a central location (building) housing many/most of the investigators. A significant aspect of the Hubs is the collocation of researchers. Collaborators at other institutions may partner with the Hub leader. Industries may also be associated with Hubs.</td>
<td>Many</td>
<td>5 years with one 5-year renewal possible. “The bar is significantly higher” for further renewals. Managed by Offices across DOE. A Board of Advisors consisting of senior leadership will coordinate across DOE.</td>
<td>$25M/year with $10M additional in the 1st year for CE or building mods.</td>
<td>Purpose-driven research, spanning fundamental, transformational science to commercialization. The breadth and emphasis of activities will be influenced greatly by the nature of the Hub. For example, the topics of some Hubs are ready for commercialization or improved manufacturing methods (solar photovoltaics). Other Hubs address topics that may require greater emphasis on fundamental research. In general, DOE determines the topical areas of the Hubs, and FOAs are specific.</td>
</tr>
<tr>
<td>Energy Frontier Research Centers</td>
<td>Self-assembled group of ~6-12 investigators. May be led by Labs or universities. About 2/3 of EFRCs are led by universities.</td>
<td>Ideally, each EFRC will have a lead institution, home to many/most of the investigators, but there is flexibility.</td>
<td>Several</td>
<td>5 years with 5-year renewals possible. Managed by SC/BES</td>
<td>$2-5M/year</td>
<td>Fundamental, transformational research with a clear link to new energy energy technologies or technology roadblocks. In general, the investigators propose the subject matter from among a large set of general energy-relevant topics, and FOAs are broad.</td>
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<tr>
<td>ARPA-E</td>
<td>Single investigator, small group, or small teams.</td>
<td>No</td>
<td>Few</td>
<td>1-3 years Managed by ARPA-E, which reports to the Secretary of Energy</td>
<td>$0.5 -10M/year</td>
<td>High risk research driven by the potential for significant commercial impact. In general, DOE determines the area of interest.</td>
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</tbody>
</table>
Innovation Hubs
(http://energy.gov/science-innovation/innovation/hubs)

Major multidisciplinary, multi-investigator, multi-institutional integrated research centers, the Hubs are modeled after the forceful centralized scientific management characteristics of the Manhattan Project.

There are five funded Hubs (~$25M/yr):

• Fuels from Sunlight Hub (funded by Basic Energy Sciences, CalTech lead, Joint Center for Artificial Photosynthesis)

• Energy Efficient Building Systems Hub (funded by EERE, Penn State Univ lead Building Technologies/Systems Integration at Greater Philadelphia Innovation Cluster,)

• Modeling and Simulation for Nuclear Reactions Hub (funded by Nuclear Energy Office, ORNL lead, Consortium for Advanced Simulation of LWRs,)

• Batteries and Energy Storage Hub (funded by Basic Energy Sciences, ANL lead, Joint Center for Energy Storage Research)

• Critical Materials Hub (funded by EERE Advanced Manufacturing, DOE Ames Laboratory lead, Critical Materials Institute,)
Science: Leading Edge Research and World Class Research Infrastructure

Accomplishments, examples

✓ Completed construction on schedule and within budget of the National Synchrotron Light Source (NSLS-II) at Brookhaven; the 12 GeV Continuous Electron Beam Accelerator Facility (CEBAF) at Jefferson Accelerator Laboratory; and the National Spherical Torus Experiment (NSTX) at Princeton; commissioning underway
✓ Mapped the structure of a protein within a living cell using the Stanford Linac Coherent Light Source (LCLS)
✓ Developed a new class of polymer-based flexible electronics for solar cells and medical applications through DOE-funded university research
✓ Established traineeship programs to support students in 3 key research areas – high performance computing, advanced manufacturing and environmental management – and expanding to radiochemistry in FY 2016

FY 2016 Highlights

- Invest $273M in a multi-year, joint Office of Science - NNSA effort to achieve exascale computing – a thousand-fold improvement over current high performance computers
- Initiate 5 new Energy Frontier Research Centers (EFRCs) and continue support for existing Centers ($110M)
- Upgrade the LCLS-II ($200M) and construct the Facility for Rare Isotope Beam (FRIB) at Michigan State ($100M)
- Operate the NOvA neutrino experiment at Fermilab ($135M total operations); and develop an enhanced Long Baseline Neutrino Facility (LBNF) with international partners ($20M)
- Fund operations of National Laboratory User Facilities at 98% of capacity, up from FY 2015, supporting 31,000 researchers ($2B)
Energy: All-of-the-Above Approach for a Low-Carbon Economy

FY 2016 Highlights

- **Advanced Manufacturing**
  - Fully fund 2 new Clean Energy Manufacturing Institutes (CEMI) and continue funding 4 Institutes, as part of the larger National Network of Manufacturing Institutes ($196M for CEMI; $404M total for advanced manufacturing)

- **Energy Efficiency**
  - Accelerate emerging building technologies to reduce Nation’s building energy use by 50% ($264M, increase of $92M)
  - Increase weatherization retrofits to approximately 33,000 low-income homes nationwide ($228M, increase of $35M)

- **Sustainable Transportation**
  - Develop and demonstrate technologies to double freight truck efficiency by 2020 in the SuperTruck II ($40M)
  - Continue EV Everywhere program to enable domestic production of plug-in vehicles that are as affordable and convenient as gasoline vehicles by 2022 ($253M)

- **Biofuels**
  - Jointly fund (with USDA and DOD) commercial scale biorefineries to produce military specification drop-in fuels ($45M)
  - Continue R&D efforts on converting cellulosic and algal-based feedstocks to bio-based gasoline and diesel ($39M)

- **Renewable Energy**
  - Solar: Continue SunShot Initiative to achieve cost parity without subsidies by 2020 ($337M, increase of $104M)
  - Wind: Continue first 3 off-shore wind projects to begin operation in 2017 ($146M, increase of $39M)
  - Geothermal: Implement FORGE and pursue new approaches to hydrothermal development ($45M)
Energy: All-of-the-Above Approach for a Low-Carbon Economy

FY 2016 Highlights

- **Fossil Energy**
  - Initiate efforts leading to a natural gas fired CCS technology demonstration ($7M)
  - Work with prospective applicants for $8 billion of loan guarantee authority
  - Propose a new refundable investment tax credit ($2B) and expanded sequestration credit for commercial CCUS deployment

- **Nuclear Energy**
  - Continue cost shared licensing and technical support for small modular reactors ($62.5M)
  - Support R&D on reactor aging issues, accident tolerant fuels, and advanced reactor concepts ($108M)
  - Lay the groundwork for development of one or more facilities for management of used fuel and high-level waste using a consent-based siting program and preparation for large-scale transportation of used fuel ($75M for waste R&D; $33M for implementation)

- **ARPA-E**
  - Invest in early-stage innovation with the potential to lead to transformational energy technologies ($325M, an increase of $45M)

- **Loans and Loan Guarantees**
  - Issue new loan guarantee solicitation for new clean energy projects on Tribal Lands ($9M for credit subsidy costs)
  - Process new applications under existing solicitations for renewable energy, energy efficiency, fossil energy, nuclear energy and advance vehicle technology manufacturing solicitations ($40B in loan volume)

from Moniz FY2016 Budget Presentation
Basic Research
Office of Science
Adv Scientific Computing Research Program (ASCR)  
(http://science.energy.gov/ascr/)
To discover, develop, and deploy computational and networking capabilities to analyze, model, simulate, and predict complex phenomena.

