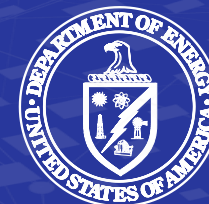


Maintaining Scientific Leadership for the Nuclear Security Enterprise: An NNSA Perspective

Njema J. Frazier, Ph.D.

Acting Assistant Deputy Administrator for
Strategic Partnership Programs (NA-10.1)

June 2022



Our DOE/NNSA Leadership Ladder

INNOVATE. COLLABORATE. DELIVER.



Secretary of Energy

- **Jennifer Granholm**



Under Secretary for
Nuclear Security &
Administrator,
NNSA

- **Jill Hruby**



Deputy
Administrator for
Defense Programs,
NNSA

- **Marv Adams**



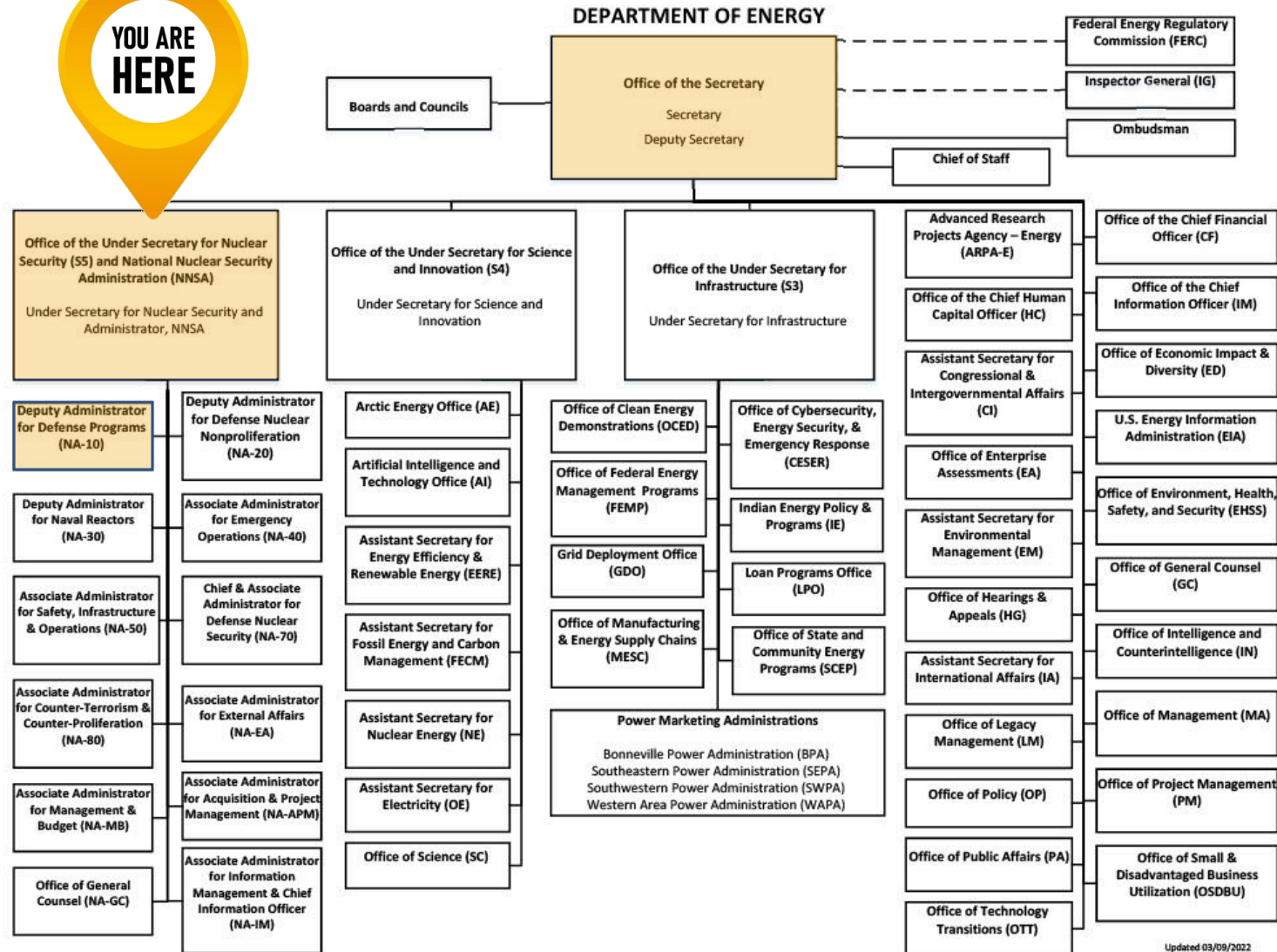
Acting Assistant
Deputy
Administrator for
Strategic
Partnership
Programs

- **Njema Frazier**

Innovate. Collaborate. Deliver.

Our Organization

INNOVATE. COLLABORATE. DELIVER.



Secretary Jennifer M. Granholm

INNOVATE. COLLABORATE. DELIVER.



