

Congressional Update: Congress Passes CHIPS+Science Legislation

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Introduction

Yesterday, Congress passed a long-awaited competitiveness and innovation package that is one of the most comprehensive in decades. The bill passed with overwhelmingly bipartisan support, including almost all Democrats, 15 Republican Senators, and 24 Republican House Members voting in favor. The *CHIPS+Science Act (CHIPS+)* appropriates \$54 billion in funding for semiconductor research and development, manufacturing, tax incentives, and workforce development as well as advanced wireless innovation infrastructure and development. The legislation also authorizes approximately \$102 billion to advance major research initiatives at the National Science Foundation (NSF), Department of Energy (DOE), the National Institute of Standards and Technology (NIST), and the National Aeronautics and Space Administration (NASA), creates a new bioeconomy research and development national initiative, and establishes Regional Technology Hubs. These latter authorized provisions did not come with appropriations and thus funding will need to come through regular appropriations or other special funding vehicles. The legislation serves as a slimmed down answer to congressional gridlock that occurred during conferencing of two larger competitiveness packages, the *U.S. Innovation and Competition Act (USICA)*, which was passed by the Senate in June of 2021, and the *Creating Opportunities for Manufacturing, Preeminence in Technology and Economic Strength Act (COMPETES)*, which was passed by the House in February 2022. Both acts sought to bolster innovative research and development across the country to remain competitive with China and other foreign adversaries, but conferencing on the two pieces of legislation stalled on disagreements over trade and other contentious provisions. Ultimately the new legislation jettisoned numerous provisions from *USICA* and *COMPETES* that dealt with trade, immigration, foreign relations, banking, public access to scholarly publications, the Department of Education (ED), labor, health, finance, and other areas while retaining the vast majority of science-related provisions from across both bills.

CHIPS+ is comprised of Division A, the *CHIPS Act of 2022*, and Division B, *Research and Innovation*. Division A provides approximately \$54 billion in funding for the *CHIPS Act of 2022*, including \$11 billion for semiconductor-related research and development, manufacturing, and packaging activities at the Department of Commerce. Division A would also appropriate \$2 billion and \$500 million for semiconductor programs at the Department of Defense (DOD) and Department of State (DOS), respectively. Additionally, the bill includes a new \$200 million fund for NSF microelectronics workforce activities and \$1.5 billion for the National Telecommunications and Information Administration (NTIA) to develop advanced wireless technologies. Division B authorizes \$102 billion without real funding and establishes policy for various federal agencies such as NSF, DOE, NIST, and NASA; authorizes a new interagency bioeconomy research and development national initiative; authorizes \$10 billion for Regional Technology and Innovation Hubs; and includes many provisions related to STEM education and workforce development, broadening participation, manufacturing, wireless research, ocean acidification, and blockchain expertise. In contrast to the science provisions where the vast majority of provisions of *USICA* and *COMPETES* were included in the final legislation, many of the politically contentious research security, immigration, and higher education provisions the research and higher education communities have been following were not included. These include concerning research

security provisions such as those related to Section 117 and 124 of the *Higher Education Act* and the Committee on Foreign Investment in the United States (CFIUS) as well as positive education and workforce provisions such as those enabling easier green card access for non-citizens with advanced STEM degrees, authorizations for international education programs, authorization of short-term Pell grants, and the *National Apprenticeship Act*.

The legislation now heads to the President’s desk for signature. The Administration has been actively pushing for bill passage and the President is strongly expected to sign it. The following pages provide additional information on major provisions in the *CHIPS+* legislation, and a comparison with *COMPETES and USICA*.

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Division A – CHIPS Act of 2022

In December 2020, Congress authorized \$52.2 billion in funding for the *Creating Helpful Incentives to Produce Semiconductors (CHIPS) for America Act* as part of the *FY 2021 National Defense Authorization Act (NDAA)*. Since the authorization of *CHIPS*, both Republicans and Democrats have vocalized the urgency behind funding for domestic semiconductor programs. The *CHIPS Act of 2022* provides the

appropriations needed for programs at the Departments of Commerce (DOC), Defense (DOD), and State (DOS) as well as a new workforce program at NSF and additional tax incentives not included in the original *CHIPS for America Act*, *USICA*, or *COMPETES*. With these additions, the funding provided in the *CHIPS Act of 2022* is \$54.2 billion, \$2 billion over the amounts proposed in *USICA and COMPETES*.

As authorized in the FY 2021 NDAA, the *CHIPS Act of 2022* would allocate funding to multiple programs across federal agencies, including the CHIPS for America Fund (DOC), the CHIPS for Defense Fund (DOD), and the CHIPS for America International Technology Security Fund (DOS). More information on the CHIPS related programs can be found below:

CHIPS for America Fund (\$50 billion)

The CHIPS for America Fund would provide \$11 billion for DOC semiconductor research and development (R&D) activities and \$39 billion in financial incentives for domestic facilities and equipment related to semiconductor activities and production. Of most interest to the academic and research community, the \$11 billion over five years for R&D activities would fund the following:

- **National Semiconductor Technology Center (NSTC):** A public-private partnership for advanced semiconductor manufacturing R&D and prototyping and workforce development.
- **Advanced Packaging Manufacturing Program:** A federal R&D program to bolster assembly, test, and packaging capabilities.
- **Manufacturing USA Semiconductor Institute:** A partnership between government, industry, and academia to advance semiconductor manufacturing and workforce training.
- **Microelectronics Metrology R&D:** An internal NIST research program to advance measurement science, standards, material characterization, instrumentation, testing, and manufacturing capabilities.

