U.S. DEPARTMENT OF ENERGY | Office of Science

Perspectives from the Office of Science

BERAC Meeting
28 October 2015

Dr. Patricia M. Dehmer
Acting Director, Office of Science

Professor Cherry Murray – Nominee for SC-1

Cherry Murray is the Benjamin Pierce Professor of Technology and Public Policy at the Harvard John A. Paulson School of Engineering and Applied Sciences (SEAS) and Professor of Physics. She concluded a five-year tenure as SEAS dean at the end of 2014.

She came to Harvard in 2009, after a distinguished career as an experimental scientist and administrator of Lawrence Livermore National Laboratory and Bell Laboratories.

Murray has significant federal energy and science policy experience in addition to her service as Principal Associate Director for Science and Technology at Lawrence Livermore National Laboratory. She served as Chair of the NAS NRC Division of Engineering and Physical Science from 2008 to 2013; as a member SEAB since 2013; as a commissioner on the Commission to Review the Effectiveness of the National Energy Laboratories; and as a member of the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling.

Murray was elected to the National Academy of Sciences in 1999, to the American Academy of Arts and Sciences in 2001, and to the National Academy of Engineering in 2002. She has served on more than 80 national and international scientific advisory committees, governing boards, and National Research Council panels and as President of the American Physical Society. She was awarded the National Medal of Technology and Innovation by President Obama in 2014.

Professor Cherry Murray

Charges/Reports: ASCAC, 2013-present

Excludes COVs and special topics, e.g., workforce development

1. **Determine potential synergies between the challenges of data-intensive science and exascale computing.** (Charge given July 25, 2012; *"Synergistic Challenges in Data-Intensive Science and Exascale Computing"* delivered March 2013).

2. **Determine the 10 principal research challenges and the technical approaches (hardware and software) required to develop a practical exascale computing system.** (Charge given July 29, 2013; *"The Top Ten Exascale Research Challenges"* delivered February 10, 2014).

3. **Review the Department's draft preliminary conceptual design for the Exascale Computing Initiative.** Specifically, determine whether there are gaps in DOE's plans or areas that need to be given priority or extra management attention. (Charge given November 19, 2014; preliminary report due March 30, 2015; final report September 30, 2015).

Charges/Reports: BESAC, 2013-present

Excludes COVs and special topics, e.g., workforce development

1. **Provide advice on the future of photon sources and science, considering both new science opportunities and new photon source technologies in parallel.**

   - Assessment of the grand science challenges that could best be explored with current and possible future SC light sources. The assessment should cover the disciplines supported by Basic Energy Sciences (BES) and other fields that benefit from intense light sources.
   - Evaluation of the effectiveness of the present SC light source portfolio to meet these grand science challenges.
   - Enumeration of future light source performance specifications that would maximize the impact on grand science challenges.
   - Prioritized recommendations on which future light source concepts and the technology behind them are best suited to achieve these performance specifications.
   - Identification of prioritized research and development initiatives to accelerate the realization of these future light source facilities in a cost effective manner.

   (Charge given January 2, 2013; *"Report of the BESAC Subcommittee on Future X-ray Light Sources"* delivered July 25, 2013).

2. **Revisit the BESAC 2007 "Challenges" Report (*"Five Challenges for Science and the Imagination"*) considering progress achieved, impact of the challenges on energy sciences, funding modalities, and new areas of basic research not described in the original report.** (Charge given February 11, 2014; report delivered mid 2015.)

Charges/Reports: FESAC, 2013-present

Excludes COVs and special topics, e.g., workforce development

1. **Assess priorities among and within the elements of the magnetic fusion energy science program.** (Charge given April 13, 2012; "Report of the FESAC Subcommittee on the Priorities of the Magnetic Fusion Energy Science Program" delivered March 2013).

2. **Develop a strategic plan for the Fusion Energy Sciences program** assuming several different funding scenarios that will ensure long-term U.S. leadership in the foundations of burning plasma science (the science of prediction and control of burning plasmas); long-pulse burning plasma science (the science of fusion plasmas and materials approaching and beyond ITER); and discovery plasma science (the science of laboratory plasmas and the high energy density state). (Charge given April 8, 2014; *"Report on Strategic Planning: Priorities Assessment and Budget Scenarios"* delivered December 2014).

3. **Assess connections between research supported by the Fusion Energy Sciences program and other scientific disciplines and technological applications.** (Charge given February 4, 2015; report delivered mid 2015.)