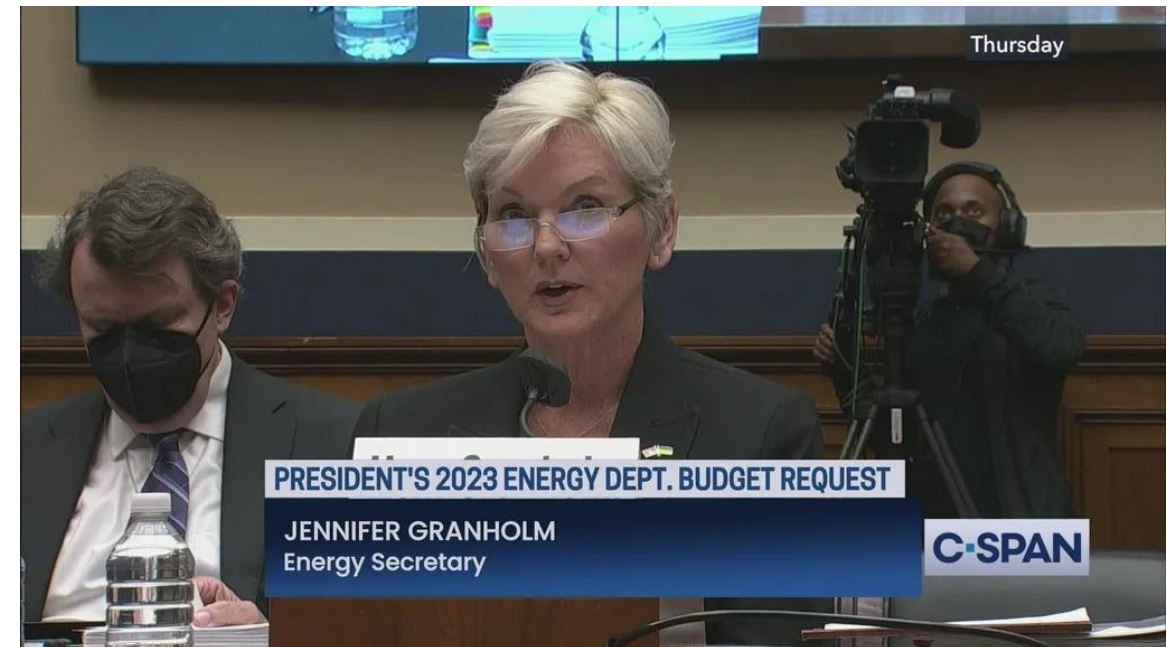
- 16th United States Secretary of Energy
- Tasked with maintaining a safe, secure and effective nuclear deterrent, reducing the threat of nuclear proliferation, remediating environmental harm caused by legacy defense programs, overseeing the United States' energy supply, advancing clean energy technologies, and managing the 17 national laboratories
- Confirmed – February 25, 2021
- Former Governor of Michigan (2003-2011), former Attorney General of Michigan (1999-2003)

DOE Programs

INNOVATE. COLLABORATE. DELIVER.

DEPARTMENT OF ENERGY FY 2022

DOE Programs	\$M
• National Nuclear Security Administration	19,700
• Other National Security	7,461
• Applied Energy	8,008
• Office of Science	7,440
• Innovation Offices	1,100
• Other Programs, Administration, and Oversight	2,503
• Receipts	-20
DOE Total	46,192



Administrator Jill Hruby

INNOVATE. COLLABORATE. DELIVER.

- Under Secretary for Nuclear Security of the U.S. Department of Energy and Administrator of the National Nuclear Security Administration
- Responsible for the management and operations of NNSA in support of the national nuclear security agenda – in particular, stockpile stewardship, nuclear nonproliferation, counterterrorism; counterproliferation; and any other activities and operations of the NNSA.
- Confirmed – February 22, 2021
- 30 years of science, engineering, and national security experience. Director of Sandia National Laboratories (2015-2017). Sam Nunn Distinguished Fellow at the Nuclear Threat Initiative (2018-2019). Member of Defense Science Board, Defense Programs Advisory Committee, National Academy of Sciences Committee for International Security and Arms Control.





