

# CHIPS and Science Program Updates

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HPC User Forum

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# About ITIF

- The world's leading science and technology policy think tank.
- Supports policies driving global, innovation-based economic growth.
- Focuses on issues at the intersection of technology innovation and public policy across several sectors:
  - Innovation and competitiveness
  - IT and data
  - Telecommunications
  - Trade and globalization
  - Clean energy, manufacturing, life sciences, and ag biotech



# CHIPS and Science Act of 2022: Top-Line Funding

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- \$52 billion for CHIPS, fully *appropriated*:
  - \$39 billion grants/incentives; \$11 billion R&D; \$24 billion ITC.
- Total of \$200 billion *authorized* for science activities FY 23-27.
- @\$81 billion FY 23-27 for NSF: \$61 billion for core science R&D activities and \$20 billion for a new directorate focused on technology transfer and commercialization activities.



# CHIPS Incentives Funding

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- Five funding announcements: TSMC, Intel, Global Foundries, BAE, Microchip.
- TSMC: \$6.6B to support 3 next-generation fabs, newest at 2-nm in AZ.
- Intel: \$8.5B, across four locations: 2 new leading-edge logic fabs, update 1 in Arizona; 2 new leading-edge fabs in Ohio; advanced packing facility in NM.
- CHIPS has received more than 620 statements of interest and more than 170 pre-applications and full applications for NOFO 1.
- Has stimulated \$234B in semiconductor manufacturing since start of 2021.
- U.S. to produce 20% of world's leading-edge chips by 2030.



Source: NIST, "Chips For America: Funding Updates" <https://www.nist.gov/chips/funding-updates>

# CHIPS R&D Funding

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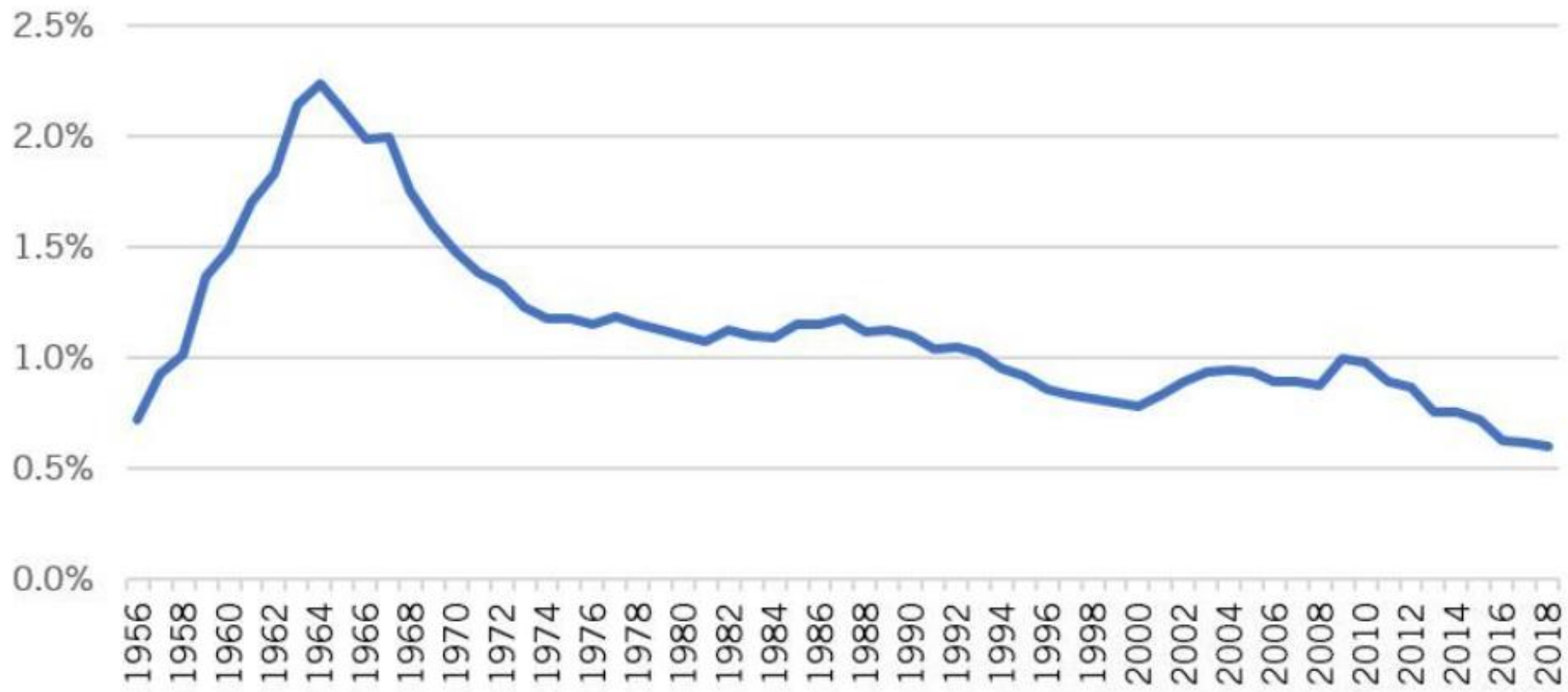
- \$5B for the National Semiconductor Technology Center (NSTC).
- A PPP that will provide domestic access to advanced prototyping capabilities; leverage shared facilities; build skilled and diverse workforce.
- Operated by the National Center for the Advancement of Semiconductor Technology (Natcast).
- An NSTC Workforce Center of Excellence will start in summer 2024.
- \$200M CHIPS Mfg. USA Institute: Semi. Mfg. Digital Twin Institute.
- \$300M for a National Advanced Packaging Manufacturing Program (NAPMP).

