

**Chairman Manchin’s Opening Statement During a Full Committee Hearing to Examine Recent Advances in Artificial Intelligence and the Department of Energy’s Role in Ensuring U.S. Competitiveness and Security in Emerging Technologies**

- The committee will come to order.
- Our hearing today is kicking off Senate discussions for the fall on a very timely topic – the recent advances in artificial intelligence, and the Department of Energy’s role in ensuring our continued competitiveness and security in emerging technologies.
- Over the past few years, six National Labs with world leading capability have been working to understand the challenges around AI and related issues. These labs are:
  - Argonne National Laboratory in Illinois
  - Lawrence Livermore and Lawrence Berkeley National Labs in California
  - Los Alamos and Sandia National Labs in New Mexico
  - And, Oak Ridge National Lab in Tennessee
- The labs’ work is bringing together both fundamental science and national security missions. This hearing will examine their findings.
- This hearing will also discuss the \$1.8 Billion dollar Exa-scale Computing Program that this Committee authorized.

- If we want to invest in AI in a cost effective way, we must build on these existing programs and avoid wasting resources with duplication.
- Most people think about the Department of Energy for its work advancing energy technologies, like nuclear reactors, energy efficiency, carbon capture, and hydrogen.
- But DOE does more than just energy.
- The Department also is the largest supporter of physical scientific research in the Federal government—conducting research and developing technologies across a range of fields from quantum computing to vaccine development to astro-physics.
- Last Congress, we spent a lot of time examining DOE’s critical role in broad scientific research in the context of the Endless Frontier Act, which ultimately became law as the CHIPS and Science Act.
- DOE’s scientific work jump starts private sector innovation, strengthens our economy, and is central to our national security.
- DOE research ensures the U.S. can anticipate, detect, assess, and mitigate emerging technological threats related to advanced computing, biotechnologies, nuclear security, and more.
- Artificial intelligence stands out across DOE’s vast mission. It has the potential to revolutionize scientific discovery, technology deployment, and national security. In fact, AI is already changing the world at a remarkable pace.

- We are seeing it deployed in battlefields across the world. Ukraine has successfully used AI-enabled drone swarms against Russian forces.
- AI also helped us fight COVID-19. DOE's Oak Ridge National Laboratories used its artificial intelligence and computing resources to model proteins in the coronavirus to help develop the vaccine.
- But make no mistake, artificial intelligence also presents risks.
- Earlier this year, a class of non-scientist students at MIT was tasked with investigating whether AI chatbots could be prompted to assist non-experts in causing a pandemic.
- In just one hour, the chatbots suggested four potential pandemic pathogens, explained how they can be generated from synthetic DNA using reverse genetics, supplied the names of DNA synthesis companies unlikely to screen orders, identified detailed protocols and how to troubleshoot them, and recommended that anyone lacking the skills to perform reverse genetics engage a core facility or contract research organization.
- That comes from a research paper titled, "Can large language models democratize access to dual-use biotechnology?", which I ask unanimous consent to enter into the record.
- Scientific and engineering expertise has long been a barrier that protects us from rogue actors.
- Until now, the common person has not had access to the resources or know-how to launch these high-tech threats on human society.

- Irresponsible availability of AI technologies risks eliminating much of the expertise required to develop a weapon, disease, or cyberattack—thereby eroding defenses we had in the past.
- AI is not a new issue for this Committee or the Department of Energy.
- Since the 1960s, DOE has been a key player in investments in AI and automated reasoning.
- As we all know well, the Department has 17 National Labs and 34 user facilities that are the crown jewels of America’s R&D network.
- DOE’s national laboratory system houses a workforce of over 70,000 scientists, engineers, researchers, and support personnel with world-leading scientific expertise, whose mission is serve the American people.
- Each of these labs plays a significant role in the future of AI.
- As I mentioned earlier, DOE is also the largest funder of the physical sciences and manages more scientific data than any other agency.
- As a result, the Department has computing resources, expertise, and experience managing large volumes of data that give the Department their natural leadership on artificial intelligence.
- When federal agencies have an AI problem, they look to the DOE and its labs for help. Over the past decade, the Department has developed thousands of AI applications.