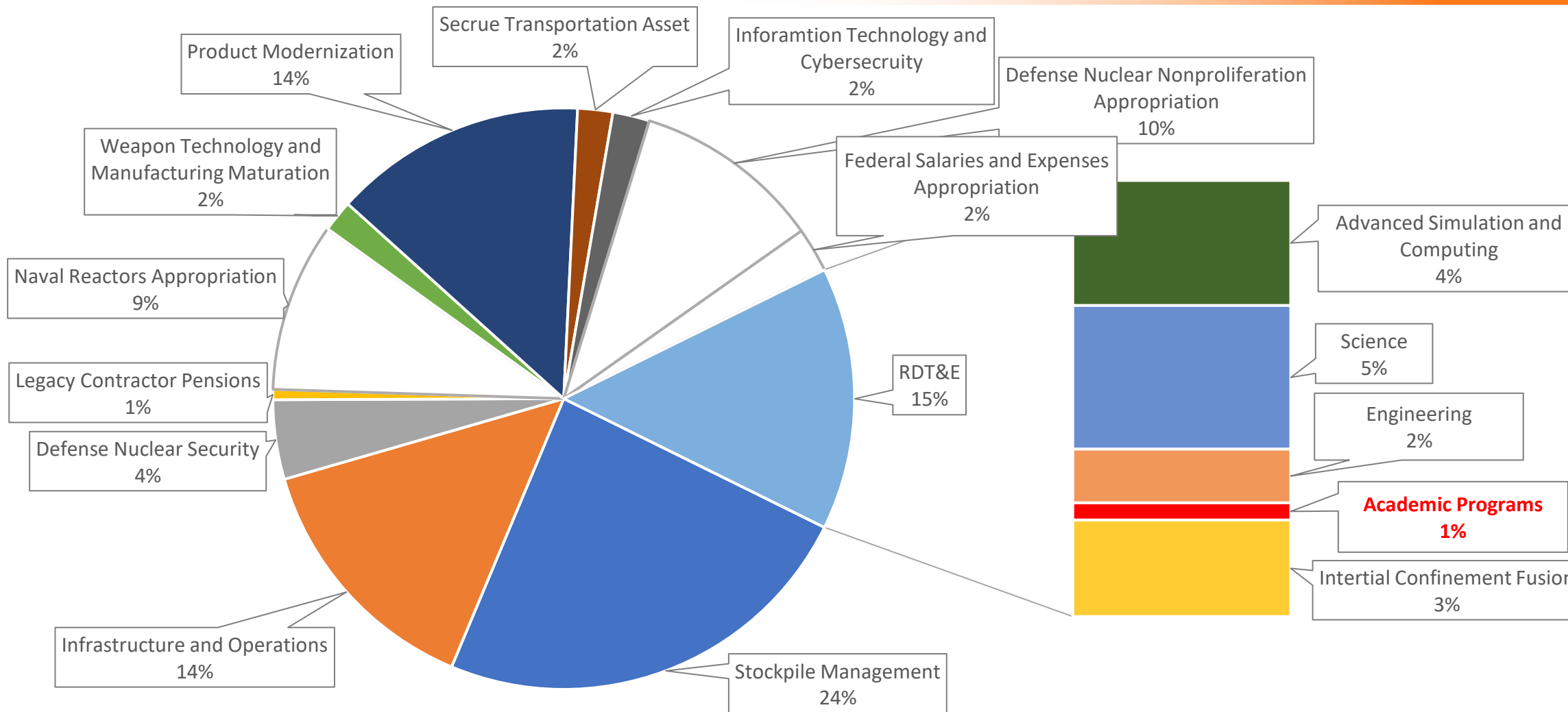
NATIONAL NUCLEAR SECURITY ADMINISTRATION

NNSA Programs	FY 22 (\$M)
• Weapons Activities	15,484
• Defense Nuclear Nonproliferations	2,264
• Naval Reactors	1,867
• Federal Salaries and Expenses	464
• Cancellation of Prior Year Balances	(336)
NNSA Total	19,743



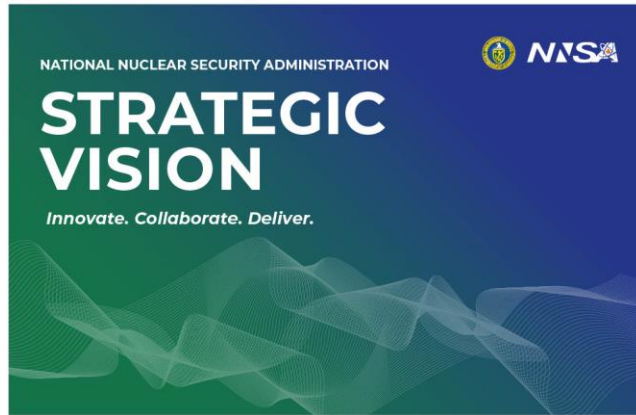
NNSA At-A-Glance

INNOVATE. COLLABORATE. DELIVER.



Our Mission

INNOVATE. COLLABORATE. DELIVER.



A collage of images related to nuclear energy and research. It includes a woman in a black lab coat standing in front of a large blue industrial reactor, a large stainless steel reactor vessel in a facility, and a view of a space station or satellite in orbit against a starry background. The text 'OUR MISSION' is prominently displayed in the upper right, followed by the mission statement: 'TO PROTECT THE NATION, OUR ALLIES, AND OUR PARTNERS BY PROVIDING A RESILIENT AND RESPONSIVE NUCLEAR SECURITY ENTERPRISE'. At the bottom right, it says '11 | 2022 STRATEGIC VISION'.

OUR MISSION

TO PROTECT THE NATION,

OUR ALLIES, AND OUR

PARTNERS BY PROVIDING A

RESILIENT AND RESPONSIVE

NUCLEAR SECURITY

ENTERPRISE

11 | 2022 STRATEGIC VISION

Our Vision

INNOVATE. COLLABORATE. DELIVER.

