



U.S. DEPARTMENT OF
ENERGY

Office of
Science

Basic Energy Sciences Update:

Staffing, FY 2022 and 2023 BES Updates, BESAC Charges

Basic Energy Sciences Advisory Committee Meeting

December 7, 2022

Linda Horton, Gail McLean, and Andy Schwartz

Office of Basic Energy Sciences

Office of Basic Energy Sciences

Associate Director
Linda Horton

BES Budget and Planning

Kara Beles, Financial Management
Donetta Herbert, Financial Management
(Vacant, Senior Technical Advisor)
(Vacant, Senior Technical Advisor)

BES Operations

Teresa Crockett, Program Analyst
Robin Hayes, Program Manager and Acting EFRC Co-Lead
Kerry Hochberger, Program Analyst / BESAC*
(Vacant, Senior Technical Advisor for EFRCs**)
(Vacant, Program Support Specialist)

* Basic Energy Sciences Advisory Committee
** Energy Frontier Research Centers

Materials Sciences and Engineering Division

Andy Schwartz, Director

John Vetrano, EFRC Team Co-Lead (A)
Shawn Chen, AAAS Fellow

Scientific User Facilities Division

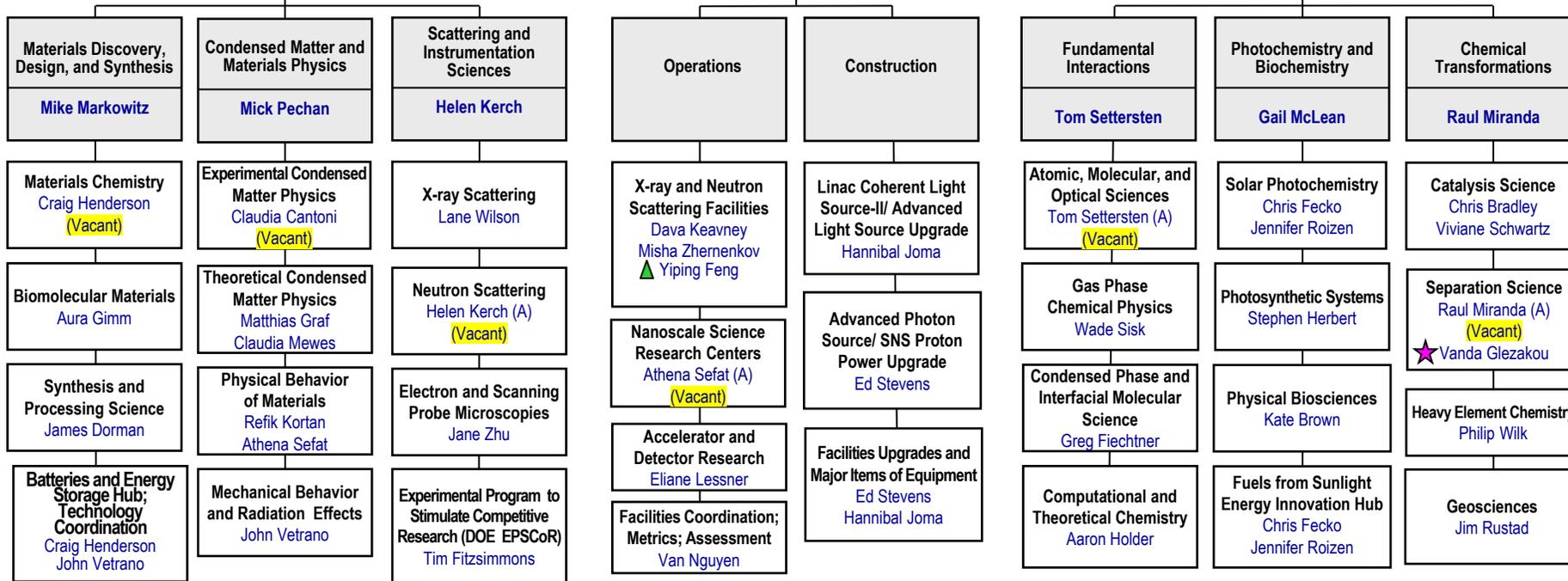
Linda Horton, Acting Director

Rocio Meneses, Program Support Specialist

Chemical Sciences, Geosciences, and Biosciences Division

Gail McLean, Acting Director

Gregory Fiechtner, EFRC Team Co-Lead (A)
Rachelle Smith, Presidential Management Fellow



Energy Frontier Research Centers (EFRCs) – Acting Co-Leads



▶ **Greg Fiechtner, Program Manager**

Greg has served as the PM for Condensed Phase and Interfacial Molecular Science since 2006, following an 8-year research career at Sandia National Labs. Greg has also served as an SNL detailee to BES for Separations and Analysis and subsequently as the BES PM for that program. He served as the Acting Team Lead for Fundamental Interactions in 2021.



▶ **Robin Hayes, Program Manager**

Robin has worked with the EFRC program since 2009, first as an AAAS Science and Technology Policy Fellow, and then as a program manager. In addition, she coordinates the SC Early Career and Graduate Student Research Programs for BES and has been a key contributor to numerous BES activities and FOAs.



▶ **John Vetrano, Program Manager**

John has served as the PM for Mechanical Behavior and Radiation Effects since 2006, following a 15-year research career at PNNL, and has been involved with management of the EFRC program since 2009. John also co-manages the JCESR Energy Innovation Hub and serves as a liaison between BES and the DOE applied technology offices.

New Hire – Synthesis and Processing Science Materials Sciences and Engineering Division



Dr. James Dorman

Program Manager, Synthesis and Processing Science
Materials Sciences and Engineering Division

Expertise

- ▶ Interface chemistry
- ▶ Directed synthesis of hierarchical metal oxides
- ▶ Engineering of structural, electronic, and chemical properties
- ▶ Alternatives to rare earth dopants

Experience

- ▶ Associate Professor, Cain Department of Chemical Engineering, Louisiana State University
- ▶ Alexander von Humboldt Research Fellowship, University Konstanz (Germany)
- ▶ Fulbright Fellowship
- ▶ DOE-National Institute for Nano Engineering (NINE) Fellowship (Sandia National Laboratories, Livermore, CA)
- ▶ Ph.D., Chemical Engineering, UC-Los Angeles

New Hire – Neutron Scattering Facilities & X-ray Light Sources

Scientific User Facilities Division



Dr. Misha Zhernenkov

Program Manager for Neutron Scattering Facilities and X-ray Light Sources,
Scientific User Facilities Division

Expertise

- ▶ Neutron/x-ray scattering for soft matter: (GI)SANS/SAXS, GIWAXS, reflectometry/off-specular scattering, tender x-ray resonant scattering, inelastic scattering; spectroscopic ellipsometry
- ▶ Beamline operations, user support, instrument development/upgrade activities
- ▶ Science areas: soft biomaterials, advanced manufacturing/3D printing studies, polymeric and bio-inspired novel nanocomposites

Experience

- ▶ Soft Matter Interfaces beamline team lead, National Synchrotron Light Source II (NSLS-II) at Brookhaven National Laboratory
- ▶ Nanometrics, Inc. (Milpitas, CA)
- ▶ Postdoctoral positions at Argonne National Laboratory's Advanced Photon Source and Los Alamos National Laboratory's Lujan Neutron Scattering Center
- ▶ Ph.D., Physics: Joint Institute for Nuclear Research/Institute Laue-Langevin

BES Staffing Transitions – Congratulations!

- ▶ **Tom Russell** – Senior Technical Advisor, BES Associate Director’s Office, retired from federal service on November 30, 2022, following 20 years of federal service. Tom joined BES in June 2015. For BES, Tom provided expert scientific advice and detailed technical analyses for the budget (formulation, execution, and defense) and for evaluation of research programs and facility operations. Notable were his roles as the BES lead for the QIS Centers Funding Opportunity, leadership in BES data programs, liaison for many BESAC activities, and as a key reviewer for BES reports and other documentation (Questions for the Congressional Record, draft legislation, etc.). Prior to BES, Tom was a National Science Foundation program director in the Division of Mathematical Sciences and held several leadership roles. His career experiences included industry as a research mathematician at Marathon Oil and 16 years in academia, including department chair for the mathematics department, at the University of Colorado – Denver.

