April 13, 2021

The Honorable Joe Manchin
Chairman
Energy and Natural Resources Committee
United States Senate
304 Dirksen Senate Office Building
Washington, DC 20510

The Honorable John Barrasso
Ranking Member
Energy and Natural Resources Committee
United States Senate
304 Dirksen Senate Office Building
Washington, DC 20510

Dear Chairman Manchin and Ranking Member Barrasso:

On behalf of the National Laboratory Directors’ Council (NLDC) – comprised of the directors of the seventeen Department of Energy (DOE) national laboratories – we write in response to your recent request for technical assistance on the draft of the Endless Frontier Act.

We commend Majority Leader Chuck Schumer and Senator Todd Young for recognizing the critical role that innovation driven by federal investment in research and technology development plays in competing with China and ensuring U.S. leadership in key technology areas. Their efforts reflect the type of bold and inventive thinking needed to address U.S. international competitiveness and to deliver novel solutions to the challenges facing the nation.

Since their founding in the Manhattan Project, the DOE national laboratories have delivered scientific advances and technology solutions for the nation, while balancing the need for open, collaborative science with the imperative of national security, economic security, and technological superiority. The DOE national laboratories are mission-driven research and development organizations that reside in an important space, with a long-term perspective and operating across the full spectrum from fundamental to applied research to the demonstration and deployment of technologies. This makes them complementary to both academia, which focuses on fundamental research and the advancement of knowledge, and industry, which is primarily concerned with the development and application of research outcomes in the near-term. As such, we believe the DOE and its national laboratories can make significant contributions to out-competing China.

We recommend that the Endless Frontier Act or other related legislation embrace a broader approach to advancing the nation’s international technology leadership and economic competitiveness by investing in and strengthening the entire U.S. innovation ecosystem, including the ongoing work and additional initiatives of DOE and the national laboratories across the Act’s key technology focus areas. Specifically, we recommend a separate, substantial, targeted investment in research for DOE and the national laboratories to advance key technology areas in coordination and collaboration with the National Science Foundation (NSF), and to fund increased support for and access to world-leading user facilities stewarded by DOE and utilized by NSF-supported scientists to advance scientific discovery and technology development.

We share the view that providing much greater resources across the innovation ecosystem is the best way to achieve the Senate’s goal of bolstering our competitiveness with China, and indeed with the rest of the world. Our distributed, multi-agency, multi-stakeholder approach to science and technology has served the nation well throughout its history. This approach brings diverse viewpoints, wide ranging capabilities, creativity, and ingenuity to science and technology in a way no other country can match.
NSF, like DOE, is an essential component of the nation’s innovation ecosystem and an important partner to the DOE and its national laboratories. NSF is the only federal agency charged with the promotion of scientific progress across all science and engineering disciplines. The research funded through its rigorous peer review process is vital to the public interest and has led to transformative discoveries that have reshaped our world. Through its sponsorship of cutting-edge, university-based research, NSF supports the education and training of the nation’s scientists, engineers, and teachers and the next generation of new ideas.

Complementing these efforts, DOE assembles and nurtures multi-disciplinary teams of scientific experts to meet federal needs and address national priorities by attacking R&D challenges at scale. DOE does this by supporting university research, industrial partnerships, and a network of 17 national laboratories that are responsible for cutting-edge science and technology research and development. The national laboratories are also responsible for constructing and maintaining one-of-a-kind, world-class research capabilities that are leveraged broadly by over 36,000 university and industrial researchers every year.

For example, the DOE Office of Science maintains and operates 28 user facilities at its national laboratories across the country. These major pieces of scientific infrastructure range from advanced supercomputers and particle accelerators to large neutron and x-ray light sources and specialized facilities for nanoscience and genomics. These user facilities are vital tools of scientific discovery and provide unique and often world-leading capabilities. The National Synchrotron Light Source II at Brookhaven National Laboratory, for instance, is currently one of the brightest X-Ray Light sources in the world and enables discoveries in a broad range of fields, including biomedicine, energy storage and conversion, quantum technology, and molecular electronics.

DOE and the national laboratories provide access not only to these major scientific tools but to dedicated experts who help tens of thousands of researchers funded by NSF and other agencies, as well as industry users, conduct scientific experiments with these powerful tools. Access to these facilities is awarded based on merit review of proposals. Technical upgrades are underway at many of these facilities to ensure that they will remain at the international forefront. However, operations of these facilities are highly budget-constrained at the same time that they are in such high demand that they are already oversubscribed in most cases by a factor of two to five. The additional funding proposed for NSF as part of the Endless Frontier Act would place further demand on these valuable tools. DOE would require a complementary and commensurate investment in the tools, capabilities, and staff support for these user facilities to enable the greater volume of high-impact research and development envisioned by the Endless Frontier Act.

