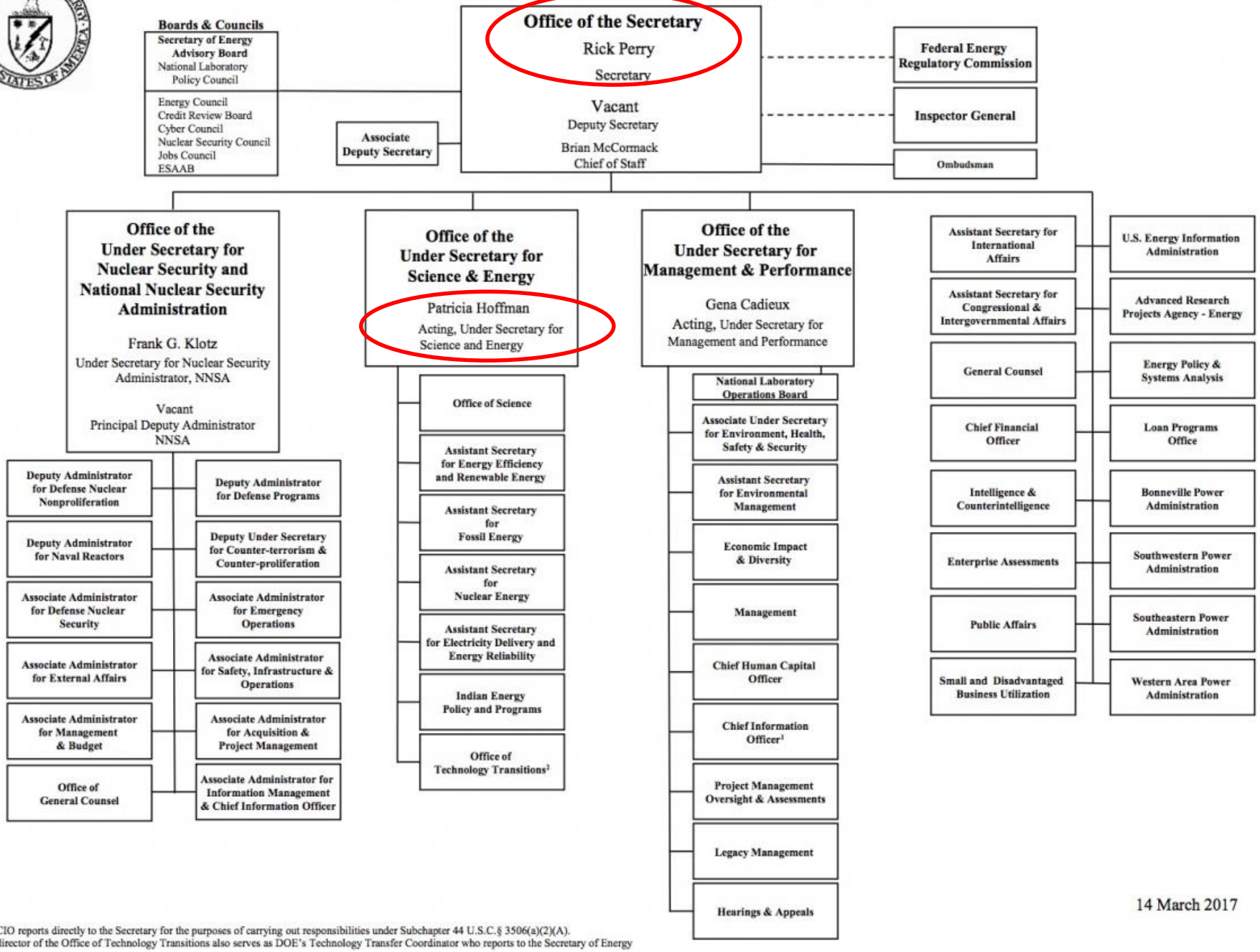
U.S. DEPARTMENT OF ENERGY | Office of Science