▶ Many staff are covering Tom’s tasks on an interim basis

- ▶ **Daniel Matuszak**– Separation Science program manager in the Chemical Sciences, Geosciences, and Biosciences Division, left federal service on November 1, 2022. Prior to joining BES in 2019, he was a physical scientist and program manager for carbon utilization at the Office of Fossil Energy. He originally joined the Department of Energy at the Advanced Research Projects Agency-Energy (ARPA-E) in 2010. Dan has more than 15 years of research and development (R&D) experience focused on gas separations and interfacial science, including academic and private sector R&D in interfacial science and technology with applications to fuel cells, catalysis, and gas separations.

▶ Raul Miranda is acting program manager for Separation Science



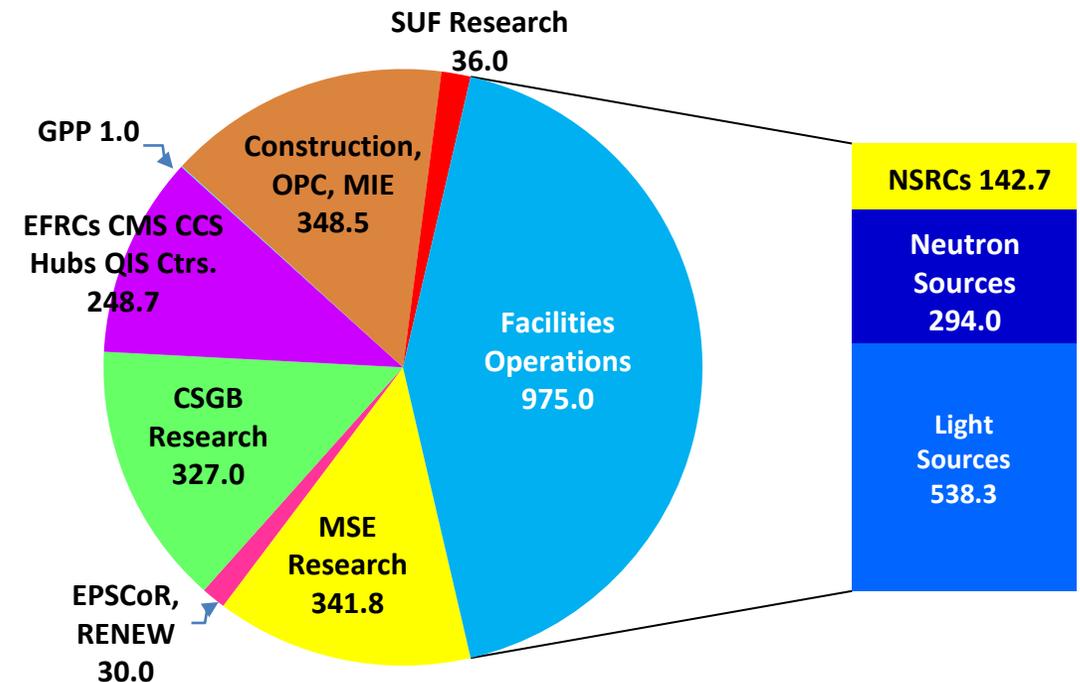
FY 2022 Enacted: \$2,308M (+\$63M or +2.8% above FY 2021)

Research programs $\Delta = +\$117.2M$

- ▶ Research (\$696.8M, +\$99.5M) includes new and expanded investments in research for clean energy, manufacturing, microelectronics, critical materials and minerals, BRaVE, and RENEW (\$3M, Reaching a New Energy Sciences Workforce)
 - ❖ EPSCoR continues (\$25M)
- ▶ Computational Materials and Chemical Sciences, Energy Innovation Hubs, and National QIS Research Centers continue (\$118.7M, +\$2.7M)
- ▶ Energy Frontier Research Centers continue (\$130M, +\$15M**)

Scientific user facilities $\Delta = +\$15.8M$

- ▶ Operations of 12 facilities continue at ~97% of historic optimal (\$975.0M)
- ▶ Facilities research (\$36M) continues AI/ML; increases accelerator R&D; plus RENEW +\$2M



Construction/MIE* $\Delta = -\$70M$

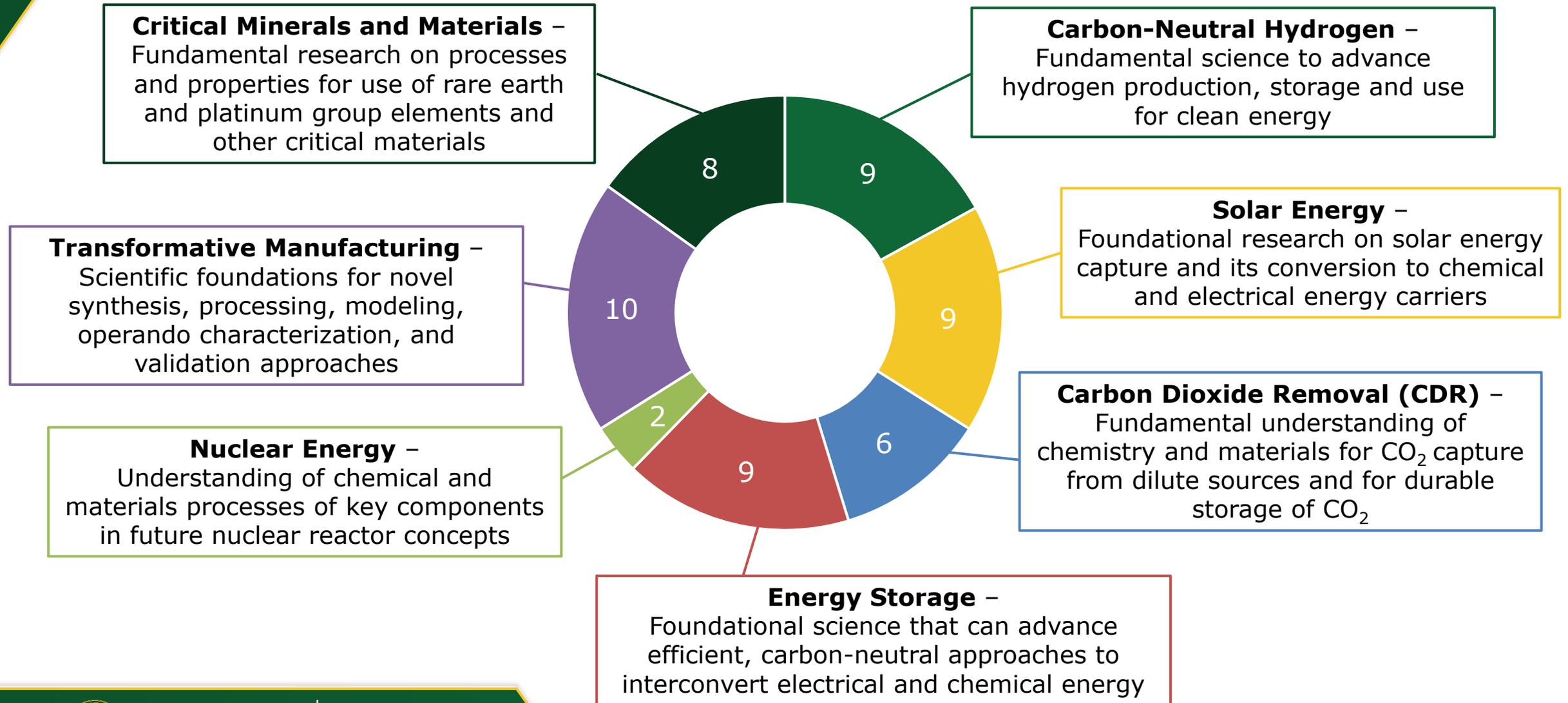
- ▶ APS-U (\$106M); LCLS-II (\$32.4M); LCLS-II-HE (\$53M); ALS-U (\$75.1M); PPU (\$17M); STS (\$32M); CRMF (\$3M)
- ▶ MIEs: NSRC Recap (\$15M); NEXT-II (\$15M)

*includes OPC, **includes SBIR

FY 2022 FOA: Chemical And Materials Sciences To Advance Clean Energy Technologies And Low-Carbon Manufacturing (CEM)

- ▶ Requested single principal investigator and small team research focused on basic chemical and materials sciences that can underpin clean energy technologies and low-carbon manufacturing
 - ❖ Clean energy technologies: approaches to capture, produce, convert, store, and use energy that reduce or eliminate unwanted emissions such as greenhouse gases as well as approaches such as direct air capture and carbon storage/sequestration
 - ❖ Low-carbon manufacturing: manufacturing processes that minimize carbon emissions and energy consumption
- ▶ Informed by coordination with EERE, FECM, and ARPA-E, crosscut activities, and co-organized workshops.
- ▶ Generate foundational knowledge that can support development of approaches to minimize climate impacts of energy technologies and manufacturing, potentially advancing the goals of DOE's Energy Earthshots Initiative
- ▶ Awards: 53 awards, 37 university-led; 16 lab-led; 6 MSI-led, 11 EPSCoR-led; 29 states; \$50M in FY 2022 funds; \$130M over 3-year awards