OUR VISION

TO ANTICIPATE
TOMORROW'S NUCLEAR
AND NATIONAL SECURITY
CHALLENGES AND DELIVER
TIMELY, INNOVATIVE
SOLUTIONS

6 | 2022 STRATEGIC VISION

NATIONAL NUCLEAR SECURITY ADMINISTRATION

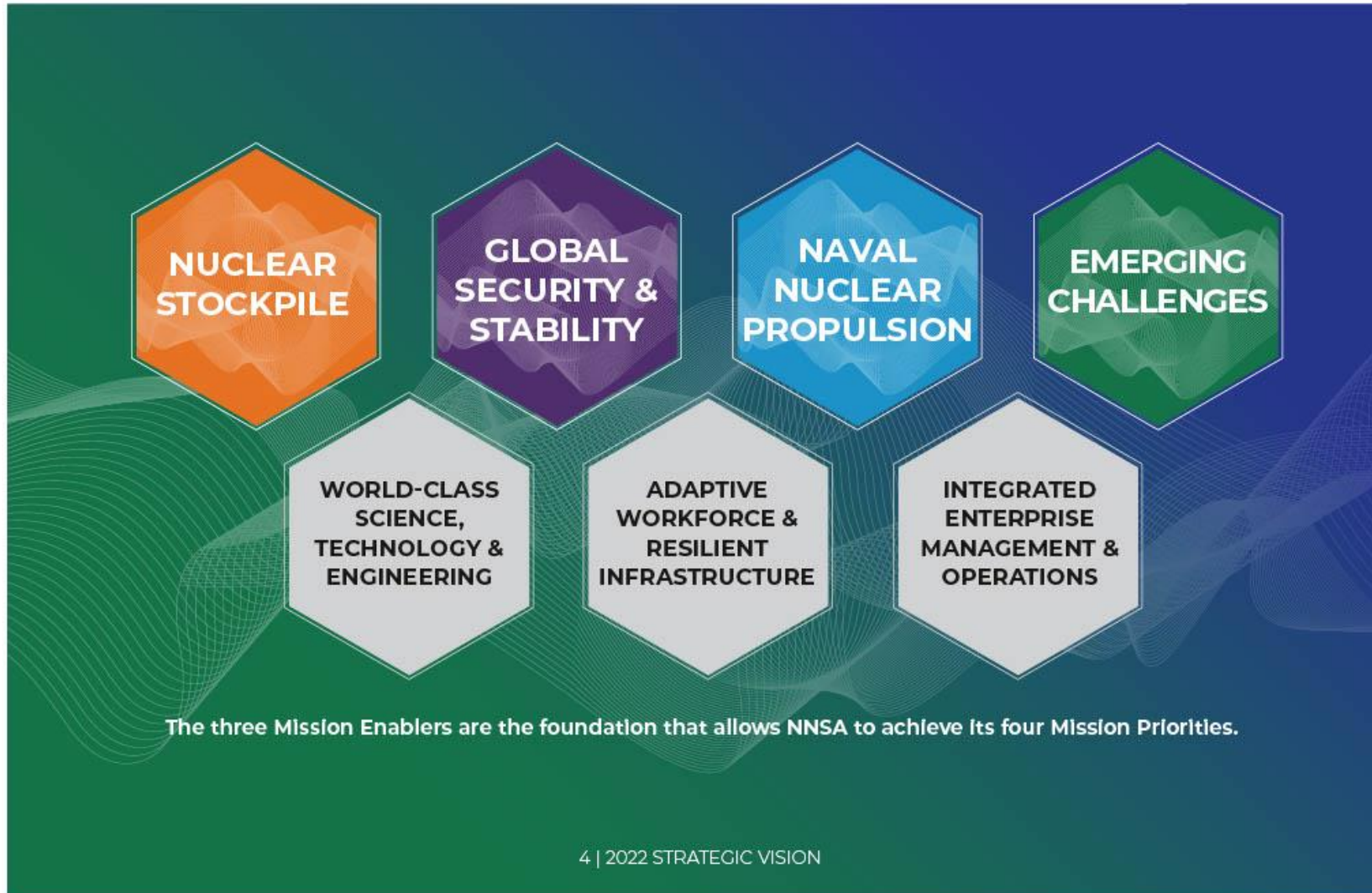
STRATEGIC VISION

Innovate. Collaborate. Deliver.

NNSA

Our Mission Priorities

INNOVATE. COLLABORATE. DELIVER.



The Nuclear Security Enterprise: What is it?

INNOVATE. COLLABORATE. DELIVER.