- For example, the National Energy Technology Lab in Morgantown, West Virginia, supports the Department of Interior in using artificial intelligence to identify orphan oil and gas wells.
- For the orphan well program, AI saves resources by analyzing old land survey maps, drilling permits, historical images, production records, and eyewitness accounts to find well sites.
- During the 2023 R&D Awards—which I am told is referred to as the “Oscars of Innovation”—Dr. Rick Stevens of Argonne National Lab, who is one of our witnesses today, was recognized for his work using AI to accelerate the discovery of new cancer therapies and treatments that are highly personalized for individual patients.
- And our Committee has recently played an important role in advancing DOE’s AI work.
- Recognizing that the United States must not fall behind in the supercomputing race, we authorized the Exa-scale Computing Program at the Department of Energy in the 115<sup>th</sup> Congress.
- In May of last year, the Frontier supercomputer at Oak Ridge National Laboratory in Tennessee passed Exa-scale—the ability to perform one billion-billion calculations per second—making this the fastest supercomputer in the world.
- Before we authorized the Exa-scale Computing Program, China had the fastest computers. Now, the U.S. has regained the lead.
- This supercomputer at Oak Ridge is already using AI to model the behavior of human cells to develop better treatments for Alzheimer’s, opioid addictions, and cancer.

- But the global AI race is just beginning.
- AI has the potential to add trillions of dollars into the world economy each year. Governments and companies around the world are competing fiercely in this new market.
- In particular, America must accelerate our efforts to compete with and defend against China on AI.
- It is estimated that annual Chinese AI investments will reach over \$26 billion by 2026, which dwarfs the U.S. government's current spending of about \$3.3 billion per year.
- Between 2015 and 2021, Chinese AI companies raised \$110 billion, including \$40.2 billion from U.S. investors in 251 AI companies.
- In 2017, China released their “New Generation AI Development Plan” which includes R&D and infrastructure targets. The U.S. currently does not have a strategic AI plan like this.
- In addition to government spending, China's workforce advantage is significant—it has twice as many STEM PhDs and twice as many STEM master's degree holders than the U.S.
- China has created Artificial Intelligence PhD programs in every one of their top universities.
- In regards to the Exa-scale Computing Program this Committee championed, the Chinese government could be set to operate as many as 10 exa-scale supercomputers by 2025.

- Xi Jinping himself has pointed to our National Lab network, calling them “indispensable momentum for the development and innovation of science and technology.” Soon China may have their very own lab network.
- Just last week, a company named Baidu released “Ernie Bot,” which is a Chinese Communist Party approved AI language model comparable to the “Chat GPT” app developed in the U.S., which we’ve all heard a lot about. “Ernie Bot” is the most downloaded app in all of Asia and is expected to continue to grow.
- It is clear to me that DOE needs to do more strategic planning around AI so that Americans have confidence that we are leveraging our key resources, such as our national labs, to their fullest potential.
- We should encourage other agencies to use DOE’s AI resources and promote private sector partnerships with the Department and the National Labs to develop safe commercial applications of AI.
- We must also understand what additional investments are needed to spur U.S. leadership in artificial intelligence.
- Congress should focus on strengthening and expanding our impressive existing programs, rather than creating duplicative new programs at other agencies.
- We should also ensure DOE and the National Labs are able to responsibly recruit leading AI experts—both from our own country, and globally.

- Much of America's AI expertise comes from abroad. Immigrants founded or co-founded nearly half of top startups in the U.S., and international students earn 60% of our Computer Science doctorates.
- At the same time, we must be absolutely sure that the Department's AI work includes strong research security requirements.
- We will not out-compete China on AI if they're able to just steal the technology funded by our taxpayers' dollars.
- The Chips & Science Act that passed last Congress featured extensive research security improvements that are now law and currently being implemented by the Department.
- However, foreign espionage is an evolving threat, and we must remain vigilant and clear-eyed in this threat.
- The United States must remain at the forefront of new, emerging technologies, and the Department of Energy is a central component of that effort.
- I'm looking forward to hearing our witnesses' perspectives on specific steps our Committee and the Department could take to ensure America is advancing AI in a competitive and responsible manner.
- With that, I will turn it over to Senator Barrasso for his opening remarks.
- Thank you, Senator Barrasso.
- I'd like to turn to our witnesses. Today we have:



- David Turk, Deputy Secretary of Energy
  - Dr. Rick Stevens, Associate Laboratory Director, Argonne National Laboratory
  - Ms. Anna Puglisi, Senior Fellow, Georgetown University's Center for Security and Emerging Technology
  - Mr. Andrew Wheeler, Vice President & Fellow, Hewlett Packard Enterprise
- Thank you all for joining us today.
  - Deputy Secretary Turk we will begin with your opening remarks.
  - Thank you, Deputy Secretary Turk. We will now go to Dr. Stevens.
  - Thank you, Dr. Stevens. And next is, Ms. Puglisi.
  - Thank you, Ms. Puglisi. And finally, Mr. Wheeler.
  - Thank you, Mr. Wheeler. Thank you all again for being here with us, and for your testimony. We will now begin with questions.