U.S. Department of Energy's
Office of Science

Budget and Facilities

Presentation to the
Basic Energy Sciences Advisory Committee (BESAC)

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U.S. Department of Energy
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Office of Science
FY 2008 Budget Request Status

Office of Science
FY 2008 Funding Status
(budget authority in thousands of dollars)

	FY 2007 Approp.	FY 2008					
		Request	Req. vs. 07	House	House vs. Request	Senate	Sen. vs. Request
Basic Energy Sciences	1,250,250	1,498,497	+248,247	1,498,497	——	1,512,257	+13,760
Advanced Scientific Computing	283,415	340,198	+56,783	340,198	——	334,898	-5,300
Biological and Environmental	483,495	531,897	+48,402	581,897	+50,000	605,320[a]	+73,423
High Energy Physics	751,786	782,238	+30,452	782,238	——	789,238	+7,000
Nuclear Physics	422,766	471,319	+48,553	471,319	——	471,319	——
Fusion Energy Sciences	318,950	427,850	+108,900	427,850	——	427,850	——
Science Lab Infrastructure	41,986	78,956	+36,970	151,806	+72,850	88,956	+10,000
Science Program Direction	166,469	184,934	+18,465	178,290	-6,644	184,934	——
Workforce Development	7,952	11,000	+3,048	11,000	——	11,000	——
Safeguards and Security	70,225	70,987	+762	70,987	——	70,987	——
Total, Science	**3,797,294**	**4,397,876**	**+600,582**	**4,514,082**	**+116,206**	**4,496,759**	**+98,883**
Less: Earmarks	——	——	——	-70,145[a]	-70,145	-49,150[a]	-49,150
Total, Science except earmarks	3,797,294	4,397,876	+600,582	4,443,937	+46,061	4,447,609	+49,733

[a] The House report did not specify which program(s) earmarks were to be funded in. Senate earmarks are funded within the Biological and Environmental Research program.

Facilities for the Future of Science:
A Twenty-Year Outlook

In November, 2003 DOE's Office of Science proposed a portfolio of 28 prioritized new scientific facilities and upgrades of current facilities spanning scientific disciplines to ensure the U.S. retains its primacy in critical areas of science and technology well into the next century.

The *Facilities for the Future of Science: A Twenty-Year Outlook* was the first long-range facilities plan prioritized across disciplinary lines ever issued by a government science funding agency anywhere in the world.