Topical Distribution of 53 CEM Awards

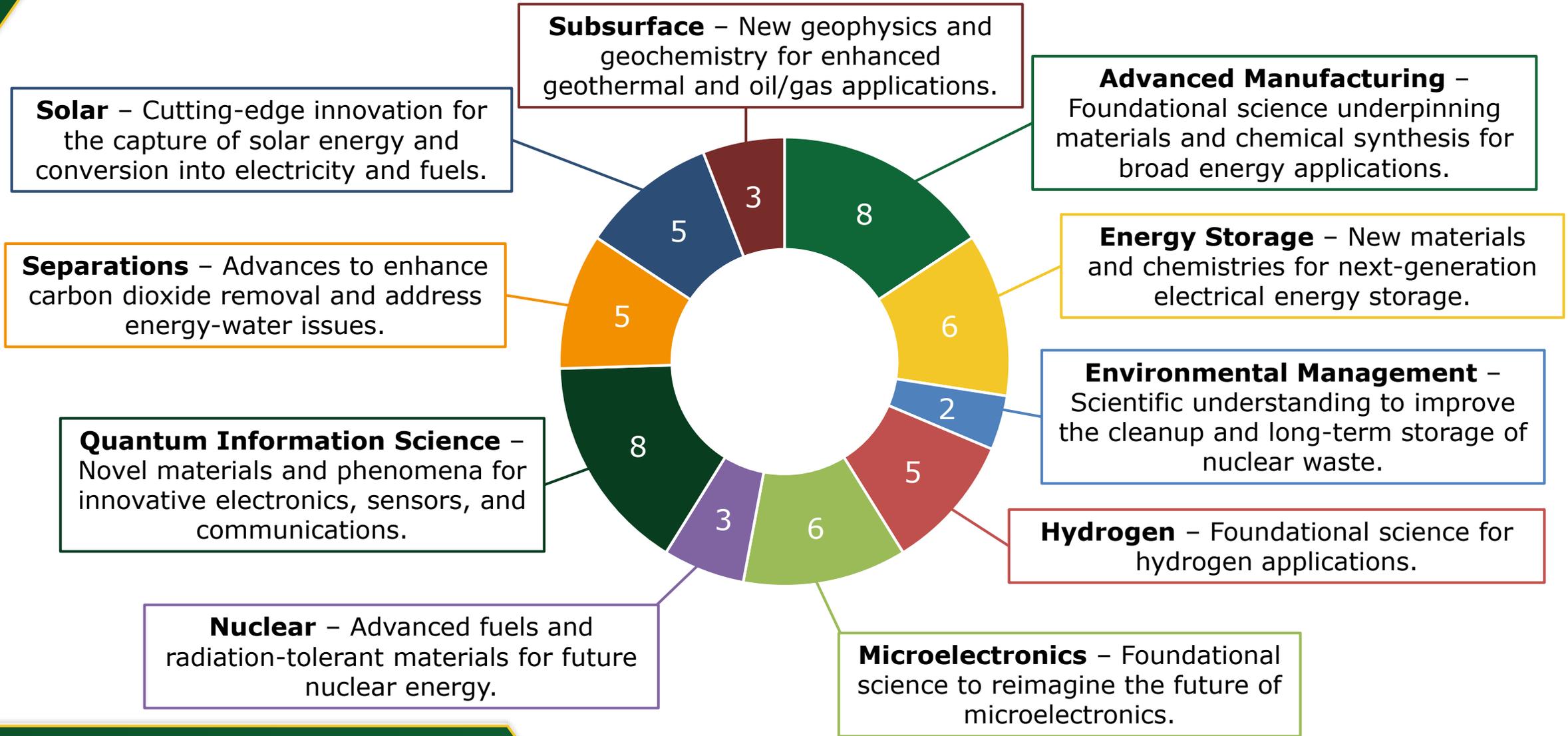


BES 2022 FOA for Energy Frontier Research Centers

- ▶ **FOA Scope:** The FY 2022 EFRC FOA emphasized:
 - ❖ **Science for Clean Energy** (Carbon-Neutral Hydrogen, Solar Energy and Fuels, Nuclear Energy, Catalysis, Energy Storage, Energy/Water, Subsurface, Direct Air Capture of CO₂)
 - ❖ **Science for Advanced Manufacturing** (Transformative Manufacturing, Microelectronics, Synthesis Science)
 - ❖ **Other National Priority Research Areas** (Quantum Information Science, Quantum Materials)
- ▶ **Application requirements:**
 - ❖ **Eligible Lead Institutions:** universities/colleges, non-profit organizations, for profit organizations, and DOE labs
 - ❖ **Award size:** \$2M to \$4M/year, up to 4-year awards; multi-disciplinary research teams; multi-institutional applications were encouraged.
 - ❖ **Preproposals:** required, limited to 3 per lead institution. Reviewed by at least 3 program managers, “priority given to scientifically innovative and forward-looking basic research with the highest likelihood of success as an application.”
 - ❖ **Review Process:** All eligible proposals sent for external merit review. Peer review and program policy factors for diversity of awards were considered in final selections.
- ▶ **Awards:** 16 new, 17 renewal, 10 transition; 33 university-led, 10 lab-led teams; 9 MSI-led; 7 EPSCoR-led ~\$100M in FY 2022 funds; ~\$400M for 4 years. Award list: <https://science.osti.gov/-/media/bes/pdf/awards/EFRC-awards-sheet-8-25.pdf>



Topical Distribution of 51 Current EFRC Awards



EPSCoR 2022 FOA: Building EPSCoR State-National Laboratory Partnership

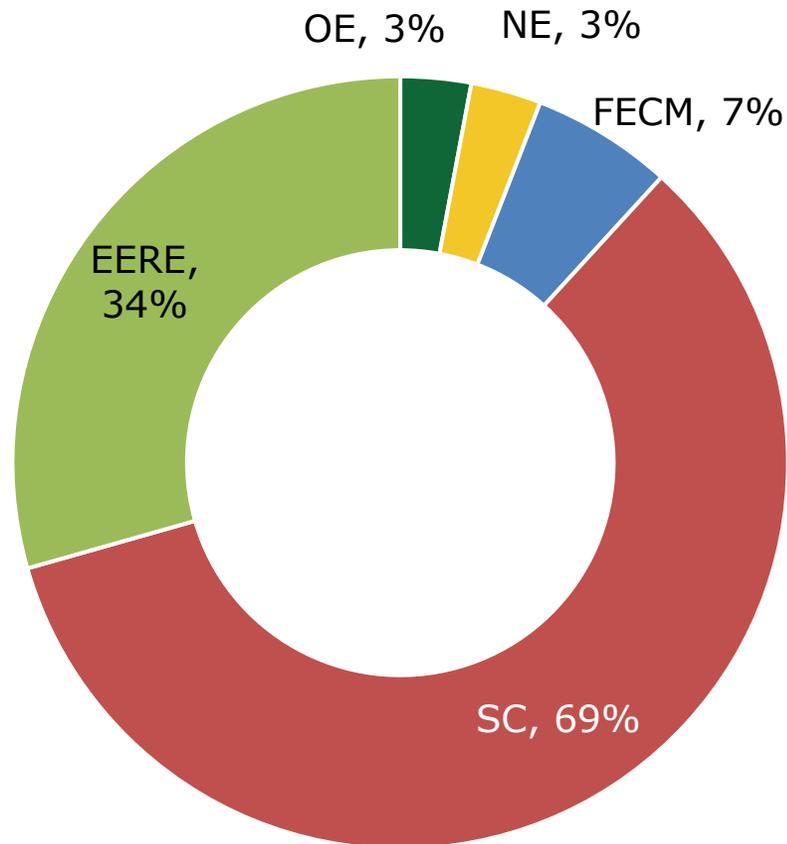
- ▶ **Awards:** Up to \$750,000; Up to 3 years, fully funded; Awards co-funded by EPSCoR and DOE Programs.
- ▶ Biennial EPSCoR State National Laboratory Partnership FOAs provide awards to support collaborations of eligible institutions and DOE national laboratory expertise/capabilities. Scope coordinated across DOE.
 - ❖ Awards are non-renewable to encourage transition to the competitive award process of the respective DOE programs.
- ▶ **FY 2022 Award Demographics:** 29 awards, \$19M + partner program contributions; 19 States plus Puerto Rico, 14% women-led; 6 MSI-led
- ▶ **Program Demographics** (include double counting of awards with more than 1 office contributing): 20 SC (14 BES, 3 FES, 2 ASCR, 1 NP); 10 EERE (3 HFC, 2 AMO, 2 VTO, 2 BETO, GTO-SETO); 2 OE; 2 FECM, 1 NE, 1 Cybersecurity
- ▶ In addition, EPSCoR supported 8 SC early career awards