Biological and Environmental Research

BER Advisory Committee (BERAC)
Spring Meeting
April 20, 2017

Sharlene Weatherwax
Associate Director

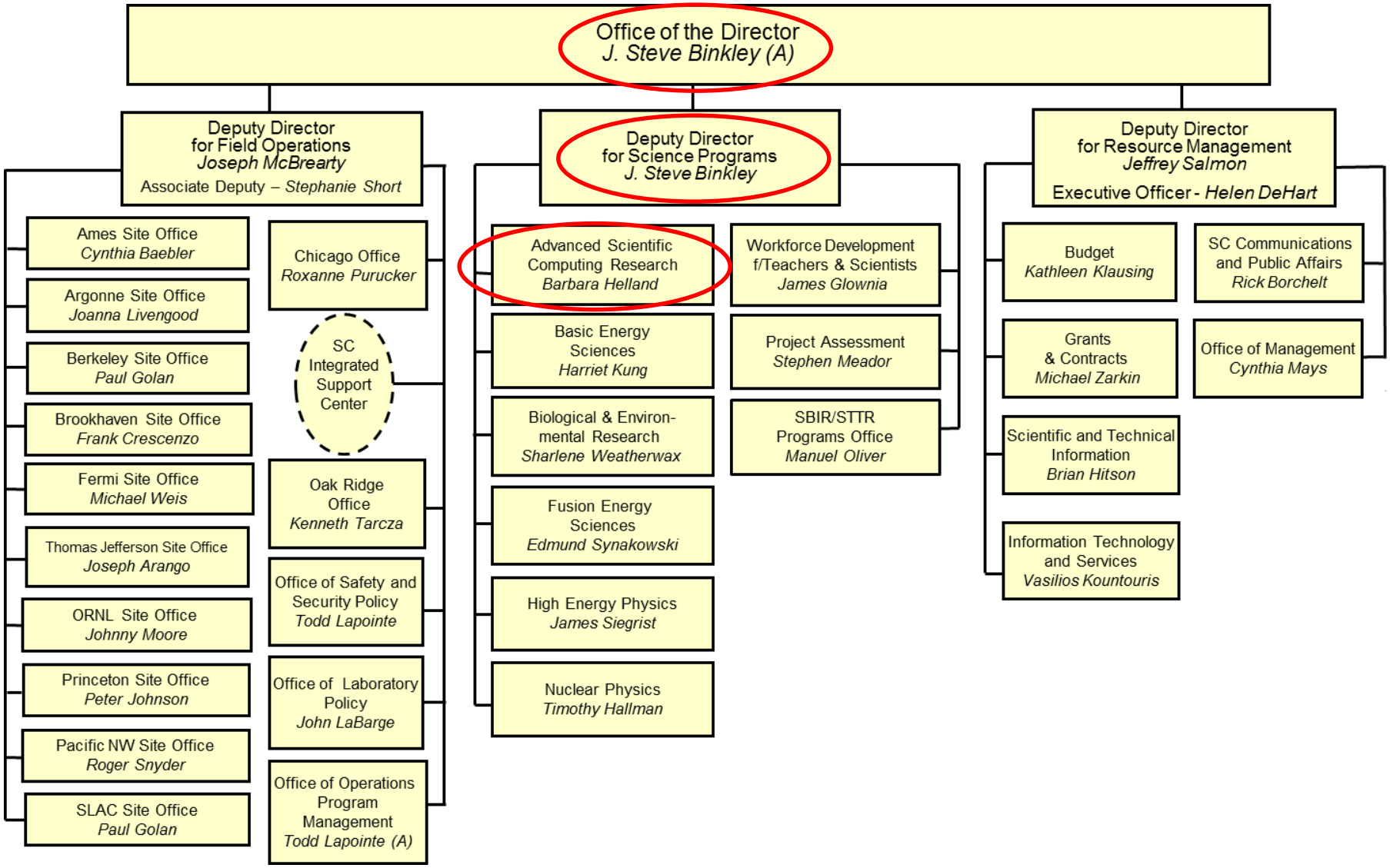
DEPARTMENT OF ENERGY



14 March 2017

[1] The CIO reports directly to the Secretary for the purposes of carrying out responsibilities under Subchapter 44 U.S.C.§ 3506(a)(2)(A).
[2] The director of the Office of Technology Transitions also serves as DOE's Technology Transfer Coordinator who reports to the Secretary of Energy

DOE Office of Science Organization



New SC Deputy Director for Science Programs

Dr. J. Stephen (Steve) Binkley

- Formerly, SC Associate Director for Advanced Scientific Computing Research
- As of January 16, 2017, also serving as Acting SC-1
- Dr. Binkley has held senior positions at Sandia National Laboratories, Department of Homeland Security (DHS), and Department of Energy (DOE).
  - At DOE, Dr. Binkley served as a technical advisor to the Assistant Secretary of Defense Programs.
  - At DHS, Dr. Binkley served as the deputy director for technology within the DHS Operations Directorate.
  - Returning to DOE in 2006, Dr. Binkley served as a senior technical advisor to the Under Secretary for Science and the Director of the Office of Science.

