Office of Science Update

Biological and Environmental Research Advisory Committee Meeting

Harriet Kung

Deputy Director for Science Programs

October 24, 2024

FY 2025 Request for the Office of Science

Requests $8,583M (+$343M; 4.2% increase over FY 2024 appropriation) with increased investments in Administration priorities to include:

- Artificial Intelligence (+$93M; $259M)
- Fusion Innovation Research Engine (FIRE) Collaboratives (+$15M; $60M)
- Reaching a New Energy Sciences Workforce (RENEW) (+$69M; $120M)
- Funding for Accelerated, Inclusive Research (FAIR) (+$32M; $64M)
- Climate Initiative ($20M)
- Microelectronics (+$22M; $95M)
- SC Energy Earthshots (+$95M; $115M)

FY 2025 Request: Labs, Facility Operations, and Projects

- *Operations of the SC-stewarded national laboratories*
  - Upgrade core laboratory infrastructure, i.e. utilities and laboratory workspace through ongoing SLI infrastructure projects and General Plant Projects (+$32M; $50M)
  - Reduce backlog of deferred maintenance and improve obsolete infrastructure at SC national laboratories
  - Continue the Laboratory Operations Apprentice Program (+$2M; $5M)
- *Facility operations*
  - Supported at ~88.3% optimal funding levels
  - SC Facilities "rebaselined" to show full costs of operations, including impacts of inflation, staffing costs, telework/remote capabilities, enhanced maintenance activities, etc.
- *Line-item construction and MIE projects*
  - Continue ongoing scientific user facility upgrade construction projects
  - Continue to support ongoing infrastructure projects

Office of Science FY 2025 Budget Status

	FY24 Enacted	FY 25 Request	% Change from FY 24	House Mark	% Change from FY 24	Senate Mark	% Change from FY24
Office of Science, Total	**8,240**	**8,583**	**4.16**	**8,390**	**1.82**	**8,600**	**4.37**
Basic Energy Sciences	2,626	2,582	-1.78	2,617	-0.38	2,563	-2.44
High Energy Physics	1,200	1,231	2.50	1,219	1.50	1,230	2.50
Advanced Sci. Computing Research	1,016	1,153	13.39	1,105	8.76	1,152	13.39
Biological and Environmental Research	900	946	5.11	850	-5.56	930	3.33
Fusion Energy Sciences	790	844	6.84	825	4.43	825	4.43
Nuclear Physics	804	833	3.61	830	3.23	850	5.72
Isotope R&D	130	184	41.54	170	30.77	168	29.23
Accelerator R&D	29	31	6.90	30	3.45	31	6.90
Scientific Laboratories Infrastructure	288	295	2.43	280	-2.78	275	-4.51
Scientific Program Direction	227	246	8.37	238	4.85	246	8.37
Safeguards and Security	190	195	2.63	195	2.63	190	0.00
Workforce Dev. for Teachers & Scientists	29	31	6.90	30	3.45	31	6.90

FY 2025 House Mark Highlights

Funds SC at $8,390M, +$150M over FY 2024 Enacted, -$193M below FY 2025 Request

- $245M for QIS research; $15M for research in support of the Quantum User Expansion for Science and Technology program (QUEST); $20M for testbeds to integrate high performance computing and quantum (flat with the Request)
- $20M for Energy Earthshots ($95M below the Request)
- $40M for FIRE Collaboratives ($20M below the Request)
- Supports expansion of microelectronics research, including Microelectronics Science Research Centers
- No funding for RENEW or FAIR initiatives
- Directs establishment of a Carbon Sequestration Research and Geologic Computational Science Initiative
- Most constructions projects funded at or near the Request