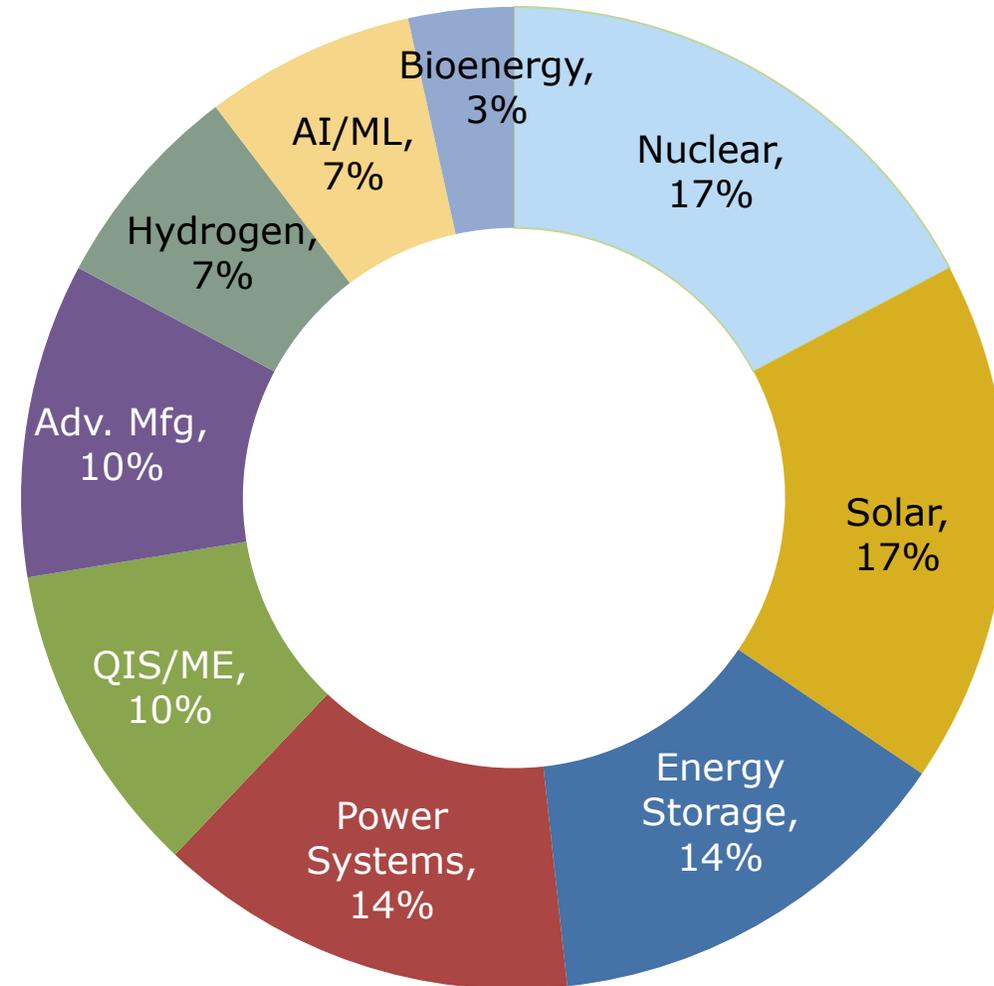
EPSCoR Award Topical Areas and Related DOE Program

Program Distribution

■ OE ■ NE ■ FECM ■ SC ■ EERE



Topical Area Distribution



BES 2022 RENEW FOA

- ▶ **Focus:** Support for training opportunities, including on-site experience at national labs, in energy-related research topics
- ▶ **Team Applications:** Teams must be led by a **non-R1 MSIs** in partnership with a **single DOE national laboratory and other non-R1 MSIs**. **15-25%** of the **proposed budget** allocated to **lab partner** to ensure active participation and mentorship. Website provided for lab partner identification.
- ▶ **FOA Issued:** 05/25/2022 – Outreach Webinar held on 06/13/2022
- ▶ **Estimated funding:** Subject to availability of funds, a total of up to \$15 million in current and future fiscal year funds will be used to support awards under this FOA.
- ▶ **Period of performance:** **3 years**, with an option to **renew** for **3 additional years**, subject to the availability of future funds.
- ▶ **Award size:** **\$500K to \$750K/yr**
- ▶ **LOI due date:** 08/02/2022; **Application due date:** 08/23/2022
- ▶ **Award announcement** planned for December 2022

User Facility Updates

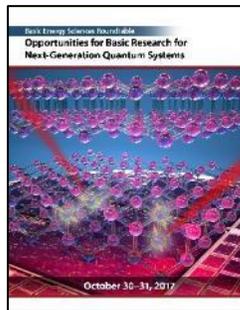
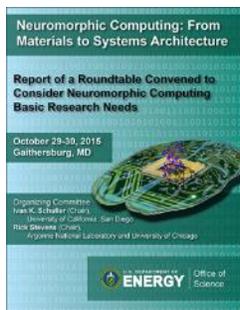
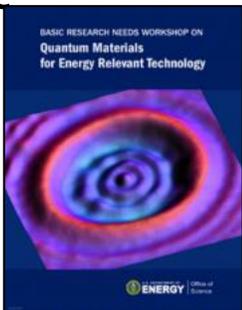
- ▶ FY 2022 – User Facilities hosted over 15,000 users in FY 2022, nearly 40% were virtual
- ▶ All BES facilities have provided “rebaselined” operations funding estimates that include:
 - ❖ Impacts from inflation and supply chain cost issues; Staffing for hybrid in-person/remote operations
 - ❖ Bringing upgrades and new capabilities on-line for users; Enhancing maintenance activities
- ▶ FY 2022 Inflation Reduction Act invested nearly \$300M in BES user facility construction projects

	FY 2022	FY 2022
	Enacted	IRA
NSLS-II Experimental Tools-II NEXT-II MIE	15,000	18,500
NSRC Recapitalization MIE	15,000	20,000
21-SC-10, Cryomodule Repair & Maintenance Facility (CRMF), SLAC	1,000	20,000
21-SC-10, Cryomodule Repair & Maintenance Facility (CRMF), SLAC, OPC	2,000	700
19-SC-14, Second Target Station STS, ORNL	32,000	42,700
18-SC-12, Advanced Light Source Upgrade ALS-U, LBNL	75,100	96,600
18-SC-13, Linac Coherent Light Source II HE, SLAC	50,000	90,000
18-SC-13, Linac Coherent Light Source II HE, OPC	3,000	6,000
Subtotal, Basic Energy Sciences	193,100	294,500

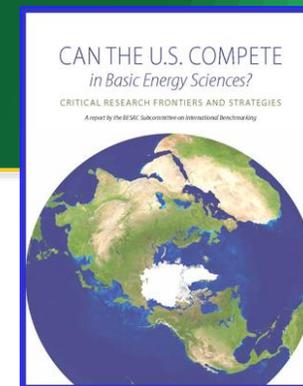
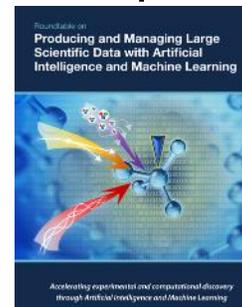
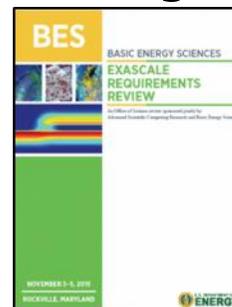
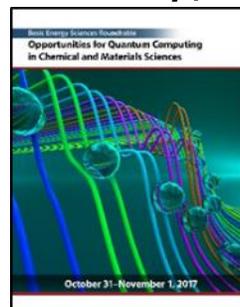
- ▶ Significant Milestones were achieved in FY 2022 and early FY 2023
 - ❖ NEXT-II: CD-2/3 (10/13/2021) NEXT III: CD-0 (09/30/2022)
 - ❖ ALS-U CD-3 (11/10/2022) NSRC Recap: CD-2/3 (3/31/2022)
 - ❖ LCLS-II-HE, CD-3B, projected 1/2023
- ▶ Upcoming – First light for LCLS II (March 5) and Start of dark time for the APS U (April 24, 2023)

