U.S. DEPARTMENT OF ENERGY | Office of Science

User Facilities in DOE's Office of Science

Committee to Assess the Current Status and Future Direction
of High Magnetic Field Science in the United States
18 May 2012

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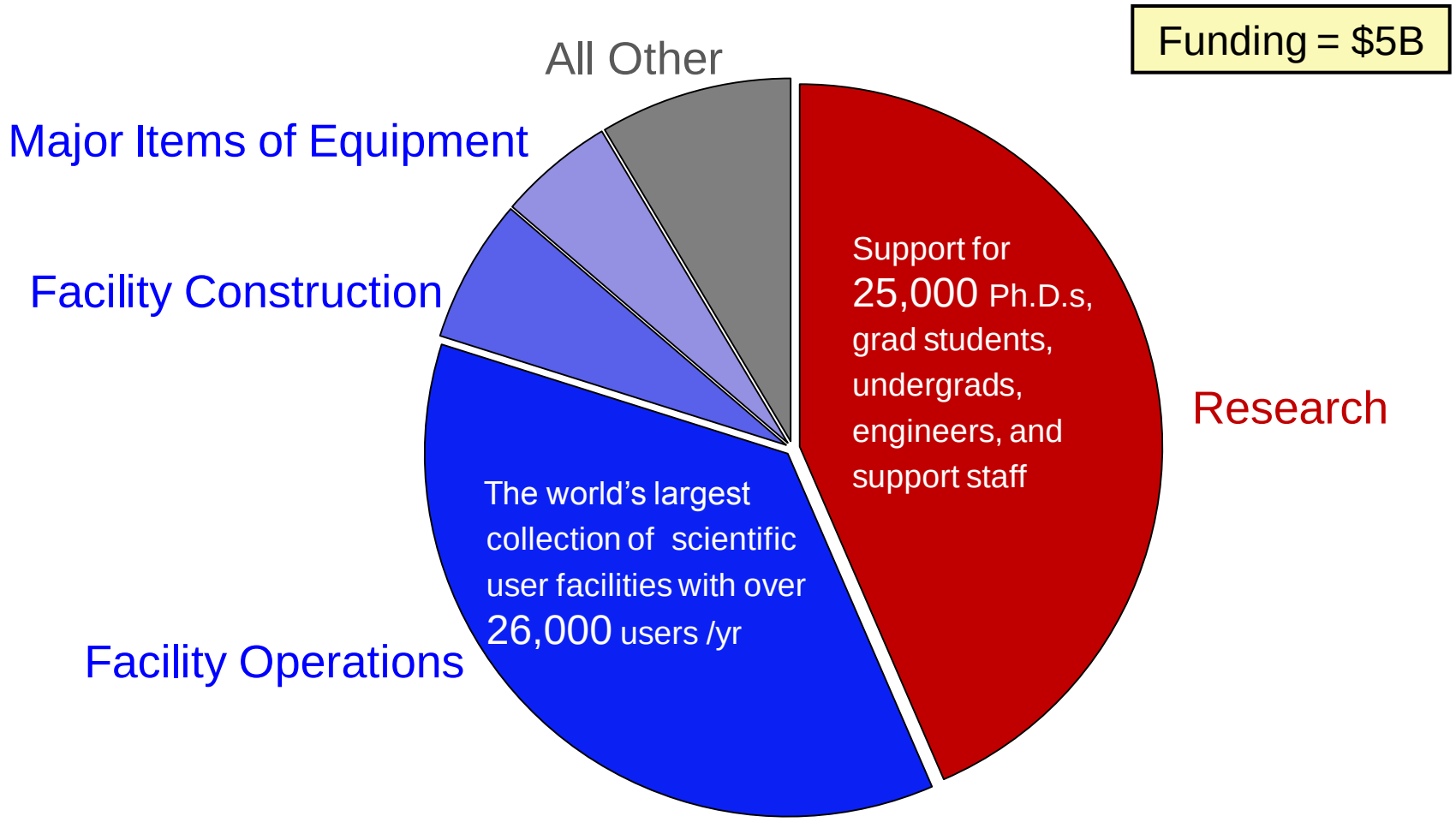
http://www.science.energy.gov/sc-2/presentations-and-testimony/

Office of Science (~$5B/year)

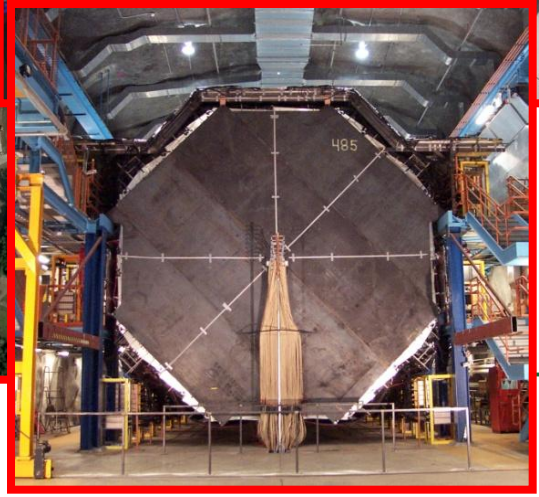
The undulator hall at the Linac Coherent Light Source, SLAC, 2011.