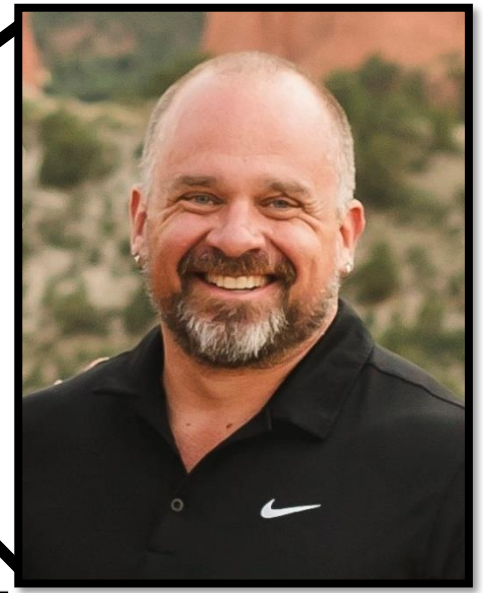
FY 2025 Senate Mark Highlights

Funds SC at $8,600M, +$360M over FY 2024 Enacted, +$17M over FY 2025 Request

- $160M for Artificial Intelligence/Machine Learning research and $100M for Frontiers in Artificial Intelligence for Science, Security and Technology (FASST) (~flat with Request)
- Not less than $265M for QIS research, including five National QIS Research Centers ($15M below the Request)
- $60M for Energy Earthshots ($55M below the Request)
- $110M for microelectronics ($15M over the Request)
- Not less than $45M for FIRE Collaboratives ($15M below the Request)
- Supports RENEW and FAIR initiatives
- $25M to establish a Carbon Sequestration Research and Geologic Computational Science Initiative and $10M for atmospheric methane removal research
- Most constructions projects funded at or near the Request

SC Leadership Updates

Sarah Staton
Director, Office of International Activities, Research Security, and Interagency Coordination



Chris C. Landers
Director, Office of Isotope R&D and Production

Office of the Director
SC-1
Harriet Kung (A)

Deputy Director for Science Programs
DDSP
Harriet Kung

- Advanced Scientific Computing Research (ASCR) — *Ceren Susut*
- Basic Energy Sciences (BES) — *Andrew Schwartz (A)*
- Biological & Environmental Research (BER) — *Dorothy Koch*
- Fusion Energy Sciences (FES) — *Jean Paul Allain*
- High Energy Physics (HEP) — *Regina Rameika*
- Nuclear Physics (NP) — *Linda Horton (A)*
- Office of Energy Sciences Workforce Stewardship (ESWS) — *Harriet Kung (A)*
  - Office of Workforce Development for Teachers & Scientists (WDTS) — *Ping Ge*
  - Office of Scientific Workforce and Integrity (SWI) — *Julie Carruthers*
- Office of International Activities, Research Security, and Interagency Coordination (IRIC) — *Elizabeth O'Malley (A)*
- Office of Communications & Public Affairs (OCPA) — *Allison Eckhardt (A)*
- Office of Scientific & Technical Information (OSTI) — *Brian Hitson*
- Office of Sponsored Activities (OSA) — *Michael Zarkin*
- Office of SBIR/STTR Programs (SBIR/STTR) — *Manny Oliver*

Deputy Director for Operations
DDO
Juston Fontaine

- Ames Site Office (AMSO) — *Samuel Bigger*
- Argonne Site Office (ASO) — *Whitney Begner-Romozzi*
- Berkeley Site Office (BSO) — *Paul Golan*
- Brookhaven Site Office (BHSO) — *Robert Gordon*
- Fermi Site Office (FSO) — *Roger Snyder*
- ORNL Site Office (OSO) — *Trey Wheeler*
- Pacific Northwest Site Office (PNSO) — *Julie Turner*
- Princeton Site Office (PSO) — *Sandra Rogan*
- SLAC Site Office (SSO) — *Hanley Lee*
- Thomas Jefferson Site Office (TJSO) — *Craig Ferguson*
- Science Laboratories Infrastructure (SLI) — *Sheila Feddis*
- Office of Isotope R&D and Production (IRP) — *Christopher Landers*
- Office of Safety and Security (OSS) — *Jessica Halse (A)*
- Office of Acquisition Management (OAM) — *Steven Jones*
- Office of Laboratory Policy (OLP) — *John LaBarge*
- Consolidated Service Center (CSC) — *Geoffrey deBeauclair*
- Office of Corporate Business Operations (OCBO) — *Jessica Halse (A)*
  - Office of Information Management (OIM) — *Shila Cooch*
  - Office of Budget (OB) — *Kathleen Klausing*
  - Office of Resource Management (ORM) — *Keyana Ellis*
  - Office of Project Assessment (OPA) — *Kurt Fisher*

09/22/2024

Frontiers in Artificial Intelligence for Science, Security, and Technology (FASST)

- The speed and scale at which AI is developing requires investment in a strategic capability to meet DOE mission needs of national security, energy security, and scientific discovery that will support sustained economic prosperity for the nation for decades to come