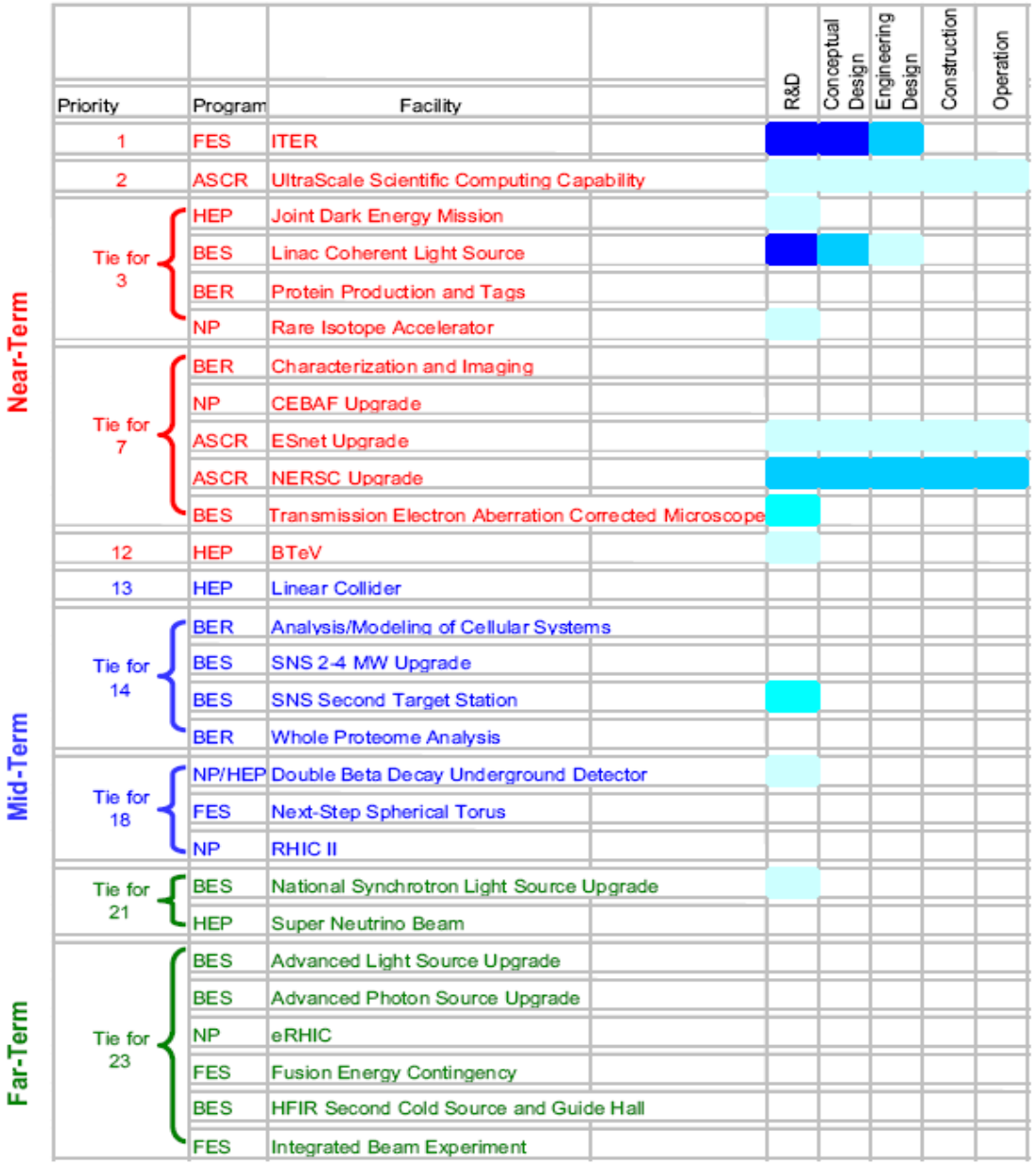
Significant progress has been made in implementing the plan and deploying many of the planned facilities.

We have just finished an update on where we are at now in 2007.