Basic Energy Sciences Program (BES)  
(http://science.energy.gov/bes/)
To understand, predict, and ultimately control matter and energy at the electronic, atomic, and molecular levels thereby providing the foundations for new energy technologies. Two divisions manage the University research portfolio: Materials Sciences and Engineering; and Chemical Sciences, Geosciences, and Biosciences.

Biological and Environmental Research Program (BER)  
(http://science.energy.gov/ber/)
To understand biological, climate, and environmental systems by: exploring the frontiers of genome-enabled biology; discovering the phys, chem, and bio drivers of climate change; and seeking the bio, geochem and hydrological molecular determinants of environmental sustainability and stewardship.

Fusion Energy Science Program (FES)  
(http://science.energy.gov/hep/)
To advance the fundamental understanding of matter at very high temperatures and densities, and to develop the scientific foundations needed for a fusion energy source.

High Energy Physics Program (HEP)  
(http://science.energy.gov/hep/)
To understand how our universe works at its most fundamental level by discovering the elementary constituents of matter and energy; probing the interactions between them; and exploring the basic nature of space and time.

Nuclear Physics Program (NP)  
(http://science.energy.gov/np/)
To discover, explore and understand all forms of nuclear matter and to understand how the fundamental particles—quarks and gluons—fit together and interact to create different types of matter in the universe.

Workforce Development for Teachers and Scientists  
(http://science.energy.gov/wdts/)
To help DOE and the Nation have a sustained pipeline of highly trained science, technology, engineering, and mathematics (STEM) individuals for the U.S. workforce.
FY 2016 SC Budget Request by Category
Dollars in Thousands

Construction
- BES: Linac Coherent Light Source-II continues and is in its peak funding year ($200,300K).
- FES: ITER - support for the UDIPQ, IO, and hardware fabrication continues ($150,000K).
- HEP: Long Baseline Neutrino Facility ($20,000K for PED); Muon to Electron Conversion ($40,000K).
- NP: FRIB continues and is at the peak of its funding profile ($100,000K); accelerator commissioning and detector construction of the CEBAF12 GeV upgrade continue ($12,000K).
- SL: Materials Design Lab at ANL ($23,910K); Photon Science Lab Building at SLAC ($25,000K); Integrative Genomics Building at LBNL ($20,000K).

Facility Operations
- AECR, BER, BES, HEP: Facilities operate at or near to optimal, >98%.
- FES: NSTX resumes operations for 14 weeks; DIII-D operates for 12 weeks until shutdown for installation of upgrades; Alcator C-Mod operates for 5 weeks prior to final shutdown at the end of FY 2016.
- NP: RHIC operates 22 weeks, same as in FY 2015; ATLAS operates 37 weeks; CEBAF is supported for continued machine development and commissioning of beam to Halls B and C.

Research
- ASCR: There is a significant increase for the exascale initiative (Δ = +$86,895K).
- BES: Increases for EFRCs, Computational Materials Sciences, and mid-scale instrumentation.
- BER: Increases for Climate and Earth System Modeling with largest percent increases for Climate Model Development & Validation and Integrated Assessment. Some decreases offset the increases.
- FES: Research continues in all areas. Increase for GPP for PPPL in support of NSTX-U operations. HEDLP is reduced, but the Matter in Extreme Conditions end station at LCLS remains fully funded.
- HEP: Research funding is nearly flat with FY 2015 and supports scientific results from operating experiments and R&D for future projects.
- NP: Research increases by more than 8% to support high-priority work.

*Other includes GPP/GPE amounts for BES, GPP for FES, Other (DOE/SC/Term/Lawrence) for NP, WDTI, SLI non-construction funding, S&S, and Program Direction.

Major Items of Equipment
- BES: Advanced Photon Source Upgrade (APS-U) ($20,000K) and NSLS-II Experimental Tools (NEXT) (15,500K).
- HEP: LHC Detector Upgrades (ATLAS and CMS) ($9,500K each); Large Synoptic Survey Telescope camera (LSSTcam) ($40,000K); Muon g-2 ($10,200K); LUX-ZEPLIN ($9,000K); SuperCOS-M-SENOLab ($2,000K); Dark Energy Spectroscopic Instrument (DESI) ($5,300K).

From Pat Dehmer's FY2016 budget presentation
What:
• Prior to submission of an application for a research grant, the PI is encouraged to contact the program manager whose areas of expertise and responsibilities most closely match the topic of the proposed research activities to learn about current funding opportunities and the nature of the work
• Based on the interaction with a program manager, the PI may be encouraged to submit a pre-application,
• Based on a review of the proposed research, the principal investigator will be either encouraged or discouraged to submit a full application.
• All grants that are funded undergo external peer review
• The usual term for a new award is three or four years, divided into one-year budget periods.

When:
Applications may be submitted at any time. However, it is recommended that a full application be sent between June 1st and November 30th in order that a funding decision can be made by June of the following year, which is necessary to obtain funding under that particular fiscal year.

How much: Varies with the program

Where: BAA DE-FOA-0001204 for FY2015
http://science.doe.gov/grants/
Applications must be submitted through Grants.gov to be considered for award.

Resource:
DOE Office of Science Award Search Website http://science.energy.gov/funding-opportunities/award-search/
The award search returns lists of
1. grants,
2. cooperative agreements, and
3. interagency awards currently funded by the DOE Office of Science.
Office of Science Early Career Research Program

**What:** To support individual research programs of outstanding scientists early in their careers and to stimulate research careers in the disciplines supported by the Office of Science

**Who:** Within 10 years of receiving a Ph.D., either untenured academic assistant professors on the tenure track or full-time DOE national laboratory employees

**How Much:**
- Univ. grants $150/yr for 5 years to cover summer salary and expenses
- National Lab awards $500K/year for five years to cover full salary and expenses

**When:** For FY2015 pre application (white paper) 11 Sept 2014

**Where:** DE-FOA-0001170  http://science.energy.gov/early-career/

FY 2014 750 full proposals reviewed; 38 awardees (21 Univ)
FY 2013 770 full proposals reviewed; 65 awardees (44 Univ)
FY 2012 850 full proposals reviewed; 68 awardees (43 Univ)
FY 2011 1150 full proposals reviewed; 69 awardees (44 Univ)
Energy Frontier Research Centers, 2009 - present

FY 2009 46 EFRCs were launched
- $777M for 5 years, $100M/year base + $277M ARRA

FY 2014 Recompetition Results
- $100M/year base
- 32 EFRCs in 32 States + Washington D.C.
  (22 renewals + 10 new)
- Each $2-4M/yr for up to 4 years
- Led by 23 Universities, 8 DOE Labs, and 1 non-profit
- ~525 senior investigators and ~900 students,
  postdoctoral fellows, and technical staff at ~100 institutions

FY 2015 – FY 2016 Review and Management Plan
- Full mid-term progress review for all centers in FY 2016, with funding for final two years contingent upon review outcome.

