

# ADVANCING ENGINEERING EDUCATION AND RESEARCH: OUTLOOK AND STRATEGY FOR 2023

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ASEE Public Policy Colloquium  
February 7, 2023

LEWIS-BURKE  
ASSOCIATES LLC

# LEWIS-BURKE AND ASEE

## Lewis-Burke Has Worked With ASEE Since October 2017

- 40 policy experts with range of expertise/backgrounds allow multi-layered issue teams with deep expertise in federal agencies, Congress, and science, engineering, technology, and education areas
- 55 clients composed of science and education entities, universities, scientific societies, managers of large federal facilities, foundations, and industry

## Goals of Work with ASEE 2017-2022

- Increase ASEE advocacy and presence in Washington and among federal stakeholders
- Preserve and expand federal support and sound policy for engineering education and research
- Support ASEE councils to enhance advocacy goals of deans and other constituencies
- Inform future federal programs and create programmatic opportunities for ASEE and the ASEE community
- Elevate the role of ASEE within the higher education and science advocacy communities

## 2022 Efforts and Successes

- Inclusion of many priorities in *CHIPS and Science Act*
- Supplemental funding for NSF and Regional Tech Hubs
- Increased funding for the National Science Foundation and Department of Defense basic research in FY 2023 appropriations
- Successful engagement on ARPA-H structure and funding to ensure it will include the engineering community
- Continued workforce efforts in workforce legislation and at the Department of Defense



# ASEE CONGRESSIONAL PRIORITIES

## Advocate for Funding at Critical Agencies

- National Science Foundation research and education funding
- Department of Defense basic and applied research
- Specific research accounts for other mission agencies (e.g. ARPA-H, Commerce, DOE, NASA, NIH)
- Pell and other student aid

## Protect Against Threats to Engineering Schools and Colleges

- Science and Security
- Immigration – high-skilled immigration and student talent pipeline

## Inform Education, Research, and STEM Policy

- Research agency reauthorizations (e.g. Defense, Quantum, Computing, NASA)
- *Workforce Innovation and Opportunity Act* reauthorization – support for work-based learning; involvement of four-year institutions
- *CHIPS and Science* implementation

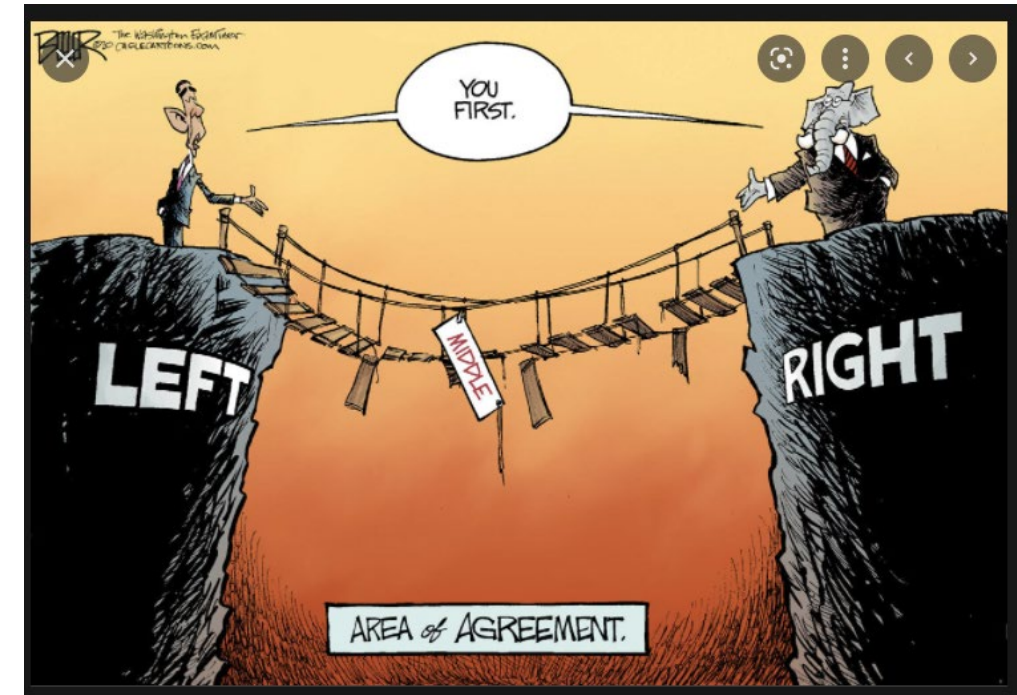
# FEDERAL OUTLOOK –DIVIDED GOVERNMENT IS UPON US

