



**Department of Energy**  
Office of Science  
Washington, DC 20585

**Office of the Director**

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Dr. Gary Stacey  
Associate Director, National Soybean Biotechnology Center  
Department of Microbiology and Molecular Immunology  
University of Missouri  
271E Christopher S. Bond Life Sciences Center  
Columbia, MO 65211

Dear Dr. Stacey:

Over the past several years, the Office of Biological and Environmental Research (BER) has held numerous workshops to identify the state-of-the-science and key research needs and opportunities across its portfolio, from genomics to climate to the environment, information critical to the continued evolution and development of leading edge, transformational science programs. However, this planning process is generally focused on near to mid term time horizons of three to five years, sometimes extending to ten years.

As the Department of Energy (DOE) continues to look toward and plan for the future, we recognize the importance of identifying scientific opportunities and grand challenges for BER in the coming decades.

BER programs support discovery science, foundational research and scientific user facilities for biology, climate and environmental science. BER increasingly uses a complex systems science approach to advance science in support of DOE's energy and environmental mission needs. This involves studying complex biological and environmental systems and processes that range from molecular to global scales over time horizons of nanoseconds to centuries and beyond. Our goal is to obtain a holistic and predictive understanding of key biological and environmental systems to provide energy options with minimal impacts on health and the environment. We are particularly interested in exploring to what extent this systems science approach will be relevant to addressing DOE's scientific challenges of the future.

Charge to the Biological and Environmental Research Advisory Committee (BERAC):

- To the extent that such predictions can be made, what are the greatest scientific challenges in biology, climate and the environment that DOE will be facing in the long term (20 year horizon)?
- How should we position BER to address those challenges? For example, what continued or new fields of BER-relevant science will the Department need to achieve its future mission challenges?



- What new and innovative tools should be developed to advance BER science? For example, what new tools might allow the integration of data from different fields to advance systems science?
- What scientific and technical advances are needed to train the workforce of the future in integrative science, including complex system science?

With these questions in mind and others that may occur to you, we request that BERAC and the subcommittee that you will establish develop an overall strategy for drafting a long-term vision for BER. We expect that this effort may begin with an initial, overarching workshop that can develop a framework for this process. We also expect that this long-term vision will serve as a catalyst for follow up workshops organized by BER Program Managers engaging the scientific community in further developing and refining ideas for the future of BER. Many thanks for your contributions to this important effort.

Sincerely,



W. F. Brinkman  
Director

cc: Anna Palmisano  
David Thomassen  
Sharlene Weatherwax