



U.S. DEPARTMENT OF  
**ENERGY**

Office of  
Science

# Biological and Environmental Research

**BER Advisory Committee (BERAC)**

**Fall Meeting**

**October 21, 2021**

*Sharlene Weatherwax*

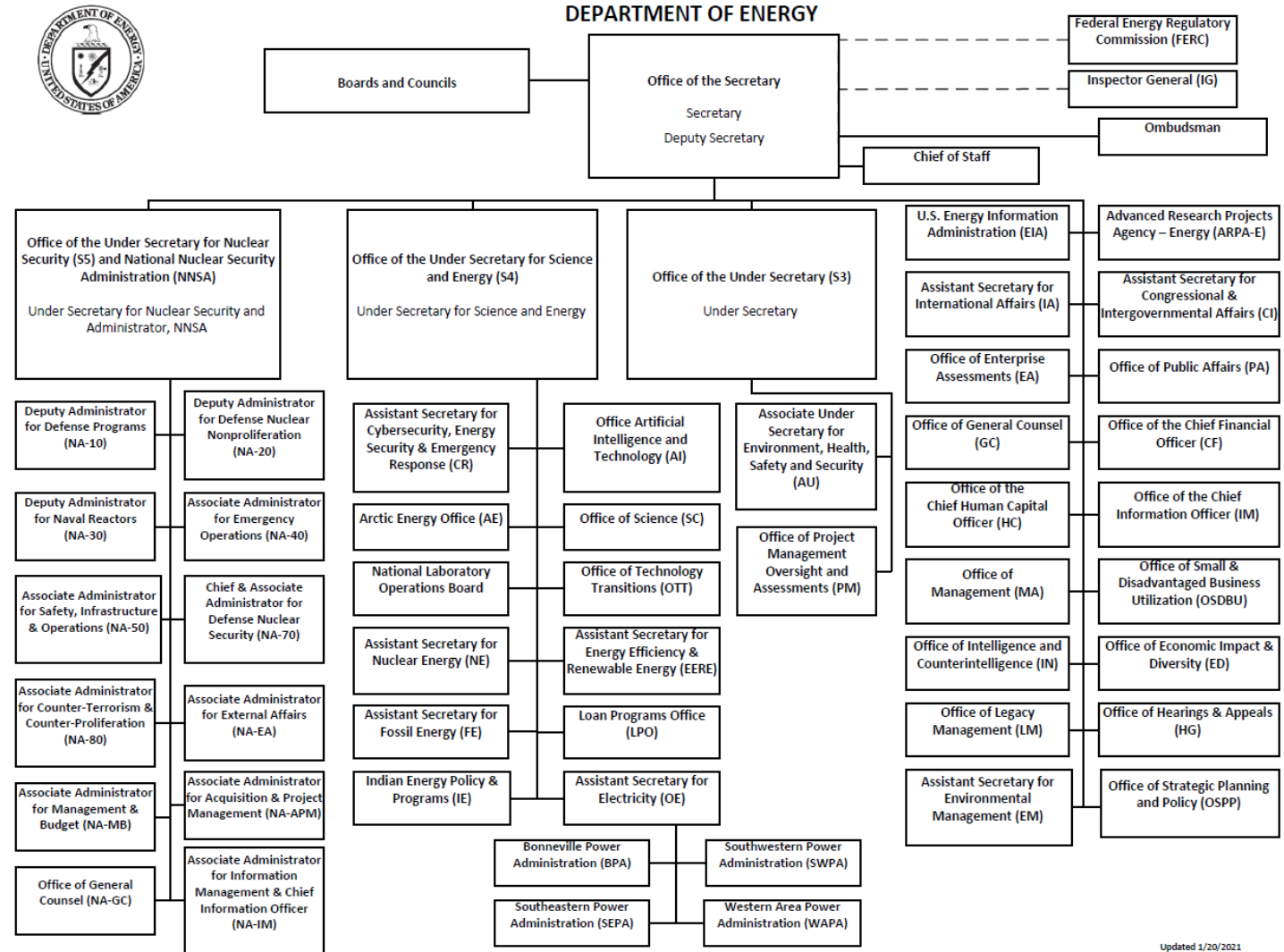
*Associate Director*

# DOE Organization Chart



Jennifer M. Granholm  
16th Secretary of Energy

Confirmation Hearing August 3, 2021:  
Dr. Geraldine Richmond to be Under Secretary for Science  
Dr. Asmeret Berhe to be Director of the Office of Science