FY 2016 Funding and New Solicitation
- Funding for EFRCs increases $10,000K (FY 2015 = $100,000K; FY 2016 = $110,000K).
- Call for new EFRC proposals with topical areas that complement current portfolio and that are informed by new community workshops.
- The EFRC program will transition to a biennial solicitation cycle starting in FY 2016.
Advanced Scientific Computing Research
Computational and networking capabilities to extend the frontiers of science and technology

- Exascale computing – (Exascale Crosscut: FY 2015 = $91,000K; FY 2016 = $177,894K; \( \Delta = +$86,894K \)) Exascale crosscut includes engagement with HPC vendors to design and develop exascale node technologies and exascale hardware and software computer designs at the system level (\( \Delta = +$69,000K \)); hardware architectures and system software; programming for energy-efficient, data-intensive applications.

- Facilities operate optimally and with >90% availability; deployment of 10-40 petaflop upgrade at NERSC and continued preparations for 75-200 petaflop upgrades at the Leadership Computing Facilities.

- SciDAC partnerships continue to accelerate progress in scientific computing.

- The Computational Science Graduate Fellowship is restored at $10,000K to fully fund a new cohort.

- Mathematics research addresses challenges of increasing complexity and Computer science research addresses productivity and integrity of HPC systems and simulations, and supports data management, analysis, and visualization techniques.

From Pat Dehmer’s FY2016 budget presentation
Acquiring Topic/Program Manager Information
Advanced Scientific Computing Research (ASCR)

Go to  http://science.energy.gov/ascr/

Click on Research in left hand column

Click on the appropriate topic for a program description  
The program manager contact information is at lower right corner

<table>
<thead>
<tr>
<th>Office Division Budget Line</th>
<th>FY14 Actual ($M)</th>
<th>FY15 PBR ($M)</th>
<th>FY16 PBR ($M)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Advanced Scientific Computation Research Program (~25% to Universities)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math, Computational, and Computer Sciences Research</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Applied Mathematics</td>
<td>47</td>
<td>49</td>
<td>49</td>
</tr>
<tr>
<td>Computer Science</td>
<td>56</td>
<td>56</td>
<td>57</td>
</tr>
<tr>
<td>Computational Partnerships (SciDAC)</td>
<td>46</td>
<td>47</td>
<td>48</td>
</tr>
<tr>
<td>Next Generation Networking for Science</td>
<td>18</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td><strong>High Performance Computing and Networking Facilities</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research and Evaluation Prototypes</td>
<td>36</td>
<td>57</td>
<td>142</td>
</tr>
</tbody>
</table>
Office of Basic Energy Sciences

**Harriet Kung, Director**
Wanda Smith, Administrative Specialist

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**Materials Sciences and Engineering Division**

**Linda Horton, Director**
Teresa Crockett, Program Analyst
Vacant

- Materials Discovery, Design, and Synthesis
  - Arvind Kini
  Vacant, P.A.
- Condensed Matter and Materials Physics
  - Jim Horwitz
  Marsophia Agnant, P.A.
- Scattering and Instrumentation Sciences
  - Helen Kerch
  Cheryl Howard, P.A.
- Experimental Condensed Matter Physics
  - Michael Pechan
- Neutron Scattering
  - Thiyaga P. Thiyagarajan
- X-ray Scattering
  - Lane Wilson

---

**Scientific User Facilities Division**

**James Murphy, Director**
Linda Carmine, Program Support Specialist
Rocio Meneses, Program Assistant

- Operations
  - X-ray and Neutron Scattering Facilities
    - Peter Lee
    - Jim Rhyne
  - National Synchrotron Light Source II
    - Phil Kraushaar

- Construction
  - NSRCs **
    - George Maracas
    - Tof Carim
  - Facilities Upgrades and MIE*** Projects
    - Phil Kraushaar
    - Vacant

---

**Chemical Sciences, Geosciences, and Biosciences Division**

**Tanja Pietraß, Director**
Diane Marceau, Program Analyst
Michaelena Kyler-Leon, Program Assistant

- Fundamental Interactions
  - Jeff Krause
  - Robin Felder, P.A.
- Photochemistry and Biochemistry
  - Gail McLean
  Vacant, P.A.
- Chemical Transformations
  - John Miller
  Vacant, P.A.
- Catalysis Science
  - Raul Miranda
  Vacant
- Solar Photochemistry
  - Mark Spitzer
  - Christopher Fecko
  - Nada Dimitrijević, ANL
- Separations and Analysis
  - Larry Rahn

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**LEGEND**

- On detail to OSTP
- Detaillee from DOE Laboratory
- P.A. Program Assistant

**Notes:**
- **NSRCs** Nanoscale Science Research Centers
- **MIE*** Major Items of Equipment
- **EFRCs** Energy Frontier Research Centers

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**February 2015**
Basic Energy Sciences

Understanding, predicting, and controlling matter and energy at the electronic, atomic, and molecular levels

- Increased funding for additional Energy Frontier Research Centers (EFRCs) ($\Delta = +$10,000K)
- Increased funding for computational materials sciences research to expand technical breadth of code development for design of functional materials ($\Delta = +$4,000K)
- New funding for mid-scale instrumentation for ultrafast electron scattering ($\Delta = +$5,000K)
- **Energy Innovation Hubs:**
  - Joint Center for Energy Storage Research (JCESR) will be in its 4th year.
    (FY 15 = $24,175K; FY 2016 = $24,137K)
  - Joint Center for Artificial Photosynthesis (JCAP) is under review for renewal starting in September 2015.
    (FY 2015 = $15,000K; FY 2016 = $15,000K)
- **National Synchrotron Light Source-II (NSLS-II)** begins its 1st full year of operations.
- Linac Coherent Light Source-II (LCLS-II) construction continues.
- BES user facilities operate at near optimum levels (~99% of optimal).
- Two major items of equipment: NSLS-II Experimental Tools (NEXT) and Advanced Photon Source Upgrade (APS-U) are underway.

From Pat Dehmer’s FY2016 budget presentation
Acquiring Topic/Program Manager Information
Basic Energy Sciences (BES)