DOE and the national laboratories are also at the forefront of advancing emerging technologies, including both fundamental and use-inspired research and development of applied energy technologies. The national laboratories also maintain a complex of energy technology demonstration facilities, such as the Manufacturing Demonstration Facility at Oak Ridge National Laboratory and the Wind Dynamometer Test Facilities at the National Renewable Energy Laboratory, that are critical to the advancement and derisking of U.S. technology innovations.

Coordination between DOE and NSF is essential to leverage each agency’s respective strengths to maintain U.S. leadership. In reviewing the key technology focus areas enumerated in the Endless Frontier Act, the National Laboratory Directors’ Council identified significant DOE investments at national laboratories and universities in nine of the eleven focus areas. We would welcome an opportunity to discuss with you the full
portfolio of these efforts and ways that the capabilities and expertise of the national laboratories should be leveraged to support increased investment in these areas. We include four illustrative examples here:

- In quantum computing and information systems, the national laboratories are leading five National Quantum Information Science Research Hubs – each with diverse members that include American industry, universities, and national laboratories – funded by DOE, thanks to bipartisan congressional support for the National Quantum Initiative and subsequent appropriations. These centers are part of a coordinated, multi-agency effort with the NSF and National Institute for Standards and Technology, and serve as an excellent example of a complementary, multi-agency approach.

- On high performance computing, semiconductors, and advanced computing hardware, the national laboratories operate two out of the top three of the world’s fastest supercomputers with more coming online later this year and early next through the Exascale Computing Initiative. And by nature of their design, these exascale systems will also represent the most powerful artificial intelligence machines in the world. In addition to the supercomputers, the national laboratories have some of the world’s leading experts in computer science and advanced mathematics, which is crucial to leveraging each new generation of bigger and better computing capabilities through advanced software development. This is a key area where DOE, through Office of Science and the National Nuclear Security Administration (NNSA), and the national laboratories have long maintained the delicate balance between the need for open science and imperative for national security as stewards of the nation’s nuclear deterrent.

- In advanced energy, batteries, industrial efficiency, and materials science, DOE – across nearly its entire portfolio – is the lead agency for the nation in driving innovation through research and development efforts at national laboratories and universities in partnership with industry; capability development and stewardship, especially at the national laboratories; and supporting robust public-private partnerships.

- In biotechnology, genomics, and synthetic biology, DOE’s national laboratories possess one of the world’s greatest collections of research facilities, international scientific leadership, and other assets focused on non-human biology for energy, environmental sustainability, and biomanufacturing. The Joint Genome Institute at Lawrence Berkeley National Laboratory and the Environmental Molecular Sciences Laboratory at Pacific Northwest National Laboratory are among the world’s most sophisticated research facilities focused on biology by design to address climate change, clean energy, and environmental sustainability. These facilities are utilized annually by thousands of users and tens of thousands of data users. Over the past year the National Virtual Biotechnology Laboratory was rapidly organized to bring DOE and NNSA scientific user facilities, additive manufacturing capabilities, and high-performance computing to bear addressing the threat posed by COVID-19.

In regard to all the key technology areas, the DOE and its national laboratories have the talent and the mechanisms to analyze the dual use implications of new technologies, and the charge to alert government authorities and policymakers to over-the-horizon technical threats that may impact American lives and underpin future U.S. economic competitiveness. The NNSA has been analyzing and identifying threats for decades with respect to U.S.-developed nuclear materials and technologies. All national laboratories have been doing the same with respect to artificial intelligence, biotechnology, and high-performance computing. These at-the-ready capabilities can be expanded and re-tasked as necessary to address ongoing and
emerging threats, and are vital to advance research frontiers in such a way as to assure our national security and economic competitiveness.

Finally, we recognize that the draft bill makes national laboratories eligible for grants from the new NSF directorate created by the bill. However, historically and currently, the national laboratories as Federally Funded Research and Development Centers are not considered eligible to apply for funding from the NSF, nor do we believe it is appropriate for national laboratories and universities to compete head-to-head for awards except through diverse, multi-institution consortia.

Thank you for requesting our input, and for your part in authorizing and overseeing the important work of the Department and our laboratories. Congress has made significant investments in DOE and the national laboratory complex that address most of the key technology areas outlined in the legislation. We look forward to working with you to ensure that DOE’s national laboratories receive the resources necessary to execute additional work in support of the goals of the Endless Frontier Act while also maintaining its stewardship and mission obligations to DOE.

Respectfully,

Adam Schwartz
Director, Ames Laboratory
Executive Committee, NLDC

Paul K. Kearns
Director, Argonne National Laboratory
Executive Committee, NLDC (Ex Officio)

Doon Gibbs
Director, Brookhaven National Laboratory
Chair, NLDC

Nigel Lockyer
Director, Fermilab

John Wagner
Director, Idaho National Laboratory

Michael Witherell
Director, Lawrence Berkeley National Laboratory