Defining Research Priorities: Basic Research Needs Strategic Planning Workshops and Roundtables

Quantum Science

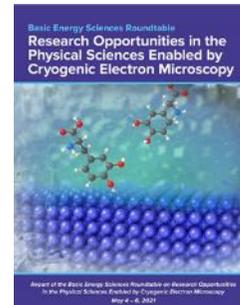
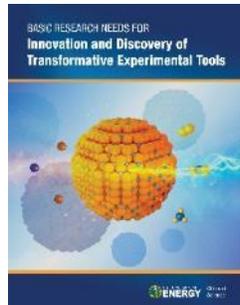


Theory, Modeling & Computation

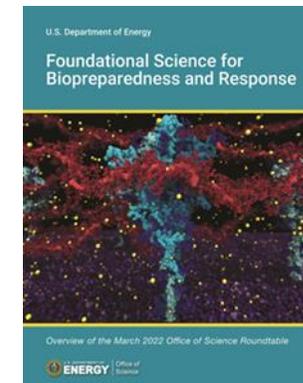
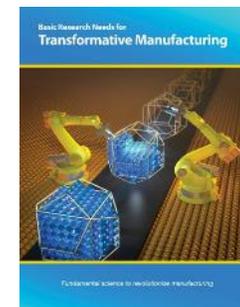
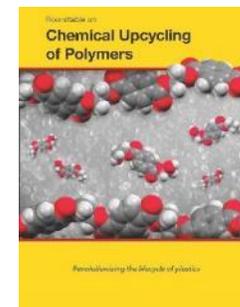


BES Advisory Committee: International Benchmarking

Characterization

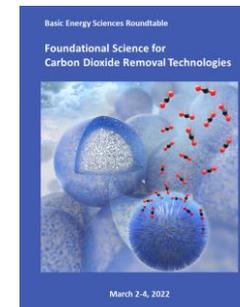
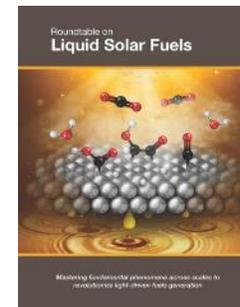
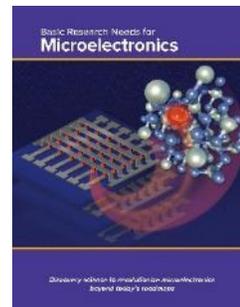
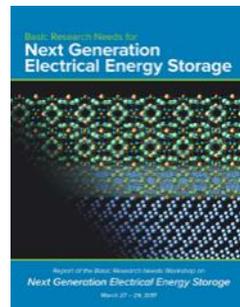
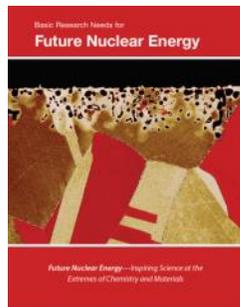
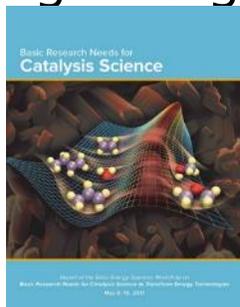
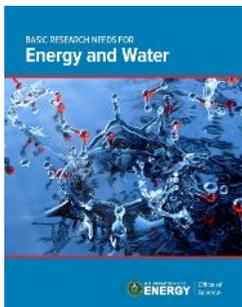


Synthesis



SC Biopreparedness & Response

Cross-Cutting Energy



DOE-BES Roundtable: Fundamental Science to Accelerate Nuclear Energy Innovation – July 20-22, 2022

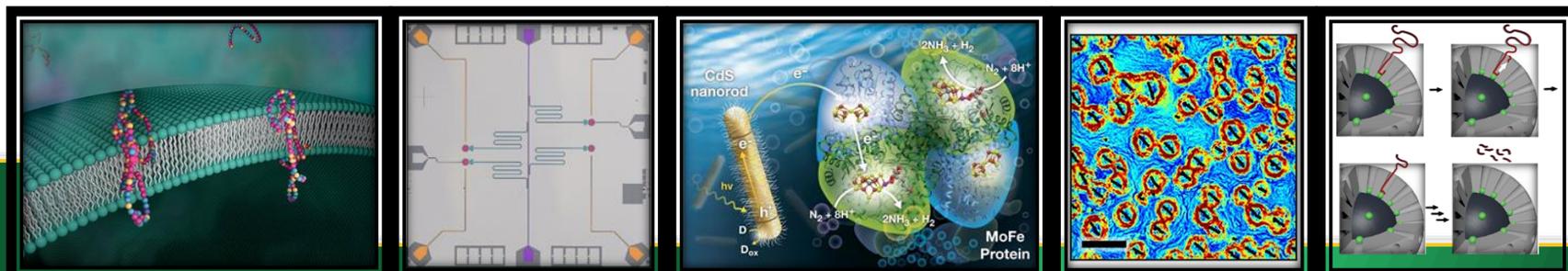
- ▶ Co-chairs: Rebecca Abergel (LBNL/UC-B); Blas Uberuaga (LANL); Marianne Walck (INL)
- ▶ Organized by BES, coordination with Advanced Scientific Computing Research, Fusion Energy Sciences, and Nuclear Energy
- ▶ Five Priority Research Opportunities were identified:
 - ❖ Master complex electronic structures to tailor thermochemical reactivity, transport, and microstructural evolution
 - ❖ Interrogate and direct the physics and chemistry underpinning next-generation coolants and solvents
 - ❖ Elucidate and control the underlying physics and chemistry of interfaces in complex nuclear environments
 - ❖ Bridge multi-fidelity, multi-resolution experiments, computational modeling, and data science to control dynamic behavior
 - ❖ Harness artificial intelligence to design inherently resilient condensed phases



Basic Energy Sciences

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

- ▶ **The BES FY 2023 President's Request is ~\$2,420M, \$112M (4.9%) above FY 2022 Enacted, balancing funding among the major program components—research, user facilities operations, and construction and upgrade of facilities.**
- ▶ **Research priorities include:**
 - ❖ **SC Earthshot Initiative (+\$104M → ~\$50M in Marks):** focuses BES research on the stretch goals of the DOE Energy Earthshots, including a new research modality (Energy Earthshot Research Centers) that will provide a solid bridge between SC and Energy Technology Offices
 - ❖ **National Competitiveness and Responsiveness:** fundamental science to **Accelerate** (+\$15M) transition of science innovations to emerging technologies, and expansion of user facilities capabilities to respond to biological threats (**BRaVE**, +\$12M). Continues support for **QIS** and **microelectronics. AI/ML** (+\$9M) to accelerate discovery science, for effective user facility operations, and interpretation of massive data sets
 - ❖ **Research Opportunities for Underrepresented Communities,** focus on Climate and Clean Energy research: **EPSCoR** (+\$10M), **RENEW** (+\$5M for MSI internships), **FAIR** (Funding to Accelerate Inclusive Research; +\$20M to build MSI research capacity/capabilities)
 - ❖ The **Batteries and Energy Storage** and **Fuels from Sunlight Energy Innovation Hub** programs continue with flat funding, including an open recompetition of the Batteries and Energy Storage Hub program. **Energy Frontier Research Centers** and **National QIS Research Centers** continue with flat funding.
- ▶ **BES user facilities** would **operate at ~90% → ~95% in Marks** of historically optimal funding levels. For international competitiveness, BES continues support for **major facility upgrades** (+\$12M) per BESAC report recommendations, MIEs for NSLS II beamlines, and recapitalization of the NSRCs.