Go to  http://science.energy.gov/bes/

Click on the BES Research tab on the left

Click on the appropriate Division tab on the left

Click on the Research Areas tab on the left

Click on the appropriate topic (mid page)
<table>
<thead>
<tr>
<th>Basic Energy Sciences Program</th>
<th>FY14 Actual ($M)</th>
<th>FY15 Enacted ($M)</th>
<th>FY16 PBR ($M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials Sciences and Engineering Research Division</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condensed Matter and Materials Physics</td>
<td>122</td>
<td>122</td>
<td>122</td>
</tr>
<tr>
<td>Experimental Condensed Matter Physics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Theoretical Condensed Matter Physics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical Behavior and Radiation Effects</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Behavior of Materials</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scattering and Instrumentation Sciences</td>
<td>64</td>
<td>64</td>
<td>67</td>
</tr>
<tr>
<td>Neutron and Xray Scattering</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neutron and Xray Scattering</td>
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<td></td>
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<tr>
<td>Electron and Scanning Probe Microscopies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Materials Discovery Design and Synthesis</td>
<td>72</td>
<td>72</td>
<td>72</td>
</tr>
<tr>
<td>Synthesis and Processing Science</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Materials Chemistry and Biomolecular Materials</td>
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<tr>
<td>Computational / Materials Sciences</td>
<td>0</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>Energy Frontier Research Centers</td>
<td>51</td>
<td>51</td>
<td>56</td>
</tr>
<tr>
<td>Energy Innovation Hub - Batteries and Energy Storage</td>
<td>24</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Chemical Sci, Geosci, and Energy Biosci Research Divison</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fundamental Interactions</td>
<td>77</td>
<td>77</td>
<td>79</td>
</tr>
<tr>
<td>Atomic, Molecular, and Optical Science</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemical Physics Research - Gas Phase</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condensed Phase and Interfacial Molecular</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computational and Theoretical Chemistry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Photochemistry and Biochemistry</td>
<td>69</td>
<td>69</td>
<td>69</td>
</tr>
<tr>
<td>Solar Photochemistry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Photosynthetic Systems</td>
<td></td>
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<tr>
<td>Physical Biosciences</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemical Transformations</td>
<td>94</td>
<td>93</td>
<td>93</td>
</tr>
<tr>
<td>Catalysis Science</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Separations and Analysis</td>
<td></td>
<td></td>
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<tr>
<td>Heavy Element Chemistry</td>
<td></td>
<td></td>
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<tr>
<td>Geosciences Research</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy Frontier Research Centers</td>
<td>49</td>
<td>49</td>
<td>52</td>
</tr>
<tr>
<td>Energy Innovation Hub - Fuels from Sunlight</td>
<td>24</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Scientific User Facilities</td>
<td>931</td>
<td>916</td>
<td>951</td>
</tr>
</tbody>
</table>
Energy Frontier Research Centers, 2009 - present

FY 2009 46 EFRCs were launched
- $777M for 5 years, $100M/year base + $277M ARRA

FY 2014 Recompetition Results
- $100M/year base
- 32 EFRCs in 32 States + Washington D.C.
  (22 renewals + 10 new)
- Each $2-4M/yr for up to 4 years
- Led by 23 Universities, 8 DOE Labs, and 1 non-profit
- ~525 senior investigators and ~900 students, postdoctoral fellows, and technical staff at ~100 institutions

FY 2015 – FY 2016 Review and Management Plan
- Full mid-term progress review for all centers in FY 2016, with funding for final two years contingent upon review outcome.

FY 2016 Funding and New Solicitation
- Funding for EFRCs increases $10,000K (FY 2015 = $100,000K; FY 2016 = $110,000K).
- Call for new EFRC proposals with topical areas that complement current portfolio and that are informed by new community workshops.
- The EFRC program will transition to a biennial solicitation cycle starting in FY 2016.

From Pat Dehmer’s FY2016 budget presentation
Energy Frontier Research Centers
science.energy.gov/bes/efrc/contacts/

**What:** Integrated, multi-investigator Centers that conduct fundamental research focusing on one or more of several “grand challenges” and use-inspired “basic research needs” recently identified in major strategic planning efforts by the scientific community. The Centers integrate the talents and expertise of leading scientists in a setting designed to accelerate research toward meeting our critical energy challenges.

**How Much:** Funded at ~$3M/yr for five years, with an additional 5 year extension possible.

**When:** Every two years starting in FY2016

**Where:** www.er.doe.gov/bes/EFRC/index.html
Increase for Computational Materials Sciences

Funding

- FY 2015 included $8,000K for new awards. FOA announced January 26, 2015, for proposals to study functional materials; 4-year awards to be funded at $2,000-4,000K per year.
- FY 2016 Request of $12,000K will continue support for the 2015 awards and will fund additional awards to broaden the technical scope of the research.

Why computational materials sciences? The U.S. trails competitors in computational codes for materials discovery and engineering

- At NERSC, the most used code is VASP, a commercial Austrian atomic scale materials modeling code requiring purchase of license.
- (Quantum) Espresso, a popular materials modeling code, was developed by Italy.
- Top codes for other fields used at NERSC were developed in the U.S. and are all free, community codes.

From Pat Dehmer's FY2016 budget presentation
Biological and Environmental Research
Understanding complex biological, climatic, and environmental systems

- Genomic sciences supports the Bioenergy Research Centers and increases efforts in biosystems design for bioenergy and renewable bioproducts ($\Delta = +$2,145K).

- Mesoscale-to-molecules research supports the development of enabling technology to visualize key metabolic processes in plant and microbial cells at the subcellular and mesoscale.

- Climate and Earth System Modeling develops physical, chemical, and biological model components to simulate climate variability and change at regional and global scales. ($\Delta = +$11,763K).

- A new activity in Climate Model Development and Validation combines code development and numerical methods with ARM data to design an Earth system model with sub-10 km resolution for use on next generation and exascale computers. ($\Delta = +$18,730K).

- Atmospheric System Research (ASR) addresses major uncertainties in climate change models: the role of clouds and the effects of aerosols on precipitation, and the atmospheric radiation balance.

- Environmental System Science supports research to provide a robust, predictive understanding of terrestrial surface and subsurface ecosystems. Includes Next Generation Ecosystem Experiments targeting climatically sensitive terrestrial ecosystems not well represented in models.

- Climate and Environmental Data Analysis and Visualization employs server side analysis to simplify analysis of large scale observations with model-generated data. ($\Delta = +$2,066K).

- User facilities operate at optimal levels: ARM continues measurements at fixed sites, and mobile facilities deploy to the Arctic, Antarctic, and the Pacific Ocean. JGI provides genome sequence data, synthesis, and analysis. EMSL initiates work using the High Resolution and Mass Accuracy Capability.

From Pat Dehmer’s FY2016 budget presentation
Climate Model Development and Validation

Model capabilities today

- Global and regional simulations to 50 km resolution in full integration mode; to 25 km with limited integration. Unable to adequately represent extreme events, important to DOE and energy infrastructure.
- No standard uncertainty quantification methodology applied to climate predictions. Improved confidence in predictions is needed by scientists and stakeholders.
- No common software infrastructure strategy in climate modeling community. Current climate models will be unable to exploit DOE’s next generation exascale computer architectures.

FY 2016 Research Efforts

- Combine major upgrades in advanced software code development, downscaling methodologies, and validation against testbeds for sites in U.S. (Oklahoma, Alaska) using the Atmospheric Radiation Measurement Climate User Facility (ARM)
- Develop scale-aware physics appropriate for very high resolution phenomena extending 10 km to below 1 km.
- Integrate scale-aware physics into improved climate modeling codes for use on next generation and exascale computers.

From Pat Dehmer’s FY2016 budget presentation
Acquiring Topic/Program Manager Information
Biological and Environmental Research (BER)

Go to  http://science.energy.gov/ber/

Click on the BER Research tab on the left side

Click on the appropriate Division on the left side

Click on the appropriate topic (mid page)

<table>
<thead>
<tr>
<th>Office Division</th>
<th>Biological and Environmental Research Program (~35% to Universities)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual ($M)</td>
<td>FY14 PBR ($M)</td>
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<tr>
<td>Biological Systems Science Division</td>
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<tr>
<td>Genomic Science</td>
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</tr>
<tr>
<td>Mesoscale to Molecules</td>
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<td>Radiological Sciences</td>
<td>15</td>
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<tr>
<td>Facilities and Infrastructure</td>
<td>85</td>
</tr>
<tr>
<td>Climate and Environmental Sciences Division</td>
<td></td>
</tr>
<tr>
<td>Atmospheric System Research</td>
<td>27</td>
</tr>
<tr>
<td>Environmental System Science</td>
<td></td>
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<tr>
<td>Terrestrial Ecosystem Science</td>
<td>45</td>
</tr>
<tr>
<td>Subsurface Biogeochemical</td>
<td>24</td>
</tr>
<tr>
<td>Climate Model Development and Validation</td>
<td>0</td>
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<tr>
<td>Regional and Global Climate Modeling</td>
<td>28</td>
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<tr>
<td>Earth System Modeling</td>
<td>35</td>
</tr>
<tr>
<td>Integrated Assessment</td>
<td>10</td>
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</tbody>
</table>
The DOE Bioenergy Research Centers
Fundamental science underpinning new biofuel technologies

Multidisciplinary fundamental science guided by milestones & deliverables, targeted to key areas needed to improve production of biofuels from renewable biomass.