## Republican Agenda

- Increased oversight of Biden administration officials and recent policies
- Spending reductions to FY 2022 levels or further – seek debt ceiling concessions
- Climate and Energy strategy - increased domestic fossil fuel production (energy security and independence) while promoting innovation, natural solutions and conservation
- New Select Committee on China – Deterring, Competing
- Tax incentives for industries to write off R&D expenses
- Curbing illegal immigration, combatting crime

## Democratic Agenda

- Continued emphasis on Biden priorities in climate, equity, economic development
- Responding to oversight of administration officials and increased use of executive action to circumvent Congress
- Carry on confirming political/judicial nominations thru Senate
- Continue to find ways to address / create international alliances to meet challenges of Strategic competition & shared global challenges





# DIVIDED GOVERNMENT FUNDING OUTLOOK

- Competition
  - FY 2023 increases for NSF, DOD, DOE, NIH, ARPA-H – agencies are flush for now
  - Implementation of special funding – *CHIPS*, *Inflation Reduction Act*, and bipartisan infrastructure bill
  - U.S. still the largest R&D funder – with large emphasis on basic research
  - Competition in knowledge- and technology- intensive industries – bipartisan interest and attention
- Continued shift toward technology development / translation
  - Yet – Divided government often more focus on basic research
- Corporate and Philanthropic funding play larger roles
  - Outside influencers, new partnerships
- Strains on the system
  - Contrasting priorities
  - Ability of a few Members of Congress to block agreement
  - Uncertainty around the debt ceiling and push for deep spending cuts
  - Staff and focus to respond to oversight efforts

*Crises NOT AS predictable*

# MAJOR LEGISLATION AND ISSUES IN THE 118TH CONGRESS



# CHIPS AND SCIENCE ACT OF 2022

## Historic competitiveness and innovation package passed in August

- Bipartisan support, slimmed down version of two larger competitiveness packages (Senate's *USICA*; House's *COMPETES*)
- **Division A:** \$54 billion **appropriated** for semiconductor R&D, manufacturing, tax incentives, and workforce development
- **Division B:** \$102 billion **authorized** for major research initiatives
  - Many NSF provisions
    - Authorizes major NSF growth - \$15.6 billion in FY 2024
    - Officially authorizes TIP
    - EPSCoR Set Aside
    - Many education provisions - new ADVANCE for underrepresented minority faculty
  - Creates a new bioeconomy research and development national initiative for engineering biology
  - Establishes Regional Technology Hubs
  - Other agency authorizations – DOE, NIST, NASA
  - Many research security provisions

## Why it Matters for Tomorrow

- Build on huge bipartisan interest in competitiveness and innovation
- We cannot realize the vision of the bill without major growth to NSF
- New programs cannot be successful without funding – Tech Hubs, bioeconomy
- Note your role in major innovation competitions – NSF Engines, Tech Hubs – more money for these programs mean more transformational awards in more places in the country, better chance for your state!