FY 2023 BES Budget Request and Marks Overview

(B/A in thousands)

	FY 2021	FY 2022	FY 2023		
	Enacted	Enacted	Request	House Mark	Senate Mark
Basic Energy Sciences					
Materials Sciences and Engineering	435,008	494,783	566,629	540,129	540,951
Chemical Sciences, Geosciences, and Biosciences	394,285	451,688	517,711	489,961	490,783
Scientific User Facilities (SUF)	1,026,707	1,057,329	1,042,899	1,171,710	1,215,505
Program Subtotal	1,856,000	2,003,800	2,127,239	2,201,800	2,247,239
21-SC-10, Cryomodule Repair & Maintenance Facility (CRMF), SLAC	1,000	1,000	10,000	10,000	10,000
19-SC-14 Second Target Station (STS) ORNL	29,000	32,000	32,000	32,000	32,000
18-SC-10 Advanced Photon Source Upgrade APS-U, ANL	160,000	101,000	9,200	9,200	9,200
18-SC-11 Spallation Neutron Source Proton Power Upgrade PPU, ORNL	52,000	17,000	17,000	17,000	17,000
18-SC-12 Advanced Light Source Upgrade ALS-U, LBNL	62,000	75,100	135,000	135,000	135,000
18-SC-13 Linac Coherent Light Source-II-HE, SLAC	52,000	50,000	90,000	90,000	90,000
13-SC-10 Linac Coherent Light Source-II LCLS-II, SLAC	33,000	28,100
Construction Subtotal	389,000	304,200	293,200	293,200	293,200
Total, Basic Energy Sciences	2,245,000	2,308,000	2,420,439	2,495,000	2,540,439

FY 2023 “Open Call” and Early Career FOAs are Released

- ▶ Continuation of Solicitation for the Office of Science Financial Assistance Program (annual “Open Call”)
 - ❖ For BES, the solicitation includes brief descriptions of 22 core research areas, with current priorities/areas of interest and contact information for cognizant program managers
 - ❖ As for FY 2022, “overarching research priorities” relevant to multiple core research areas are identified: Fundamental Science to Enable Clean Energy; Critical Materials/Minerals; Fundamental Science to Transform Manufacturing; AI/ML; and QIS
- ▶ Early Career Research Program
 - ❖ **Key changes for FY 2023:** (1) Floor for university proposals/awards raised to \$175K/year “to encourage these institutions to increase graduate student stipends;” (2) Eligibility window for this competition extended from 10 to 12 years to address challenges due to COVID-19 (SC intends to continue this in next year’s competition, then return to 10-year eligibility window)
 - ❖ **Key dates:** FOA issued on 11/16/22; **Pre-Applications due by 1/5/23;** Encourage/discourage decisions by 2/6/23; Application due date: 3/23/23

Overview of New FY 2023 SC Requirements for Proposals

- ▶ **PIER Plans:** All FY 2023 SC Funding Opportunity Announcements (FOAs), DOE National Lab Announcements, and other funding solicitations require applicants to submit a **Promoting Inclusive and Equitable Research (PIER) Plan** as an appendix to their proposal narrative.
 - ❖ To aid in assessment of PIER Plans, merit review includes an additional standard criterion: “Quality and Efficacy of the Plan for Promoting Inclusive and Equitable Research”
- ▶ **Conference Proposals:** For FY 2023 applications to SC requesting funds to support a conference, the host organizations of the conference must have an established **code of conduct or policy** in place that addresses discrimination and harassment, including sexual harassment, other forms of harassment; and must include a **recruitment and accessibility plan** for speakers and attendees that includes discussion of recruitment of individuals from groups historically underrepresented in the research community.

Informational Resources on the SC Website

About

Funding Opportunity Announcements (FOAs)

DOE National Laboratory Announcements

Grants Policy and Guidance

Applicant and Awardee Resources

Grants Process

Promoting Inclusive and Equitable Research (PIER) Plans

Conference Proposals

Statement on Digital Data Management

Applicant FAQs

Awardee FAQs

DOE Public Access

Award Search / Public Abstracts [↗](#)

Acknowledgements of Federal Support

Promoting Inclusive and Equitable Research (PIER) Plans

Beginning in FY 2023, all Department of Energy (DOE) Office of Science Funding Opportunity Announcements (FOAs) and DOE National Lab Announcements and other funding solicitations will require applicants to submit a Promoting Inclusive and Equitable Research (PIER) Plan as an appendix to their proposal narrative. PIER Plans should describe the activities and strategies applicants will incorporate to promote diversity, equity, inclusion, and accessibility in their research projects. PIER Plans will be evaluated as part of the merit review process and will be used to inform funding decisions.

The Office of Science (SC) is deeply committed to supporting diverse, equitable, inclusive, and accessible work, research, and funding environments that value mutual respect and personal integrity, and SC is committed to promoting people of all backgrounds, including individuals from groups and communities historically underrepresented in STEM fields and SC activities in recognition of our responsibility to serve the public. Transforming our understanding of nature to advance scientific discovery and U.S. energy, economic, and national security can only be accomplished by harnessing a diverse range of views, expertise, and experiences to drive scientific and technological innovation. The inclusion of PIER Plans in funding applications makes this commitment to inclusive excellence explicit and a consistent expectation of all SC-funded research and research related activities.

Applications to the Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Programs do not require PIER Plans at this time but will be phased in at a later date. Applications for supplemental funding on existing awards and applications requesting funding for conferences do not require PIER Plans.

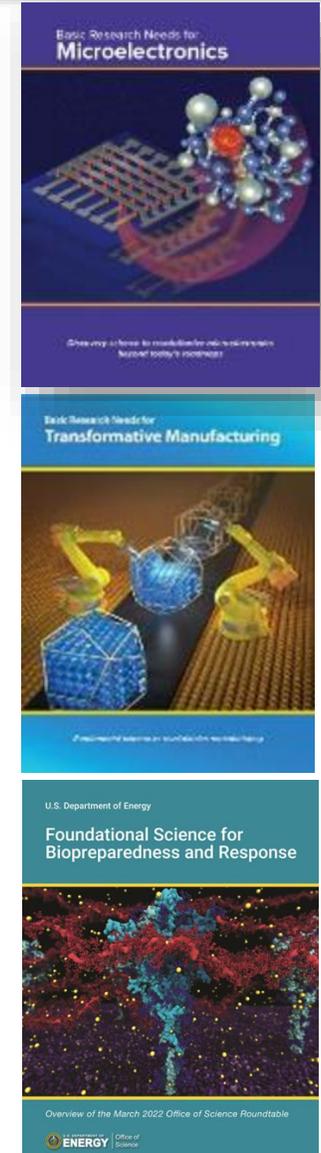
- [Information about PIER Plans](#)
- [Frequently Asked Questions](#)
- [PIER Plan Resources for SC Program Staff](#) (Internal to SC network only)

Information about Promoting Inclusive and Equitable Research (PIER) Plans



FY 2023 National Competitiveness Investments

- ▶ BES will continue to support national initiatives on QIS, microelectronics, data AI/ML, and clean energy and sustainable, low-carbon manufacturing
- ▶ **Accelerate Innovations in Emerging Technologies** (Accelerate, Up to \$15M for BES, SC-wide initiative): BES will support research to accelerate the transition of science advances to clean energy technologies, including future-generation microelectronics, low-carbon manufacturing, and emerging technologies to move from laboratory to industrial prototypes. RFI issued.
- ▶ **Biopreparedness Research Virtual Environment** (BRaVE, +\$9M for BES, SC-wide initiative): BES will support critical analytical and data/AI/ML capabilities foundational to responses for future emergencies, including capabilities at user facilities.



