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Artificial Intelligence in the Environment and Energy Federal Opportunities Landscape

Lewis-Burke Associates LLC – March 2025

Introduction

This document provides an overview of priority areas and funding opportunities across the federal government at the intersection of environment and artificial intelligence (AI). Given the new and uncertain political environment, with the Trump Administration making significant changes to federal agency programming, this document is not entirely comprehensive. Lewis-Burke Associates will continue to update Rutgers University as we glean greater insight into future programming across the federal government.

The document provides a high-level overview for several agencies relevant to the Rutgers Climate and Energy Institute (RCEI), including the Department of Energy (DOE), National Science Foundation (NSF), U.S. Department of Agriculture (USDA), and the National Oceanic and Atmospheric Administration (NOAA).

Federal Outlook

Congress

Artificial intelligence and machine learning (AI/ML) will remain a top policy priority for the 119 Congress. In the 118 Congress, several bills were introduced that have that would authorize and protect key AI initiatives, many of which may resurface in this Congress as a part of a larger initiative to advance a comprehensive AI legislative package. Among these are the *CREATE AI Act* (more information in NSF section), which would formally authorize and provide support for the National AI Research Resource (NAIRR), and the *Future of AI Innovation Act*, which would ensure support for the U.S. AI Safety Institute. Additionally, the House and Senate science-related committees have expressed interest in potentially reauthorizing the *National AI Initiative ACT* in the 119 Congress, which guides funding levels and policies for programs related to core and fundamental AI R&D.

Despite the transcendence of many individual AI bills from the 118th Congress to the 119th, the Bipartisan House AI Task Force launched last year is expected to be altered significantly or dismantled under the Trump Administration. This shift will likely open a space for focusing on new Congressional AI policy initiatives and priorities that more align with the President's "America First" AI vision. Most recently, Senators Heinrich (D-NM) and Rounds (R-SD) introduced the American Science Acceleration Project (ASAP) which is a national initiative centered on leveraging AI to expedite scientific and technological discovery and deployment. To begin, the focus will be on developing a large, potentially cross-agency, shared data infrastructure but the offices will be releasing a request for information (RFI) for stakeholders to provide additional ideas and needs in this space.

Several other policy makers who have historically focused on AI policy sit in key leadership positions on science committees. For example, Rep. Jay Obernolte (D-CA) who leads the subcommittee on research and technology of the House Science, Space, and Technology

Committee and co-chairs the House AI Caucus. On the Senate side, Senator Maria Cantwell (D-WA) will serve as Ranking Member on the Senate Commerce, Science, and Transportation Committee. Sen. Cantwell is a long-term supporter of STEM and AI education and co-introduced the *Future of AI Innovation Act* and *NSF AI Education Act*.

Lastly, Congress passed a full-year Continuing Resolution (CR) which was signed into law by President Trump. The CR will fund government operations for the remainder of the fiscal year, until September 30, and institute several changes to the funding landscape. The CR provides stability of funding for most federal science agencies and does not explicitly impact many existing programs. Stipulated in the CR, each major federal agency is to submit a spend or operating plan to Congress by May 1, 2025. This is an effort to provide Congress with greater transparency on final budgeting decisions and programmatic priorities for the rest of FY 2025, a responsibility that has typically been assumed by the Appropriations Committees. These plans will provide a draft framework of which programs will be slated to continue and which the Administration is interested in terminating at many of the agencies relevant to the environment and emerging technologies landscape.

Trump Administration

Aligned with bolstering innovation in AI, President Trump signed an Executive Order (EO) on *Removing Barriers to American AI Innovation*, on January 23. The EO comes after the President rescinded the previous Administration's EO on AI, which focused heavily on AI safety, security, and trustworthiness. The Trump Administration's EO calls for agencies to revise or withdraw all "policies, directives, regulations, or orders, or other actions" aligned with the Biden AI EO, calling for agencies to focus on rapid AI innovation, economic competitiveness, and national security in AI. Regarding AI development, the Order expresses that AI systems must be developed without bias or "engineered social agendas." Finally, the Order directs David Sacks, the White House crypto and AI Czar, to work with the National Security Advisor and Presidential Assistant for Science and Technology on a new AI Action Plan, as well as directing the White House to "revise and reissue" AI guidance through the Office of Management and Budget (OMB). The full EO can be found here and the Fact Sheet can be found here.