- 25,000 Ph.D. scientists, graduate students, undergraduates, engineers, and support staff at more than 300 institutions
- 32 national user facilities serving more than 26,000 users each year
- 45% of Federal support of basic research in the physical sciences
- 100 Nobel Prizes during the past 6 decades—more than 20 in the past 10 years

Research and Facilities in the Office of Science



Some of the 32 Office of Science User Facilities



LCLS, SLAC; ARM, North Slope of Alaska; STAR Detector at RHIC, BNL; NSTX, PPPL; APS, ANL; MINOS far detector, U.Minn/FNAL; NSLS-II, BNL, NERSC Computing Center, LBNL

Office of Science User Facilities, 2012

Facility	Host institution
Basic Energy Sciences (BES)	
Light Sources	
Advanced Light Source (ALS)	LBNL
Advanced Photon Source (APS)	ANL
Linac Coherent Light Source (LCLS)	SLAC
National Synchrotron Light Source (NSLS)	BNL
Stanford Synchrotron Radiation Light Source (SSRL)	SLAC
Neutron Sources	
High Flux Isotope Reactor (HFIR)	ORNL
Spallation Neutron Source (SNS)	ORNL
Lujan at Los Alamos Neutron Science Center (LANSCE)	LANL
Nanoscale Science Research Centers	
Center for Functional Nanomaterials (CFN)	BNL
Center for Integrated Nanotechnologies (CINT)	Sandia/LANL
Center for Nanophase Materials Sciences (CNMS)	ORNL
Center for Nanoscale Materials (CNM)	ANL
The Molecular Foundry	LBNL
Electron Microscopy Centers	
National Center for Electron Microscopy (NCEM)	LBNL
Electron Microscopy Center for Materials Research	ANL
Shared Research Equipment Program (ShaRE)	ORNL

Advanced Scientific Research Computing (ASCR)	
National Energy Research Scientific Computing Center (NERSC)	LBNL
Argonne Leadership Computing Facility (ALCF)	ANL
Oak Ridge Leadership Computing Facility (OLCF)	ORNL
Energy Sciences Network (ESnet)	LBNL
Biological and Environmental Research (BER)	
Environmental Molecular Sciences Laboratory (EMSL)	PNNL
Atmospheric Radiation Measurement Climate Research (ARM)	Global Network
Joint Genome Institute (JGI)	LBNL
High Energy Physics (HEP)	
Proton Accelerator Complex	FNAL
Facility for Advanced Accelerator Experimental Tests (FACET)	SLAC
Nuclear Physics (NP)	
Continuous Electron Beam Accelerator Facility (CEBAF)	TJNAF
Holifield Radioactive Ion Beam Facility (HRIBF)	ORNL
Relativistic Heavy Ion Collider (RHIC)	BNL
Argonne Tandem Linac Accelerator System (ATLAS)	ANL
Fusion Energy Sciences (FES)	
DIII-D	General Atomics
National Spherical Torus Experiment (NSTX)	PPPL
Alcator C-Mod	MIT

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

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User Facilities

- ASCR User Facilities
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- FES User Facilities
- HEP User Facilities
- NP User Facilities
- User Facilities Frequently Asked Questions

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The undulator hall of the Linac Coherent Light Source. SLAC National Accelerator Laboratory

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The Office of Science national scientific user facilities provide researchers with the most advanced tools of modern science including accelerators, colliders, supercomputers, light sources and neutron sources, as well as facilities for studying the nanoworld, the environment, and the atmosphere. In Fiscal Year 2011 over 26,500 researchers from academia, industry, and government laboratories, spanning all fifty states and the District of Columbia, utilized these unique facilities to perform new scientific research.

Learn More
Click here to learn more about the Office of Science User Facilities, including how to gain access.

A user facility is a federally sponsored research facility available for external use to advance scientific or technical knowledge under the following conditions:

- The facility is open to all interested potential users without regard to nationality or institutional affiliation.
- Allocation of facility resources is determined by merit review of the proposed work.
- User fees are not charged for non-proprietary work if the user intends to publish the research results in the open literature. Full cost recovery is required for proprietary work.
- The facility provides resources sufficient for users to conduct work safely and efficiently.
- The facility supports a formal user organization to represent the users and facilitate sharing of information, forming collaborations, and organizing research efforts among users.
- The facility capability does not compete with an available private sector capability.

User facility definition memorandum (257KB)

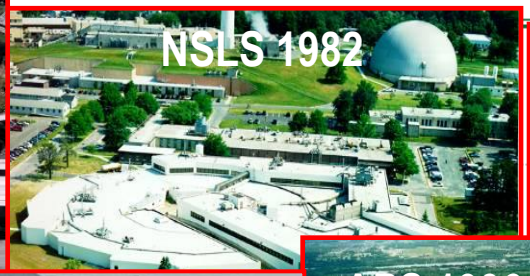
Current list of Office of Science user facilities (21KB)

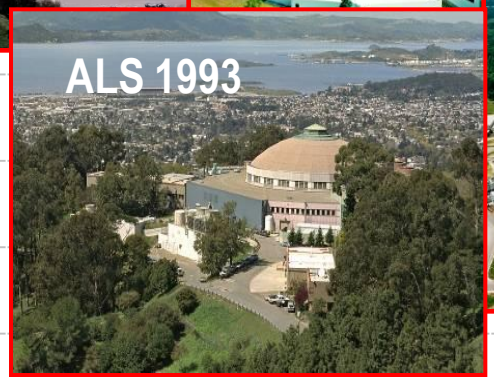
Evaluation for the BES Facilities

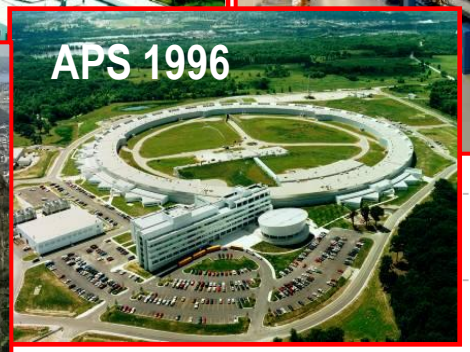
- Annual (rare), biennial, or triennial (common) external peer review to assess:
  - Impact of science, in the aggregate
  - Service to a big, happy scientific community