Source: NIST, "Chips For America: National Semiconductor Technology Center"

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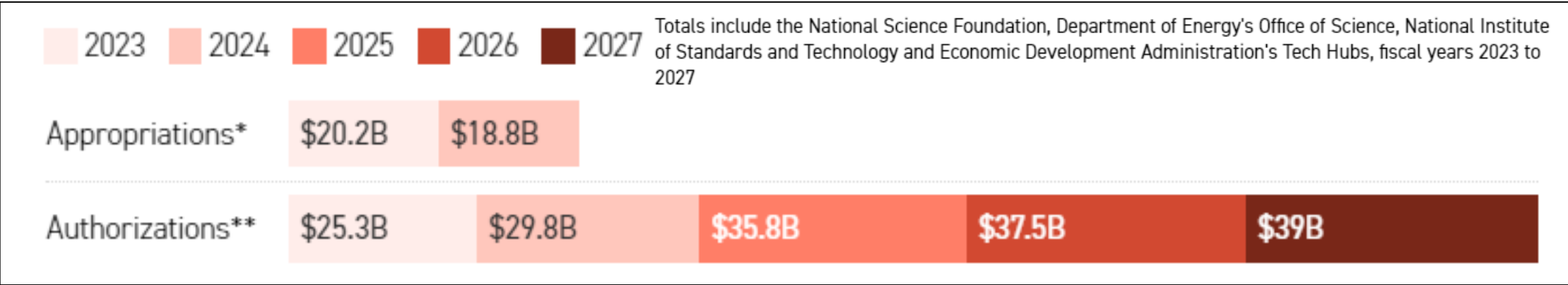
# Ignominious Slide in Federal R&D Funding