The Trump Administration has already begun providing opportunities for non-federal entities to engage with the Administration on AI. In mid-February the Office of Science and Technology Policy (OSTP) and the Networking and Information Technology Research and Development (NITRD) National Coordination Office (NCO) have released a Request for Information (RFI) on the Development of an Artificial Intelligence Action Plan. The creation of this plan was directed by the EO and responses to this RFI will inform a national AI plan to spur AI innovation, ensure global dominance in AI, and fortify national security. Responses to the RFI were due by **March 15**, and topics may address any relevant AI policy issue, which include: "hardware and chips, data centers, cybersecurity, data privacy and security throughout the lifecycle of AI system development and deployment, technical and safety standards, risks, regulation, and governance," among many other topics.

Below is more detailed information on AI priorities and major funding opportunities across relevant federal agencies. **Please note** that in the rapidly changing federal landscape, policies, programs, and priorities may be subject to change; we have provided the most up to date information at the time of this writing.

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Agency Overview of Opportunity Space

Department of Energy (DOE)

Under the Trump Administration, the U.S. Department of Energy (DOE) will continue to prioritize AI, seeking to utilize it to support DOE's top cross-cutting emerging technology, research, and development initiatives. Upon his confirmation, DOE Secretary Chris Wright released his first Secretarial Order to highlight department priorities related to energy innovation and deployment for the next four years. The order aligns with the Trump Administration's deregulatory energy stance and seeks to expand support for strengthening grid reliability and security, in addition to supporting energy and emerging technology innovation. Specific research and development (R&D) priorities outlined in the order include geothermal, hydropower, critical minerals, artificial intelligence, amongst others. One emerging area of opportunity, although not mentioned in the Secretarial Order, may be around the energy usage needed to power large data centers and ways to either decrease the required amount of energy needed for AI or develop more renewable solutions.

The recently passed Continuing Resolution (CR) will fund government operations through September 30, 2025, funding the remainder of fiscal year (FY). The *Full-Year Continuing Appropriations and Extensions Act of 2025* will fund major DOE offices and programs at ~ FY 2024 enacted funding levels (with some cuts, such as $84 million in FY 2024 earmarked applied energy projects), including robust funding for the DOE Office of Science; applied energy programs; and clean energy demonstration and deployment programs. The CR funding levels are significantly higher than what was proposed in FY 2025 House and Senate appropriations bills, presenting continued opportunities for programming and initiatives that would have likely been slashed in a completed appropriations package for FY 2025. This presents mixed results for DOE programming at large though, as some desired programs that may have received support in the proposed FY 2025 appropriations bill will now miss out on funding in the CR – including a new Climate Science Initiative, Rural Integrated Field Labs program, and an atmospheric methane removal research program. Additionally, although the CR presents funding stability for some existing DOE programs, DOE is restricted from creating new research initiatives, hindering its ability to create and fund new programs that would focus on and/or include artificial intelligence (AI). Current DOE AI-related opportunities may be funded under the CR, but they are few and far between, more information can be found below.

Last year, DOE's Office of Science (SC) Advanced Scientific Computing Research (ASCR) program released and funded the Advancements in Artificial Intelligence for Science program, which supported basic computer science and mathematics research in AI for science, specifically looking to support the development of:

- "Foundation models for computational science;
- Automated scientific workflows and laboratories;
- Scientific programming and scientific-knowledge-management systems;
- Federated and privacy-preserving training for foundation and other AI models for science; and
- Energy-efficient AI algorithms and hardware for science."

A new solicitation for this program has not been released, and DOE has not indicated if there will be continued support for the Biden-era program. It is likely that new DOE AI-related programs and opportunities will be released in place that align more with the President's energy-AI priorities.

