



# Advanced Memory Technology Program Request for Information (RFI)



National Technology & Engineering Solutions of Sandia (NTESS) LLC, Management and Operator of Sandia National Laboratories, is in the process of conducting a market survey in preparation for a potential Request for Quote (RFQ) for an advanced memory technology development targeting Department of Energy (DOE) National Nuclear Security Administration (NNSA)'s large-scale High-Performance Computing (HPC) systems. **The document is not an RFQ**, or part of an RFQ at this time. This is a Request for Information (RFI) to identify research and development areas in and related to advanced memory technologies that will drive an improvement in effective performance of NNSA mission applications.

Information supplied in this RFI shall not be used or disclosed for any purpose other than to provide information under this RFI. NTESS will not return any information packages. **This Document is Not a Request for Quotation (RFQ)**. This request for information does not commit NTESS to subcontract for any supply or service whatsoever. Further, NTESS is not at this time seeking proposals and will not accept unsolicited proposals. Subcontractors are advised that NTESS will not pay for any information or administrative costs incurred in response to this RFI; all costs associated with responding to this RFI will be solely at the interested party's expense. In addition, responding to this RFI does not guarantee respondent will be considered for the RFQ process.

Written feedback is due no later than 30 days – 1 May 2024. Responses to this RFI must be in accordance with *Response Instructions & Format* described herein.

Prepared by Sandia National Laboratories, Albuquerque, New Mexico 87185 and Livermore, California 94550  
Sandia National Laboratories is a multi-mission laboratory managed and operated by National Technology and Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International, Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525. SAND2024-03800O



# 1 National Nuclear Security Administration Mission

The United States Department of Energy (DOE) National Nuclear Security Administration (NNSA) has an extensive history in partnering with technology providers and system integrators in investigating, developing and fielding advanced technologies, in support of the NNSA missions. One of NNSA's core mission responsibilities is to ensure the United States maintains a safe, secure, and reliable nuclear stockpile through the application of unparalleled science, technology, engineering, and manufacturing. Under the Advanced Simulation and Computing (ASC) program, computer simulation capabilities are developed to analyze and predict the performance, safety, and reliability of nuclear weapons and to certify their functionality. It is anticipated that the NNSA's traditional simulation codes will be augmented by Artificial Intelligence (AI) and Machine Learning (ML) technologies adding new use cases and workflows to an already challenging environment. Historically, the performance of many critical NNSA mission applications have been limited by memory bandwidth and latency. Memory bandwidth has increased at an order of magnitude less per year (on average) versus processor performance. Improving memory latency has proven to be even more challenging. Because of this, the ASC program seeks to conduct research in advanced memory technologies. Ultimately, the motivation of this research is to increase the effective performance of NNSA mission applications. It is desirable that any potential investments made will result in plan of record technologies as early as 2028; however later intercepts are acceptable.

Additional information about the NNSA and ASC can be found at the following locations:

- <https://www.energy.gov/nnsa/missions>
- <https://www.sandia.gov/asc>
- <https://computing.llnl.gov>
- <https://mission.llnl.gov/advanced-simulation-and-computing>

## 2 Request for Information

NTESS is soliciting feedback through this Request for Information (RFI) regarding emerging advanced memory and associated technologies, and approaches to achieve the stated goals of the three NNSA laboratories (Sandia National Laboratories, Lawrence Livermore National Laboratory and Los Alamos National Laboratory). Respondents to this RFI should meet all of the following numeric requirements defined as follows:

- 1) US-based manufacturer.
  - a. Respondent shall be a US-owned, US-listed, or have a US-headquartered entity.  
OR
  - b. Respondent shall have a manufacturing site located in the US that represents, at a minimum, 15% of their global production by either total volume or total revenue.  
OR
  - c. Respondent shall have a research and development entity physically

located in the US that employs, at a minimum, 25 staff involved in research activities that are physically located in the US.

- 2) Manufacturer of large-scale memory systems and memory semantic storage.
  - a. Respondent shall be capable of manufacturing, at a minimum, 100TB of volatile storage (e.g. SRAM, DDR, HBM or equivalent technology) per year.  
OR
  - b. Respondent shall be capable of manufacturing, at a minimum, 1PB of non-volatile memory or storage per year.  
OR
  - c. Respondent shall be capable of manufacturing large-scale memory fabric or disaggregated memory or storage systems capable of scaling to at least 100TB of usable capacity.

Responses shall describe how they meet the numerically listed qualifying requirements. Of primary importance, responses shall discuss how investments in their proposed areas of investigation will result in dramatically improved effective performance of NNSA mission applications. Areas of potential interest include, but are not limited to:

- Fundamental memory storage technology (density, capacity, bandwidth, access speed, access granularity). This may include new devices or materials.
- Network-on-chip improvements, including improved topologies, memory access Quality of Service (QoS), and improved handling of cache coherency traffic.
- Module or package improvements, including improved signaling or optical integration.
- Innovative memory system organization, multi-level memory integration and/or memory system management including reduction or elimination of NUMA effects for heterogeneous node architectures and improved memory management for heterogeneous disaggregated systems. This may include technologies to optimize data placement or movement for improved locality.
- Near-memory data marshalling and/or compute capabilities; with an emphasis on benefit across multiple application domains. For example, advances in integrated memory encryption, data compression techniques or assists for address translation.
- Improved integrity and resilience features which minimize loss of capacity or performance for future memory devices and connection mechanisms to processing elements.