Nuclear Security Enterprise Laboratories, Plants, and Sites



Dr. Marvin Adams

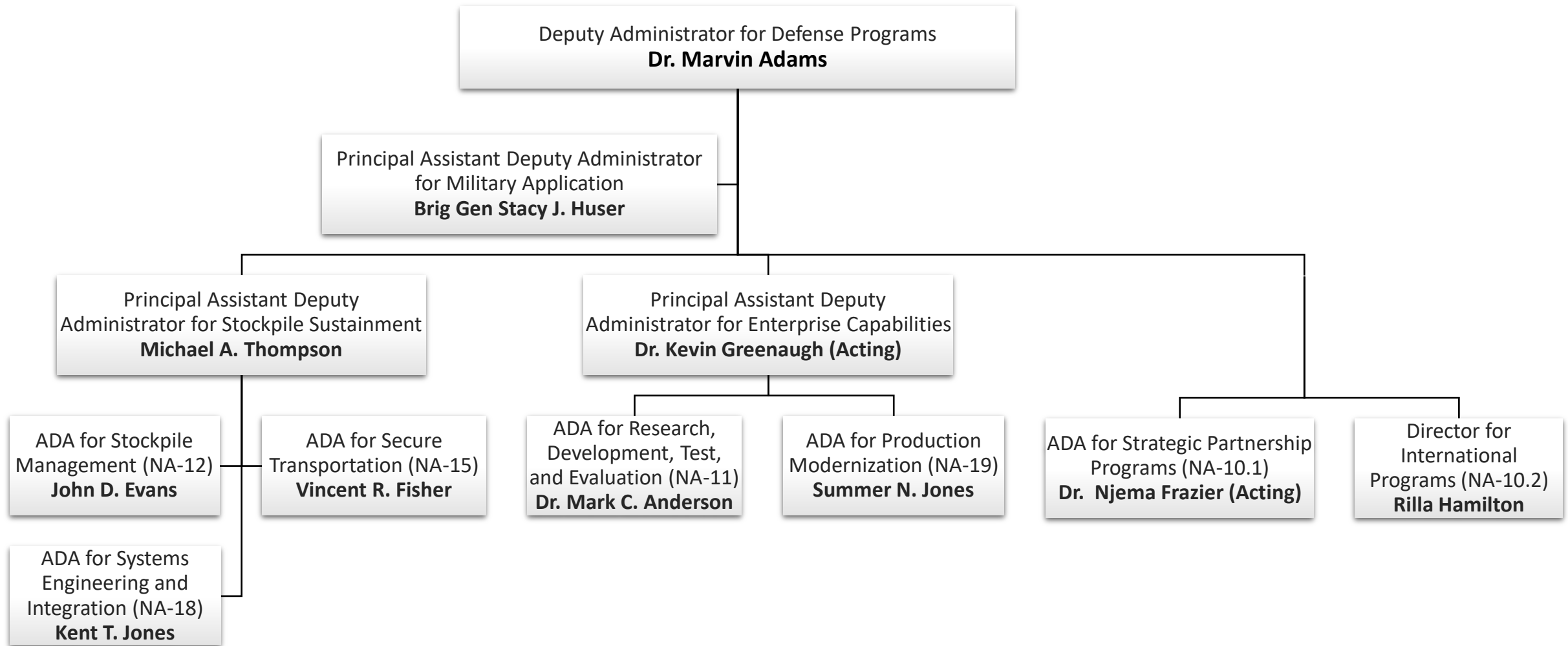
INNOVATE. COLLABORATE. DELIVER.



- NNSA Deputy Administrator for Defense Programs
- Leads the team that directs the Stockpile Stewardship Program
- Confirmed – April 7, 2022
- Sworn in – April 11, 2022
- Professor of Nuclear Engineering at Texas A&M, physicist at LLNL (1986-1992), President’s Council of Advisors on Science and Technology, Stockpile Assessment Team of the Strategic Advisory Group for U.S. Strategic Command, JASON defense advisory group, National Academics Committee on International Security and Arms Control

Defense Programs

INNOVATE. COLLABORATE. DELIVER.



Science Supporting Weapons Activities

INNOVATE. COLLABORATE. DELIVER.

Enduring Stockpile

- Advances scientific methods for nuclear weapons assessments
- Develops advanced capabilities to enable the resolution of significant finding investigations

Life Extension and Modernization

- Explores initial concepts to enable life-extension modifications to the stockpile
- Researches and develops new technologies for future stockpile needs

Knowledge Base and Infrastructure

- Preserves the U.S. core intellectual and technical competencies in nuclear weapons
- Recruits and trains new generation of scientists, engineers, and technicians

Broad National Security Mission

- Leverages resources to address emerging nuclear security threats
- Supports the assessment of foreign and adversary nuclear weapons for intelligence activities

Dr. Njema J. Frazier

INNOVATE. COLLABORATE. DELIVER.

- Acting Assistant Deputy Administrator for Strategic Partnership Programs
- Responsible for ensuring that strategic interactions with other federal agencies, private industry, academia, and foreign entities are established, maintained, and conducted in the best interest of the NNSA and the Nation.
- Sworn into Senior Executive Service – September 12, 2018
- Former Director of the Office of Experimental Sciences, \$1.3B weapons science R&D program to direct, plan, coordinate, and execute experiments in fields ranging from nuclear physics, hydrodynamics, plasma physics, and materials science, to high energy density and ignition science – Visiting Professor at National Defense University – Professional staff member for the U.S. House of Representatives Committee on Science.
- Joined NNSA in 2001



Maintaining Scientific Leadership: What will it take??

INNOVATE. COLLABORATE. DELIVER.

RESEARCH: Strengthen key fields of research relevant to the nuclear security mission through scientific innovation

INNOVATION: Drive scientific and technical innovation within the academic community that can be leveraged by NNSA laboratories

TRAINING: Develop the next-generation of diverse, highly-trained, technical workers able to support DOE/NNSA's core missions

PIPELINE: Ensure a diverse and robust cadre of NSE-eligible experts trained in disciplines vital to the nuclear security enterprise

PEER-REVIEW: Maintain technical expertise external to the nuclear security enterprise for providing advice, cross-check, and peer review

INCLUSION: Expand the pool of workforce talent in the Nuclear Weapons Complex by taking a more compressive and integrated approach to academic pipeline development

Maintaining Scientific Leadership: Supporting Research and Researchers

INNOVATE. COLLABORATE. DELIVER.