BER staff changes

Kathy Holmes – BER Administrative Assistant

Joe Graber – Genomic Science Program Team Lead

BERAC Members Recognized

Jim Ehleringer

University of Utah

- Elected to the National Academy of Sciences

Ruby Leung

Pacific Northwest National Laboratory

- Elected to the National Academy of Engineering

New BERAC Members – WELCOME!

Kristala Prather

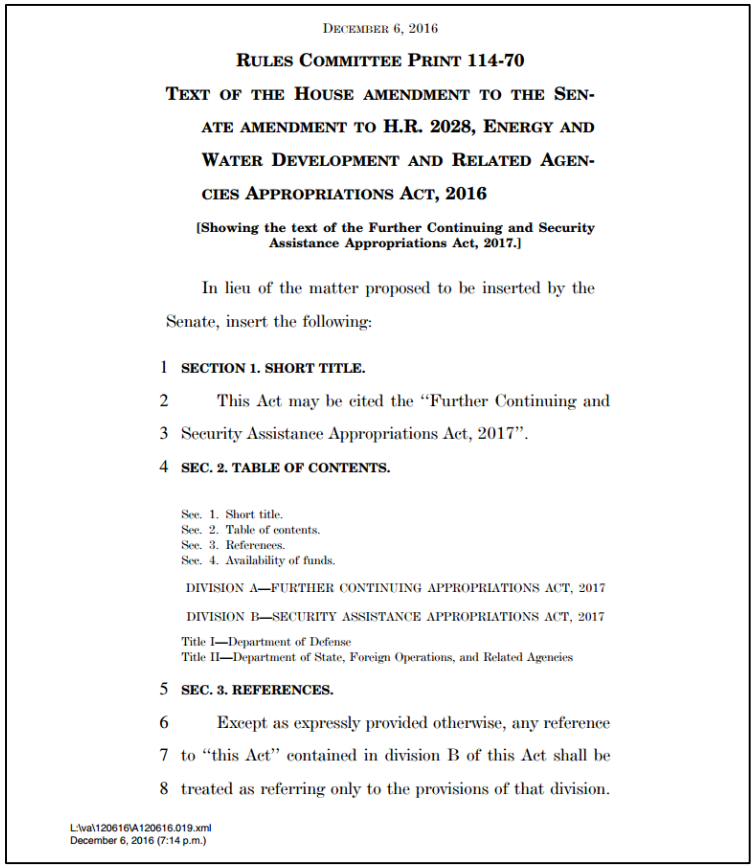
Theodore T. Miller Associate Professor
of Chemical Engineering
Massachusetts Institute of Technology

Amy Brunner

Associate Professor
Department of Forest Resources &
Environmental Conservation
Virginia Tech

BER Budget

	FY2016 ($M)
Biological Systems Science	$294.3
Research	$214.8
Facilities	$79.5
Climate and Environmental Science	$314.7
Research	$199.0
Facilities	$115.7
TOTAL	$609.0



DECEMBER 6, 2016

RULES COMMITTEE PRINT 114-70

TEXT OF THE HOUSE AMENDMENT TO THE SENATE AMENDMENT TO H.R. 2028, ENERGY AND WATER DEVELOPMENT AND RELATED AGENCIES APPROPRIATIONS ACT, 2016

[Showing the text of the Further Continuing and Security Assistance Appropriations Act, 2017.]

In lieu of the matter proposed to be inserted by the Senate, insert the following:

SECTION 1. SHORT TITLE.

This Act may be cited the "Further Continuing and Security Assistance Appropriations Act, 2017".

SEC. 2. TABLE OF CONTENTS.

Sec. 1. Short title.
Sec. 2. Table of contents.
Sec. 3. References.
Sec. 4. Availability of funds.

DIVISION A—FURTHER CONTINUING APPROPRIATIONS ACT, 2017

DIVISION B—SECURITY ASSISTANCE APPROPRIATIONS ACT, 2017

Title I—Department of Defense
Title II—Department of State, Foreign Operations, and Related Agencies

SEC. 3. REFERENCES.