Federal R&D as a Share of U.S. GDP

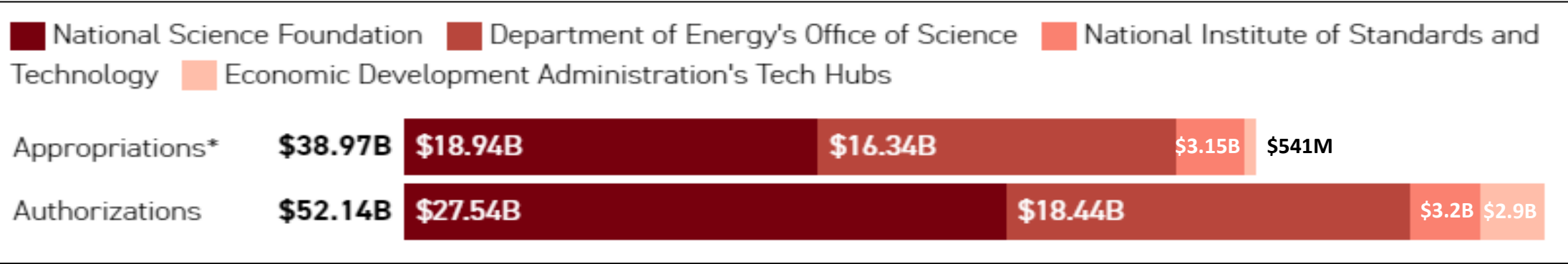


# CHIPS and Science Act: Science Funding

## Appropriations vs. CHIPS & Science Authorizations, FY 2023–2024



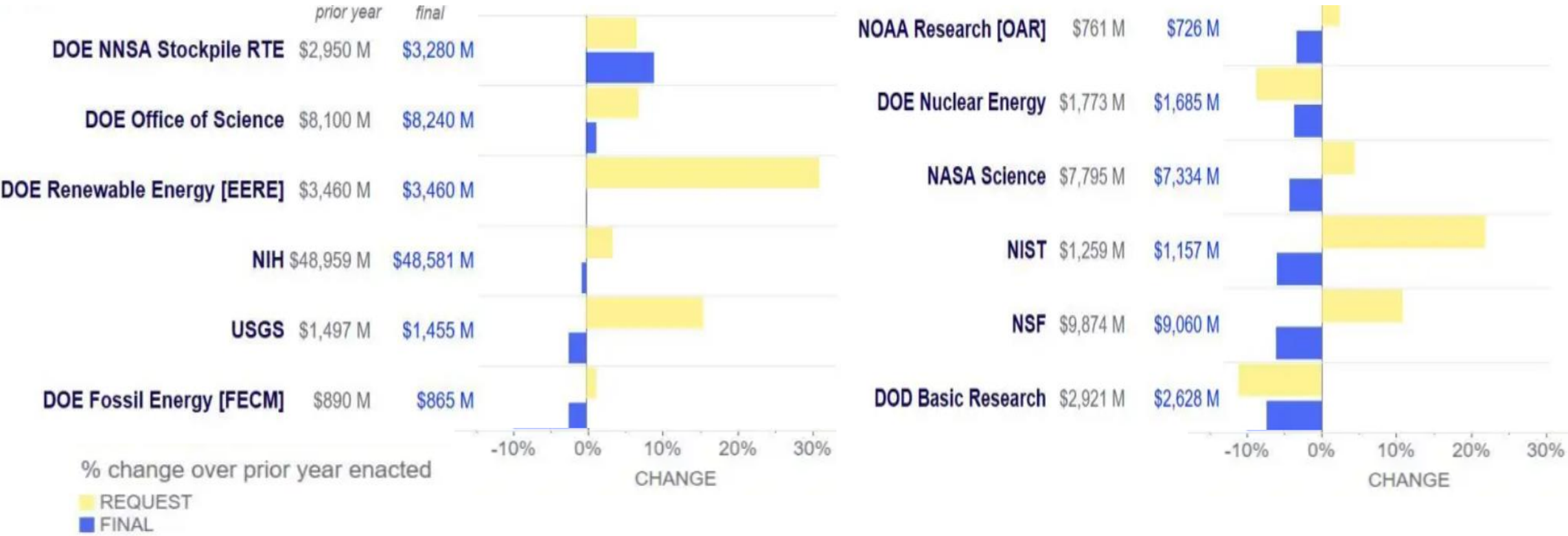
## Appropriations vs. CHIPS & Science Authorizations, By Selected Agency, FY 2023–2024



Source: Christine Mui, *Politico*, "How Congress Defanged Biden's Big Science Push"

# CHIPS and Science Act: Science Funding

## FY 2024 Appropriations: Select Science Agencies



Source: Mitch Ambrose, American Institute of Physics, "Science Agencies Squeezed Under Budget Caps for FY24 and FY25"



# CHIPS and Science Act: Science Funding Key Takeaways

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- NSF should have received \$15.64B in FY 24 according to CHIPS, will get \$9.06B, 40% below CHIPS authorization; 8% below prior year.
- NIST's \$1.16B drops 8% vs. prior year, 11% below CHIPS target.
- Collectively, NSF, NIST, and DoE Office Science are \$8 billion below CHIPS authorization targets set for FY 24.