The Prioritized Facilities List

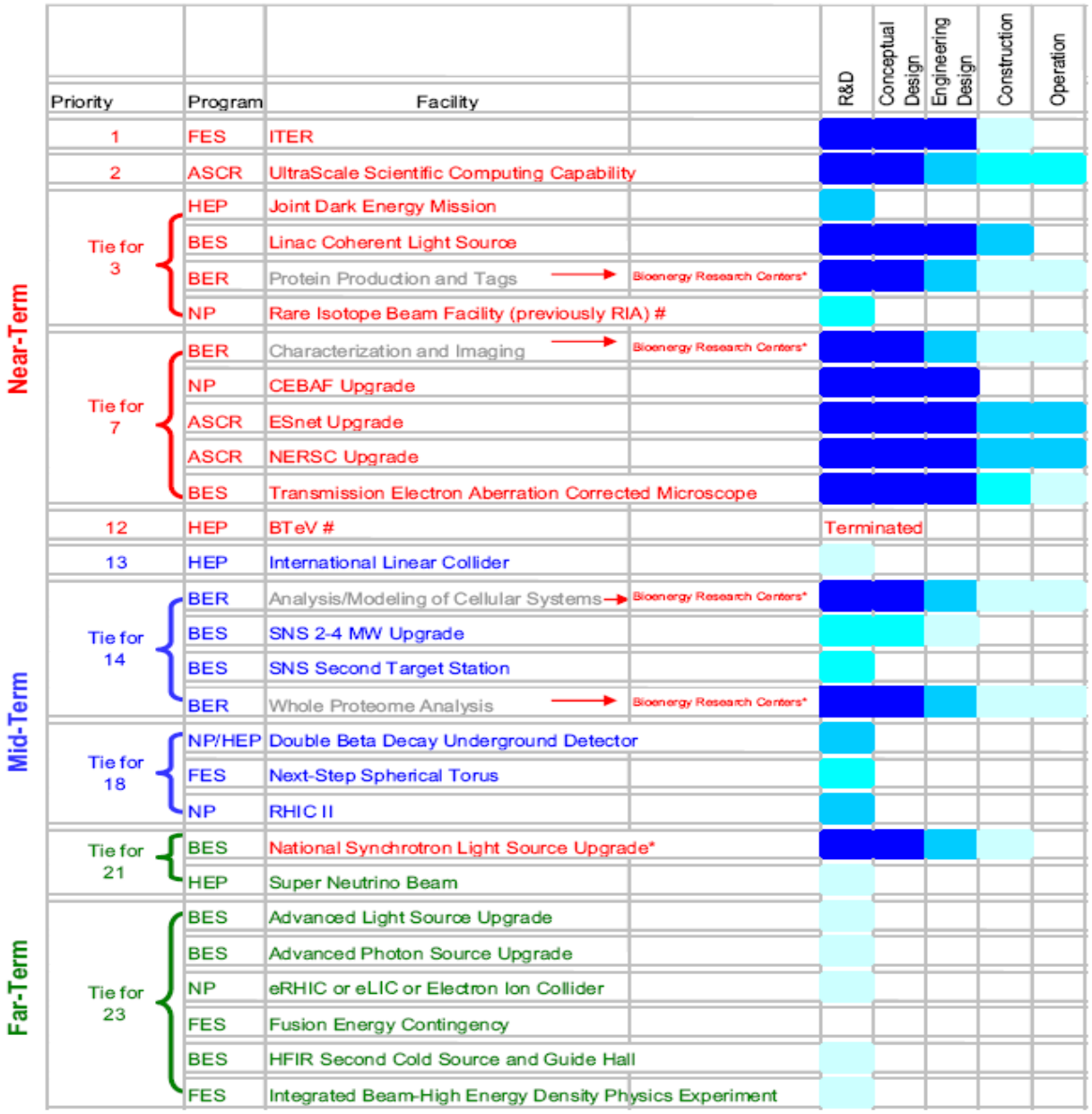
Priority			
Near-Term			
1		FES	International Thermonuclear Experimental Reactor
2		ASCR	UltraScale Scientific Computing Capability
Tie for 3		HEP	Joint Dark Energy Mission
		BES	Linac Coherent Light Source
		BER	Protein Production and Tags
		NP	Rare Isotope Accelerator
Tie for 7		BER	Characterization & Imaging
		NP	Continuous Electron Beam Accelerator Facility 12GeV Upgrade
		ASCR	Esnet Upgrade
		ASCR	NERSC Upgrade
		BES	Transmission Electron Achromatic Microscope
12		HEP	BTeV
Mid-Term			
13		HEP	Linear Collider
Tie for 14		BER	Cellular Systems Analysis & Modeling
		BES	SNS 2-4 MW Upgrade
		BES	SNS Target Station II
		BER	Whole Proteome Analysis
Tie for 18		NP	Double Beta Decay Underground Detector
		FES	Next Step Spherical Tokamak
		NP	RHIC II
Far-Term			
Tie for 21		BES	National Synchrotron Light Source Upgrade
		HEP	Super Neutrino Beam
Tie for 23		BES	Advanced Light Source Upgrade
		BES	Advanced Photon Source Upgrade
		NP	eRHIC
		FES	Fusion Energy Contingency
		BES	High Flux Isotope Reactor Guide Hall II
		FES	Integrated Beam Experiment

Facilities For the Future: 20-Year Outlook – November 2003



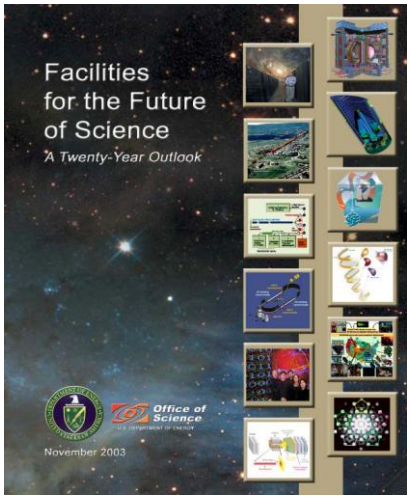
Programs:
ASCR = Advanced Scientific Computing Research
BES = Basic Energy Sciences
BER = Biological and Environmental Research
FES = Fusion Energy Sciences
HEP = High Energy Physics
NP = Nuclear Physics