Updated 1/20/2021

# BER Staff Changes

## Departures



**Dr. Mike Kuperberg**  
On Detail to OSTP/USGCRP  
(July 2021)



**Dr. Christiana Stan**  
Earth and Environmental System Modeling  
IPA from George Mason University  
(Completed IPA in January 2021)



**Dr. Brian Bencoter**  
Environmental System Science  
IPA from Florida Atlantic University  
(Completed IPA June 2021)



**Ms. Brittaney McMillian**  
Program Analyst  
(July 2021)



**Ms. Ashley Cottom**  
Program Analyst  
(July 2021)

# BER Staff Changes

## Arrivals



**Dr. Brian Bencoter**  
Program Manager  
Environmental System Science  
(June 2021)



**Dr. Paul Sammak**  
Program Manager  
Biomolecular Characterization  
and Imaging Science  
(May 2021)



**Dr. Resham Kulkarni**  
Program Manager  
Computational Biosciences  
and Genomic Sciences  
(August 2021)



**Dr. Aaron Grade**  
AAAS Fellow  
Environmental System Science  
(August 2021)



**Dr. Olga Tweedy**  
AAAS Fellow  
Earth and Environmental Systems Modeling  
(September 2021)



**Ms. Kate Garmer**  
Program Analyst  
(August 2021)



**Ms. Lauren Brunk**  
Program Analyst  
(June 2021)

# BERAC *Completed* Membership



**Amy Brunner**  
Virginia Tech



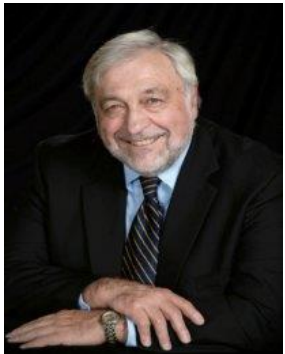
**G. Phil Robertson**  
Michigan State University



**Cheryl Kuske**  
LANL



**David A. Stahl**  
University of Washington



**Jerry Melillo**  
Marine Biological Laboratory



**John Weyant**  
Stanford University

# BERAC *New* Membership



**Ana Barros**  
University of Illinois



**Matthew Fields**  
Montana State University



**Bruno Basso**  
Michigan State University



**Sonia Kreidenweis**  
Colorado State University

# BERAC Researchers Recognized

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**Dr. Kristala Jones Prather**, Massachusetts Institute of Technology  
2021 Andreas Acrivos Award for Professional Progress in Chemical Engineering,  
American Institution of Chemical Engineers (AIChE)



**Dr. Gloria Muday**, Wake Forest University  
Elected to The North American Arabidopsis Steering  
Committee (NAASC) – 2021-2026

# BER Researchers Recognized

## Department of Energy 2021 Office of Science Distinguished Scientist Fellows



**Dr. L. Ruby Leung, Pacific Northwest National Laboratory** – Honored for “pioneering new approaches in climate modeling, the discovery of unexpected impacts of regional climate change, and understanding extreme weather events and their future changes.”



**Dr. Jay Keasling, Lawrence Berkeley National Laboratory** – Honored for “national scientific leadership in synthetic biology that has advanced DOE’s strategy in renewable energy, especially the realization of biofuels and bioproducts that enable biomanufacturing at scale and inspire and grow the U.S. bioeconomy.”



# BER Researchers Recognized

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**Dr. Susannah G. Tringe, Lawrence Berkeley National Laboratory  
Department of Energy/Office of Science/2020 Ernest Orlando Lawrence Award**

“recognized for development and applications of high throughput DNA sequencing techniques (e.g., shotgun technique) to study microbial communities in numerous different environments including wetlands, seminal studies of plant-microbiome interactions in crop science, and early exploration of amplicon sequencing in environmental samples.”