Charges/Reports: HEPAP, 2013-present

Excludes COVs and special topics, e.g., workforce development

1. **HEPAP via the P5 panel (i.e, the Particle Physics Project Prioritization Panel) should develop an updated strategic plan for U.S. high energy physics that can be executed over a 10-year timescale in the context of a 20-year global vision for the field.** Consider the recent discovery of the long-sought Higgs boson, the observation of missing among all three known neutrino types at unexpectedly large rates, and budgets that are more stringent than those considered by the previous P5 panel (2008). (Charge given September 2013; *"Building for Discovery: Strategic Plan for U.S. Particle Physics in the Global Context"* delivered May 22, 2014.)

2. **Assess the accelerator R&D effort supported by the High Energy Physics program.** (Charge given June 10, 2014; *"Accelerating Discovery: A Strategic Plan for Accelerator R&D in the U.S."* delivered May 18, 2015.)

Charges/Reports: NSAC, 2013-present

Excludes COVs and special topics, e.g., workforce development

1. **Provide advice for an effective strategy for implementing a possible 2nd generation U.S. experiment on Neutrinoless Double Beta Decay (NLDBD) capable of reaching the sensitivity necessary to determine whether the neutrino is a Majorana or Dirac particle.** (Charge given December 2013; *"Report to* NSAC on Neutrinoless Double Beta Decay*"* delivered April 24, 2014.)

2. **Conduct a new study of the opportunities and priorities for U.S. nuclear physics research, and recommend a long-range plan that will provide a framework for coordinated advancement for the nation's nuclear science research programs over the next decade.** (Charge given April 23, 2014; report delivered October 2015.)

3. **Establish an NSAC Isotope (NSACI) subcommittee for an initial period of two years to conduct a new study of the opportunities and priorities for isotope research and production, an effort that should result in a long-range strategic plan for the DOE Isotope Program managed by the Nuclear Physics program.** (Charge given April 23, 2014; report requested March 2015.)

4. **Provide additional advice for an effective strategy for implementing a possible 2nd generation U.S. experiment on Neutrinoless Double Beta Decay (NLDBD) capable of reaching the sensitivity necessary to determine whether the neutrino is a Majorana or Dirac particle under the inverted-hierarchy mass scenario.** (Charge given March 30, 2015; report requested November 2015.)

Charges/Reports: BERAC, 2013-present

Excludes COVs and special topics, e.g., workforce development

1. **Recommend initiatives for field-based research (the so-called Integrated Field Laboratory) that capture a multi-disciplinary approach and build on observations and modeling: (1) define the criteria for selecting sites for future BER field-based research and (2) prioritize the sites identified or described.** As described by BERAC in 2013, the IFLs are highly instrumented laboratories that build on existing BER observational and modeling capabilities that serve to integrate and expand vertically (from the bedrock to the atmosphere) and geographically (across key geographic regions).

   (Charge given September 23, 2014; draft report presented February 19, 2015; final report due fall 2015. This charge continues earlier BERAC charges that resulted in: *"Grand Challenges for Biological and Environmental Research: A Long-Term Vision"* December 2010; *"BER Virtual Laboratory: Innovative Framework for Biological and Environmental Grand Challenges"* February 2013)

Charges/Reports: BERAC, ~2010-2013

Report to the Biological and Environmental Research Advisory Committee (BERAC) by the Committee of Visitors for the Report of the Committee of Visitors (1009KB), a report prepared October 2013 (in response to the charge August 30, 2012 (339KB)). BER response (20KB) to the COV report.

Response (152KB) to the Office of Science User Facilities charge to prioritize scientific user facilities for the Office of Science dated December 20, 2012 (790KB)

Report entitled, "BER Virtual Laboratory: Innovative Framework for Biological and Environmental Grand Challenges," Hi Res Version (4.3MB) | Low Res Version (3.2MB) that expands on the development and use of new tools mentioned in the BERAC "Long Term Vision (3.3MB)" report. In response to the charge dated September 14, 2011 (274KB).

Report to the Biological and Environmental Research Advisory Committee (BERAC) by the Committee of Visitors for the Review of the Biological Systems Science Division (229KB). a report prepared October 2011 (in response to the charge dated August 30, 2010 (500KB)). BER response (22KB)to the COV report

A report on the description of current policies and practices for disseminating research results in the fields relevant to the Biological and Environmental Research program (139KB), prepared on June 17, 2011 (in response to the charge dated February 25, 2011 (1.2MB))

Report of the BERAC Review Panel on the Atmospheric Radiation Measurement (ARM) Climate Research Facility (ACRF) (578KB), a report prepared March 11, 2011 (in response to the charge dated August 30, 2010 (361KB).

Grand Challenges for Biological and Environmental Research: A Long-Term Vision (3.3MB), a report prepared December 2010 (in response to the charge dated September 29, 2009 (941KB).

BERAC Grand Challenges Report