- BioEnergy Science Center (Oak Ridge National Lab)
- Joint BioEnergy Institute (Lawrence Berkeley National Lab)

In 5 years of operations:
- 1,110 peer-reviewed publications
- Over 400 invention disclosures and/or patent applications

In FY 2014, the BRCs will target:
- Detailed characterization of selected candidate biofuel crops (switchgrass and poplar lines) with reduced recalcitrance properties.
- Improved lignin removal techniques producing a new product stream from pretreated biomass during biofuel production.
- Increased tolerance of biofuel-producing microorganisms to pretreatment processes.
- Optimized biosynthetic pathways in microbial hosts for conversion of cellulosic sugars to a variety of drop-in hydrocarbon fuel components.
- Incorporation of microbe-plant interactions and biogeochemical relationships into analyses of bioenergy crop sustainability on marginal lands.
Fusion Energy Sciences
Matter at very high temperatures and densities and the scientific foundations for fusion

- Research is supported for the DIII-D and NSTX-U national programs.
- NSTX-U operates for 14 weeks; DIII-D operates for 12 weeks; and Alcator C-Mod operates for 5 weeks prior to facility close-out at the end of FY 2016.
- Support continues for U.S. research involvement on international machines EAST (China), KSTAR (Korea), and W7-X (Germany).
- HEDLP research is focused on the MEC instrument at LCLS.
- General plasma science activities continue, including the partnership with NSF.
- U.S. contributions to ITER support US ITER Project Office; the US direct contribution; and progress on hardware contributions, including fabrication of the central solenoid magnet modules and structures and the toroidal field magnet conductor.
Acquiring Topic/Program Manager Information
Fusion Energy Sciences

Go to  [http://science.energy.gov/fes/](http://science.energy.gov/fes/)

Click on the FES Research tab on the left side

<table>
<thead>
<tr>
<th>Fusion Energy Sciences Program (~35% to Universities)</th>
<th>FY14 Actual ($M)</th>
<th>FY15 PBR ($M)</th>
<th>FY16 PBR ($M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burning Plasma Science: Foundations</td>
<td>204</td>
<td>216</td>
<td>191</td>
</tr>
<tr>
<td>Burning Plasma Science: Long Pulse</td>
<td>35</td>
<td>39</td>
<td>31</td>
</tr>
<tr>
<td>Discovery Plasma Science</td>
<td>66</td>
<td>62</td>
<td>47</td>
</tr>
<tr>
<td>Plasma Science Frontiers</td>
<td>422</td>
<td>46</td>
<td>32</td>
</tr>
</tbody>
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High Energy Physics
Understanding how the universe works at its most fundamental level

- HEP is implementing the strategy detailed in the May 2014 report of the Particle Physics Project Prioritization Panel (P5), formulated in the context of a global vision for the field
  - HEP Addresses the five compelling science drivers with research in three frontiers and related efforts in theory, computing and advanced technology R&D
  - Increasing emphasis on international partnerships (such as LHC) to achieve critical physics goals

- Energy Frontier: Continue LHC program with higher collision energy (13+ TeV)
  - The U.S. will continue to play a leadership role in LHC discoveries by remaining actively engaged in LHC data analysis and the initial upgrades to the ATLAS and CMS detectors

- Intensity Frontier: Develop a world-class U.S.-hosted Long Baseline Neutrino Facility
  - Continue the design process for an internationalized LBNF and development of a short baseline neutrino program that will support the science and R&D required to ensure LBNF success
  - Fermilab will continue to send world's highest intensity neutrino beam to NOvA, 500 miles away

- Cosmic Frontier: Advance our understanding of dark matter and dark energy
  - Immediate development of new capabilities continue in dark matter detection with baselining of 2nd-generation experiments; and in dark energy exploration with baselining of DESI and fabrication of LSST camera.

From Pat Dehmer’s FY2016 budget presentation
Acquiring Topic/Program Manager Information
High Energy Physics Program

Go to [http://science.energy.gov/hep/](http://science.energy.gov/hep/)

Click on HEP Research tab on left

Click on the appropriate topic

<table>
<thead>
<tr>
<th>High Energy Physics Program (~40% to Universities, except for Adv Tech R&amp;D)</th>
<th>FY14 Actual ($M)</th>
<th>FY15 PBR ($M)</th>
<th>FY16 PBR ($M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Frontier Experimental Physics</td>
<td>152</td>
<td>147</td>
<td>155</td>
</tr>
<tr>
<td>Intensity Frontier Experimental Physics</td>
<td>251</td>
<td>264</td>
<td>247</td>
</tr>
<tr>
<td>Cosmic Frontier Experimental</td>
<td>97</td>
<td>107</td>
<td>119</td>
</tr>
<tr>
<td>Theoretical and Computational Physics</td>
<td>64</td>
<td>59</td>
<td>60</td>
</tr>
<tr>
<td>Advanced Technology R&amp;D</td>
<td>150</td>
<td>120</td>
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</tr>
</tbody>
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Nuclear Physics
Discovering, exploring, and understanding all forms of nuclear matter

- Funding for research increases in every NP subprogram to support high priority research areas, e.g., in nuclear structure, nuclear astrophysics, the study of matter at extreme conditions, hadronic physics, fundamental properties of the neutron, and neutrinoless double beta decay. (Increase = +$13,843K or 8.1%)

- Research at RHIC capitalizes on record luminosity and new capabilities to probe the perfect Quark-Gluon liquid. The FY 2014 run commissioned the Heavy Flavor Tracker, (new microvertex detector); the FY 2015 run will generate baseline data from proton+proton and proton+Au collisions; the FY 2016 run will generate the definitive Au+Au data to inform our understanding of the perfect liquid, discovered at RHIC in 2005.

- The 12 GeV CEBAF Upgrade continues beam development and commissioning activities in preparation for project completion and the full start of the 12 GeV physics program in 2017.

- Construction continues on the Facility for Rare Isotope Beams to provide unparalleled opportunity for research on nuclear structure and nuclear astrophysics.

- Upgrades of the ATLAS ion source and Booster Cyromodule provide new scientific capability for understanding nuclear structure and the origin of the elements in the cosmos.

- Research, development, and production of stable and radioactive isotopes is provided for science, medicine, industry, and national security.