- A focused approach is needed to
  - Prevent the United States from losing its competitive scientific edge and ability to maintain our national and economic security
  - Catalyze a diverse and competitive innovation AI ecosystem
  - Build technical expertise necessary to govern AI
  - Attract and train a talented workforce.

https://www.energy.gov/fasst

FASST will build the world's most powerful integrated scientific AI systems through four key interconnected pillars:

- AI-Ready Data
- Frontier-Scale AI Computing Infrastructure and Platforms
- Safe, Secure, and Trustworthy AI Models and Systems
- AI Applications

DOE has unique capabilities to achieve FASST goals

Leverages DOE's enabling infrastructure to deliver key assets for the nation

- Advance National Security
- Attract and Build a Talented Workforce
- Harness AI for Scientific Discovery
- Address Energy Challenges
- Develop technical expertise necessary for AI governance

https://www.federalregister.gov/documents/2024/09/12/2024-20676/notice-of-request-for-information-rfi-on-frontiers-in-ai-for-science-security-and-technology-fasst

FASST cuts across all SC core science areas

- **AI for Science** – accelerating innovation through scientific AI foundation models trained on highly-curated scientific datasets
- **AI Hardware Innovation** – new AI algorithms and hardware co-design to improve energy efficiency by >100x
- **AI for User Facilities** – optimized, autonomous experiments with real-time data analysis and AI-enabled real-time control of accelerators & detectors to improve operational efficiency
- **Trustworthy AI systems** – storage and archival tools for FAIR (findable, accessible, interoperable, and reusable) data and privacy-preserving algorithms to enable science using proprietary and sensitive data
- **A Diverse AI Workforce** - leverage DOE's technical workforce to integrate AI across the science research community

Real-time analysis of atomic microscopy data

Digital twins and system analysis for soils

Theory-aware AI global experiment control

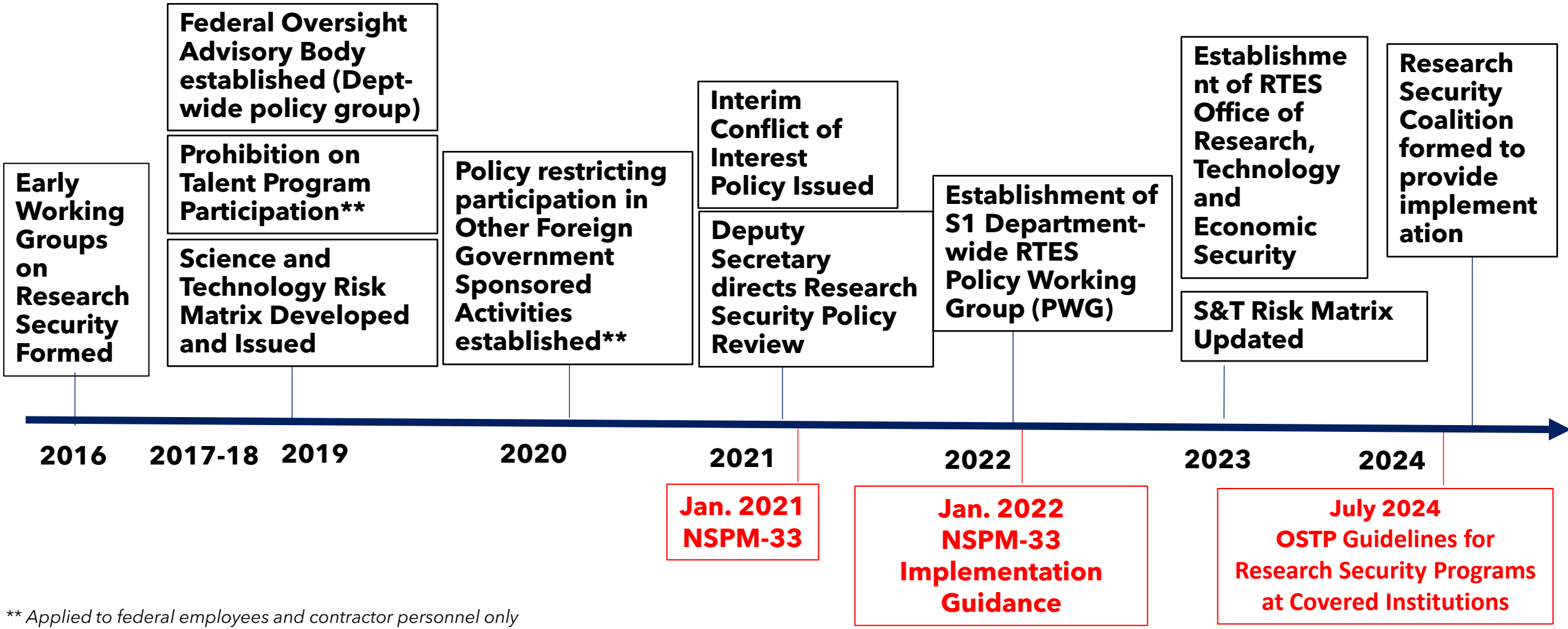
https://www.energy.gov/sites/default/files/2024-07/FASST%20Handout%20%281%29_0.pdf

