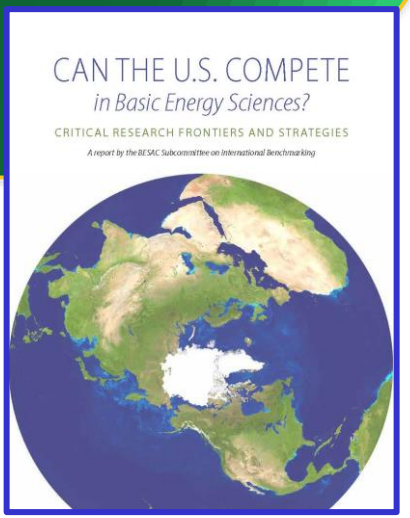
For 2023, BESAC has 4 Charges from the Office of Science

- **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

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

Report Summary

Findings

- An overall downward trend in competitiveness in all research areas
- U.S. advanced research facilities are no longer unique
- Support for mid- and small-scale instrumentation difficult to obtain.
- *The fierce global competition for scientific tal*ent

Possible Strategies for Success

- Increased investment in basic energy sciences research
- Additional investment in computation, data analysis methods, computer hardware and architecture
- Boost support for scientists, enhance U.S. competitiveness for talent
- Balance need for new facilities with support for existing facilities
- Better integrate research from basic to applied to industrial

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?**