From Pat Dehmer’s FY2016 budget presentation
Acquiring topic/PO information
Nuclear Physics Program

Go to [http://science.energy.gov/np/](http://science.energy.gov/np/)

Click on the NP Research tab on the left

Select the appropriate program (mid page)

<table>
<thead>
<tr>
<th>Nuclear Physics Program (~40% to Universities)</th>
<th>FY14 Actual ($M)</th>
<th>FY15 PBR ($M)</th>
<th>FY16 PBR ($M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium Energy Nuclear Physics Research</td>
<td>36</td>
<td>36</td>
<td>38</td>
</tr>
<tr>
<td>Heavy Ion Nuclear Physics Research</td>
<td>34</td>
<td>34</td>
<td>36</td>
</tr>
<tr>
<td>Low Energy Nuclear Physics Research</td>
<td>50</td>
<td>48</td>
<td>52</td>
</tr>
<tr>
<td>Nuclear Theory Research</td>
<td>46</td>
<td>43</td>
<td>46</td>
</tr>
</tbody>
</table>
Acquiring Topic/Program Manager Information
Workforce Development For Teachers and Scientists

Go to  http://science.energy.gov/wdts/

Select program of interest

<table>
<thead>
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<th>FY14 Actual ($M)</th>
<th>FY15 PBR ($M)</th>
<th>FY16 PBR ($M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workforce Development for Teachers and Scientists</td>
<td>27</td>
<td>20</td>
</tr>
</tbody>
</table>

Program Manager: Dr. James Glownia
Workforce Development for Teachers and Scientists

Ensuring a pipeline of STEM workers to support the DOE mission

- At DOE labs and facilities, WDTS will support ~1,000 students and faculty
  - 750 Science Undergraduate Laboratory Interns (SULI) placed at one of 17 DOE labs or facilities
  - 70 Community College Interns (CCI)
  - ~100 graduate students engaged in Ph.D. thesis research for 3-12 months at a DOE laboratory
  - 60 faculty and 25 students in the Visiting Faculty Program (VFP)

- Support for the National Science Bowl
  - More than 20,000 students, coaches, and volunteers participate in the regional and final competitions.
  - In FY 2015, there are 118 regional events, involving 14,000 students from all fifty states, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands. WDTS brings the regional winners, the top 4% of the teams, to Washington, D.C. for the final competitions.

- Support for 6 Albert Einstein Distinguished Educator Fellows

- Support for on-line business systems modernization
  - This activity modernizes on-line systems used to manage applications and review, data collection, and evaluation for all WDTS programs.

- Support for program evaluation and assessment
  - This activity assess whether programs meet established goals using collection and analysis of data and other materials, such as pre- and post-participation questionnaires, participant deliverables, notable outcomes, and longitudinal participant tracking.

From Pat Dehmer’s FY2016 budget presentation
Applied Research Programs

Electricity Delivery and Energy Reliability (OE or EDER)
http://www.oe.energy.gov/
The mission is to lead national effort to modernize the electric grid, enhance security and reliability of the energy infrastructure, and facilitate recovery from disruptions to the energy supply. In addition to develop new technologies for the storage of energy and the transmission of energy.

Energy Efficiency and Renewable Energy (EERE)
http://www.eere.energy.gov/
EERE works to strengthen the United States' energy security, environmental quality, and economic vitality in public-private partnerships. Programs include biomass, buildings, geothermal, hydrogen and fuel cells, solar, vehicles, wind & hydropower and industry.

Fossil Energy (FE)
http://fossil.energy.gov/index.html
Ensuring that we can continue to rely on clean, affordable energy from our traditional fuel resources is the primary mission. Programs include clean coal and natural gas power systems, carbon sequestration, hydrogen and other clean fuels, and oil and natural gas supply and delivery.

Nuclear Energy (NE)
http://www.ne.doe.gov/
The primary mission is to advance nuclear power as a resource capable of making major contributions in meeting the nation's energy supply, environmental, and energy security needs by resolving technical, cost, safety, security and regulatory issues through research, development, and demonstration.
Office of Electricity Delivery and Energy Reliability (OE)
Electricity Delivery and Energy Reliability
From JoAnn Milliken presentation to Association of American Universities Jan 11, 2010

Power Systems Engineering Research Center (PSERC)
- 40 researchers in 3 research areas—13 Universities and over 30 Industry Members
  • Multidisciplinary, specializing in:
    ➢ power systems, applied mathematics, non-linear systems, power electronics, control theory, computing, operations research
    ➢ economics, industrial organization and public policy.
  • Strong synergy between research and education
    ➢ Some 85 graduate students working on PSERC research projects
    ➢ Research improves quality of education experience
    ➢ Research required of faculty
  • Quality power programs (grad and undergrad)
    ➢ Students receiving quality and diverse education
    ➢ Interaction with industry invaluable
  • Employment search assistance
    ➢ Faculty available for consultation
    ➢ Creation of PES-Careers (www.PES-Careers.org)
    ➢ Job opportunities web site folder
    ➢ Student listserv for contacting students

PSERC - http://www.pserc.wisc.edu/
Office of Electricity Delivery and Energy Reliability
Research and Development

Clean Energy Transmission and Reliability supports activities in next-generation cables and conductors to increase the delivery capacity of electricity systems, to improve the affordability of electric services, and to enhance efficiency by reducing energy losses.

Transmission Reliability sponsors research into a variety of tools that will improve advanced system monitoring, visualization, control, operations, and market structure will ultimately modernize the electricity transmission infrastructure to ease congestion, allow for increases in demand, and provide greater security.

Advance Modeling Grid Research Program leverages scientific research in mathematics for application to power system models and software tools. In achieving this goal, the Program also fosters strategic, university-based power systems research capabilities.

Smart Grid Research and Development advance smart grid functionality by developing innovative, next-generation technologies/tools for transmission, distribution, energy storage, power electronics, cybersecurity and the advancement of precise time-synchronized measures of certain parameters of the electric grid.

Cybersecurity for Energy Delivery Systems Through partnerships with academia, CEDS is supporting the development of frontier research, providing a platform to bring power systems engineering and computer science together, to meet the current and future needs of providing cybersecurity for energy delivery systems.

Energy Storage Program performs research and development on a wide variety of storage technologies. The program includes batteries (both conventional and advanced), flywheels, electrochemical capacitors, superconducting magnetic energy storage (SMES), power electronics, and control systems.

Transformer Resilience and Advanced Components (new in 2016)

Power Electronics based on wide bandgap (WBG) semiconductor materials, such as silicon carbide (SiC), gallium nitride (GaN), and diamond. A number of barriers and challenges exist in utilizing WBG semiconductor based PE, including designing new types of devices and creating cost-effective high-vol manuf processes.
EERE R&D Programs

EERE programs support research and development of energy efficiency or renewable energy technologies in the areas:

Office of Energy Efficiency
- Buildings
- Federal Energy Management
- Advanced Manufacturing
- Sustainability Performance
- Weatherization and Intergovernmental

Office of Renewable Power
- Geothermal
- Solar
- Wind
- Water Power
  [http://energy.gov/eere/water/water-power-program](http://energy.gov/eere/water/water-power-program)

Office of Transportation
- Bioenergy
- Fuel Cells
- Vehicles

EERE Funding Opportunity Exchange: [https://eere-exchange.energy.gov/](https://eere-exchange.energy.gov/)
EERE

Advanced Manufacturing Office (AMO)
(was the Industrial Technology Program)
http://energy.gov/eere/amo/advanced-manufacturing-office

Mission
- Develop and demonstrate new, energy-efficient processing and materials technologies at a scale adequate to prove their value to manufacturers and spur investment.
  - Develop broadly applicable manufacturing processes that reduce energy intensity and improve production.
  - Develop and demonstrate pervasive materials technologies, enabling improved products that use less energy throughout their lifecycles.
- Conduct technical assistance activities that promote use of advanced technologies and better energy management to capture U.S. competitive advantage.