**Dr. Sally McFarlane, U.S. Department of Energy  
2020 AAAS Fellow**

# 2021 Early Career Research Program (ECRP) BER Focus Areas

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## **(1) Systems biology research to advance sustainable bioenergy crop development**

Technical Contact: Pablo Rabinowicz, [pablo.rabinowicz@science.doe.gov](mailto:pablo.rabinowicz@science.doe.gov)

- Applications are requested for systems biology-driven, basic research on the fundamental principles of sustainable bioenergy feedstocks in relationship to their ecosystem context.

## **(2) Aerosol-Cloud Processes**

Technical Contact: Shaima Nasiri, [shaima.nasiri@science.doe.gov](mailto:shaima.nasiri@science.doe.gov)

- Applications are sought that will improve fundamental understanding of aerosol-cloud processes through analysis of BER observational data.

# 2021 Early Career Research Program (ECRP) BER Selectees



PI Name	Institution	Research Area	Proposal Title
Benjamin Cole	LBL	BSSD - Systems Biology, Bioenergy	Defining the influence of environmental stress on bioenergy feedstocks at single-cell resolution
Melissa Cregger	ORNL	BSSD - Systems Biology, Bioenergy	Understanding the Effects of Populus—Mycorrhizal Associations on Plant Productivity and Resistance to Abiotic Stress
Gabriel Isaacman-VanWertz	Virginia Tech	EESD -Atmospheric Science	Parameterizing wet removal of aerosol-forming oxygenated gases and its regional and global impacts
Ruben Rellan-Alvarez	North Carolina State University, Raleigh	BSSD - Systems Biology, Bioenergy	Improving Candidate Gene Discovery by Combining Multiple Genetic Mapping Datasets
Dié Wang	BNL	EESD -Atmospheric Science	Understanding Deep Convective Cloud Kinematic Processes and Their Responses to Aerosols
Xue Zheng	LLNL	EESD -Atmospheric Science	Using ARM Data and Multiscale Models to Advance the Understanding of Liquid-Phase Cloud Response to Aerosol Perturbation over Ocean and Land

# 2022 Early Career Research Program (ECRP)

**Released on September 9, 2021**

## **(1) Systems biology and biosystems design of bioenergy-relevant microbes to enable production of next-generation biofuels, bioproducts, and biomaterials**

Technical Contact: Pablo Rabinowicz, [pablo.rabinowicz@science.doe.gov](mailto:pablo.rabinowicz@science.doe.gov)

- Applications are requested for systems biology research to advance the development of emerging eukaryote or prokaryote model microorganisms and/or microbial communities relevant for the production of biofuels, bioproducts, and/or biomaterials by converting lignocellulosic biomass, upcycling synthetic (petroleum-derived) polymers, or as a byproduct of photosynthesis.

## **(2) Environmental Process Research in Urban-Influenced Coastal Systems**

Technical Contact: Jennifer Arrigo, [Jennifer.arrigo@science.doe.gov](mailto:Jennifer.arrigo@science.doe.gov) and  
Daniel Stover, [Daniel.stover@science.doe.gov](mailto:Daniel.stover@science.doe.gov)