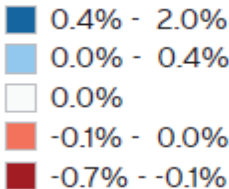


# CHIPS and Science Act of 2022: Technology Hubs & HPC

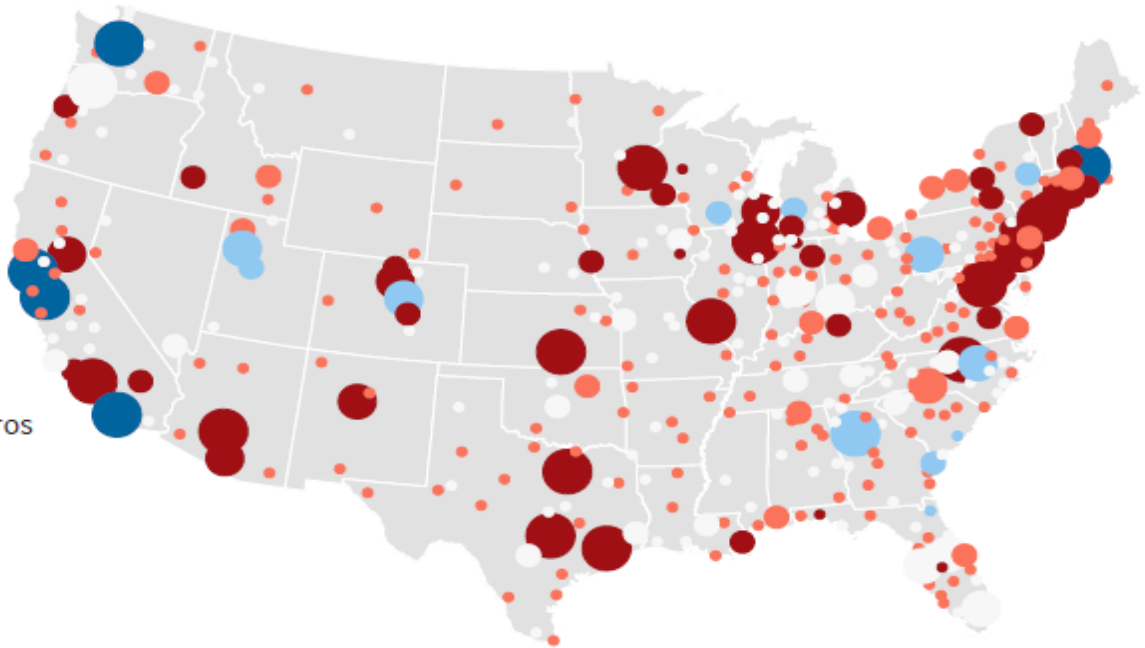
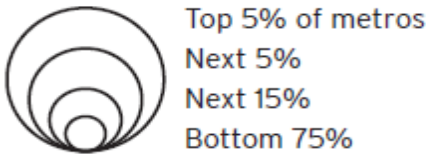
- CHIPS authorized \$10 billion over five years to create 20 geographically distributed “regional technology and innovation hubs.”