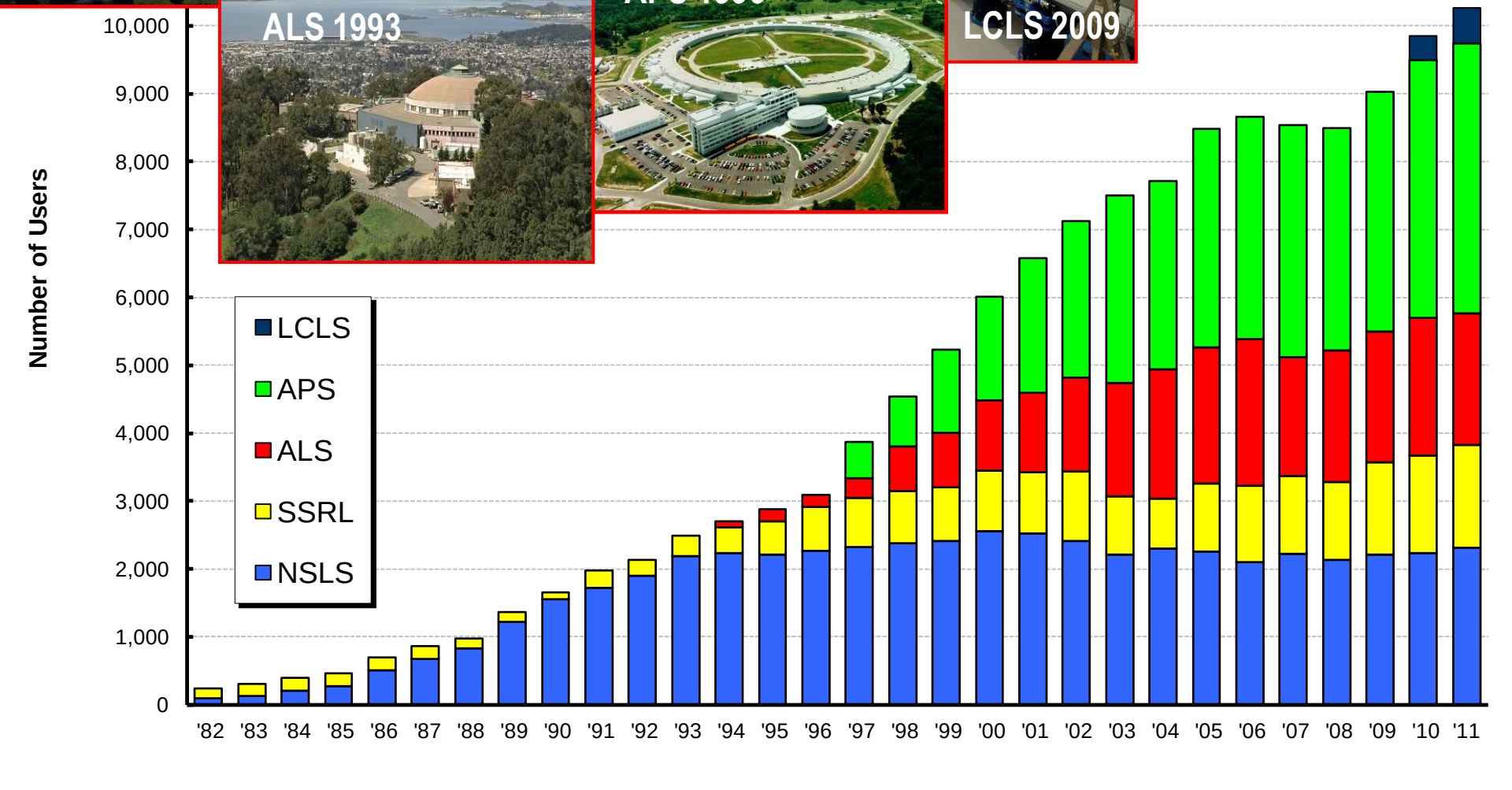
- Examination/interpretation of data from the Annual Facilities Questionnaire
  - User demographics
  - Operations data
  - Budget data
  - Summary of user satisfaction mini survey