# FY 2023 APPROPRIATIONS AND FY 2024 OUTLOOK

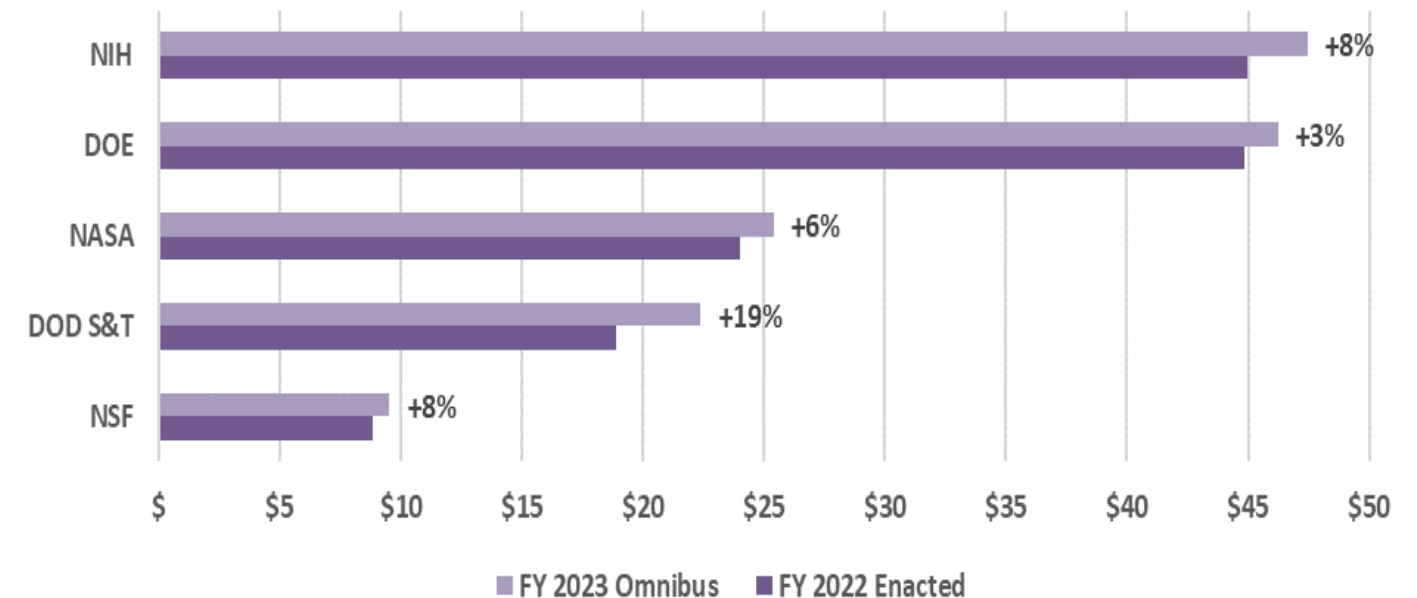
## FY 2023 Appropriations and FY 2024 Outlook

- FY 2023 appropriations finalized in December
- Both Defense and non-Defense programs received increases
- \$1 billion in *CHIPS and Science* supplemental funding for NSF, EDA, and Commerce Regional Tech Hubs
- \$1.5 billion for ARPA-H, now has \$2.5 billion to spend
- FY 2024 budget request delayed – March release likely
- Deep disagreement on spending levels for FY 2024 – year-long CR possible, potential brinkmanship or shutdowns

## Why it Matters for Tomorrow

- \$1 billion supplemental was far less than needed
- Cannot lose momentum with urgent national security challenge from China
- Reversion to FY 2022 funding levels would mean deep cuts to key agencies that are still recovering from sequestration

FY 2023 Appropriations for Select Federal Agencies  
(\$ in billions)





# NATIONAL SCIENCE FOUNDATION

## Major Growth in FY 2023 Appropriation and Supplemental Funding for *CHIPS and Science*

- \$335 million provided for *CHIPS and Science* – brings total increase to a historic 12 percent over FY 2022 funding
- TIP directorate officially launched and Engines program underway
- Emphasis on geography of innovation and capacity building – Engines, GRANTED, EPSCoR
- Engineering Directorate playing key role in Bioeconomy Initiative and continued manufacturing priority
  - Engineering Research Visioning Alliance continues to support new directions
- Continued major focus on equity and the Missing Millions – large growth to EDU in FY 2023 appropriations
- Continued focus on climate and clean energy – didn't get full funding in FY 2023 so future plans unclear

## Why it Matters for Today

- Unique moment at NSF – opportunity to hear more about direction of EDU, TIP, and ENG Directorates