- Academic Fellowships
 - Stewardship Science Graduate Fellowship (SSGF)
 - Laboratory Residency Graduate Fellowship (LRGF)
 - Computational Science Graduate Fellowship (CSGF)
- PSAAP Centers of Excellence
 - Massachusetts Institute of Technology
 - Oregon State University
 - Stanford University
 - University of Buffalo
 - University of Colorado Boulder
 - University of Illinois, Urbana-Champaign
 - University of Maryland
 - University of New Mexico
 - University of Texas at Austin
- MSIPP – 26 Consortia
- SSAA Centers of Excellence
 - Cornell University
 - Massachusetts Institute of Technology
 - Texas A&M University (LENS)
 - Texas A&M University (Materials)
 - University of California, San Diego
 - University of Illinois Chicago
 - University of Notre Dame
 - University of Texas at Austin
 - University of Michigan
- SSAA – 39 new grants to be awarded by end of FY
- HEDLP – 14 current grants with new awards expected this FY from recent FOA

Of the 67 alumni of the SSGF/LRGF programs, 42% have gone on to careers at one of the national laboratories or other government agencies

NNSA Academic Programs Map

INNOVATE. COLLABORATE. DELIVER.

Stewardship Science
Academic Alliance - SSAA

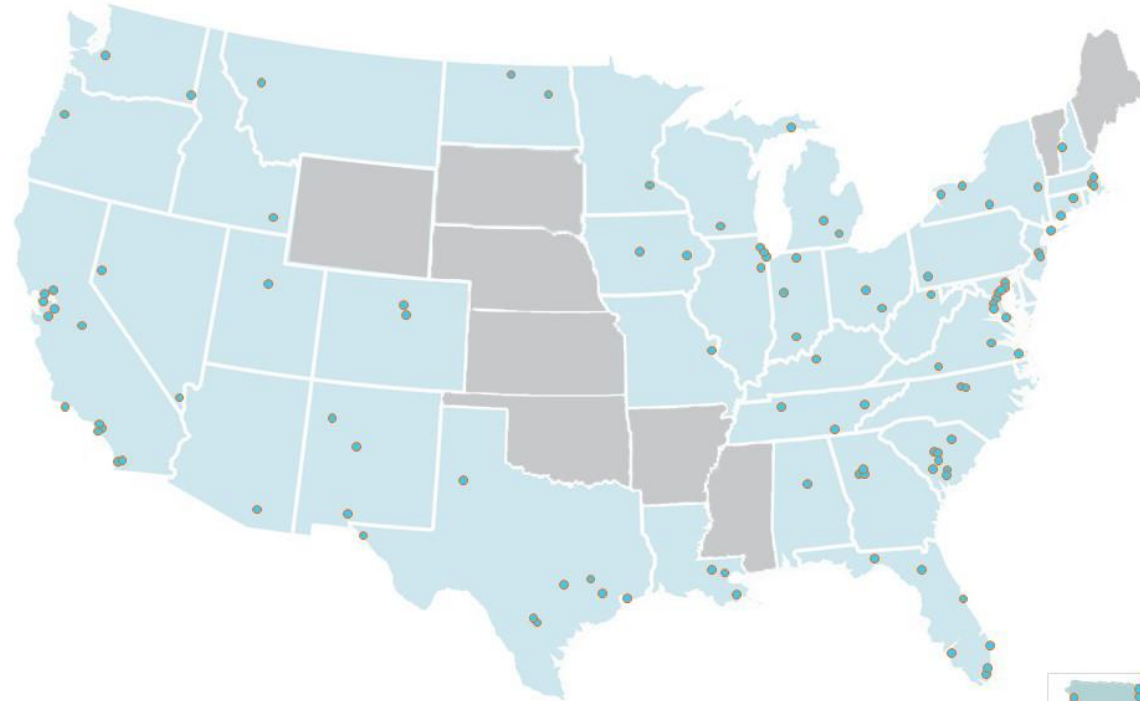
Joint Program in High
Energy Density Lab
Plasmas – JHEDLP*