Status of *Facilities For the Future: 20-Year Outlook* – By the end of FY 2008



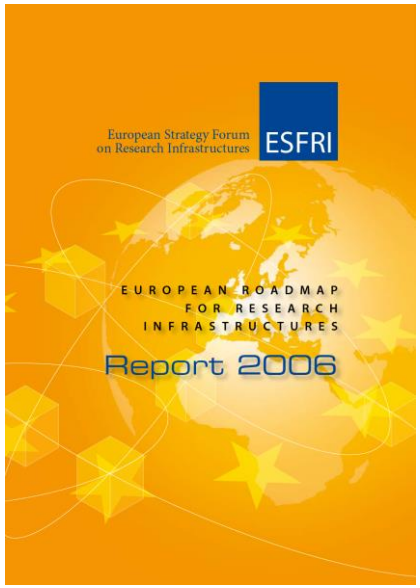
*Technology readiness changed
Changed due to planned facility abroad

Comparing Facilities Portfolio With Europe's Roadmap



DOE Science plan

- Is a "bottoms up" & "top down" approach
- Includes prioritization across fields of science
- 28 facilities made the cut
- While some facilities are international, most would be entirely funded by the U.S.



ESFRI Roadmap

- Is not a priority list
- Aim is to facilitate discussion to allow for coherent planning
- 35 facilities made the cut
- Each facility supported by at least one European Member and has great potential at pan-European level

European Roadmap for Research Infrastructures, Report 2006 (pg.8-9)

	Projects (in alphabetical order per discipline)	Estimated Construction Cost (M€) *	First possible operations for users	Indicative Operational/ Deployment Cost (M€/year)	Description
Social Sciences & Humanities	CESSDA	30	2008	6	Facility to provide and facilitate access of researchers to high quality data for social sciences
	CLARIN	108	2008	10	Research Infrastructure to make language resources and technology available and useful to scholars of all disciplines
	DARIAH	10	2008	4	Digital infrastructure to study the sources in cultural heritage institutions
	EROHS	43	2008	12	Central and distributed facility to promote and ensure cooperation and integration of data, technologies and policies
	ESS : European Social Survey	9	2007	9	Upgrade of the European Social Survey (set up in 2001 to monitor long term changes in social values)
	SHARE	50	2007	< 1	Data infrastructure for empiric economic and social science analysis of the on-going changes due to population ageing
Environmental Sciences	AURORA BOREALIS	360	2010	18	European Polar Research Icebreaker
	EMSO	150	2011	20	Multidisciplinary Seafloor Observatory (5 sites)
	EUFAR	50 - 100	2007	2 - 4	Long Range Tropospheric Aircraft (options: C130 or Airbus 400M)
	EURO ARGO (GLOBAL)	76	2010	6	Ocean Observing buoy system (deployment over 12 years)
	IAGOS-ERI (GLOBAL)	20	2008	6	Climate Change Observation from 20 commercial aircrafts (deployment)
	ICOS (GLOBAL)	255	2010	13	Integrated Carbon Observation System (deployment/operation over 20 years)
	LIFE WATCH	370	2014	70	Infrastructure for research on the protection, management and sustainable use of biodiversity
Energy	HIPER	850	2015	80	High Power long pulse Laser for "fast-ignition" Fusion
	IFMIF (GLOBAL)	855	2017	80	International Fusion Materials Irradiation Facility
	JHR	500	2014	30	High flux reactor for Fission Reactors Materials Testing
Biomedical & Life Sciences	EATRIS	255	2010	50	Network of new research centres to translate basic discoveries into clinical interventions in major diseases
	European Bio-banking and Biomolecular Resources	170	2009	15	Network of existing and new biobanks (samples and data from patients and healthy persons) and molecular resources
	INFRAFRONTIER	320	2007	36	Distributed infrastructure for the archiving and phenotyping of mice as models for studying human diseases
	Infrastructure for Clinical Trials and Biotherapy Facilities	36	2007	5	Network of clinical research centres, clinical trials and biotherapy facilities for therapeutic innovations
	Integrated Structural Biology Infrastructure	300	2007	25	Network of centres for integrated structural biology (protein production, NMR, crystallography, microscopy)
	Upgrade of European Bio-Informatics Infrastructure	550	2007	7	Shared platform for data resources in the Life Sciences (based on a major upgrade of EBI)
Material Sciences	ELI	150	2013	6	Extreme Light intensity short pulse Laser
	ESRF Upgrade	230	2007-2014	NA	Upgrade of the European Synchrotron Radiation Facility (in 7 years)
	ESS: The European Spallation Source	1050	2017	80	European Spallation Source for neutron spectroscopy
	European XFEL	986	2013	84	Hard X-ray Free Electron Laser in Hamburg
	ILL 20/20	160	2012-2017	NA	Upgrade of European Neutron Spectroscopy Facility (in 2 phases)
	IRUVX-FEL	760	2006-2015	70	Infrared to soft X-rays complementary Free Electron Lasers (in 5 users facilities)
	PRINS	1110	2008-2013	256	Paneuropean Infrastructure for Nanostructures and Nanoelectronics
Astronomy, Astrophysics, Nuclear and Particle Physics**	ELT: The European Extremely Large Telescope	850	2018	40	European Extremely Large optical telescope
	FAIR	1186	2014	120	Facility for Antiproton and Ion Research
	KM3NET	220-250	2015	NYD	Underwater Neutrino Observatory (in design phase)
	SKA: The Square Kilometre Array (GLOBAL)	1150	2014-2020	100	Square Kilometer Radiotelescope Array (in two phases)
	SPIRAL 2	137	2011	7	Production and study of rare isotope Radioactive beams (toward the future facility EURISOL)
CDT	EU-HPC	200-400	2008	100-200	Integrated European High Power Computing Service (2 - 4 high-end centers)