## Why it Matters for Tomorrow

- Emphasize the importance of funding to meet the expanded mission outlined in *CHIPS and Science* - \$15.6 billion authorized in FY 2024!
- Funding for TIP should grow alongside core investments in research and education that power our STEM ecosystem

# DEPARTMENT OF DEFENSE

## Continued support but less focus under the Biden Administration given major domestic agenda

- Biden Administration focus on modernization and higher TRL activities/Senate continues to ensure funding for basic research
  - \$2.9 billion for basic research in FY 2023, 6 percent above FY 2022 funding
  - Continued major support for defense instrumentation - \$30 million increase for each branch
  - First ever Space Force basic research funding
  - \$15 million increase for manufacturing engineering education
- Continued interest in workforce needs, expanding university and industry partnerships, domestic and international student pipeline
  - Congressionally mandated report on graduate education still not completed
- New congressional interest in defense innovation ecosystems - strategy to foster required by FY 2023 defense authorization
- Shifting politics – Republicans divided on how much DOD should be included in their push for budget cuts

## Why it Matters for Tomorrow

- Must continue to make the case for why university research and workforce development is needed to keeping US tech superiority and protecting the warfighter
- Showcase innovation ecosystem activities and their relevance to defense priorities
- Continue the push for graduate traineeship program
  - Would enable stronger partnerships that prepare students to tackle national security challenges



# ENGINEERING FOR BIOLOGY, HEALTH, AND MEDICINE

## ARPA for Health is Established, Authorized, and Heavily Funded

- \$2.5 billion to spend between FY 2022 and FY 2023 appropriations
- Director is in place – Renee Wegrzyn – biosecurity and synthetic biology expert
- Modeled after DARPA, focus on high-risk high-reward projects and activities
- Four key priority areas: health science futures, scalable solutions, proactive health, resilient systems
- Development so far aligned with ASEE priorities
  - Emphasis on tech breakthroughs, independence from NIH, program manager autonomy, and broad scope across HHS mission

## National Bioeconomy Initiative Launched

- Harness the tools of engineering to meet biological challenges in health, agriculture, materials, and other sectors
- Specific program thrusts not yet well defined across agencies

## Why it Matters for Tomorrow

- Note exciting research in engineering biology/biomanufacturing/biotech and importance of new investments across NIH, NSF, DOE, and DOD to realize the transformational vision of the bioeconomy initiative
- Thank Members involved in ARPA-H authorization and appropriations for inclusion of our principles and note our hopeful watching of ARPA-H next steps

# EDUCATION AND WORKFORCE DEVELOPMENT

## Increased Oversight and Little Legislative Movement on Higher Education

- Increasingly partisan view of higher ed as conservatives focus on grievances of non-college-educated voters
- Extremely small chance of *Higher Education Authorization* movement – deep disagreements on many issues
- House oversight attention on endowments, campus DEI activities/critical race theory, free speech, foreign gifts, and other issues

## *Workforce Innovation and Opportunity Act (WIOA) Reauthorization Potential this Year*

- Higher chance of bipartisan agreement on workforce development than education policies in split Congress
- WIOA authorizes workforce development programming at the Department of Labor (DOL)
- WIOA programs have typically left out four-year institutions of higher education as eligible entities and are often not flexible enough to support innovative workforce development programs like experiential learning and cooperative education
- Push for sector-based workforce development to enable innovation in emerging technology areas

## Why it Matters for Tomorrow

- If your school is strong in workforce development, advocate for WIOA to include four-year institutions of higher education for workforce development grant programs
- WIOA programs should support innovation so that we can set students up for success in the modern economy





# IMMIGRATION AND RESEARCH SECURITY

## Immigration and Border Security Continue to be a Major Partisan Issue

- House Republicans pushing for immigration changes as part of border security focus – some proposals also restrict legal immigration
- Bipartisan group in Senate looking for potential deal
  - End of pandemic emergency/title 42 and DACA court rulings could increase urgency for action
- Chance of legislation passing still low given partisan challenges
  - Even policies with bipartisan support have a hard time moving