Synchrotron Light Sources

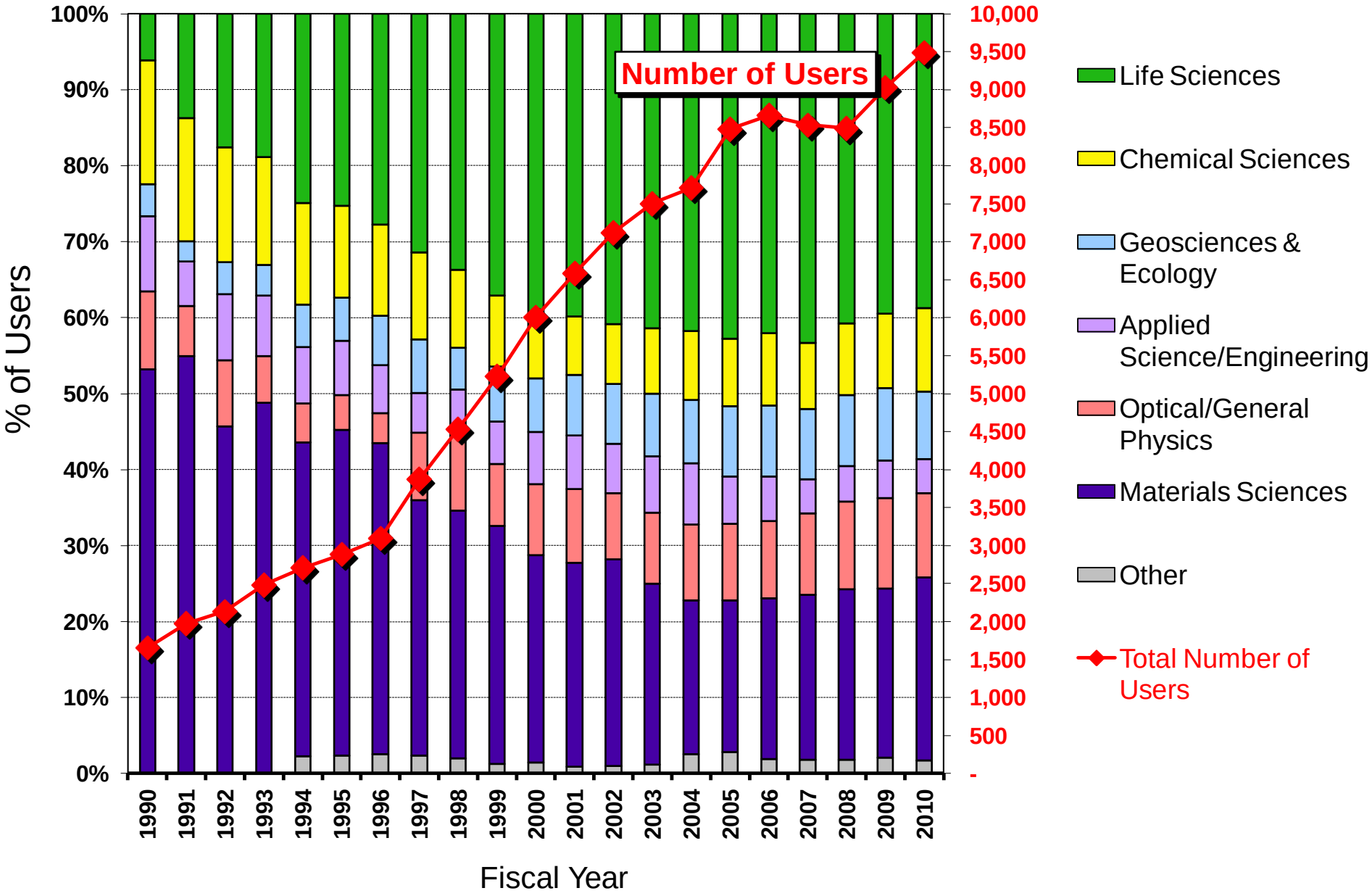




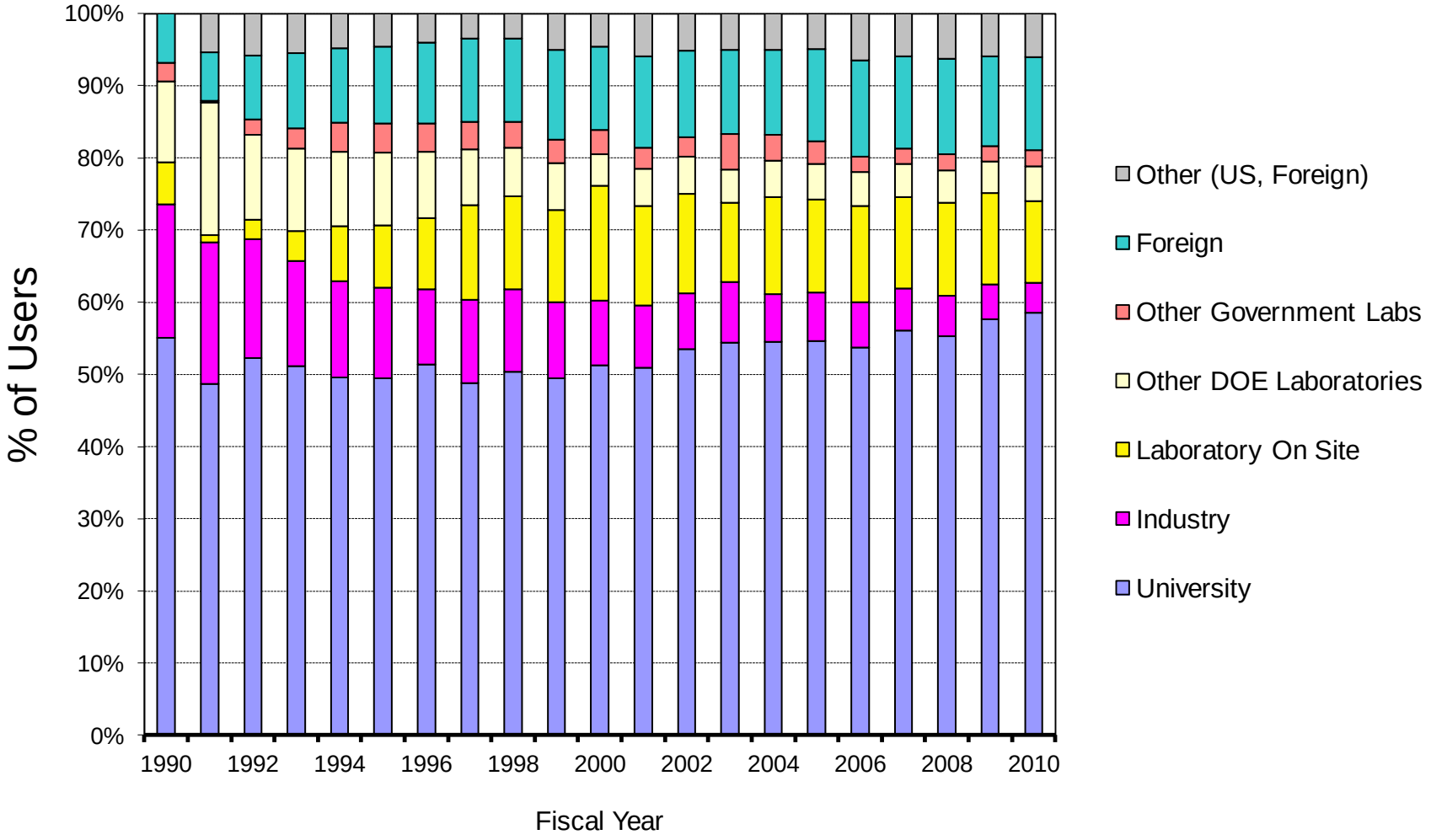




Users by Discipline at the Synchrotron Light Sources

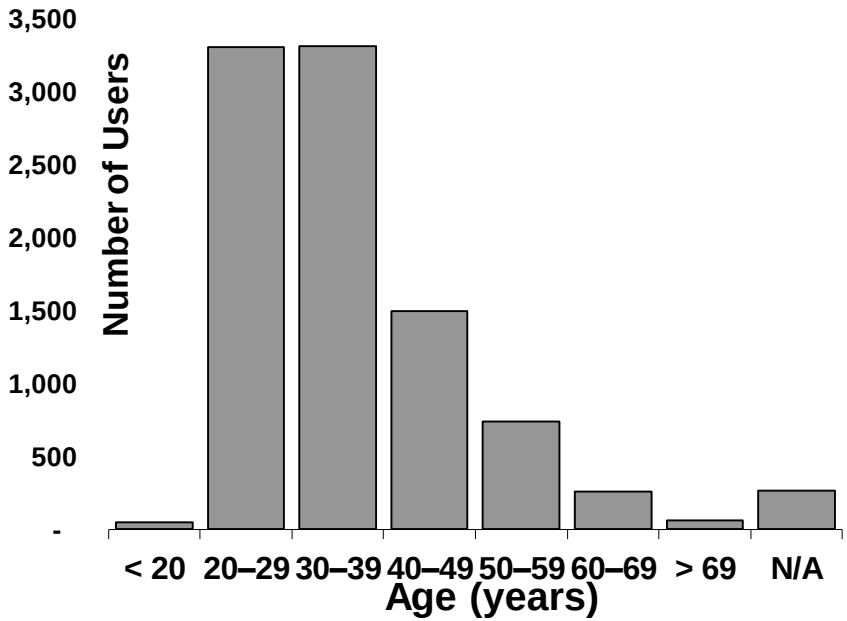


Users by Employer at the Synchrotron Light Sources

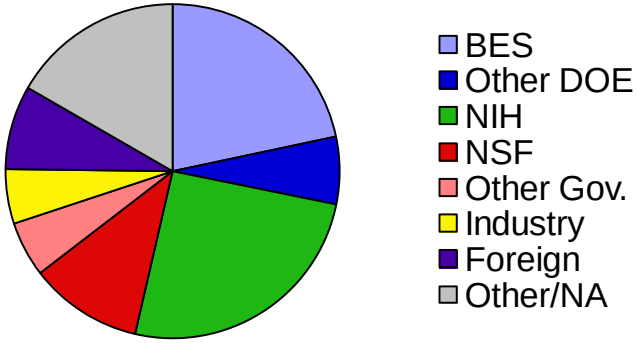


