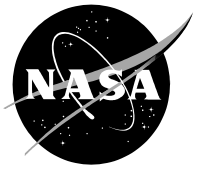

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National Aeronautics and
Space Administration

March 8, 2023

Committee on Science, Space,
and Technology

United States House of Representatives

Statement by:

Mr. Jim Reuter, Associate Administrator, Space Technology Mission Directorate
National Aeronautics and Space Administration

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Mr. Jim Reuter, Associate Administrator
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before the
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Good morning and thank you for inviting me here today. My name is Jim Reuter and I am the Associate Administrator for NASA's Space Technology Mission Directorate (STMD). STMD develops transformative technologies enabling future missions to the Moon, Mars, and beyond, while driving the space economy through strategic investments.

NASA and the Department of Energy (DOE) have worked together for over 50 years. Our collaboration has allowed for many successful missions and projects – from plutonium-powered Mars rovers to a unique physics experiment on the International Space Station to a nuclear fission system ground demonstration that could be used on other worlds.

DOE expertise provides crucial support to NASA's human spaceflight, science, technology, and aeronautics mission directorates. We currently have more than 20 active partnership agreements, with more in development.

Today, one of our most critical collaborations is space nuclear power and propulsion because fission surface power is essential to living and working on the Moon and nuclear propulsion systems may help power future crewed missions to Mars.

DOE provides NASA with nuclear regulatory and safety support, indemnification, subject matter expertise, and test facility access. Integrated teams are maturing low-enriched uranium reactor designs and materials, advanced manufacturing methods, design data, digital modeling, and test capabilities for space systems. Advancing space nuclear technologies may also benefit small modular reactors on Earth.

Fission power systems offer a reliable way to support operations on other worlds by providing electricity for habitats, resource extraction and processing plants. DOE assists our maturation efforts for reactor designs and materials. In 2018, the agencies conducted a joint ground test of a kilowatt reactor concept that helped develop preliminary reactor design concepts. In 2022, the agencies extended that development through three industry-led design efforts for 40-kilowatt systems as part of NASA's Moon to Mars campaign.

DOE contributions to space nuclear propulsion – a technology that may be used for human missions to Mars – are key to reducing the mass and size of reactors through advanced reactor fuels and materials. NASA and DOE are working with industry to advance higher-temperature fission fuels and reactor designs as part of a nuclear thermal propulsion engine. Three contracts for design efforts were awarded in 2021. The technology maturations gained through these efforts provided the groundwork for NASA's partnership with DARPA, which plans to accelerate the technology readiness of a nuclear thermal rocket.

DOE is also a major partner in nuclear facility and irradiation testing. Currently, we are coordinating enhancements at the Idaho National Laboratory Transient Reactor Facility to bolster capabilities for nuclear propulsion fuel element testing. We are also coordinating facility assessments and strategies for a nuclear propulsion ground demonstration test site and concept development.

DOE and NASA also collaborate on Radioisotope Power Systems (RPS) which harness heat from the natural decay of a radioisotope, plutonium-238, to produce electric power and heat for spacecraft systems and science instruments. This technology has allowed 30 NASA missions to visit some of the solar system's most remote and otherwise unreachable locations.

Five nuclear-powered science missions are operating today, including two Voyager spacecraft that launched in 1977 and are still operating in interstellar space. RPS powers the Mars Perseverance Rover, which is currently exploring and collecting samples on the surface of Mars, and will also power NASA's Dragonfly mission, a rotorcraft destined for Saturn's largest moon Titan.

Through Constant Rate Production, DOE has reestablished the domestic capability to produce plutonium-238, with production aligned to NASA mission needs. We are also investing in new technology for more efficient, higher-performing RPS to be considered for infusion in the next decade.

Our coordination in scientific research is increasing our knowledge of the universe. DOE is the primary government sponsor of the Alpha Magnetic Spectrometer (AMS), a particle physics detector attached to the exterior of the International Space Station. It has helped us understand the formation of the universe and search for evidence of dark matter.

AMS is just one example of DOE's Office of High Energy Physics and NASA carrying out successful joint projects. In the coming years, an experiment called LuSEE-Night (one of two landers in the Lunar Surface Electromagnetics Experiment) will be delivered by NASA's Commercial Lunar Payload Services to the far side of the Moon. It will test the feasibility of low-frequency radio astronomy from the lunar far side and make radio observations of the early universe.

Our partnership also benefits us closer to home. NASA and DOE both participate in the U.S. Global Climate Research Program, coordinating models used to understand climate change on timescales ranging from months to centuries and keeping our nation a leader in understanding the Earth system.

NASA Aeronautics has been working closely with the DOE's Advanced Research Projects Agency-Energy to develop lighter electrical systems and more reliable circuits and is applying that research to our national aviation challenges.

We look forward to continued collaboration with DOE and welcome opportunities to expand our partnerships and leverage our resources. Together, we will advance technology, science, and exploration in meaningful ways.