Except as expressly provided otherwise, any reference to "this Act" contained in division B of this Act shall be treated as referring only to the provisions of that division.

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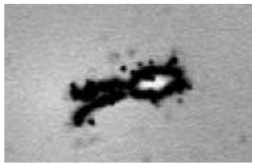
December 6, 2016 (7:14 p.m.)

Continuing Resolution through April 28, 2017

BER – a unique 70-year history of transformational science

BEGINNINGS - Atomic Energy Acts of 1946 and 1954

- Research and development related to theory, production, use of nuclear energy
- Implications involving availability for health, social, political, and economic sectors
- Encouraging and conducting research and development in clean and renewable energy sources



EARLY TRANSFORMATIONAL SCIENCE

- First to develop an atmospheric general circulation model
- First radiotracer observations in the environment
- First observations of genetic effects from radiation exposure

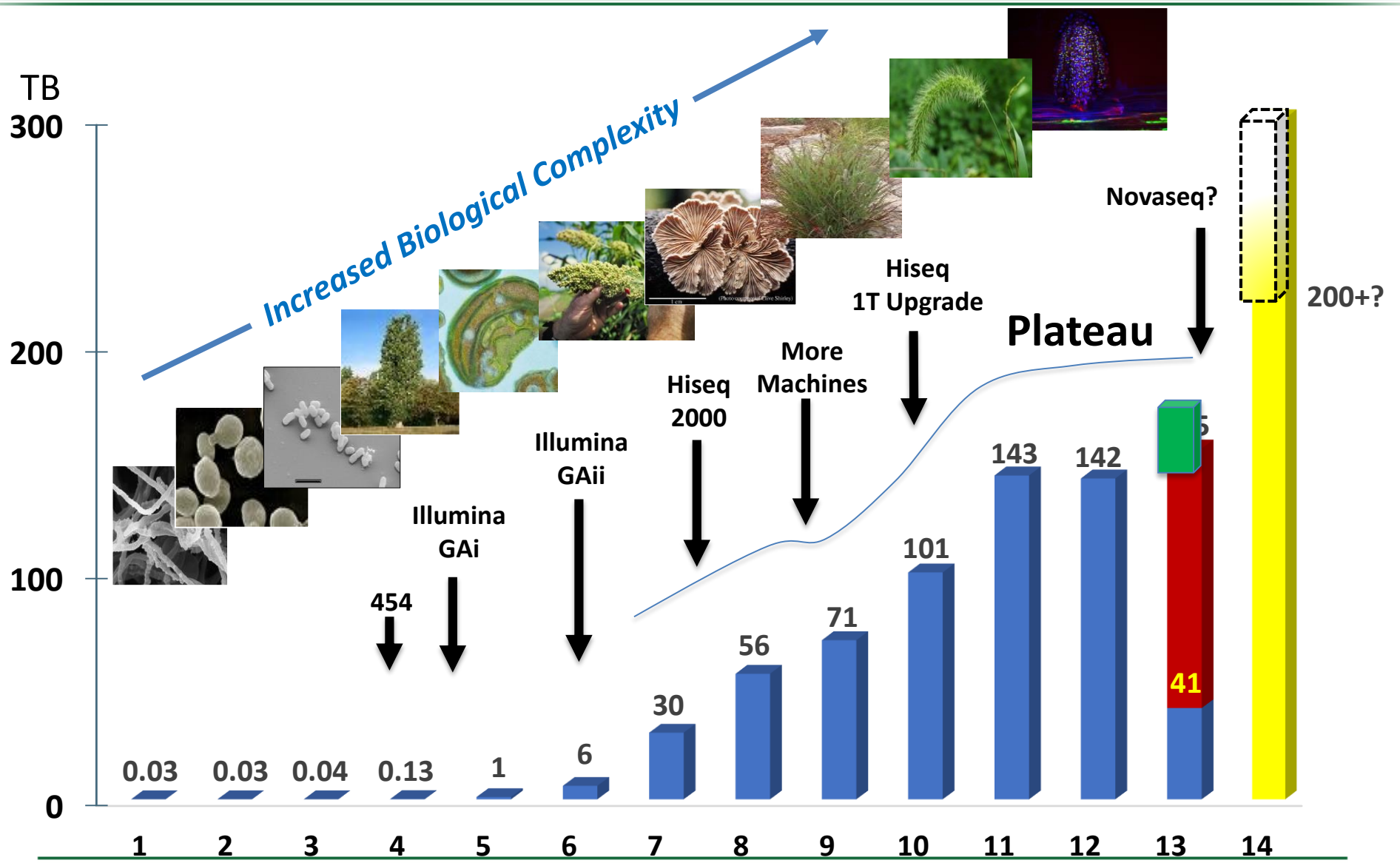
BREAKTHROUGHS IN CAPABILITIES

- First earth system model, combining atmosphere, ocean, ecology
- Initiated the Human genome project
- First agency to launch long term experimental observations