Metros by change in share of total innovation sector jobs

Share of innovation sector jobs change, 2005-17



Innovation sector jobs, 2005



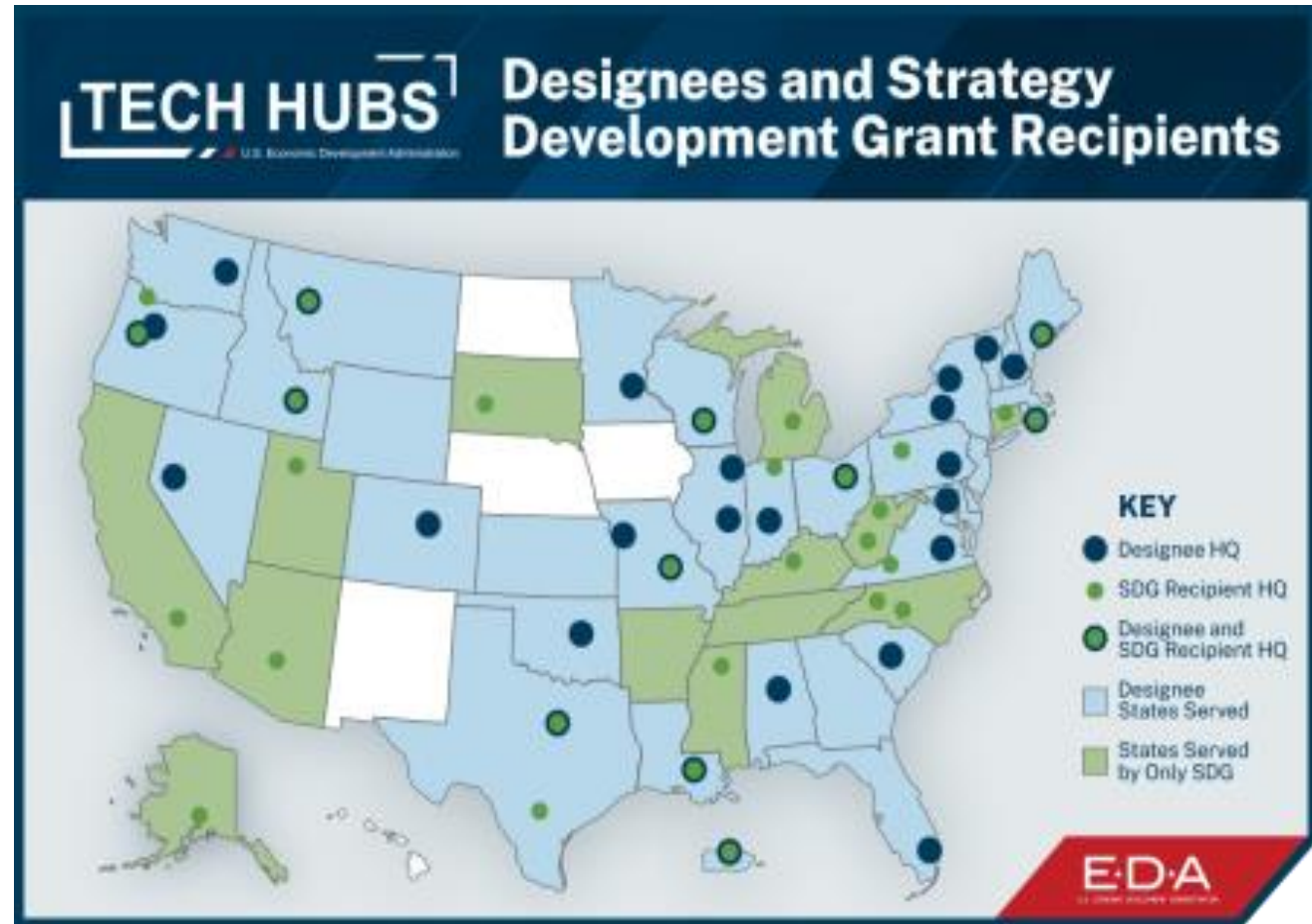
*One-third of jobs in innovation-based industries are concentrated in just 14 U.S. counties.*



Source: ITIF and Brookings, “The Case for Growth Centers: How to Spread Tech Innovation Throughout America,” December 2019