Research Security at DOE: An Evolving Landscape

- Given DOE's broad mission space, the **research, technology, and economic security (RTES)** policies need to address a wide range of risk levels, and our implementation must be risk-based.

- As RTES policies are developed, DOE and National Labs ensure balance to…
  - Continue to attract and retain the best and brightest;
  - Promote principled international collaborations, which are most beneficial to all when they are:
    - **Built upon** openness, transparency, parity of intellectual and financial contributions, and mutual respect of IP rights
    - **Driven by** scientist-to-scientist ties and scientific community interest
    - **Promoting** US competitiveness and discovery of the 'best science'

Evolution of Research, Technology, and Economic Security (RTES) at DOE



** *Applied to federal employees and contractor personnel only*

DOE Financial Assistance (FA)

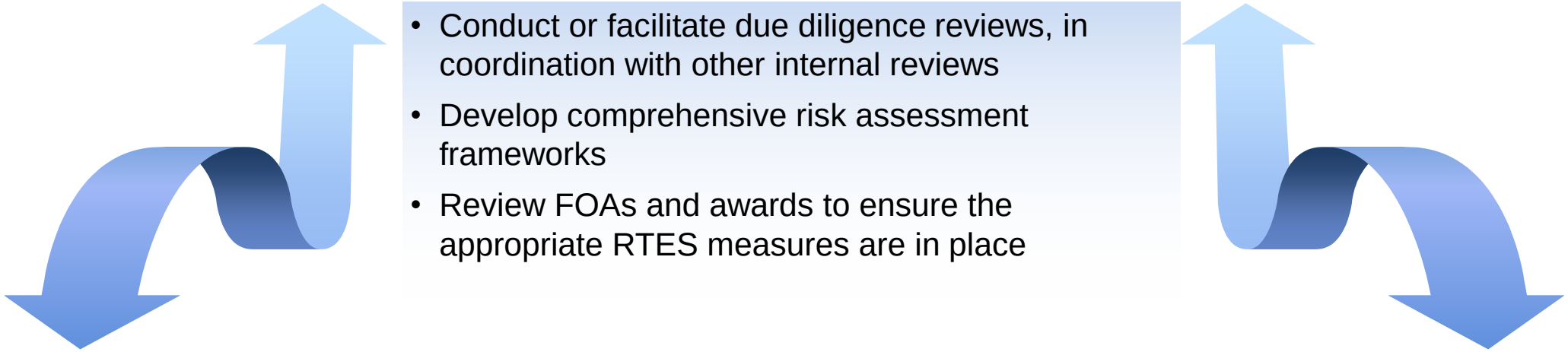
- RTES Policy Working Group (PWG)
  - **Function**: Address RTES policy development and consistency with interagency processes (e.g. related to NSPM-33 implementation)
    - Includes financial assistance and laboratory policy
  - The PWG is working to update DOE FA policies, such as:
    - Discussing adoption of the NSF-stewarded common forms
    - COI/COC NOPR was released in the Federal Register (closed 8/19)

- Office of Research, Technology and Economic Security (RTES Office)
  - **Function**: Provide consistency and support for due diligence reviews and risk mitigation in DOE FA and loan activities
  - Office of Science is working closely with the RTES Office to ensure that its due diligence reviews maintain transparency and do not create undue burden on the community

Primary RTES Office Functions

Due Diligence, Liaison & Assessment

- Conduct or facilitate due diligence reviews, in coordination with other internal reviews
- Develop comprehensive risk assessment frameworks
- Review FOAs and awards to ensure the appropriate RTES measures are in place



Information Sharing (Internal)

- Resource to program offices on RTES
- Foster cross-office information sharing through program RTES POCs
- Train offices on how to identify, communicate, and mitigate security risks

Communications & Outreach (External)