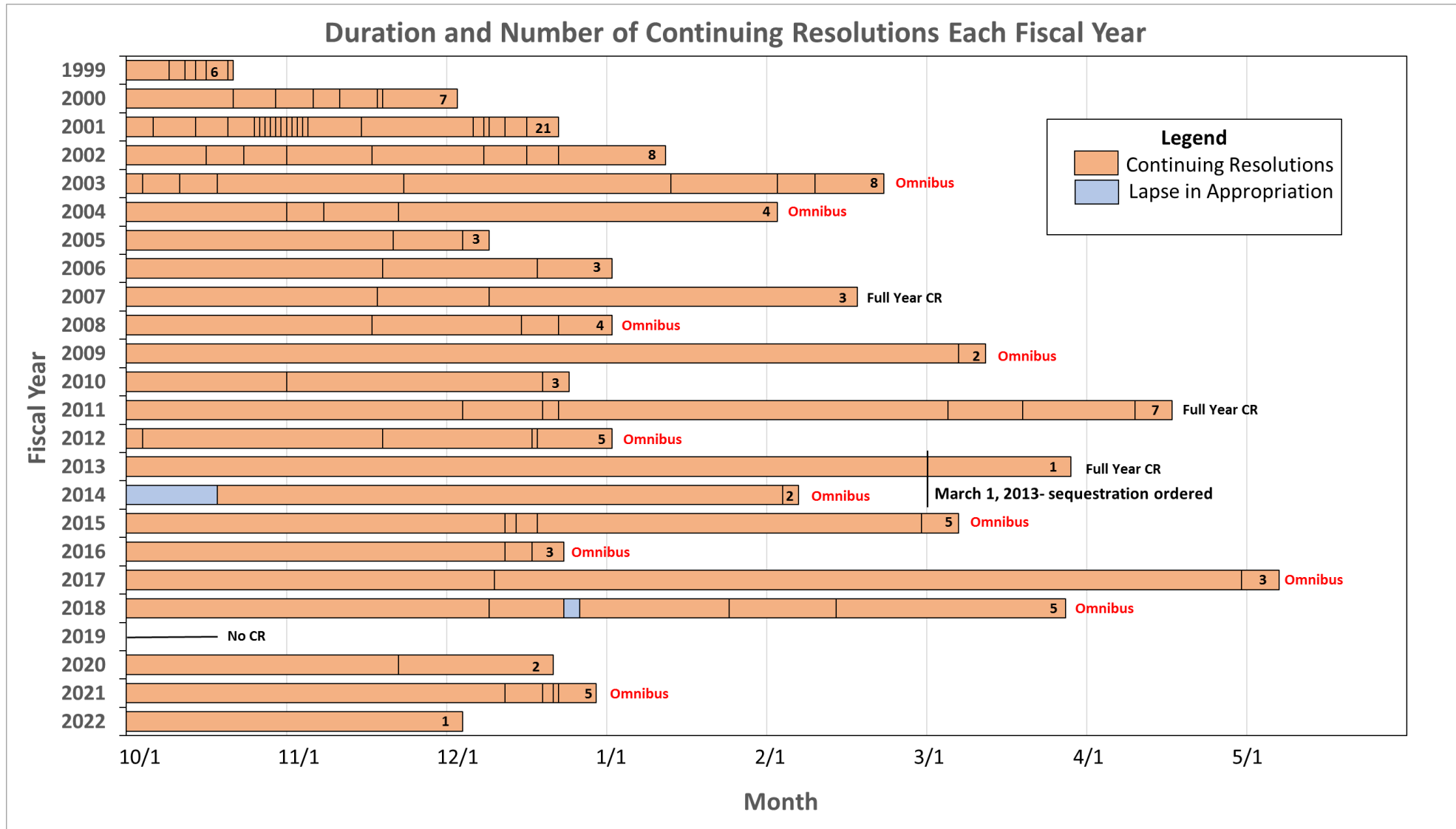
- Applications are sought within the scope of the ESS program that will improve fundamental understanding of ecological and hydro-biogeochemical processes in urban influenced coastal systems.

**Pre-apps due: October 21, 2021**

**Pre-app response date: December 1, 2021**

**Proposals due: January 20, 2022**

# Budget: Duration and Number of Continuing Resolutions



# BER FY 2022 President's Request

(Dollars in thousands)

	(dollars in thousands)			
BER FY 2021 Appropriation and FY 2022 President's Request	FY 2021 Enacted	FY 2022 President's Request	FY 2022 House Mark	FY 2022 Senate Mark
<b>Biological and Environmental Research</b>				
Genomic Science	\$277,574	\$277,000		
Biomolecular Characterization and Imaging Science	\$45,000	\$45,000		
Biological Systems Facilities & Infrastructure	\$80,000	\$84,500		
Biological Systems Science, SBIR/STTR	\$0	\$0		
<b>Total, Biological Systems Science</b>	<b>\$402,574</b>	<b>\$406,500</b>	<b>\$400,000</b>	<b>\$406,500</b>
Atmospheric System Research	\$36,000	\$39,000		
Environmental System Sciences	\$87,777	\$119,500		
Earth and Environmental Systems Modeling	\$100,674	\$108,000		
Earth and Environmental Systems Sciences Facilities	\$125,975	\$155,000		
Earth and Environmental Systems Sciences, SBIR/STTR	\$0	\$0		
<b>Total, Earth and Environmental Systems Sciences</b>	<b>\$350,426</b>	<b>\$421,500</b>	<b>\$405,000</b>	<b>\$421,500</b>
<b>Total, Biological and Environmental Research</b>	<b>\$753,000</b>	<b>\$828,000</b>	<b>\$805,000</b>	<b>\$828,000</b>