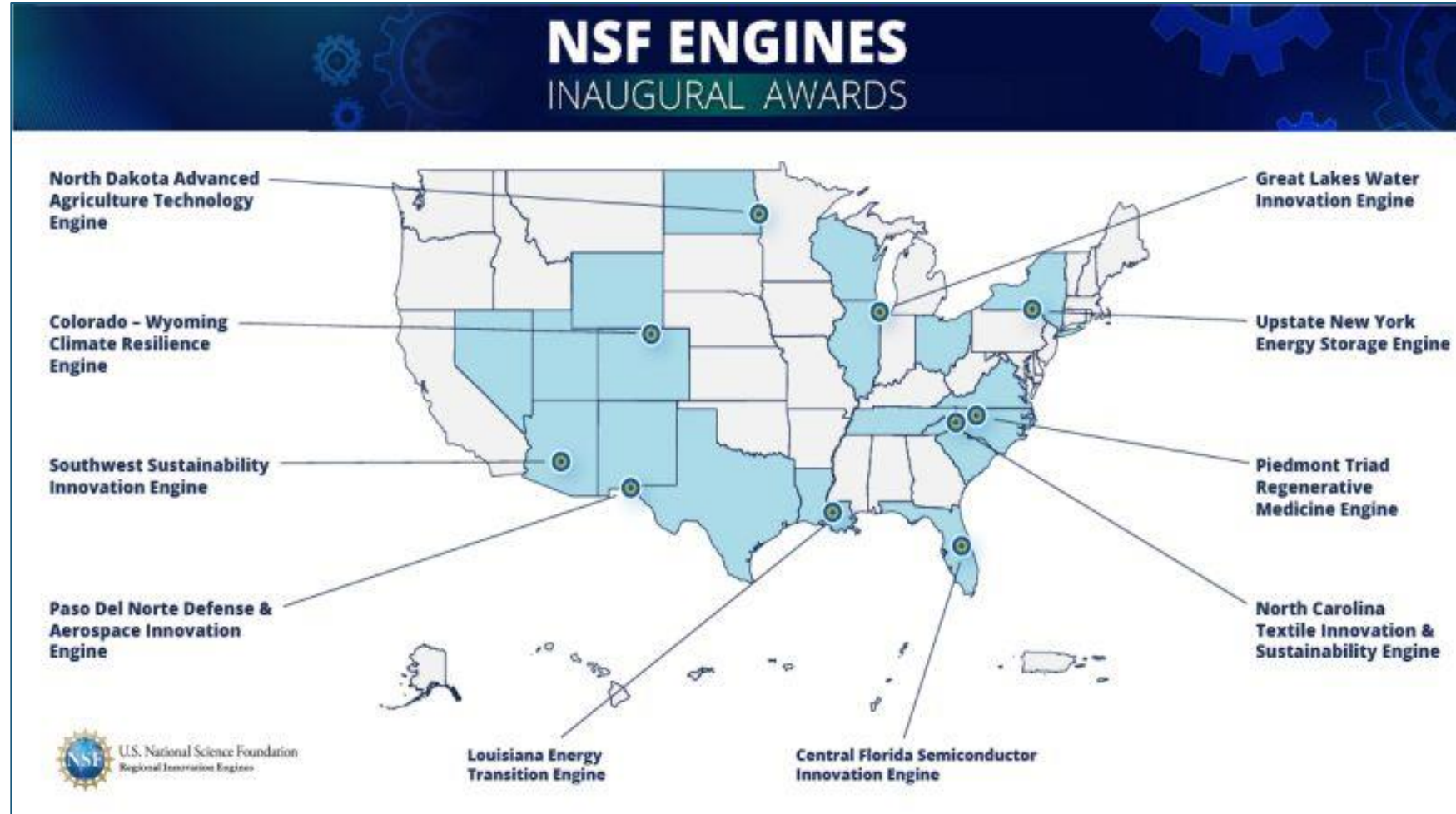
# EDA Tech Hubs Program

- Congress appropriated \$500M FY 23.
- 31 tech hubs designated, can compete for \$75M implementation grants.
- Place-based approach to build regional innovation ecosystems.
- However, Congress has appropriated only \$41M for the program in FY 24.