Conduct outreach with the broader scientific community on RTES topics

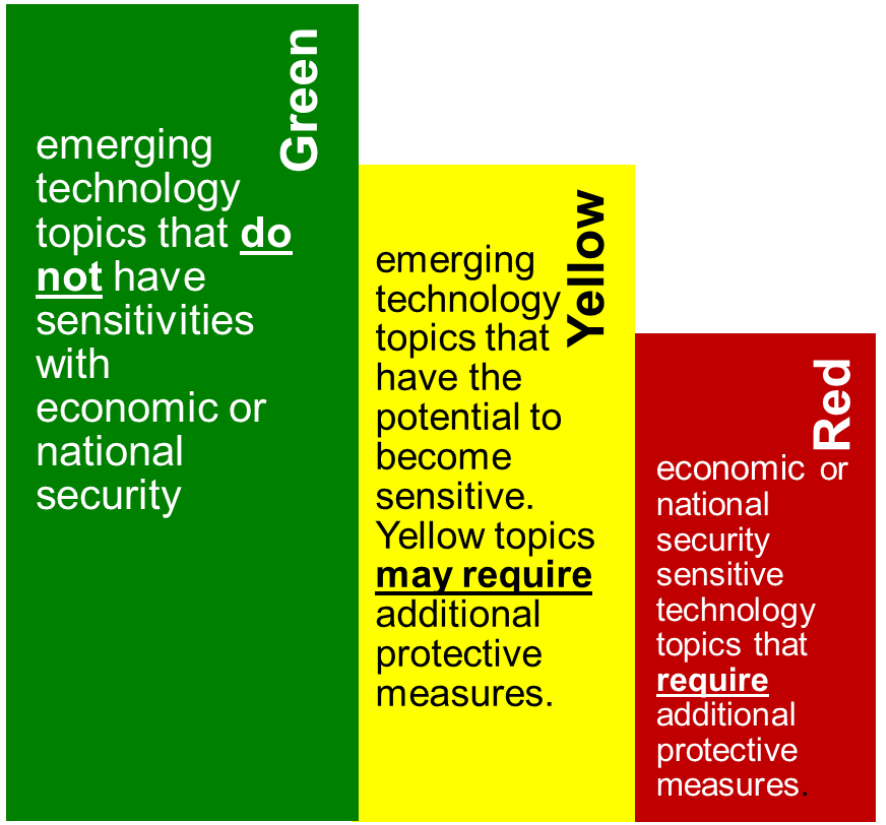
Office of Science Financial Assistance

- The Office of Science (SC):
  - Continues to recommend universal disclosure (sources of support, positions and appointments)
  - Continues to recommend the use of SciENcv to reduce administrative burden by allowing the use of digital persistent identifiers
  - Has already announced the acceptance of interagency common formats for current and pending support and bio-sketches
- SC strongly supports recent actions emerging from its interagency partners:
  - DoD and NIH Decision Matrices, NSF TRUST Framework
  - Continued development of the NSF SECURE Center
- DOE and SC will look to these achievements and related policies as we continue to consider our approach to financial assistance

DOE Laboratory Policy

- DOE uses its Science and Technology Risk Matrix to manage risks at National Laboratories associated with critical and emerging technologies that do not otherwise have control mechanisms