TODAY – Toughest challenges with transformational technology only DOE can lead

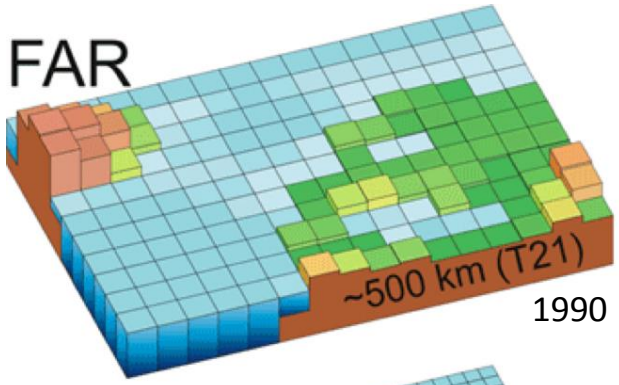
- Bioenergy research combining system science, technology, and engineering
- Multi-disciplinary, systems approach at the interface between physical and life sciences
- Earth system model platform, with energy and uncertainty quantification, on world's fastest computers
- Long term field experiments as "big science" linked to DOE mission

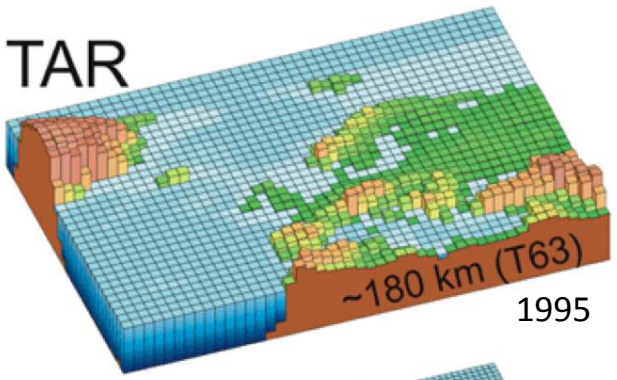
Increases in Genome Sequencing and Analysis

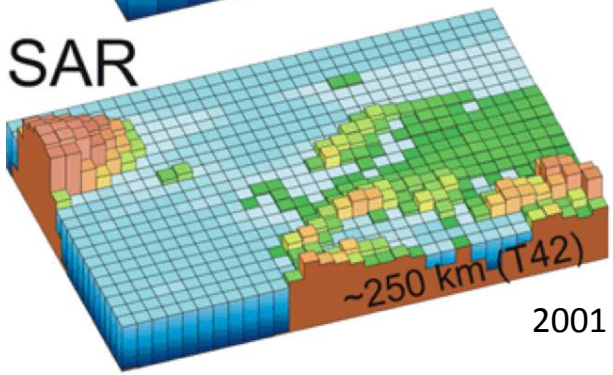


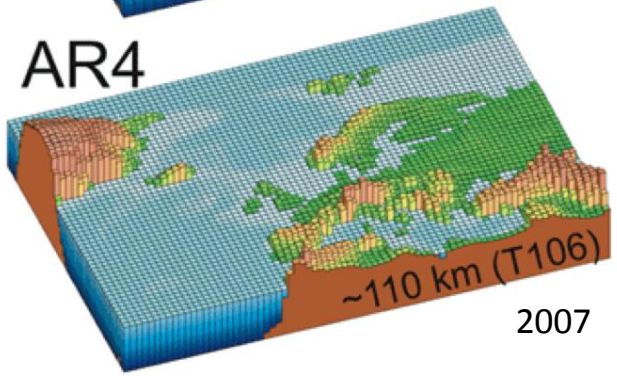
Demonstrable Improvements in Science and Modeling

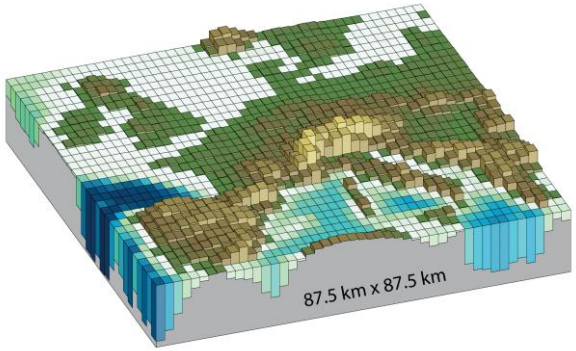
Evolution of grid-resolved topography since start of IPCC (First Assessment Report, FAR).