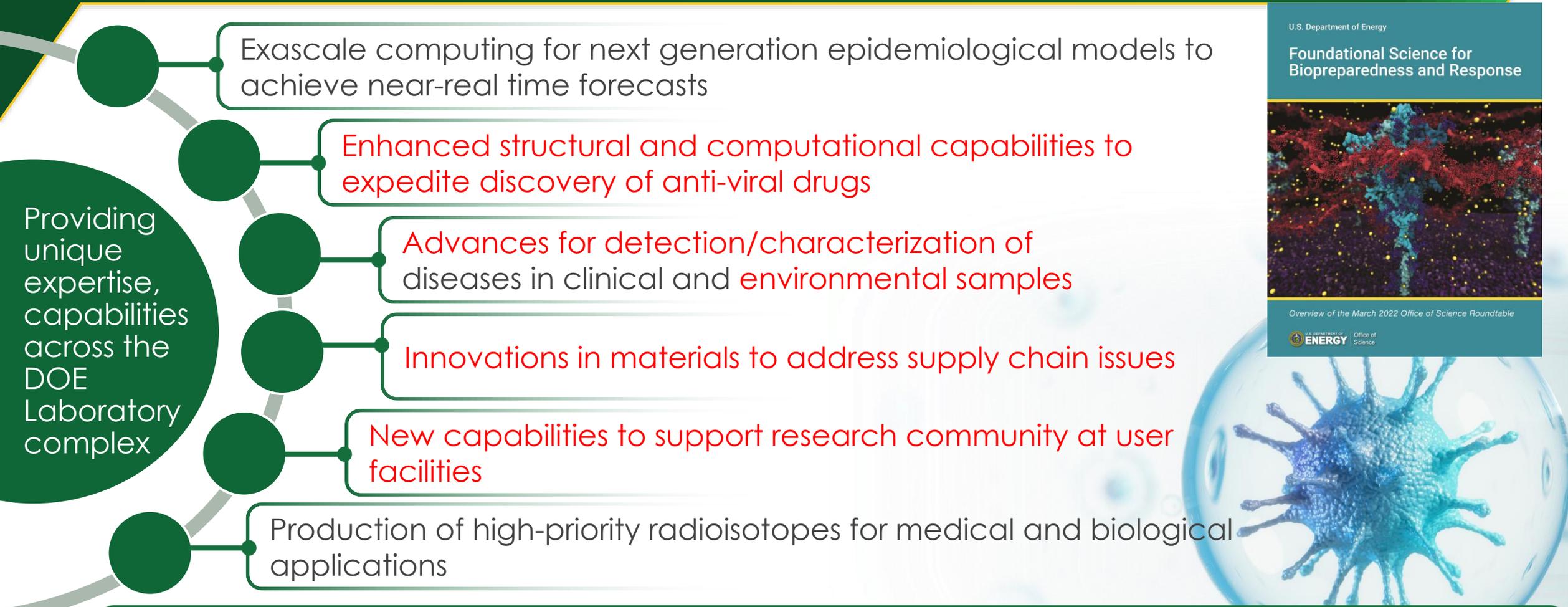
Accelerate Innovations in Emerging Technologies

Request for Information (RFI)

- ▶ SC seeks input on:
 - ❖ Challenges and opportunities associated with transitioning new discoveries to high-value technologies to drive the economy of the future.
 - ❖ Identifying approaches that can accelerate the process from scientific discovery to sustainable production of new technologies across the innovation continuum.
 - ❖ Opportunities for ensuring a robust workforce for future industries.
- ▶ Scope covers 10 key technology focus areas
- ▶ Responses must be received by Friday, December 23, 2022.
- ▶ <https://www.federalregister.gov/documents/2022/11/08/2022-24250/accelerating-innovations-in-emerging-technologies>



Biopreparedness Research Virtual Environment (BRaVE)

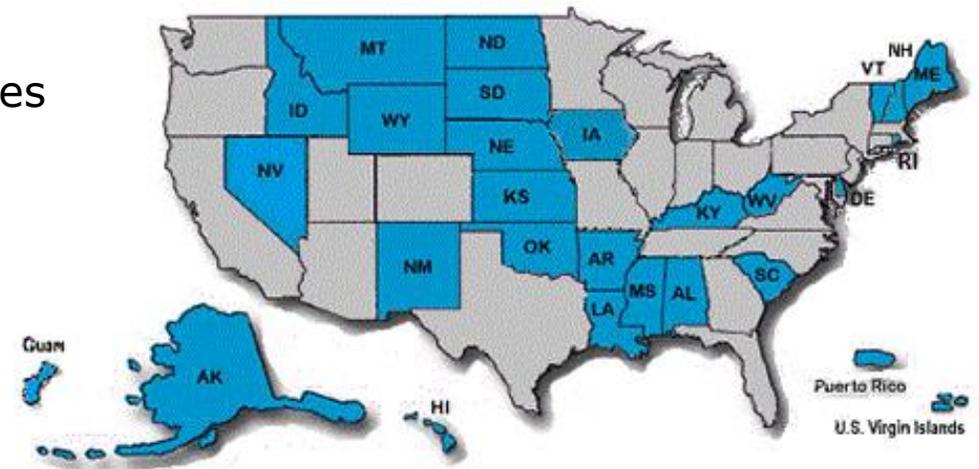


BRaVE is a framework to rapidly activate, integrate, and coordinate the expertise and research capabilities across the DOE Lab Complex to address urgent research needs in an emerging crisis

Research Opportunities for Underrepresented Communities

BES will build stronger programs with underrepresented institutions and regions, including strengthening awareness to address environmental justice issues

- ▶ **FAIR (Up to \$20M for BES, part of SC-wide initiative) - Funding for Accelerated Inclusive Research.** Enhancing research at minority serving institutions (MSIs) and emerging research institutions. The activities will improve the infrastructure, capacity, capability, and expertise at these institutions to enable competitive research and build beneficial partnerships, including DOE National laboratories and facilities, complementing the RENEW workforce initiative.
- ▶ **RENEW (Up to \$10M for BES)** – Doubling the FY 2022 investment, BES increases support for the SC-wide RENEW initiative that leverages SC's world-unique National laboratories and user facilities to provide internships for students at academic institutions currently under-represented in the BES research portfolio.
- ▶ **EPSCoR (Up to \$35M)** - The increased funding in the DOE EPSCoR program will support DOE-mission research in U.S. states and territories that do not have large federally-supported academic research programs. The FY 2023 funding opportunity will focus on larger-team implementation awards that facilitate development of research capacity and capabilities (including instrumentation) in the EPSCoR jurisdictions.



Office of Science (SC) Informational Webinar on Initiatives and Programs – December 15, 2022

- ▶ SC is hosting a public webinar to provide an overview of the research we support and to describe our efforts in the following initiatives and programs:
 - ❖ Climate Resilience Centers (Biological and Environmental Research)
 - ❖ Early Career Research Program - <https://science.osti.gov/early-career>
 - ❖ Established Program to Stimulate Competitive Research (EPSCoR) - <https://science.osti.gov/bes/epscor>
 - ❖ Funding for Accelerated, Inclusive Research (FAIR) - <https://science.osti.gov/Initiatives/FAIR>
 - ❖ Reaching a New Energy Sciences Workforce (RENEW) - <https://science.osti.gov/Initiatives/RENEW>

Everyone, including researchers and research administrators who are new to the Office of Science, are encouraged to attend.

▶ **Date/Time: Thursday, December 15, 4:00-5:00 p.m. EST**

▶ **Registration Required:**

https://science-doe.zoomgov.com/webinar/register/WN_miVi9vJFRAYKjnLO3EQ4BQ

FY 2023 Batteries and Energy Storage Hub FOA

- ▶ The Joint Center for Energy Storage Research (JCESR) is currently in its tenth and final year
- ▶ Per the FY 2023 budget request, BES plans to issue a Funding Opportunity Announcement to openly recompete the Batteries and Energy Storage Hub program
 - ❖ Hub-scale projects provide scientific foundations for next-generation energy storage
 - ❖ Supports both grid and mobile electrochemical energy storage
 - ❖ Collaboration among national laboratory, academic, and/or industrial team partners
- ▶ **Program Coordination:**
 - ❖ Coordination across DOE through the Joint Strategy Team for Batteries, including federal program managers for the Energy Storage Grand Challenge and the Long Duration Storage Shot

FY 2023 SC Energy Earthshots Initiative (Request +\$104M; **Marks +\$50M**)

- ▶ Addresses key research challenges at the interface between basic research and applied research and development activities to bridge the R&D gap and realize the stretch goals of the DOE Energy Earthshots
- ▶ BES, with other SC Offices, will initiate a new research modality of Energy Earthshot Research Centers (EERCs)
 - ❖ Modeled on the Energy Frontier Research Centers, BES will support large teams that are multi-investigator, multi-disciplinary, and multi-institution (academic, national laboratory, industrial) to advance foundational knowledge and enabling capabilities in experimental and computational chemical and materials sciences to address Earthshot goals
 - ❖ BES will coordinate closely with the Energy Technology Offices and existing research consortia/demonstration projects, to establish teams that span the R&D continuum and accelerate both science and technologies – providing a strong bridge between BES and technology research
- ▶ BES will complement EERCs with small group awards
 - ❖ Focus on use-inspired fundamental research to address knowledge gaps that limit achievement of the Energy Earthshot goals

Enhanced Geothermal Shot



90% Reduction 2035

Floating Offshore Wind Shot



>70% Reduction 2035

Industrial Heat Shot



85% Reduction 2035

Hydrogen Shot



1 Dollar 1 Kilogram 1 Decade

Long Duration Storage Shot



Reduce storage costs by 90%*...
*from a 2020 Li-Ion baseline

...in storage systems That deliver 10+ hours of duration

...in 1 decade

Carbon Negative Shot



<100 Dollars 1 Ton 1 Decade

<https://www.energy.gov/policy/energy-earthshots-initiative>

Announcing: User Facility Science Webinar Series

A BES public webinar series to enhance communication on BES User Facility science, highlighting contributions to national scientific priorities of Clean Energy, Microelectronics, Advanced Manufacturing, and Biopreparedness

Kickoff Event: Friday, January 27, 2023, 12:00 pm EST



Dr. Asmeret Asefaw Berhe
Director, Office of Science
Welcome Remarks



Prof. Sossina Haile
Northwestern University
Materials for batteries and
hydrogen



**Prof. Leora
Dresselhaus-Marais**
Stanford University
Low-emissions steel,
additive
manufacturing



Dr. Yong Chu
Brookhaven National Lab,
NSLS-II
Nanoscale imaging in
Microelectronics



Dr. Andrey Kovalevsky
Oak Ridge National Lab
Antiviral compounds for
COVID-19

Registration and detailed agenda to come...