Following the CR, any major shifts in funding across DOE require congressional notification and a reprogramming request. The Trump Administration may seek to slash funding for existing programs funded under the CR that do not align with their priorities, such as clean energy projects. For DOE a reprogramming request to be triggered, DOE must move more than $5 million or 5 percent of funding out of a program that has a congressional control point. The request would then have to be approved by the Chair and Ranking Member of both the House and Senate Appropriations Energy and Water Subcommittee – that is not uniform across the federal government. DOE has until May 1 to submit a spend plan to Congress on department expenditures for major programs, projects, and activities, which is expected to have aligned priorities with the President's Budget Request (PBR) coming this Spring.

Looking ahead to FY 2026, DOE is considering the creation of AI Research and Development Centers. In July 2024, the Senate introduced the Department of Energy (DOE) Artificial Intelligence Act which would authorize $1.2 billion to create at least eight National Lab-led AI Research and Development Centers. Key elements would include:

- National lab-led multidisciplinary centers with research university and industry partners;
- No less than $30 million per year for each center with an initial award period of no less than five years and up to seven years, with another five-year renewal;
- Advance three main objectives—accelerate the safe and trustworthy deployment of AI for science, energy, and national security missions; demonstrate the use of AI in addressing those DOE mission areas; and maintain a U.S. competitive advantage; and
- Each center should have a distinct AI research and innovation goal to advance specific science, energy, and national security missions and develop a technical roadmap to meet those goals within five to seven years (the first award term for the center).

National Science Foundation

As written above, the CR passed earlier this month continues funding for federal agencies roughly at their FY 2024 levels and NSF was no different. It is worth noting that the FY 2024 base appropriations for NSF was 5 percent below FY 2023 but that supplemental packages like the Inflation Reduction Act (IRA) helped enable additional programming to take place – that is not anticipated to happen under this Administration. Moreover, the FY 2024 omnibus bill did not provide a specific funding level for AI but encouraged continued efforts to support AI related research initiatives as well as a focus on the transparency, interpretability, and explainability of AI. The CR funding levels would continue to support current and planned AI institutes along with recently launched and long-standing AI programs in research and education but the May 1 agency spend plans will likely confirm whether these are intended to remain. More information on specific opportunities is provided below.

NSF's AI research and education activities cut across the Agency, spanning "AI algorithms, robotics, human-AI interaction, and advanced hardware and systems for AI, as well as use-inspired research in neuroscience, biology, chemistry, physics, intelligent transportation." NSF activities to support AI include fundamental research, education and workforce development, translation activities, use-inspired and applied research, and access to data and advanced computing research infrastructure. While most of NSF's AI related work is not explicitly focused on climate or environmental use cases, many of the programs that fund AI support a wide range of relevant applications. Some of those include:

- **NSF AI Research Institutes:** NSF's flagship activity in AI is the NSF AI Research Institutes. Winners of the first three rounds of AI Institutes were announced in August 2020, July 2021, and May 2023, with more institutes currently under competition in astronomical sciences, materials research, and strengthening generative AI. NSF has partnered with several agencies across the federal government on AI Institutes, including environmental agencies like the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Department of Agriculture (USDA).
    - The next competition is expected in the *summer of 2025* as NSF shifted to biannual program cadence.
    - More information regarding the current AI Institute competition can be found here.

- **National Artificial Intelligence Research Resource Pilot (NAIRR):** The NAIRR Pilot program was launched in January 2024 and supports "fundamental, translational and use-inspired AI-related research with particular emphasis on societal challenges." The program connects U.S. researchers and educators to computational, data, and training resources needed to advance AI research, partnering with government-supported and non-governmental partners to create a shared national research infrastructure. In its first phase, the NAIRR Pilot Program will provide researchers and educators with access to advanced computing, the ability to provide feedback on use cases for the NAIRR Pilot by filling out a survey, and access to a growing list of contributed AI-specific resources, such as pre-trained models, AI-ready datasets, and relevant platforms. The pilot was expanded in July through a Dear Colleague Letter that called for new usage proposals.
    - More information on the NAIRR pilot can be found here.