SBIR/STTR funding:

FY 2021 Enacted: SBIR \$23,851,000 and STTR \$3,352,000

FY 2022 Request: SBIR \$25,504,000 and STTR \$3,589,000

# FY 2022 Initiative - Biopreparedness Research Virtual Environment (BRaVE)

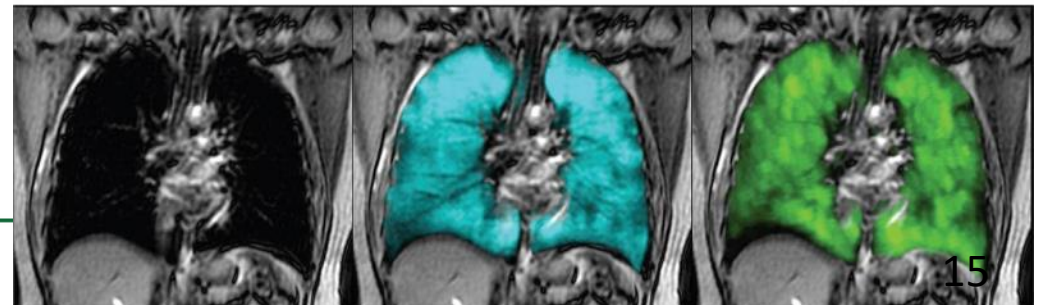
- **A virtual platform to rapidly mobilize DOE's bioscience R&D assets in response to national crises**
- **Provides distributed DOE laboratory research teams with collaborative frameworks and rapid access to:**
  - DOE's High-Performance Computing resources and x-ray and neutron characterization facilities
  - Collaborative Design-Build-Test-Learn workflows that leverage DOE's databases of biological, chemical and materials datasets
  - Medical radioisotopes that may prove crucial to biological emergency responses
- **Supports development of DOE's next-generation analytical technologies, user facility resources, national preparedness for medical isotope processing, and biotechnological capabilities**



$^1\text{H}$  MRI

$^3\text{He}$  MRI

$^{129}\text{Xe}$  MRI



# FY 2022 Initiative - Urban Integrated Field Laboratories

**GOAL: Advance underpinning science of integrated natural-human urban systems to assure resilience to climate extremes using equitable solutions**

- Urban regions exhibit large spatial variability and their diverse populations are known to be vulnerable to climate extremes
- Urban systems have been 'left out' of all climate models and are not part of most climate observing systems
- The benefits of climate solutions will be greatest with disadvantaged socioeconomic groups living in heterogeneous urban systems



## SCIENCE:

- ▶ How does climate change cause and respond to human systems across heterogeneous urban landscapes?
- ▶ What are the dynamical connections involving climate extremes, infrastructure risk, and vulnerable population groups?
- ▶ How will uncertainties in predictions be constrained by using observational, modeling, and analytic systems?



# FY 2022 Initiative - National Virtual Climate Laboratory (NVCL)

**GOAL: Advance access to climate science through public engagement on local to regional scale climate science, equitable solutions, and partnerships with National Laboratories, HBCUs and Minority Serving Institutions, and regional stakeholders**

- The greatest risks due to climate change are preferentially targeting vulnerable population groups exposed to the more serious climate extremes
- The connections between climate risks, resilience, and equitable solutions have received little attention by the broad climate research community
- Leverages foundational investments in the DOE national laboratory complex
- Opportunity for collaborations with other DOE offices, other agencies, and diverse institutions to assure equitable solutions can be rapidly deployed



## ACTIVITIES:

- ▶ Build connections between HBCUs and MSIs and the national labs
- ▶ Develop a capability matrix for national labs and other entities that can serve traineeships and strategic planning
- ▶ Develop outreach and training workshops on climate science to inform solutions of importance to frontline communities

# FY 2022 Initiative - Climate Resilience Lab/Centers

**VISION:** Premier national lab on climate resiliency research that accelerates basic climate system science towards equitable solutions