Characteristics of Users at the Synchrotron Light Sources in FY 2010

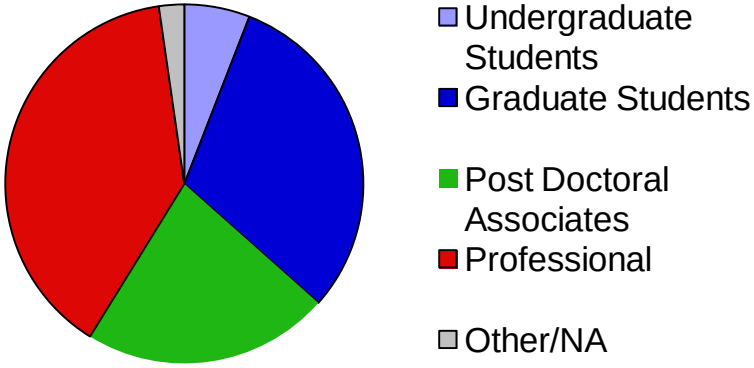
37%	First-Time Users
27%	Female
	Citizenship
51%	United States
29%	Foreign, Non-Sensitive Countries
20%	Foreign, Sensitive Countries
	Nature of Research
97%	Nonproprietary research only
1%	Nonproprietary and proprietary research
2%	Proprietary research only