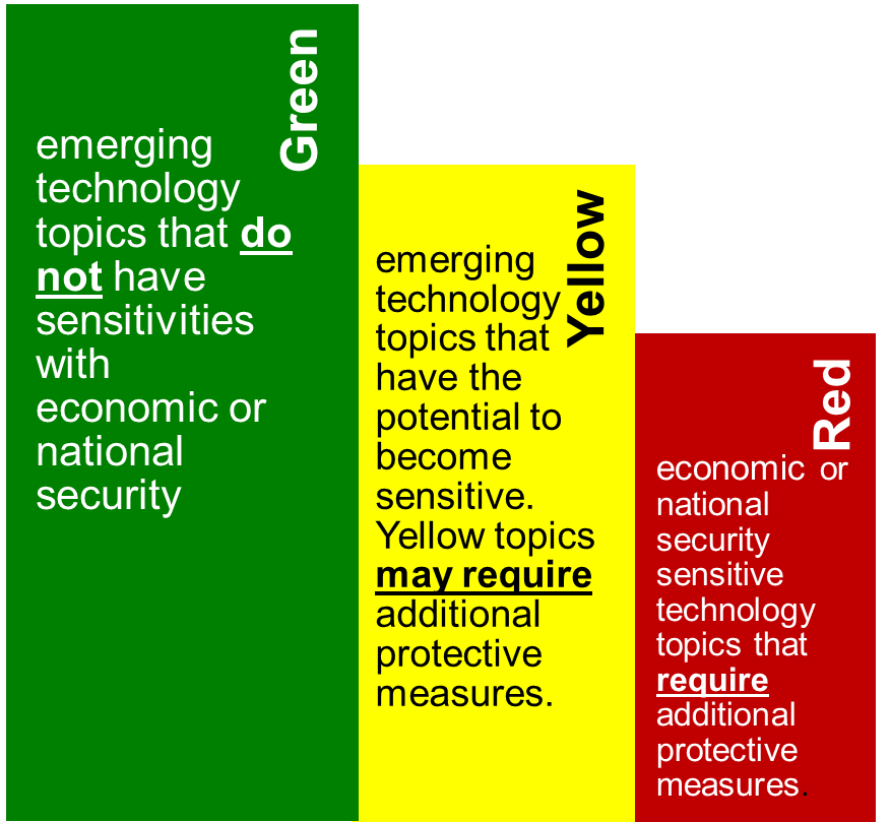
- **Applies only to:**
  - Countries of Concern (China, Russia, Iran, North Korea)
  - Guidance and management of certain activities at national laboratories (e.g., foreign engagements, CRADAs/SPPs, official travel, foreign national access)
  - Topics include: QIS, AI, HPC, Energy Storage/Batteries, Biotechnology, Accelerator R&D.



DOE Laboratory Policy

- **Recent Matrix Developments:**
  - DOE updated the Matrix in 2023 and will continue to do so annually to ensure consistency with major scientific and technological developments.
  - An unlimited distribution S&T Risk Matrix has been developed and disseminated to the national laboratories, university partners, and sister science funding agencies to foster education and awareness.
  - DOE is developing user guides and training resources to streamline implementation.

- In addition, DOE is working to update implementing Orders related to RTES policy to meet WH and statutory requirements while addressing gaps identified by the Department.



Interagency and Community Engagement

It is essential that DOE coordinates its research security policy with the interagency, and in my role, I am making it a priority to increase engagement with the research community.

- Continuing to participate as co-chair on the National Science and Technology Council (NSTC) Subcommittee on Research Security.
- Continuing to engage with like-minded allies and partners through State Department-led efforts through activities such as the MCD.
- Increasing public-facing engagements with leaders and membership of organizations such as FDP, COGR, AAU, and APLU, as well as with the AANHPI research community.
  - Engage in meaningful ways that demonstrate our commitment to hearing all voices.

Lessons Learned To-Date

Policy Development

- **Engaging with leaders in our research communities builds trust, creates buy-in, and results in more effective policies**
  - At the National Laboratories, Chief Research Officers were essential ambassadors to laboratory community in developing S&T Risk Matrix
  - Discussions with scientific societies and AANHPI community have been helpful
- **Close working relationships with interagency partners are critical**
  - Coordinating bodies like NSTC Subcommittee on RS have been essential for sharing best practices and developing effective, harmonized policies

Policy Implementation

- **Effective implementation depends on strong, trusted relationships between research security experts and technical experts**
  - Technical expertise is critical for assessing risks and developing appropriate mitigations associated with any research security concern
- **Flexibility and transparency are key**
  - Due diligence reviews and mitigations should be risk-based and flexible with unique circumstances of the research
  - Agencies should transparently communicate risk review criteria and corresponding levels of mitigations

Key Questions for the Future

How do we strategically balance international engagement and research security?

- Where our security policies differ with like-minded allies and partners, how can we best coordinate to ensure the success of our partnerships?
- How do we ensure that our policies do not undermine our ability to attract the best and brightest to study and innovate in the U.S.?

As due diligence risk reviews for fundamental research are implemented, how can we:

- Streamline reviews to not impact timelines to award?
- Develop nuanced criteria for assessing research risks that recognize the (sometimes blurry) boundaries between basic, applied, and more mature stages of R&D?

How can we transition from a compliance culture to one of partnership with the research community?

- Requires continued, proactive campaign of awareness-raising and education on risks and policies, and demonstrated commitment to equity
- PIs and researchers must understand why research security is important to all
- Scientific societies and advocacy organizations will continue to be important partners

THANK YOU!