Predictive Science
Academic Alliance
Program - PSAAP

Computational Science
Graduate Fellowships –
CSGF*

Minority Serving
Institution Partnership
Program - MSIPP

Tribal Education
Partnership Program -
TEPP



40
States

- 103 Fellows
- 44 Grants*
- 26 Consortia
- 18 Centers*

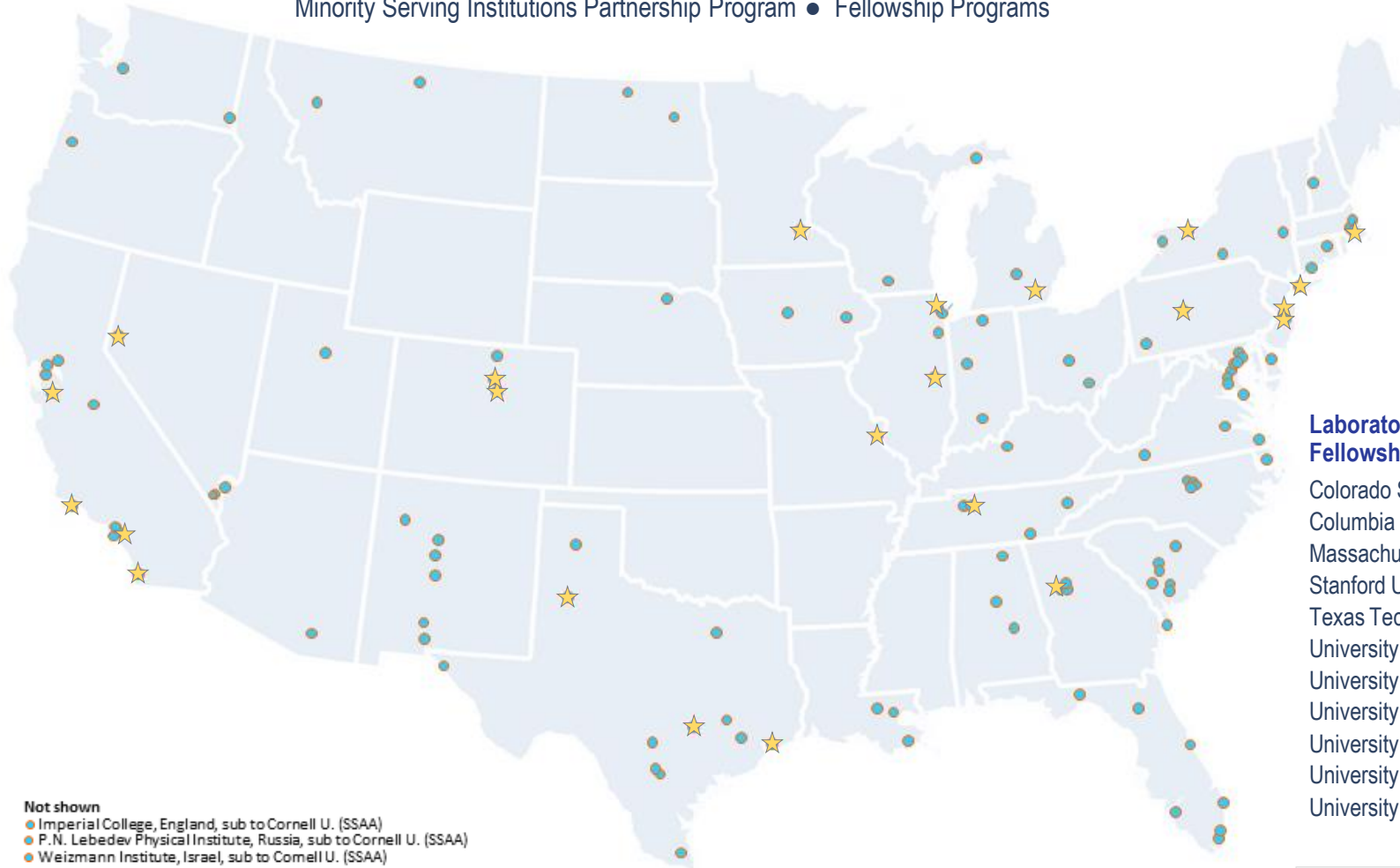
NNSA Academic Programs Map: Fellowships

INNOVATE. COLLABORATE. DELIVER.

Stewardship Science Academic Alliances ● Joint Program in High Energy Density Laboratory Plasmas ● Predictive Science Academic Alliance Program
 Minority Serving Institutions Partnership Program ● Fellowship Programs

Stewardship Science Graduate Fellowship Program

- California Institute of Technology
- Georgia Institute of Technology
- Massachusetts Institute of Technology
- Northwestern University
- Pennsylvania State University
- Princeton University
- Rice University
- Rutgers University
- Stanford University
- University of California, Santa Barbara
- University of Colorado, Boulder
- University of Michigan
- University of Minnesota
- University of Rochester
- Vanderbilt University
- Washington University in St. Louis



Laboratory Residency Graduate Fellowship Program

- Colorado School of Mines
- Columbia University
- Massachusetts Institute of Technology
- Stanford University
- Texas Tech University
- University of California, San Diego
- University of California, Santa Barbara
- University of Illinois at Urbana Champaign
- University of Michigan
- University of Nevada, Reno
- University of Texas at Austin

Not shown

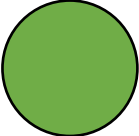
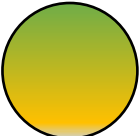
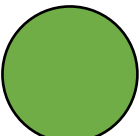
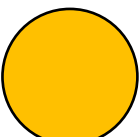
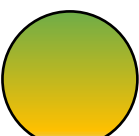
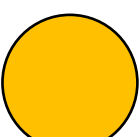
- Imperial College, England, sub to Cornell U. (SSAA)
- P.N. Lebedev Physical Institute, Russia, sub to Cornell U. (SSAA)
- Weizmann Institute, Israel, sub to Cornell U. (SSAA)

★ Denotes SSGF/LRGF university



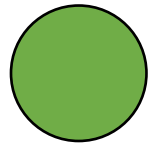
Maintaining Scientific Leadership: How are we doing?

INNOVATE. COLLABORATE. DELIVER.

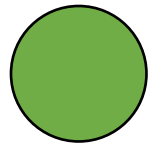
-  **RESEARCH:** Strengthen key fields of research relevant to the nuclear security mission through scientific innovation
-  **INNOVATION:** Drive scientific and technical innovation within the academic community that can be leveraged by NNSA laboratories
-  **TRAINING:** Develop the next-generation of diverse, highly-trained, technical workers able to support DOE/NNSA's core missions
-  **PIPELINE:** Ensure a diverse and robust cadre of NSE-eligible experts trained in disciplines vital to the nuclear security enterprise
-  **PEER-REVIEW:** Maintain technical expertise *external* to the nuclear security enterprise for providing advice, cross-check, and peer review
-  **INCLUSION:** Expand the pool of workforce talent in the Nuclear Weapons Complex by taking a more compressive and integrated approach to academic pipeline development

Maintaining Scientific Leadership: Where are we going?