# NSF Regional Innovation Engines (RIE) Program

- RIE awarded \$15M in seed money to 10 teams.
- Goal to grow new regional hubs of tech R&D/inn.
- Potential to receive up to \$160M each over 10 years.
- Those funds authorized but not appropriated.



# CHIPS and Science Act of 2022: HPC Funding/Strategy

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- 40% increase in funding for Advanced Scientific Computing Research (ASCR) program, growing from \$1.03B FY 2021 to \$1.41B FY 2027.
- Admin’s FY 25 budget request would fund ASCR at \$1.15 billion, which would be an increase of \$130 million, or 12.7 percent, over FY24 levels.

	<b>FY23</b>	<b>FY24</b>	<b>FY25 PBR</b>	<b>\$ CHANGE</b>	<b>% CHANGE</b>
DOE SC Total	\$8.10B	\$8.24B	\$8.60B	+\$360M	+4.4%
ASCR	\$1.07B	\$1.02B	\$1.15B	+\$130M	+12.7%

- FY 25 budget requests \$880M for Advanced Simulation and Computing to support NNSA’s exascale high-performance computing capability.

# CHIPS and Science Act of 2022: HPC Funding/Strategy

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- NSF: Develop and regularly update an advanced computing roadmap.
- NSF: Initiate a secure computing enclave pilot program to assist universities in ensuring the security of data resulting from federally supported research.
- Ensure Regional Innovation Engines have access to HPC resources.



# ITIF's "A New Frontier Report"

**ITIF** | INFORMATION TECHNOLOGY & INNOVATION FOUNDATION

## A New Frontier: Sustaining U.S. High-Performance Computing Leadership in an Exascale Era

STEPHEN EZELL | SEPTEMBER 2022

Continued leadership in high-performance computing (HPC) as it enters the exascale era remains a key pillar of U.S. industrial competitiveness, economic power, and national security readiness. Policymakers need to sustain investments in HPC applications, infrastructure, and skills to keep America at the leading edge.

### KEY TAKEAWAYS

- HPC represents an essential strategic national capability, and global HPC leadership depends on staying at the cutting edge of both HPC systems development as well as their application and use.
- The advent of exascale supercomputing opens doorways for researchers from a variety of fields to explore physical phenomena at a scale and level of resolution, detail, fidelity, and confidence that heretofore was scarcely imaginable.
- Competence in HPC is increasingly important to industrial competitiveness, underpinning research and development (R&D) and innovation in a range of sectors from aerospace and biotechnology to consumer packaged goods and clean energy.
- Given the critical importance of supercomputing to countries' economic and national security, many nations and regions are competing fiercely for supercomputing leadership.
- In 2015, the United States had nearly twice as many of the world's top 500 supercomputers as China. But China has flipped the script, now reporting 173 (which is even likely an undercount) versus 128 for the United States.
- To keep America at the leading edge, policymakers must leverage HPC-related funding and programs in the CHIPS and Science Act, expand its STEM (science, technology, engineering, and math) pipeline, and democratize access to HPC computing resources.

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A New Frontier: Leveraging U.S. High-Performance Computing Leadership in an Exascale Era

Thursday, September 15, 11:00AM - 12:00PM EST

Watch later Share

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 U.S. House of Representatives

Rick Arthur  
 of Research

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 ITIF

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 Hewlett Packard Enterprise

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 Geophysical Fluid Dynamics Laboratory

Bob Sorensen  
 Hyperion Research

Watch on YouTube

# Frontiers in AI for Science, Security, and Tech (FAAST) Program

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- Deliver a transformational AI ecosystem and results for national science and security through DOE R&D and partnerships with industry.
- Deliver nation-scale AI toolsets for critical missions in nuclear security, Biopreparedness, biopharmaceutical innovation, etc.
- DOE will transform its vast repositories of scientific data into “data lakes” that provide “drop-in” solutions for multi-domain foundational AI models.
- Leverage DOE capabilities to assess security vulnerabilities and risks in frontier AI models.



# Thank You!

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