The NNSA laboratories will provide collaborative support and information to achieve our stated goals appropriate to the proposed technology including, but not limited to, providing benchmark, mini-, proxy-, mission-application and workflow analysis and support, memory access pattern and tracing information and baseline performance metrics on pre-exascale and exascale class platforms. Responses shall include details regarding what information and resources are requested to be provided by the NNSA laboratories for the successful execution of proposed work, if any, for each technology area included. Responses should also include anticipated product intercept with future plan-of-record technology schedules. Responses are

open to both technology providers and integrators. Team responses are not only welcome but encouraged. Responses will be reviewed by select individuals from the NNSA laboratories and ASC Federal Program office.

See section 3 for information regarding response format.

Responses can be in any format that complies with the guidelines listed previously and in Section 3. Note, the RFI is requesting information regarding particular advanced technologies. A complete system description is not required as part of a response, but the response should include any pertinent information regarding how the technology would be integrated into a larger system to achieve the stated application improvement goals. Responses will be treated as company proprietary and shared with a very limited number of individuals from the NNSA laboratories and ASC Federal Program office.

Responses to this RFI will be evaluated and discussed by the NNSA laboratories with the goal of selecting one or multiple responses for further discussion between the respondent and the NNSA laboratories during an information session that will be scheduled at a later date. NTESS may contact respondents for questions, clarifications or request additional details regarding selective responses at any time.

### **3 Response Instructions & Format**

- If you are interested in responding please submit the following information to the Subcontracting Professional (SP) (Procurement Representative, [spears@sandia.gov](mailto:spears@sandia.gov)) by 4:00 p.m. MST on 1 May 2024. Responses should be sent by e-mail.
- Interested parties are requested to respond to this RFI with a written type response, slides are permissible. Responses shall be no more than 40 standard (8 ½ x 11, 12 font) pages (or slides) in length including marketing materials and brochures. Interested parties wishing to protect specific information and data from unauthorized disclosure should mark such information as "Limited Rights Data," or "Restricted Computer Software," as defined in FAR 52.227-14 -- Rights in Data - General. Exceptions to the page limit must be requested prior to submission.
- Questions regarding this RFI during the response period shall be submitted in writing by e-mail to the SP listed above. Questions shall not contain proprietary or classified information. NTESS does not guarantee that questions received after 26 April 2024 will be answered.
- Respondants may secure an optional presentation slot immediately following the RFI response period listed above. Slots will be reserved on a first-come basis. Please email Haley Whitaker [hcwhita@sandia.gov](mailto:hcwhita@sandia.gov) to secure your slot.
- Furnish the name, title and phone number of the person(s) authorized by your company to provide the requested information on behalf of your company.
- State whether or not your company has ever been Foreign Ownership, Control and Influence (FOCI) approved or is capable of being approved by the Department of Energy (DOE) or Department of Defense (DOD). Note: This information will be used for planning purposes only and will not be used as a determining factor in the development of a list of potential offerors if a subsequent RFQ is issued.
- Disclose any Huawei Technologies Co. Ltd, ZTE Corporation, Acronis, or Kaspersky Lab hardware, software, or services incorporated into your proposed solution in response to this RFI.
- iSupplier is NTESS supplier database. To learn more and register visit Sandia's iSupplier website which can be found: [https://www.sandia.gov/working\\_with\\_sandia/prospective\\_suppliers/supplier\\_registrati](https://www.sandia.gov/working_with_sandia/prospective_suppliers/supplier_registrati)

[on.html](#).

- Socioeconomic Information - It is NTESS' policy to provide Small Businesses (SB), Small Disadvantaged Businesses (SDB), Woman-owned Small Businesses (WOSB), HUB Zone businesses (HUBZone), Veteran-owned Small Businesses (VOSB), and Service Disabled Veteran-owned Small Businesses (SDVOSB) the maximum opportunity to participate in the award of subcontracts.
  - State your current socio-economic information, if applicable. Alternatively, if you are a large business, state your ability to partner with SB, SDB, WOSB, HUBZone, VOSB, and SDVOSB's.
  - Include ideas on how to partner with small businesses in an effort to provide the services listed. North American Industry Classification System (NAICS) code applicability should also be included. It is anticipated the following NAICS codes will apply: 334111, 334118, 541512, 541519.
  - Provide information regarding any similar partnership arrangements you are currently participating in or have participated in the past with socio-economic groups listed above. NTESS may elect to deem a portion of the RFQ and resulting award as a small business set-aside.

**Once again, information provided in response to this RFI is for informational purposes only. NTESS makes no guarantees regarding any numbers or historical information and NTESS will not be bound under any circumstances to these numbers in the event of issuance of an RFQ and any resulting subcontract.**



**Sandia National Laboratories**