For 2023, BESAC has 4 Charges from the Office of Science

- ▶ **Committee of Visitors Charges** – Since 2002, Committees of Visitors (COVs) appointed by the SC Federal Advisory Committees have assessed (1) the efficacy and quality of the processes used to solicit, review, recommend, monitor, and document funding actions; and (2) the quality of the resulting program portfolios. COVs for 2023:
 - ❖ Office of Workforce Development for Teachers and Scientists (WDTs) for fiscal years 2017-2022 (charged previously, delayed due to COVID and other impacts)
 - ❖ Division of Materials Science and Engineering for fiscal years 2018-2022
- ▶ **Charges related to the BESAC International Benchmarking Report**
 - ❖ Charge to propose strategies for research investments in BES-supported domains in the medium to long term
 - ❖ Charge to assess the impact of the Nanoscale Science Research Centers (NSRCs) to date and provide strategies for selection of high-impact, future directions

WDTS COV Report is Requested by the End of 2023

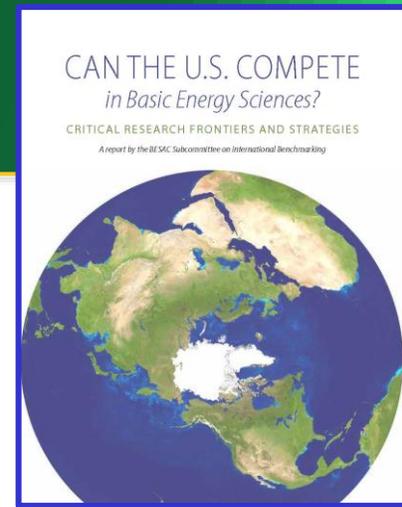
- ▶ Previous BESAC COVs examined the activities of WDTS in May 2010 and December 2016. The 2016 COV confirmed the effectiveness of the WDTS programmatic structure and activities that resulted from a major re-structuring in response to the 2010 report.
- ▶ The third COV review was planned a year ago but was postponed due to the pandemic and other constraints. The revised charge supports the change in delivery date and period covered by the COV.
- ▶ In addition to the standard charge, This COV is asked to assess:
 - ❖ Effectiveness of the online technology development and evaluation activities
 - ❖ Diversity, equity, and inclusivity (DEI) of participation in WDTS programs, including outreach efforts to enhance DEI
- ▶ Scope: The Science Undergraduate Laboratory Internships (SULI); The Community College Internships (CCI); The Visiting Faculty Program (VFP); The Office of Science Graduate Student Research Program (SCGSR); The National Science Bowl® (NSB); and The Albert Einstein Distinguished Educator Fellowship (AEF)

MSE COV includes the DOE EPSCoR program

- ▶ MSE COV Report is also requested by the end of 2023
- ▶ The most recent MSE COV was completed in May 2018. The COV report found that the processes by which MSE operates were fair, efficient, and professionally implemented. As a result, the MSE research portfolio was outstanding on a national and international scale. The committee made recommendations relating to staff travel, staffing levels, award durations, proposal pressure, and research metrics, among others.
- ▶ In addition to this standard charge, the COV is asked to comment on the diversity, equity, and inclusivity of participation in MSE programs.
- ▶ Scope: Materials Discovery, Design and Synthesis; Condensed Matter and Materials Physics; Scattering and Instrumentation Sciences; Established Program to Stimulate Competitive Research (DOE EPSCoR)

Additional BESAC Charges Follow from the 2021 BESAC International Benchmarking Report

- ▶ Report “Can the U.S. Compete in Basic Energy Sciences? Critical Research Frontiers and Strategies” : https://science.osti.gov/-/media/bes/besac/pdf/Reports/AH_DOE2021-Benchmarking_202108.pdf
- ▶ **Based on BESAC Charge** to identify critical research areas in basic energy sciences; to examine U.S. competitiveness in these areas, in major research facilities and tools, and in funding mechanisms; and to suggest strategies that could enhance the U.S. position in comparison to its global competitors
- ▶ **Finding:** in critical areas, China is surging, Europe leads in quantum information science, and the U.S. is flattening or falling behind
- ▶ **Strategies for Success:** Increased investment in research, facilities, instrumentation; greater support for early- and mid-career scientists; improve opportunities for facility staff scientists; better integrate energy sciences research from basic to applied to industrial
- ▶ **Follow-up actions:** 2 new charges to BESAC



Charge to Develop Strategies for Research Investments

- ▶ This charge requests advice on BES investment strategies for effective use of available resources.
 - ❖ Builds on Benchmarking Report “strategies for success” plus recent national focus on the strategic implications on government investment in science, including the CHIPS and Science Act (August 2022)
 - ❖ Rising costs for research, facility operations, and facility construction due to the combined effects of inflation, competition for talent, supply chains, and the pandemic. Even if increased authorization levels are realized in future appropriations, under business-as-usual scenarios, these forces will require ongoing prioritization of research topics.
- ▶ Request for proposed strategies for area-agnostic strategies that BES can subsequently apply to specific research topics as BES and the research community move forward. BESAC could consider:
 - ❖ **Topical Priorities:** How should BES determine that a topical area is a high priority for increased investment? How should BES determine that a topical area is a low priority for continued investment and could be reduced or phased out? How should BES identify new topical areas for investment? As disciplines converge on complex problems, how should BES identify and foster cross-cutting areas for investment?
 - ❖ **Investment balance:** How should BES balance research and instrumentation support for National Laboratories? How should BES balance research and instrumentation support for academic grants?
 - ❖ **Modality balance:** What should be the balance among the research modalities (single principal investigator, small groups, and team research [e.g., Energy Frontier Research Centers, Energy Innovation Hubs, Quantum Information Science Research Centers, and computational science centers]) for the future?
 - ❖ **Discovery and Use-driven balance:** How should BES weigh the potential for technological impact in defining investment priorities? How can BES play a useful role in enabling innovations to cross the “valley of death”? How sharp or fuzzy should the “basic-applied boundary” be?
 - ❖ **International:** How should BES take account of international competition in its research domains?
 - ❖ **Frequency:** How frequently should these evaluations be revisited?

Assess Impact and Future Directions for the BES Nanoscale Science Research Centers

- ▶ As a second charge related to the International Benchmarking report, this charge focuses on facilities and instrumentation.
- ▶ The NSRCs were established between 15 and 20 years ago. Since their conception as user facilities, nanoscience has evolved from a new methodology to an established foundational capability for science and commercial technologies, and the NSRCs' capabilities have expanded to include the electron microscopy user facilities and quantum information science.
- ▶ The charge to BESAC is to study the NSRCs' impact to date and to provide strategies for selection of high-impact, future directions for these facilities, answering such questions as which aspects of the NSRCs are "world-leading", and how they should evolve to better serve the Nation and user research.
- ❖ Some questions that BESAC could consider in this study include:
 - ❖ What has been the impact of the NSRCs? Consider scientific productivity, instrumentation advances, user community, contributions to national priorities, including energy technologies, and other metrics. What aspects of these facilities are "world-leading"?
 - ❖ How are the collective NSRCs synergistic? What are the unique scientific roles?
 - ❖ The initial vision for the NSRCs included synergies with the other user facilities at each of the laboratories. Has this vision been realized? What future directions are most promising?
 - ❖ What are the best practices and opportunities for enhancement in the NSRC outreach activities to ensure a diverse user community?
 - ❖ **How should the NSRCs evolve to better serve the nation and user research?**

Questions? Feedback?



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