AMO: Bridging the Innovation Gap
AMO Investments leverage strong Federal support of basic research by partnering with the private sector to accelerate commercialization

http://energy.gov/eere/amo/research-development-projects
Innovative Process and Materials Technologies
http://energy.gov/eere/amo/innovative-process-and-materials-technologies-0
These cost-shared projects are selected through a competitive process from exceptional research teams working on foundational process and materials technologies.

Next Generation Manufacturing Processes
http://energy.gov/eere/amo/next-generation-manufacturing-processes
New manufacturing processes, simulation tools, and technologies are pursued in four key areas - reactions and separation, high temperature processing, waste heat minimization and recovery, sustainable manufacturing - to lower the energy intensity of manufacturing.

Next Generation Materials
http://energy.gov/eere/amo/next-generation-materials
Innovative materials can open new design spaces for high-performance and renewable energy technology manufacturing. Projects focus on three areas with clean energy, carbon, and economic benefits. Current projects are in thermal and degradation resistant materials, highly functional, high-performance materials, and lower-cost materials for energy systems

Combined Heat & Power (CHP)
http://energy.gov/eere/amo/combined-heat-and-power
Develop, test, and validate advanced CHP and distributed energy systems to pave the way for accelerated deployment in manufacturing and other applications. Current projects are in advanced reciprocating engine systems, packaged CHP systems, high-value applications, fuel-flexible CHP, and demonstrations
## EERE Funding at Universities

<table>
<thead>
<tr>
<th>EERE Program</th>
<th>% of Funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle Technologies</td>
<td>~ 5%</td>
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<tr>
<td>Hydrogen/Fuel Cell Program</td>
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<tr>
<td>Solar</td>
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</tr>
<tr>
<td>Wind &amp; Hydropower</td>
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<tr>
<td>Geothermal</td>
<td>~25%</td>
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</tbody>
</table>
Now the Advanced Manufacturing Program

Industrial Technologies Program
Industrial Assessment Centers

• DOE's university-based Industrial Assessment Centers (IACs) train engineering students for careers in industrial energy efficiency
• IACs serve 300+ plants per year (under 1 TBtu/yr) and typically identify savings of 8%-10% or $115,000/plant
• Database of 13,500 assessment results:
  http://iac.rutgers.edu/database

http://www.energy.gov/eere/amo/industrial-assessment-centers-iacs
DOE Office of Fossil Energy
Energy and Science $9.8B Request Increases 5% from FY 2014

FE request supports sustainable fossil fuel usage

Carbon Capture, Utilization, and Storage
  Post- and pre-combustion capture systems
  Storage infrastructure and technology

Natural Gas
  Scientific testing of gas hydrates
  Interagency R&D collaboration on shale gas development
  Demonstration of natural gas CCS technology
Fossil Energy

DOE’s CCS University Research Programs

- University Coal Research Program
  - DOE’s longest-running student-teacher research grant initiative, focused on advancing new ideas in coal and CCS research through annual awards.
  - $2.5 million will be available for award in 2010 through competitive solicitation. Funding opportunities are typically announced in October.

- Historically Black Colleges & Universities and Other Minority Institutions Education and Training
  - Emphasizes advancing coal/CCS research and supporting the education of scientists and engineers from diverse backgrounds through annual awards.
  - $800K will be awarded in 2010 through competitive solicitation. Funding opportunities are typically announced in October.

- University Turbine Systems Research (UTSR)
  - Supports university research on a cost-share basis to accelerate basic turbine technology development for hydrogen-fueled turbines.
  - Approximately $2.5 million in federal cost-share is anticipated in 2010 through competitive solicitation of new UTSR research.

- Geologic Sequestration Training and Research
  - Training opportunities for graduate and undergraduate students to provide the human capital and skills required for implementing carbon capture and storage technologies.
  - 43 projects selected in 2009, totaling $12.7 million in federal funding.

DOE Office of Fossil Energy
Research and Development Programs

The Office of Fossil Energy seeks to advance technologies related to the reliable, efficient, affordable and environmentally sound use of fossil fuels as well as manage the Strategic Petroleum Reserve and Northeast Home Heating Oil Reserve to provide strategic and economic security against disruptions in U.S. oil supplies.

Research and Development Areas:
Clean Coal Technologies  http://energy.gov/fe/science-innovation/clean-coal-research
Carbon Capture and Storage  http://energy.gov/fe/science-innovation/carbon-capture-and-storage-research
Oil and Gas  http://energy.gov/fe/science-innovation/oil-gas-research

Research and Development Opportunities
Most R&D procurements for the Office of Fossil Energy are coordinated by the National Energy Technology Laboratory (NETL). Most of the links below are to NETL's business-related web pages.

Financial Assistance for R&D
Financial assistance vehicles support or stimulate R&D for a public purpose. Grants are used when there is no need for substantial involvement between the recipient and agency during performance of the grant. Cooperative agreements are used when substantial involvement is needed between the recipient and agency during performance.

- View a listing of competitive solicitations currently posted by NETL.
  http://www.netl.doe.gov/business/solicitations
- DOE encourages organizations and individuals to submit self-generated, unsolicited proposals that are relevant to its research and development mission.
  http://www.netl.doe.gov/business/unsolicited-proposals
DOE Office of Nuclear Energy
R&D Programs

**Nuclear Reactor Technologies**
http://energy.gov/ne/nuclear-reactor-technologies
Supports crosscutting research and development for innovative technologies that offer the promise of dramatically improved performance for advanced reactors and fuel cycle concepts.

**Advanced Modeling and Simulation**
http://energy.gov/ne/nuclear-reactor-technologies/advanced-modeling-simulation
Using supercomputers to advance nuclear energy technologies.

**Fuel Cycle Technologies**
http://energy.gov/ne/fuel-cycle-technologies
Working to solve nuclear waste and proliferation issues.

**Nuclear Energy University Program**
http://energy.gov/ne/nuclear-reactor-technologies/nuclear-energy-university-program
NEUP engages U.S. colleges and universities to conduct research and development (R&D), enhance infrastructure and support student education thereby helping to sustain a world class nuclear energy and workforce capability.