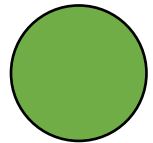
INNOVATE. COLLABORATE. DELIVER.



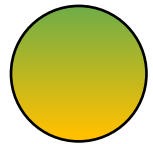
RESEARCH



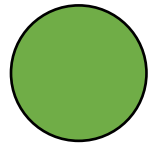
INNOVATION



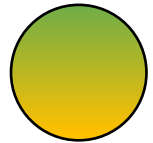
TRAINING



PIPELINE



PEER-REVIEW



INCLUSION

- **Scientific Risk Mitigation:** Cement Community of scientists and engineers that can complement NNSA workforce in advancing science of interest
- **Workforce Inclusion:** Adopt an AP Model that embraces talented researchers at Tier 1, 2, and 3 institutions; Full integration with MSIPP/TEPP efforts and leveraging of resources across the program
- **Program Responsiveness:** Improve NNSA's Ability to execute on Congressionally-mandated money/scope coming into NNSA to meet needs
- **Complex Integration:** Incorporate time on, and access to, experimental facilities and high-performance computers; leverage other vehicles (LaserNet, ZNetUS); Increase integration and support for lab, plant, site activities/priorities

Future Direction (musings from a Theorist!)

INNOVATE. COLLABORATE. DELIVER.

Academic Programs (AP)

- Continue to support Centers of Excellence, Grants, MSIPP/TEPP Consortia, and Fellowships performing research relevant to the nuclear security mission. These programs advance scientific research, understanding, and innovation, as well as the development of the next-generation of diverse, highly-trained, scientific and technical workers needed both within, and outside of, the nuclear security enterprise.

[NEW] Pipeline Development (PD)

- Support efforts to grow the workforce in disciplines vital to the nuclear security enterprise by increasing NNSA's presence within the scientific community and expanding the pool of STEM talent throughout the nation who are identified, recruited, cleared, and retained in the Nuclear Weapons Complex.

[NEW] Distributed Research Laboratories (DRL)

- Support early-stage, multi-disciplinary hybrid research hubs for academia, industry, and NNSA labs, plants, and sites. These collaborations are formed in areas of interest for NNSA and the Department and are meant to serve as nascent research kernels that can be grown and matured into NNSA Centers of Excellence (thus expanding the pipeline into Academic Programs).

HQ Commitment to Academia, Pipeline, and Workforce

INNOVATE. COLLABORATE. DELIVER.

- Increase visibility, integration, and impact of academic R&D, pipeline development, and sustainable workforce efforts
- Adapt HQ structure to support current activities, emerging trends, and future needs in APW
- Assess AP Focus areas supported by NNSA
- Set up mechanisms for multi-year tracking, measurement, and evaluation

Administrator's Call to Action

INNOVATE. COLLABORATE. DELIVER.

FROM THE NNSA LEADERSHIP TEAM



Jill M. Hruby
*Under Secretary of Energy
for Nuclear Security
and Administrator, NNSA*



Frank A. Rose
*Principal Deputy
Administrator, NNSA*

It is our privilege to serve as the Administrator and Principal Deputy Administrator of the National Nuclear Security Administration (NNSA). NNSA's mission is essential and enduring, and it is at the heart of our Nation's security. We are impressed every day with the commitment of the NNSA federal workforce and our partners at the laboratories and sites — collectively the Nuclear Security Enterprise (NSE). Together, we provide comprehensive nuclear security solutions that protect our American people, our allies, and our partners in a dynamic world.

The geopolitical environment is shifting, science and technology capabilities are advancing at an accelerated pace, and threats continue to evolve. This leads to increasing uncertainty about the future. However, it also ushers in many opportunities. The NSE has a tremendous ability to anticipate the future and play an indispensable role in providing solutions to the range of national security challenges our Nation faces.

Our common goal across the NSE is to deliver on the NNSA mission, consistent with the vision in this document. We are proud of how the enterprise comes together to address nuclear security challenges, and it is the foundation of our success. Collaboration is vital to solving the issues we face today.

NNSA is the one place in government where the complementary missions of nuclear deterrence, arms control, and nonproliferation come together to meet our national security needs. This unique mission integration is NNSA's *Strategic Advantage*, and it is enabled by unparalleled science, technology, and engineering (ST&E) capabilities, an unrivaled workforce, an innovative spirit, and a commitment to delivering on our mission as efficiently and effectively as possible. We will nurture and draw on that advantage to bring our science, products, and infrastructure to the next level of maturity and make the world a safer place.

NNSA's unique mission [...] is enabled by unparalleled science, technology, and engineering (ST&E) capabilities, an unrivaled workforce, an innovative spirit, and a commitment to delivering on our mission as efficiently and effectively as possible. We will nurture and draw on that advantage to bring our science, products, and infrastructure to the next level of maturity and make the world a safer place.

Questions

INNOVATE. COLLABORATE. DELIVER.



Thank You!