## Research Security Oversight Expected to Ramp Up

- House Republicans have made China a major focus on their agenda, including concerns about university research security
- House Science Committee and new China Committee both expected to increase oversight
- Continued push for new provisions in the *National Defense Authorization Act*
- Agencies focused on implementing provisions from *CHIPS and Science*

## Why it Matters for Tomorrow

- Emphasize importance of attracting the best and brightest for our competitiveness and innovation ecosystem
- Be ready to discuss how your campus takes research security seriously and what precautions you have put in place



# NEW HOUSE US-CHINA COMPETITION COMMITTEE

The House voted 365-65 to establish the **Select Committee on the Strategic Competition Between the United States and the Chinese Communist Party** (H. Res. 11)

- The 16-member panel will be Chaired by Rep. Mike Gallagher (R-WI)
- The purpose of the new Committee is to explore ways the U.S. can counter China's growing economic and strategic power
- The bipartisan vote reflects rare agreement between Republicans and Democrats at the start of a divided government
- Initial focus will be on U.S. investments in China, including tax-advantaged pension funds
- Ability to hold public hearings and submit policy recommendations to other committees on ways the U.S. can counter China's economic, technological, and national security competition

## **Why it Matters for Tomorrow**

- Concerns over U.S. competition with China continue to drive the narrative on Capitol Hill
- Important to make connections between research and innovation funding and competitiveness for members on the committee
- Policy recommendations could have research security and innovation investment implications

# QUESTIONS AND DISCUSSION

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# BACKUP SLIDES

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# BIDEN ADMINISTRATION R&D PRIORITIES

## Biden Administration Science and Technology Priorities

The FY 2024 OMB/OSTP memo to federal agencies highlights importance of federally supported R&D to address societal grand challenges including climate change, health, prosperity, security, environmental quality, equity, and justice for all Americans. The Biden Administration's focus on racial equity innovation and the translation of basic research into businesses and products is also emphasized in the memo.

## FY 2024 Multi-Agency R&D Priorities

- Preparing for and Preventing Pandemics
- **NEW** Reducing the Death Rate from Cancer by Half:
  - **NEW** Close the Screening Gap
  - **NEW** Understand and Address Environmental and Toxic Exposures
  - **NEW** Decrease the Impact of Preventable Cancers
  - **NEW** Bring Cutting Edge Research Through the Pipeline to Patients and Communities
  - **NEW** Support Patients and Caregivers
- Tackling Climate Change:
  - Climate Science
  - Innovation in Clean Energy and Climate Technology and Infrastructure
  - Climate Change Adaptation and Resilience
  - Nature-Based Climate Solutions
  - Greenhouse Gas Monitoring
- Advancing National Security and Technological Competitiveness:
  - Critical and Emerging Technologies
  - Commercialization and Scale-Up
  - **NEW** International Cooperation
  - **NEW** Catastrophic Risk Mitigation
- Innovating for Equity
- **NEW** Cultivating An Equitable STEM Education, Engagement, And Workforce Ecosystem
- **NEW** Promoting Open Science and Community-Engaged R&D

# ECONOMIC DEVELOPMENT ADMINISTRATION

**Funding Outlook:** In FY 2023, EDA is funded at \$498 million, a 33.3% increase in base funding. The agency also received \$1.18 billion in supplemental funding that is available until expended.



## Overview:

- Broadly supports innovation, infrastructure, workforce and economic development initiatives.
- Investment priorities for funding decisions: Equity; Recovery and Resilience; Workforce Development; Manufacturing; Technology-Based Economic Development; Environmentally-Sustainable Development; etc.

## Major Programming in FY 2023 Omnibus:

- Received \$500 million for **Regional Technology Hubs** – Massive hubs authorized in CHIPS+ to stimulate regionally-diverse economic growth and expand innovation capacity around key technology areas. *\$459 million funded through supplemental.*
- **RECOMPETE Pilot Program** - \$200 million for a program that will provide development and implementation grants to support long-term, place-based economic development in persistently distressed labor markets and underserved communities. *\$159 million funded through supplemental.*
- Disaster Recovery - \$500 million in supplemental funding for regions impacted by FEMA-declared major disasters in 2021 and 2022. Supports economic development in qualified regions through construction, non-construction, technical assistance, etc.