- **The Collaborations in Artificial Intelligence and Geosciences (CAIG):** Launched in December 2023, the CAIG program supports "the development of advanced AI methods for geosciences research, along with the associated educational and technical efforts to build capacity for the adoption of AI-driven approaches by geoscientists." The program is also interested in efforts to expand access to cyberinfrastructure (CI).
    - Upcoming deadline: April 2, 2025
    - More information on CAIG is available here.

- **Accelerating Computing-Enabled Scientific Discovery (ACED):** launched in February 2024, the ACED program seeks to drive new computing advancements while accelerating scientific discovery by promoting partnerships between computer science researchers and those with expertise related to the Biological Sciences, Mathematical and Physical Sciences, and Engineering.
    - The program solicitation notes interest in questions related to how novel artificial intelligence techniques can accelerate scientific discovery as well as how new innovations in digital twins can exceed traditional modeling techniques.
    - Upcoming deadline: September 17, 2025.
    - More information on ACED can be found here.

Other Ongoing Cross-Cutting Funding Opportunities

NSF has invested in AI through multiple funding opportunities including fundamental research across NSF. Examples of NSF programs that support AI research are described below.

- ***NEW:*** **Fire Science Innovations through Research and Education (FIRE) program:** The FIRE program will support research or conference proposals for multidisciplinary research that advances understanding of variables contributing to the start and spread of fires, methods for management, and/or insights into solutions for more fire-resilient built infrastructure and communities. Along with fitting into the described focus areas, proposed projects should have strengths in at least one of the following areas: advancing wildfire data; modeling, artificial intelligence, or machine learning; cross-scale wildfire interactions; community adaptation; reducing built infrastructure, natural fuels, or social system vulnerability; and community/stakeholder engagement. Proposed research can cover any area of science, engineering, or education supported by NSF.
    - The 2025 proposal submission window is June 12 – June 20, 2025. The due dates for this annual program in subsequent years are anticipated to be February 3 – February 10.
    - The FIRE program page is available here.

- **Expanding AI Innovation through Capacity Building and Partnerships (ExpandAI):** Aims to build capacity and broaden participation in AI research, education, and workforce development. ExpandAI will support Capacity Building Pilots (CAP) awards, and partnership awards within the NSF AI Institute ecosystem (ExpandAI Partnership (PARTNER) awards). This solicitation includes DHS, USDA, NIST, and DOD.
    - Full proposal window submissions between March 11 – June 23, 2025 and June 24 – October 17, 2025
    - More information on ExpandAI can be found here.

- **Emerging Mathematics in Biology (eMB):** The eMB program supports "research in mathematical biology that addresses significant biological questions by applying nontrivial mathematics or developing new theories — particularly from foundational mathematics, including artificial intelligence or machine learning."
    - Predicted deadline: March 2, 2026.
    - More information on eMB is available here.

- **Mathematical Foundations of Digital Twins (MATH-DT):** Launched in March 2024 The MATH-DT program supports "foundational mathematical and statistical research on digital twins in applied science to harness science, technology and innovation to address society's most pressing challenges". The program encourages collaborative efforts in fundamental research innovation in Digital Twin development.
    - Deadline of March 16, 2026
    - More information on MATH-DT can be found here.

AI-related Dear Colleague Letters of Relevance:

- Dear Colleague Letter: NSF/BIO Led Agency Opportunity in Biological Informatics, Systems Understanding of Host-Microbe Interactions, Synthetic Cells and Cellular Systems, and Synthetic Microbial Communities.
- Dear Colleague Letter: NSF/BIO Advancing Research at the intersection of Biology and Artificial Intelligence (AI)/Machine Learning (ML).