**Nuclear Energy Enabling Technologies**
Develop crosscutting technologies that directly support and complement the Office of Nuclear Energy’s (NE) development of new and advanced reactor concepts and fuel cycle technologies.
Nuclear Energy University Programs

- NE University Programs support comprises two components:
  - University Research and Education
    - Research and development
    - Infrastructure improvements
    - Human capital development through research participation
  - Integrated University Program
    - Basic nuclear science and engineering scholarships and fellowships

- University Research and Education ($55.2M)
  (Encourages minority-serving institution participation)
  - NE mission-specific and mission-relevant nuclear science and engineering R&D projects (70%)
    - 3-4 yr. projects
    - Mission-specific R&D up to $900K (34 total)
    - Mission-relevant R&D up to $600K (9 total)
  - Infrastructure grants (30%)
    - 1-yr. awards
    - Equipment upgrades up to $300K (26 total)
    - Curriculum development up to $120K (26 total)
    - Reactor upgrade award up to $1.5M (2 total)
    - Reactor Infrastructure up to $200K (7 total)

- Integrated University Program ($5M)
  - Scholarship and fellowships grants
    - 1-yr. $5K scholarships (85 total)
    - 1-yr. $25K scholarships for outstanding students (3 total)
    - 3-yr. $150K fellowships (30 total)
Nuclear Energy University Programs
FY 2010 Timeline

- Research and Development
  - Oct. 9, 2009 – Publish Request for Pre-applications
  - Nov. 10, 2009 – Pre-applications due
  - Dec. 2009 – Publish Request for Full Proposals
  - Jan. 2010 – Full proposals due
  - Apr. 2010 – R&D selections announced
  - Jul./Aug. 2010 - NEUP Workshop

- Scholarships and Fellowships
  - Dec. 2009 – Publish Request for Applications (for students to apply for a scholarship or fellowship)
  - Jan. 2010 – Publish Funding Opportunity Announcement (FOA) (for universities and colleges to administer NEUP scholarships and fellowships)
  - Feb. 2010 – Student applications due
  - Apr. 2010 – Scholarship and fellowship selections announced

- Infrastructure
  - Jan. 2010 – Publish FOA for Infrastructure
  - Mar. 2010 – Infrastructure applications due
  - Apr. 2010 – Complete review process
  - May 2010 – Infrastructure selections announced

From JoAnn Milliken presentation to Association of American Universities Jan 11, 2010
Fulfilling ARPA-E’s Mission

To enhance the economic and energy security of the U.S.

- Reduce Energy-Related Emissions
- Improve Energy Efficiency
- Reduce Energy Imports
- To ensure U.S. technological lead in developing and deploying advanced energy technologies

• Find and fund high-risk, high-impact projects
• Identify and promote revolutionary advances in fundamental sciences
• Accelerate transformational technologies or create new technologies where none currently exist
• Translate scientific discoveries and cutting-edge inventions into technological innovations
• Bridge gaps in the energy innovation pipeline
ARPA-E Vision of its Program

ARPA-E Competition Among Portfolio of Approaches to Create New Learning Curves

Cost ($)/Performance

Technology Innovation

Current Learning Curve

ARPA-E Innovation

Deployment

NOW

Scale OR Technology Readiness Level
ARPA-E WAS CREATED WITH A VISION TO BRIDGE GAPS IN THE ENERGY INNOVATION PIPELINE

what ARPA-E will do

- Seek high impact science and engineering projects
- Invest in the best ideas and teams
- Will tolerate and manage high technical risk
- Accelerate translation from science to markets
- Proof of concept and prototyping

what ARPA-E NOT will do

- Incremental improvements
- Basic research
- Long term projects or block grants
- Large-scale demonstration projects
Figure: ARPA-E Coordination within DOE and with Other Stakeholders

Technology Risk

High Risk
High Payoff

Office of Science

Technology Transition Path

ARPA-E

Applied Energy Offices

Venture Capital and Small Businesses
Private Equity/Capital & Large Corporations

Loan Guarantee Program
Government Procurement

Low Risk
Evolutionary

Technology Maturity

Basic Science

Deployment
Figure: ARPA-E’s Program Development Process

Program Execution

Establish
- Contract Negotiation and Awards
- Award Announcements
- Project Selection

Envision
- Program Conception (Idea / Vision)
- Technical Deep Dive
- Workshop
- Internal Debate
- Further Refinement & FOA Development

Evaluate
- Full Proposal Panel Review
- Concept Paper Review
- Proposal Rebuttal Stage

Engage
- FOA Announced

Timeline: 6-8 Months from Program Conception to Execution
## ARPA-E Program Managers

<table>
<thead>
<tr>
<th>Program Manager</th>
<th>Email/Tel</th>
<th>Interests</th>
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</table>
DOE ARPA-E
Funding Announcements

What: ARPA-E issues periodic Funding Opportunity Announcements (FOAs), which are focused on overcoming specific technical barriers around a specific energy area. ARPA-E also issues periodic OPEN FOAs to identify high-potential projects that address the full range of energy-related technologies, as well as funding solicitations aimed at supporting America’s small business innovators.

All ARPA-E applicants are required to first submit a Notice of Intent and Concept Paper. ARPA-E will review the concept paper and provide early feedback on whether the idea is likely to form the basis of a successful full application. Only after ARPA-E has provided a notification on the concept paper will the applicant be permitted to submit a full application.

When: Periodic with specified deadlines

Where: For information on ARPA-E’s current FOAs and detailed information on the ARPA-E funding application process:

http://arpa-e.energy.gov/?q=programs/apply-for-funding
DOE ARPA-E

Idea Development

What
This Funding Opportunity Announcement (FOA) is intended to provide rapid support to revolutionary applied energy research (Studies) that may lead to new ARPA-E programs to develop transformational and disruptive energy technologies.

Applicants will submit brief Concept Papers (4 page maximum) as described below, and selected Concept Paper Applicants will then be invited to submit Full Applications. This FOA addresses only the Concept Paper process. Applicants must propose energy research that is not (1) covered by current ARPA-E projects, programs, FOAs, and RFIs (Requests for Information) and (2) an incremental improvement to existing technology. Applicants are encouraged to review current ARPA-E projects, programs, FOAs, and RFIs prior to application.

How Much  less than $500K for less than 12 months

When  - not solicited every year. For the past solicitation Concept Paper Submission Deadline: 9/26/2014

The SSAA Program was developed to support state-of-the-art research at U.S. academic institutions in areas of fundamental physical science and technology of relevance to the Stockpile Stewardship Program mission. The Office of Research, Development, Test and Evaluation annually invests in the Stewardship Science Academic Programs (SSAP).

Consideration will be given to proposals that emphasize experimental efforts, although proposals to advance theory that have a strong, demonstrable connection to experimental efforts will be considered.

Topic 1  Properties of Materials under Extreme Conditions and/or Hydrodynamics
Topic 2  Low Energy Nuclear Science
Topic 3  Radiochemistry

Restricted to a citizen of the United States or an alien lawfully admitted for permanent residence.

How Much: A research grant is awarded for up to three years at a funding level appropriate for the proposed scope, typically $50K to $300K per year. Total funding up to $9M annually is anticipated.

When: proposals due 27 Oct 2014 for the 2014 FOA

Where: DE-FOA-0001067
Predictive Science Academic Alliance Program

What: The centers are either Multidisciplinary Simulation Centers (MSC) or Single-Discipline Centers (SDC) solving a problem that advances basic science/engineering; verification and validation/uncertainty quantification; and contributing towards achieving effective exascale computing, to demonstrate predictive science in a HPC environment.

The NNSA Office of Advanced Simulation and Computing (ASC), in collaboration with LLNL, LANL and SNL, funded the Predictive Science Academic Alliance Program II (PSAAP II) focused on three major integrated areas:

- Discipline-focused research needed to further predictive science and enabled by effective extreme scale computing.
- Developing and demonstrating technologies and methodologies to support effective extreme computing in the context of science/engineering applications.
- Predictive science based on verification and validation and uncertainty quantification for large-scale simulations.

How Much: An estimated total of $20M per year, over a five year period. Up to $4M annually for each MSC and $2M annually for each SDC for five years.

When: June 2012 (present PSAAP cadre 2014-2019)

Where: DE-FOA-0000728