## Other Programs of Note:

- Build to Scale: Focuses on entrepreneurship and commercialization activities.
- STEM Apprenticeship Program: innovative STEM workforce models that complement a region's workforce needs.
- University Centers: Commercialization support, business consultation, and planning.

# DEPARTMENT OF DEFENSE

**FY 2023 Funding: DOD received \$797.7 billion in discretionary spending, a \$76 billion increase over the FY 2022 enacted level and \$45 billion above the FY 2023 PBR.**



- Within DOD Research, Development, Test and Evaluation (RDT&E), **Science and technology (S&T) accounts** receive overall boosts across Services and Defense-wide accounts, compared to FY 2022.
  - **S&T accounts (6.1-6.3) would be funded at \$22.4 billion**, a 19 percent increase, compared to FY 2022.
    - Basic Research (6.1) – 5.7% increase
    - Applied Research (6.2) – 12.9% increase
    - Adv. Tech Development (6.3) – 26.6% increase
  - Funding prioritizes the Department’s missile defense, climate, and modernization initiatives.
  - Increases DOD investment in microelectronics, next generation wireless, quantum, hypersonics, and space research.
- **Other Major Increases/Priorities**
  - \$174.3 million for the **National Defense Education Program (NDEP)**, including civil society, language, and SMART programs.
  - \$120 million increase for the **Defense University Research Instrumentation Programs (DURIP)**, spread evenly (\$30 million) across all Service Branches, including Space Force for the first time.
  - Bolstering the defense workforce, including manufacturing research.

# DEPARTMENT OF DEFENSE - HEALTH & BIOMEDICAL RESEARCH

**FY 2023 Funding Outlook: The Defense Health Program received a budget of \$3 billion, an increase of \$408 million or 15.5% over FY 2022.**



- **Mission:** “Responsively and responsibly create, develop, acquire, and deliver capabilities for the warfighter.”
- The Defense Health Program includes:
  - Defense Medical Research and Development Program (DMRDP) / Army Medical Research and Development Command
  - Congressionally Directed Medical Research Program (CDMRP)
- **\$370 million for the Peer Review Medical Research Program (PRMRP) and \$130 million for the Peer Review Cancer Research Program within the Congressionally Directed Medical Research Program (CDMRP).**
- DOD Core Programs/Projects Program Area Directorates/Joint Program Committees:
  - Combat Casualty Care
  - Radiation Health Effects
  - Military Infectious Diseases
  - Medical Simulation and Information Sciences
  - Military Operational Medicine
  - Clinical and Rehabilitative Medicine
- Other limited funding for health-related issues in DOD can be found through the Services as well as the Defense Advanced Research and Development Authority (DARPA) and the Defense Threat Reduction Agency (DTRA).



# NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY



**Funding Outlook:** In FY 2023, NIST was funded at \$1.63 billion, a \$397.3 billion (32.3%) increase compared to the FY 2022 level. NIST PBR for FY 2023 was \$433.1 million above FY 2022.

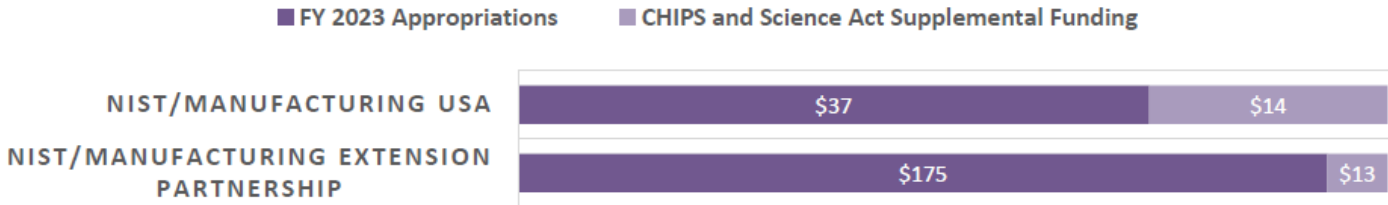
**Agency Priorities – *Industries of the Future***