## MISSION AND SCOPE:

- Coordinate resilience basic research across the DOE complex with a focus on local climate impacts, resilience, and equitable energy solutions
- Intellectual home for local-level climate resilience research for DOE and the Nation
- Leverage ongoing foundational investments in BER funded research
- Develop demonstration research projects with multi-institutional collaborations
- Provide outreach, community engagement, and collaboration opportunities involving Historically Black Colleges and Universities, minority serving institutions, other national laboratories, and community level stakeholders



## UNIQUENESS:

- ▶ This is the first such laboratory of its kind, with its focus on climate-energy and equitable solutions at the local scale
- ▶ Its emphasis on climate and environmental justice will be the first of its kind in the Nation
- ▶ Significant leadership role and siting at an HBCU/MSI
- ▶ Planning begins in FY 2022

# FY 2022 Initiative - Reaching a New Energy Sciences Workforce (RENEW)

## Office of Science-wide Initiative



- Outreach
- Listening tours & round tables to:
- Gain understanding about challenges
- Develop evidence-based solutions



- Identify unique SC Lab opportunities
- Partner with MSIs & professional societies
- Implement action plan

Competitively support new traineeship awards resulting in:

- “Hands on” experiences, mentoring, enhanced workforce DEI



- Tracking of post-traineeship outcomes
- Assessing program effectiveness

# Administration Priorities for FY2023

- Pandemic readiness and prevention
- **Climate change**
  - **Climate science**
  - **Innovation in clean-energy technologies and infrastructure**
  - **Climate adaptation and resilience**
  - **Nature-based climate solutions for mitigation and adaptation**
  - **Monitoring and measurement**
- **Critical and emerging technologies**
  - **AI; QIS; High-performance computing**
  - **Enable large-scale data analysis; high-resolution modeling**
- **Innovation for equity to expand inclusion in Federal Science**
- National security and economic resilience
- STEM education and engagement guidance



EXECUTIVE OFFICE OF THE PRESIDENT  
WASHINGTON, D.C. 20503



M-21-32

MEMORANDUM FOR THE HEADS OF EXECUTIVE DEPARTMENTS AND AGENCIES

FROM: SHALANDA D. YOUNG *Shalanda D. Young*  
ACTING DIRECTOR  
OFFICE OF MANAGEMENT AND BUDGET

DR. ERIC S. LANDER *Eric S. Lander*  
DIRECTOR  
OFFICE OF SCIENCE AND TECHNOLOGY POLICY

SUBJECT: Multi-Agency Research and Development Priorities for the FY 2023 Budget

This moment in American history, as we face unprecedented challenges but also unprecedented opportunities, is a moment for the Federal Government to take action to refresh and reinvigorate our Nation's science and technology enterprise with the aim of harnessing the full power of science and technology on behalf of the American people. Scientific discovery, technological breakthroughs, and innovation are the engines for expanding the frontiers of human knowledge and are vital for responding to the challenges and opportunities of the 21st century.

Federal funding for research and development (R&D) is essential to maximize the benefits of science and technology to tackle the climate crisis and advance health, prosperity, security, environmental quality, equity, and justice for all Americans. Simply supporting R&D is not sufficient; however, Federal agencies should ensure that the R&D results are made widely available to other scientists, to the public to facilitate understanding and decisions, and to innovators and entrepreneurs who can translate them into the businesses and products that will improve all of our lives. And, as we seek to make our supply chains more resilient, R&D investments should create more than just cutting-edge technology; they should also create products that are made in the United States by U.S. workers.

This memorandum outlines the Administration's multi-agency R&D priorities for formulating fiscal year (FY) 2023 Budget submissions to the Office of Management and Budget (OMB). The priorities covered in this memo require continued investments in R&D; science, technology, engineering, and mathematics (STEM) education and engagement; STEM workforce development; technology transfer and commercialization; and research infrastructure, with emphasis on Historically Black Colleges and Universities, other Minority Serving Institutions, and disadvantaged communities who have been historically underserved, marginalized, and adversely affected by persistent poverty and inequality. These priorities should be addressed within the FY 2023 Budget guidance levels provided by OMB.

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Thank you!