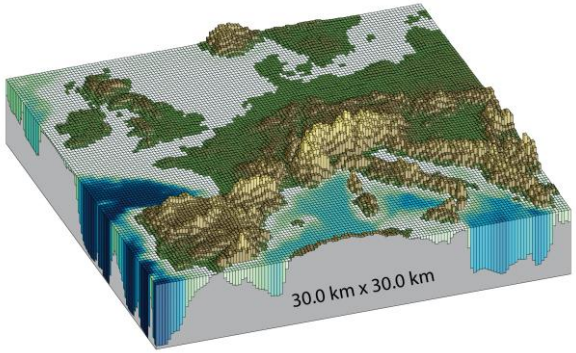










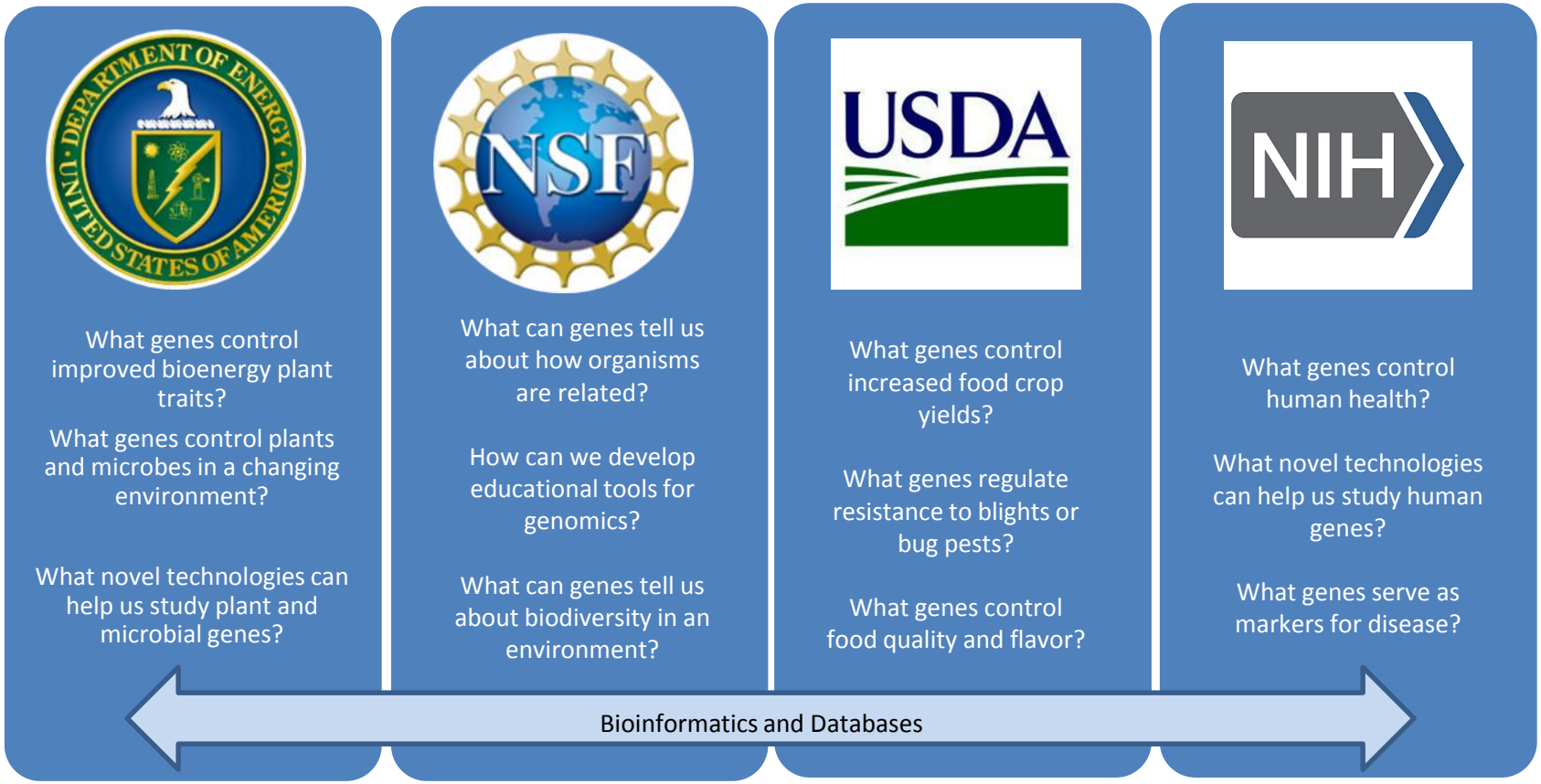


Next generation
Earth System Models

25km models are demonstrably better for representing:

- Intense storms (hurricanes, frontal systems)
- Extreme precipitation
- Convection

Genomics from an Agency Perspective



Climate and Earth System Modeling from an Agency Perspective

How does the climate system affect energy production, distribution, and supply?

- Earth system and integrated assessment models
- Long-term field experiments and atmospheric observations
- Study time periods of 2-40 years

How is the Earth system changing, based on satellite observations?

- Satellite-based observations of the atmosphere, oceans, and land surface
- Fundamental research on remote sensing

How can we improve weather and climate predictions for public safety and commerce?

- Atmospheric and ocean monitoring and modeling
- Study time periods of hours – 1 year (weather)

How can we improve fundamental understanding of historical climate systems?

- Support of university capacity across a broad range of geosciences.

Data products and data archives

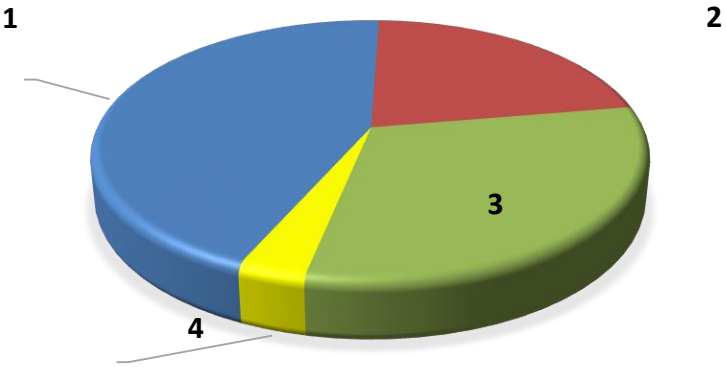
US Global Change Research Program (coordinating body)