NYD = not yet defined
NA = not applicable - already covered within the current budget
CDT = Computer and Data Treatment

* For several projects the cost indicated will still need further review on the basis of more detailed technical and financial studies to be carried out
** Proposals related to particle physics and space science can be found under the CERN and ESA respective websites

21st Century Light Sources:

An assessment of needs driven by new scientific opportunities

- The BES suite of storage-ring-based light sources is one of the largest and most scientifically productive complex of user facilities in the world, serving more than 8,500 users each year.
- The Linac Coherent Light Source at SLAC, the first hard x-ray, linac-based light source, will be added to this complex in FY 2009. It will be fully operational a year or two later.
- The National Synchrotron Light Source – II at BNL, an advanced ultra bright storage-ring-based light source, will be added to the complex a few years later, in approximately 2015.
- By 2015, with LCLS and NSLS-II newly operating, the youngest of today's BES light sources will be approaching its 20th birthday. Now is the time for DOE and the scientific community to begin the process of strategic planning for the 21st century light sources that will be as impactful as today's light sources and address the scientific needs of the community in the 21st Century.
- The scientific opportunities and mission needs – as developed over the past five years in ten Basic Research Needs workshops and in the BESAC Grand Challenges study – are the major drivers for the specifications of new and upgraded light sources.

BESAC Charge

Consider the characteristics of the next generation light sources that will address the scientific and technological challenges put for in the Basic Research Needs workshops reports and the BESAC Grand Challenge study and that will enable new and innovative ways of probing our material world in the 21st Century.

The characteristics to be specified are the standard ones used to describe light sources: wavelength, flux, brightness, emittance, coherence, pulse length, potential instrument suite, availability and reliability of the entire system, and user accessibility. The charge excludes consideration of the many specific pre-proposals or proposals for light sources that are currently being discussed in the community. However, the capabilities of various types of light sources (including lasers, storage-ring-based and linac-based light sources, or other types of light sources) should be evaluated against the preferred characteristics of the new light sources. Both upgrades and new facility concepts may be considered in this context.

The work of the BESAC subcommittee should be reported to BESAC at its summer 2008 meeting.