- Cybersecurity
- Artificial intelligence
- Quantum information science
- Biotechnology
- Advanced manufacturing
- Emerging research priorities include:
  - Bioeconomy and biomanufacturing
  - Climate and energy measurement
  - Semiconductors (CHIPS Act)

***NIST Priorities Included in FY 2023 bill***

- \$8 million for standards of critical and emerging technologies
- \$37 million for Manufacturing USA; more than doubles funding than FY 2022, but less than PBR request to quadruple the program.
  - \$20 million for a new manufacturing institute (topic TBD)
- \$175 million for the Hollings Manufacturing Extension Partnership, a 10.8% increase compared to the FY 2022 levels

FY 2023 APPROPRIATIONS AND SUPPLEMENTAL FUNDING (\$ IN MILLIONS)



# DEPARTMENT OF LABOR (DOL)

**FY 23 Funding Outlook: Discretionary programs within DOL would receive \$13.8 billion, up \$652million as compared to the FY 2022 enacted level.**



## Agency Priorities:

- Expansion of Registered Apprenticeship (RA)
- Increased support Workforce Innovation and Opportunity Act (WIOA) programs and community college capacity
- Support for workforce development in rural communities

## New Priorities:

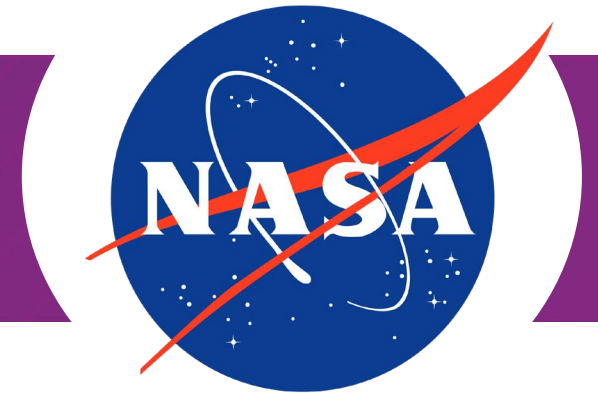
- Career pathways for youth grants
- Directive to support additive manufacturing and wireless infrastructure workforce

## Programs of Note:

- Apprenticeship Grants: Primarily focused on state efforts, with some eligibility for other entities like IHEs.
- H-1B Skills grants: Competitive training grants focused on middle- to high-skilled H-1B occupations in key industry sectors, opportunities for infrastructure workforce development
- Strengthening Community College Training Grants: Build connections between CCs and employers/regional workforce needs

# NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

**FY 2023 Funding Outlook: NASA received funded at \$25.38 billion, a 5.6% increase over FY 2022.**



## Overview

- Mission: advance human exploration and understanding of the Earth and space
- Most of NASA's budget devoted to human exploration missions and operations
- FY 2023 breakdown:
  - \$7.8 billion for science
  - \$1.2 billion for technology
  - \$935 million for aeronautics

## Decadal surveys inform scientific priorities, competitive opportunities, and influence policymakers:

- Earth Science (ESAS 2017), Astronomy (Astro2020), Planetary Science (2022), Biological and Physical Science (2023), Heliophysics (2024)

## Likely FY 2023 Themes

- Delays/uncertain timing of draft/final AOs, slower than anticipated implementation of recent astronomy and planetary decadal.
- Extramural opportunities within space technology not as robust as expected due to FY 2023 funding outcome.
- Increased focus on GHG monitoring and climate research via new Earth Information Center.
- Continued interest in nexus between scientific exploration of the lunar environment and technology development needed to support future Artemis missions.

## Political Outlook

- NASA, commercial space a focus for House Science, Space, and Technology Committee and Chairman Frank Lucas (R-OK)
  - **Expect significant legislative attention on those topics, especially at intersection with sustained concerns over US global competitiveness/China**
- Broader fights over federal spending will exacerbate strain already felt across NASA science portfolio.