U.S. Department of Agriculture (USDA)

The future of AI at USDA is a bit uncertain right now as new leadership is transitioning in at the agency and their remarks on AI have been limited. However, in late 2024, U.S. Department of Agriculture (USDA) finalized its FY 2025 - 2026 Artificial Intelligence (AI) Strategy, headed by USDA Chief Data & AI Officer, Christoher Alvares. While this plan is not currently accessible through the website, likely due to reviews by the new Administration, some of the research compiled may inform future USDA priorities and plans for AI efforts and activities. Additionally, as of the time of writing, Officer Alvares is still in place at USDA, indicating that his plans and ideas may continue forward into this Administration. The AI Strategy states its vision to "build workforce readiness, governance, and technological infrastructure required to safely integrate AI into our mission and business delivery and more effectively distribute benefits and services internally and across the nation." This will be done through:

- Creating operational efficiencies;
- Leveraging vast amounts of geospatial data;
- Expanding the use of predictive analytics;
- Driving data-informed agricultural policy and research;

- Forging stronger relationships with academia; and
- Exploring AI in a semi-federated model.

The Strategy's goals and objectives expected to continue into this Administration fall into these categories:

- Workforce Readiness in AI: The USDA emphasizes the importance of preparing the workforce for adoption of AI, including recruitment, retention, and upskilling initiatives. This includes possible public facing competitions and engagement opportunities.
- AI Infrastructure and Toolset: USDA seeks to expand and invest in common infrastructure such as the USDA AI Lab and the Enterprise Data Analytics Platform & Toolset (EDAPT).
- Data Readiness and Access: USDA plans to invest in data management practices, acquire contracts and vendors that adhere to USDA policies, and standardize data sharing processes.

Recently, Dr. Scott Hutchins was named Deputy Undersecretary of USDA's Research, Education, and Economics (REE) mission, a post he held under the previous Trump Administration. This likely bodes well for the integration of AI and other advanced technologies into the agency's programming. He previously led on the development of the Agriculture Innovation Agenda which explored ways to leverage technology and other bold ideas to meet the demands to feed the growing population in a sustainable way – touching on AI "to uncover and monitor soil health and ecosystems variables," automation, robotics, sensors, and more. The following potential AI-powered opportunities are currently within the USDA's purview:

Revolutionizing Agricultural Research and Innovation:

The data strategy emphasizes data-driven agricultural research and creating fertile ground for AI applications. AI can act as a powerful intelligence engine, analyzing vast datasets to:

- Accelerate development of superior crop varieties: AI can analyze data on factors like soil composition, weather patterns, and pest resistance to identify genetic traits that can be bred into crops, leading to increased resilience and productivity.
- Optimize resource management for sustainable agriculture: AI can analyze data on fertilizer application, water usage, and pest control strategies to develop targeted approaches that maximize yield while minimizing resource waste. This translates to not only economic benefits for farmers but also environmental benefits through reduced pollution and water overuse.
- Predict and proactively manage agricultural risks: AI can analyze historical data and weather patterns to predict potential outbreaks of pests or diseases, allowing farmers to take preventative measures and safeguard their crops. This proactive approach can significantly reduce crop losses and ensure a more stable food supply.

Enhancing Food Safety and Security:

The data strategy highlights the importance of data for food safety. AI can be a valuable tool to analyze data from farm to fork to:

- Identify and prevent foodborne illness outbreaks: AI can analyze data on food production, processing, and distribution to identify potential sources of contamination in the food supply chain. This allows for quicker intervention and helps prevent outbreaks of foodborne illnesses.
- Optimize food security strategies: AI can analyze data on food production, consumption, and trade patterns to identify potential food shortages. This knowledge empowers policymakers to develop data-driven strategies for ensuring food security for the nation's population.

While the document doesn't explicitly list funding opportunities, it suggests that leveraging AI alongside data analysis is a priority for the USDA. This suggests potential funding opportunities for research and development efforts focused on integrating AI with agricultural data collection and analysis.