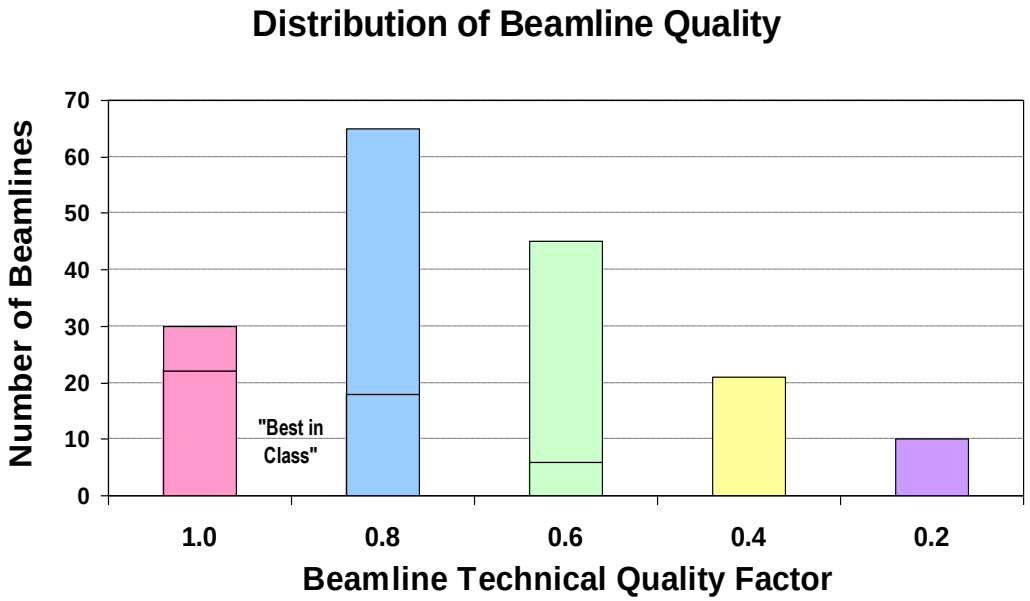
Source of User Support

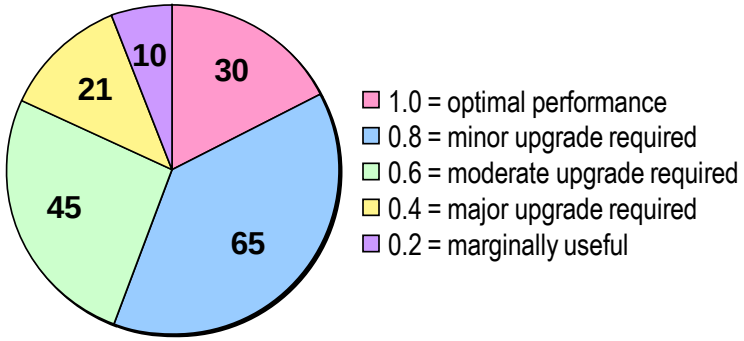


User Employment Level



Distribution of Technical Quality of 171 Beamlines (2005)





After the beamlines were counted, the operating beamlines were rated according to a quality factor. This was done by the light source senior staff. For the four DOE synchrotrons that participated in the FY 2004 pilot study, the quality factor assignments for each beamline were vetted by a “normalization” team consisting of one senior technical staff member from each of the light sources. The team visited the light sources and spot checked the ratings to ensure uniformity.

After a “beta test” during FY 2004, refined instructions were provided for FY 2005. The data shown here were collected based on FY 2005 surveys. The quality factor data indicate that only 18 percent of the beamlines at the four DOE facilities are operating at optimal performance. An equal number of operating beamlines require major upgrades or are marginally useful. The majority of beamlines, 64 percent, require minor or moderate upgrades. Across the four DOE facilities, 46 beamlines (27 percent) were rated as "Best in Class" as bench-marked against similar capabilities worldwide.

Your Questions

From the letter of invitation:

The High Magnetic Field Science Committee … is particularly interested in:

- the steward-partner model and its applicability to research facilities of varying types,
- centralized vs. distributed research capabilities,
- opportunities and challenges of co-locating experimental capabilities.

Other questions from the Statement of Task:

- How can the operational and financial stewardship of the research and facilities be optimized to address changes in the disciplinary spectrum and user needs?
- In-house versus outside users?

END

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Basic Energy Sciences (BES) Annual Facilities Questionnaire

Facility: Enter Your Facility Name Here (ACRONYM)
Fiscal Year: 2011 Date submitted: 20-Oct-11

SUMMARY DATA

Facility USERS this Fiscal Year (*Researchers who submitted a successful proposal—see definitions*)

Question Number — Add an asterisk (*) in this column next to any question that has additional information appended.

			Remote Access		Off-Site
1		Number of Badged Users			
2	0	Number of Other Users; Itemize:	0	plus	0
• **First-Time Users** (subset of Q. 1-2)					NSRCs only
3		Number of Badged Users			
4	0	Number of Other Users; Itemize:	0	plus	0
• **Researchers Associated with Experiments** (i.e., Facility Users, Q. 1-2, plus their co-proposers)					
5		Number of Badged Users and Co-Proposers			
6		Number of Other Users and Co-Proposers			

Obtain Specialty Services or Materials; Itemize (no research proposal; e.g., purchases)

7	0		Enter appropriate categories for your facility here
	Sum of Entries →		*For example…*
			Institutions that Utilize the Transplutonium Program
			Institutions that Obtain Medical Isotopes

Facility Configuration

8		Number of Beam Lines (*or analogue*) Available to Users
9		Number of Additional Beam Lines Possible.
10	*	Provide Facility Schematic Diagram(s) to Explain Above Configurations

Facility Hours of Operation for Users (365 days = 8,760 hours)

11		Maximum Number of Hours for Users (under optimal budget) (excludes machine research, operator training, accelerator physics, etc.)
12		Scheduled Hours of Operation for Users
13		Scheduled Hours Delivered to Users (may not exceed Q 12)
14		Unscheduled Hours Delivered to Users
15	*	*Next Fiscal Year* - Planned Hours for Users (attach schedule)

Beam Line Hours of Operation for Users (from Q. 35)

16		Beam Line Hours Scheduled
17		Beam Line Hours Delivered
18		Beam Line Hours Used

Number of Scientific Publications

19		*Estimate* of Facility Publications for this Fiscal Yea
20		*Final* Facility Publications for *Previous Calendar Year*

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Basic Energy Sciences (BES) Annual Facilities Questionnaire