Biological and Environmental Research: Current

Integrating observations and experimental capabilities for predictive systems-level understanding, from microbes and plants to ecosystems and climate.

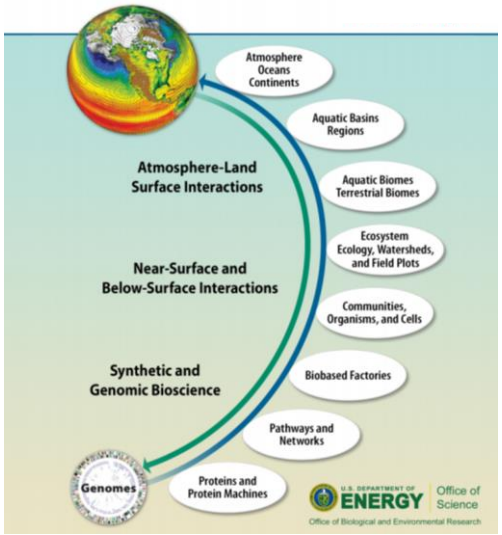
BER at a Glance

- ~1,350 Ph.D. scientists and ~450 students at research institutions in 35 states and Puerto Rico, and at 11 DOE laboratories.
- Over 550 research projects in 12 research areas; ~3,100 users at 3 BER scientific user facilities
- BER funding: ~70% in research (~33% universities, ~67% DOE labs), ~30% in operations for scientific user facilities



Unique features of BER

- The nation's largest basic genomic research portfolio focused on identifying, understanding and modifying plants and microbes with bioenergy and/or bioproduct properties
- World's most sophisticated and highest resolution Earth System Research Model
- The only federally-funded genome sequencing facility focused on non-medical plants, microbes and microbial communities for bioenergy and bioproduct production.
- The world's largest scientific supporter of ground-based facilities for characterizing the atmosphere's energy balance, including aerosols and clouds.