USDA AI Funding Opportunity

NIFA has supported a variety of AI activities, including machine learning, data visualization, natural language processing, and autonomous systems through its core programming to leverage AI's power throughout agriculture and the food supply chain. Unlike some other agencies, USDA has not launched AI specific programming (apart from the AI Institutes that previously partnered with the National Science Foundation), instead it has integrated AI into recurring solicitations at the agency. It should be noted that this solicitation is currently under review by the new Administration, and that the re-release of this program is not guaranteed:

- **Foundational and Applied Science Program** – USDA's Agricultural and Food Research Initiative's (AFRI) Foundational and Applied Science program (FAS) is an annual program competed through the National Institute of Food and Agriculture (NIFA) focused on supporting research, education, and extension projects that extend the fundamental and applied sciences. There are six topic areas supported through the program which include:
    - Plant Health and Production and Plant Products which includes AI "research on ways to leverage parameters and processes that directly relate to theory, genetics and crop models";
    - Animal Health and Production and Animal Products;
    - Food Safety, Nutrition, and Health, this section directly calls out proposals on advanced food manufacturing which encompasses AI;
    - Bioenergy, Natural Resources, and Environment;
    - Agriculture Systems and Technology; and

- Agriculture Economics and Rural Communities.

National Oceanic and Atmospheric Administration (NOAA)

Under the Biden Administration, NOAA had made efforts to integrate AI systems and technologies across agency operations to better understand the environment and develop innovative management and mitigation strategies, including in weather forecasting, climate modeling, and environmental monitoring operations. NOAA utilizes the power of machine learning and AI technologies to enable human-machine collaboration to improve the environment. The Trump Administration's stance on NOAA, and, in particular, its research arm, is still somewhat uncertain and thereby the fate of the programming around AI that currently exists is unknown. One potential opportunity space may be in the continued build out of AI in weather forecasting while areas like climate modeling may be deemphasized by the Agency moving forward.

The following material relates to materials that were put out under the Biden Administration and outlined the Agency's intended direction with AI. Much of this will be archived or repackaged, we will likely know more about the programming after the spend plan is submitted to Congress later this Spring.

NOAA's Science Council, an internal agency body comprised of senior level NOAA scientists, sets the agency's research and development (R&D) priorities and goals, including NOAA's six science and technology (S&T) focus areas, which includes AI: 1. Uncrewed Systems; 2. AI; 3. Cloud Computing; 4. Use of Advanced Methods to Analyze Material such as DNA, RNA, or other proteins; 5. Data; 6. Citizen Science. In support of the AI focus area, NOAA's Science Council has released two AI-focused reports: the *NOAA AI Strategy* and the *NOAA AI Strategic Plan 2021-2025*. The NOAA AI Strategy, released in February 2020, outlines NOAA's ambitions to integrate AI into agency programs and operations, and seeks to:

1. Establish an efficient organizational structure and processes to advance AI across NOAA.
2. Advance AI research and innovation in support of NOAA's mission.
3. Accelerate the transition of AI research to applications.
4. Strengthen and expand AI partnerships.
5. Promote AI proficiency in the workforce.

In support of efforts outlined in the NOAA AI Strategy, the NOAA Center for Artificial Intelligence (NCAI) was established to serve as an innovative space that supports researching and implementing AI/ML technologies into mission science initiatives. NCAI provides researchers and scientists opportunities to collaborate and network on AI/ML at NOAA, including hosting several roundtables and workshops, including the NOAA Workshop on Generative AI. Additionally, NCAI has conducted research in several AI-related fields, including AI to Forecast Rip Currents, utilizing AI to Protect Endangered Species, and using AI to Build Resilient and Healthy Marine Ecosystems.

AI/ML work done by NOAA is highlighted in the article called AI at NOAA: Highlighting Innovation in Practice.

The NOAA AI Strategic Plan 2021-2025, released in January 2021, was intended to serve as a guiding document to the AI Strategy, working to accelerate and ensure "transformational advancements in the quality and timeliness of products and services across NOAA mission areas." The strategic plan detailed steps NOAA should take to ensure successful implementation across the agency, including expanding partnerships in AI-based environmental research with the academic and research communities, collaborating with NSF National AI Research Institutes on AI R&D projects, and developing an annual R&D prize competition for AI applications in environmental science.