Facility: Enter Your Facility Name Here (ACRONYM)
Fiscal Year: 2011

User Demographics

	0	Number of Users (sum Q. 1 plus Q. 2)

Question Number

Gender

21		Female
		Male
0		Information Not Available

Race/Ethnicity

22		American Indians or Alaskan Natives
		Asians/Pacific Islanders
		Black, non-Hispanics
		Hispanics
		White, non-Hispanics
0		Information Not Available

Age

23		Under 20 years
		20-29 years
		30-39 years
		40-49 years
		50-59 years
		60-69 years
		Over 69 years
0		Information Not Available

Citizenship

24		U.S. Citizen
		Foreign National, non-Sensitive Countries
		Foreign National, Sensitive Countries
0		Terrorist-Sponsoring Nations (U.S. State Department's list)

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Basic Energy Sciences (BES) Annual Facilities Questionnaire

Facility: Enter Your Facility Name Here (ACRONYM)
Fiscal Year: 2011

User Affiliations

0 Number of Users (sum Q. 1 and 2 or itemize them separately)

Question Number

Employer (User's Research Institution)

25		U.S.	Academic	
			Host DOE laboratory -- associated with host user facility	
			Host DOE laboratory -- not associated with facility	
			Other DOE laboratories	
			Non-DOE federally funded institution	
			Industry	
			Other	0 Subtotal U.S.
		Foreign	Academic	
			National laboratory	
			Industry	
0			Other	0 Subtotal Foreign

Employment Level

26		Undergraduate student
		Graduate student
		Postdoctoral research associate
		Faculty member / professional staff / research scientist
		Retired or self employed
0		Other

Type of User

27		General User only
		Partner User only
0		Both a General User and a Partner User

Proprietary Research

28		Users conducting only nonproprietary research
		Users conducting nonproprietary and proprietary research
0		Users conducting only proprietary research

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Basic Energy Sciences (BES) Annual Facilities Questionnaire

Facility: Enter Your Facility Name Here (ACRONYM)
Fiscal Year: 2011

Geographic Distribution of U.S. User Institutions

0 Subtotal U.S. (from subtotal within Question 25)

Question Number

U.S. State of User's Research Institution (Must sum to "Subtotal U.S." for Question 25)

29		Alabama		Nevada
		Alaska		New Hampshire
		Arizona		New Jersey
		Arkansas		New Mexico
		California		New York
		Colorado		North Carolina
		Connecticut		North Dakota
		Delaware		Ohio
		Florida		Oklahoma
		Georgia		Oregon
		Hawaii		Pennsylvania
		Idaho		Rhode Island
		Illinois		South Carolina
		Indiana		South Dakota
		Iowa		Tennessee
		Kansas		Texas
		Kentucky		Utah
		Louisiana		Vermont
		Maine		Virginia
		Maryland		Washington
		Massachusetts		West Virginia
		Michigan		Wisconsin
		Minnesota		Wyoming
		Mississippi		
		Missouri		District of Columbia
		Montana		Puerto Rico
0		Nebraska	0	Other (itemize below)

Itemize other U.S. territories here.

If any → *For example…*
Guam
U.S. Virgin Islands

Basic Energy Sciences (BES) Annual Facilities Questionnaire

Facility: Enter Your Facility Name Here (ACRONYM)
Fiscal Year: 2011

Information Derived from Experiment Demographics

	0	Number of Users from Q. 1-8

Question Number

Source of Support (number of users)

30		DOE, Office of Basic Energy Sciences
		DOE, Office of Biological and Environmental Research
		NNSA
		DOE, other (includes LDRD)
		Homeland Security
		DOD
		NSF
		NIH
		NASA
		USDA
		Other U.S. Government
		Industry
		Foreign
0		Other

Subject of Experiment or Service (number of users)

31		Materials sciences
		Physics (excludes condensed matter physics)
		Chemistry (excludes materials chemistry)
		Polymers
		Medical applications
		Biological and life sciences (excludes medical applications)
		Earth sciences
		Environmental sciences
		Optics
		Engineering
		User facility instrumentation or technique development
		Purchase of specialty services or materials
0		Other

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Basic Energy Sciences (BES) Annual Facilities Questionnaire

Facility: Enter Your Facility Name Here (ACRONYM)
Fiscal Year: 2011

Budget Data

Question Number

Annual Budget ($ in thousands)

32		Utilities
		Maintenance / operations of sources
		ES&H
		Security
		Operators/Technicians
		R&D
		User support
		Facility administration
		Other (itemize)
	0	Total Annual Operating Budget (sum of above)
		Capital Equipment
		AIP
		GPP/GPE
	0	**Total Annual Budget** (sum of Operating, CE, AIP and GPP/GPE)

Sources of Funding for Annual Budget ($ in thousands)

33		DOE, BES - Division of Scientific User Facilities	
		Division of Materials Sciences and Engineering	
		Division of Chemical Sciences, Geosciences, and Biosciences	
	0	DOE (other) (Sum of Entries)	Itemize other DOE sources here
	0	Other (Sum of Entries)	Itemize other non-DOE sources here
0	0	**Total Annual Budget** (same value as for Question 31)	

Facility Replacement Cost ($ in thousands) YEAR

34		Original cost of facility (then-year dollars) →	
		Replacement cost of original facility (this-year dollars)	

Basic Energy Sciences (BES) Annual Facilities Questionnaire

Facility: Enter Your Facility Name Here (ACRONYM)
Fiscal Year: 2011

Summary Table of Beam Line Usage

Question Number
35

To be completed by NSLS, SSRL, ALS, APS, and LCLS

A		B	C	D	E	F
		Name of beam line	% of FY beam line was usable	# of hours **SCHEDULED** on beam line	# of hours **DELIVERED** to beam line	# of hours that researchers **USED** the delivered time
1						
2						
3						
4						
etc.						
…						
		Facility Totals:				

For instructions, refer to: **BES_FY11_Sync_beamline_report.doc**

FY 2011 Supplemental Reporting Requirements
BES Synchrotron Radiation Light Sources

You may use your established format from previous years.
— you do not need to use this Excel worksheet.