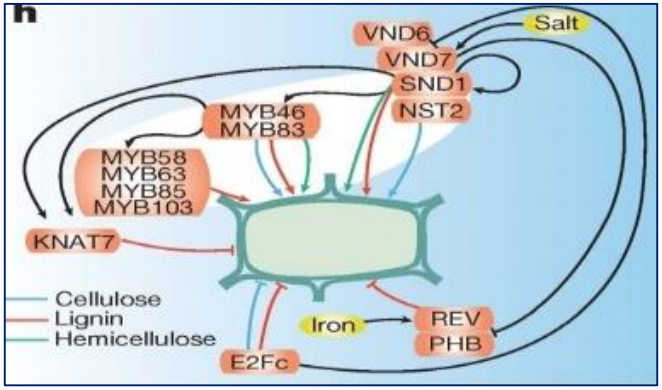


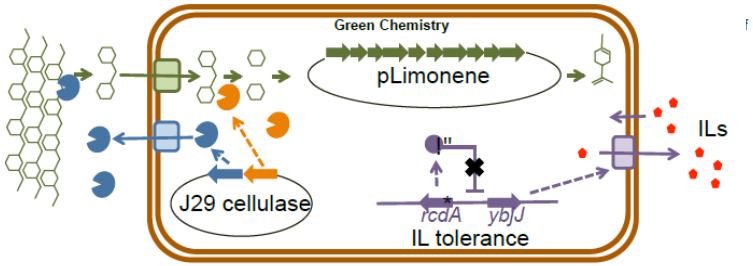
BER Support of Research Across the Nation

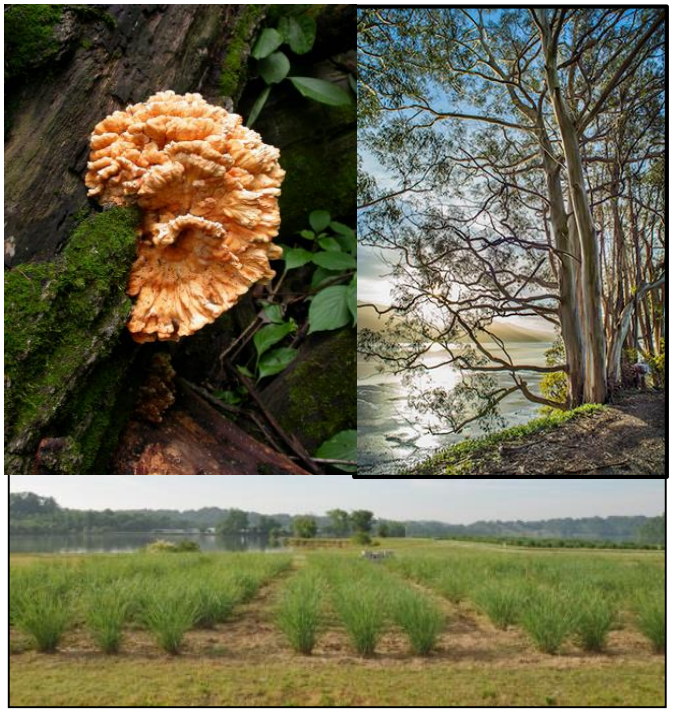
- Ames Laboratory
- Argonne National Laboratory
- Brookhaven National Laboratory
- Lawrence Berkeley National Laboratory
- Lawrence Livermore National Laboratory
- Los Alamos National Laboratory
- National Renewable Energy Laboratory
- Oak Ridge National Laboratory
- Pacific Northwest National Laboratory
- Sandia National Laboratories
- SLAC National Accelerator Laboratory

BER's Biology Investments and Benefits to Society

Fundamental biological research on plants and microorganisms underpins broad innovations in biotechnology for energy and the environment







Requires long-term investments in data analysis, molecular and genomic facilities, and multi-disciplinary efforts in basic science fields (e.g., molecular and cellular biology, chemistry, mathematics, computer science, etc.)

BER's Climate Science Investments and Benefits to Society

Energy and infrastructure security depends on predictions of climate variability

Requires long-term investments in data archives, observations to validate climate models, and multi-disciplinary efforts in basic science fields, (e.g., meteorology, ecology, biology, chemistry, mathematics, computer science, etc)