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Basic Energy Sciences (BES) Annual Facilities Questionnaire

Facility: Enter Your Facility Name Here (ACRONYM)
Fiscal Year: 2011

Beam Line Statistics

A. Complete one USER FACILITY table which sums the data for all the beam lines.
*** B. Provide these data for EACH BEAM LINE (facility determines succinct format).**

Question Number
Name of Beam Line: A. USER FACILITY table (sums the data for all the beam lines)
36

0	Annual operating cost of the beam line ($ in thousands)
	- do not include costs of operating the facility itself; Itemize operating cost by source below:
	BES Division of Scientific User Facilities
	BES, Materials Sciences and Engineering
	BES, Chemical Sciences, Geosciences, and Biosciences
	DOE, other (itemize)
	Other (itemize)
	Number of instruments on beam line
	Estimate of what percentage of beam line is instrumented
	Number of end stations on beam line
	End-station hours requested by users
	End-station hours delivered to users
	Provide two types of itemizations below:
	End-station hours delivered to partner users
	End-station hours delivered to general users
	End-station hours delivered for nonproprietary research
	End-station hours delivered for proprietary research
	Total number of publications from this beam line
	Itemize:
	Number of publications authored/coauthored by a staff member of the facility (i.e., supported by a DOE FWP)
	Number of publications authored/coauthored by a non-staff member of the facility (i.e., not supported by the FWP)

Basic Energy Sciences (BES) Annual Facilities Questionnaire

Facility: Enter Your Facility Name Here (ACRONYM)
Fiscal Year: 2011

USER SATISFACTION Mini-Survey

Question Number **37**

0 Number of Users (sum Q. 1 plus Q. 2)
Number of Users who filled out a Mini-Survey

Please circle only one number for Questions 1-4 or mark NA if the question does not apply.

1 **How satisfied were you with the fraction of the year that the facility operates?**

100% = [ ] [ ] [ ] [ ] [ ] [ ] 0

5	4	3	2	1	NA
Very Satisfied	*Satisfied*	*Neither Satisfied Nor Dissatisfied*	*Dissatisfied*	*Very Dissatisfied*	Not Applicable

2 **How satisfied were you with the schedule or service (i.e., was the time or service delivered on schedule and was downtime kept to a minimum)?**

100% = [ ] [ ] [ ] [ ] [ ] [ ] 0

5	4	3	2	1	NA
Very Satisfied	*Satisfied*	*Neither Satisfied Nor Dissatisfied*	*Dissatisfied*	*Very Dissatisfied*	Not Applicable

3 **How satisfied were you with the performance (i.e., was beam or service maintained close to specifications)?**

100% = [ ] [ ] [ ] [ ] [ ] [ ] 0

5	4	3	2	1	NA
Very Satisfied	*Satisfied*	*Neither Satisfied Nor Dissatisfied*	*Dissatisfied*	*Very Dissatisfied*	Not Applicable

4a. **How satisfied were you with the support for users provided by the facility staff?**

100% = [ ] [ ] [ ] [ ] [ ] [ ] 0

5	4	3	2	1	NA
Very Satisfied	*Satisfied*	*Neither Satisfied Nor Dissatisfied*	*Dissatisfied*	*Very Dissatisfied*	Not Applicable

4b. **How satisfied were you with the support for users provided by the beam line staff?**

100% = [ ] [ ] [ ] [ ] [ ] [ ] 0

5	4	3	2	1	NA
Very Satisfied	*Satisfied*	*Neither Satisfied Nor Dissatisfied*	*Dissatisfied*	*Very Dissatisfied*	Not Applicable

5 **Please provide comments for any score rating of 1 or 2 on Questions 1-4 above.**
* Summarize responses succinctly on another sheet.

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Basic Energy Sciences (BES) Annual Facilities Questionnaire

Facility: Enter Your Facility Name Here (ACRONYM)
Fiscal Year: 2011

USER SATISFACTION Mini-Survey (continued)

Question Number
37 (*continued*)

6 **What was the subject of your use of this facility this year?**
(circle the subject that best applies) **#**

- **a.** Basic research [ ]
- **b.** Applied research [ ]
- **c.** Developed a new or improved product, process or technolog [ ]

7 **How do you intend on communicating the knowledge gained at this facility?**
(circle all answers that apply)

- **a.** Publish in peer-reviewed open literature [ ]
- **b.** Present findings at professional society meeting [ ]
- **c.** Acquired a patent [ ]
- **d.** Other [ ]

8 **What additional benefits did you gained at this facility?**
(circle all answers that apply)

- **a.** Furthered the goals of the Department of Energy [ ]
- **b.** Obtained access to unique capabilities not available elsewhere (e.g., forefront experiments; one-of-a-kind instruments; distinctive materials or services) [ ]
- **c.** experiments, increased multidisciplinary work; enabled a new approach within you discipline) [ ]
- **d.** Trained students (undergraduate, graduate or postdoctoral associate) [ ]
- * **e.** Other benefit(s); please specify: [ ]

9 **Are the training and safety procedures appropriate? If not, how would you change them?**
* Summarize responses succinctly on another sheet.

10 **What would you like this facility to do differently?**
* Summarize responses succinctly on another sheet.

11 **Other comments.**
* Summarize responses succinctly on another sheet.