Below is a summary of the funding breakdown for the \$50 million CHIPS for America Fund per fiscal year (FY).

APPROPRIATION	FY23	FY24	FY25	FY26	FY27	TOTALS	
Sec. 9902 incentive program	\$19 billion (including \$2 billion dedicated to legacy chip production)	\$5 billion	\$5 billion	\$5 billion	\$5 billion	\$39 billion	
Sec. 9906 R&D/workforce development programs	\$5 billion	\$2 billion	\$1.3 billion	\$1.1 billion	\$1.6 billion	\$11 billion	
							\$2 billion - NSTC
							\$2.5 billion – NAPMP \$500 million – other R&D (including Manufacturing USA)
DOC Admin (2% of Sec. 9906 funding) *	-\$100 million	-\$40 million	-\$26 million	-\$22 million	-\$32 million	-\$220 million	

*Note: The Department of Commerce (DOC) is authorized to spend 2% of the Sec. 9906 appropriation on administration, salaries, expenses, and oversight costs of managing the CHIPS Program, including \$5 million/year for the inspector general.

CHIPS for America Defense Fund (\$2 billion)

The CHIPS for America Defense Fund would provide DOD and the Intelligence Community with funding for R&D, testing, and workforce development. Funds would be used to implement DOD’s

Microelectronics Commons, a national university-based network for prototyping and lab-to-fab transition of semiconductor technologies in addition to workforce training.

CHIPS for America International Technology Security Fund (\$500 million)

The CHIPS for America International Technology Security Fund would provide funding for international information and communications technology security. The fund would support international semiconductor supply chain activities, including secure and trusted telecommunications and other emerging technologies.

CHIPS for America Workforce and Education Fund (\$200 million)

The CHIPS for America Workforce and Education Fund would provide funding for activities at NSF to strengthen the nation's semiconductor workforce. In *NSF for the Future* under Division B, the bill provides the authorization for this funding. Authorized activities would include innovative approaches to workforce development such as new curricula and materials, professional development programs, design of, or direct support for learning experiences, faculty hiring and academic research capacity building, workforce pathway programs and partnerships, graduate traineeships, informal education, skilled technical workforce investments, and prioritization within existing workforce development programs. The bill would also authorize the creation of a National Network for Microelectronics Education including regional partnerships and activities to grow workforce pathways, shared academic infrastructure for experiential learning, and a coordination hub for dissemination of best practices and increased public awareness.

Public Wireless Supply Chain Innovation Fund (\$1.5 billion)

The Public Wireless Supply Innovation Fund would provide funding for DOC's National Telecommunications and Information Administration (NTIA) to develop innovative wireless technologies. Much like *COMPETES* and *USICA*, the final legislation would appropriate \$1.5 billion for the Public Wireless Supply Chain Innovation Fund to deploy Open Radio Access Network (Open RAN) network equipment to promote open architecture, software-based wireless technologies, and funding innovative, catalytic mobile broadband technologies. The fund will be managed by the National Telecommunications and Information Administration (NTIA), with input from NIST, the Department of Homeland Security (DHS), and the Intelligence Advanced Research Projects Activity (IARPA), among others.

Additional provisions in the *CHIPS for America Act of 2022* include:

- A 25 percent investment tax credit (ITC) for investments and incentives in semiconductor manufacturing;
- Expanding the scope of the Government Accountability Office (GAO) report required in the FY 2021 NDAA to evaluate steps the federal government can take to avoid future semiconductor and workforce shortages;
- Encouraging increased participation of economically disadvantaged individuals in the semiconductor workforce; and
- Prohibiting the use of federal incentive funds for new semiconductor manufacturing efforts in countries that present a national security threat, including China.

Division B – Research and Innovation

National Science Foundation

The *CHIPS+* package contains a conferenced version of the *National Science Foundation for the Future Act*, which the House passed last summer and was part of the House's *COMPETES* bill. The conferenced version contains almost all of *NSF for the Future* with some modified language, and incorporates versions of all NSF-related provisions from the *Endless Frontier Act* portion of *USICA*. The final version of *NSF for the Future* authorizes increased funding for NSF research, supports STEM Education at all levels, increases opportunities for broadening participation, grows the percentage of funding at NSF going to EPSCoR-eligible institutions and authorizes the new Directorate for Technology, Innovation, and Partnerships (TIP).

The legislation authorizes \$81 billion for NSF over five years, growing annual authorized funding to \$19 billion in FY 2027. The authorization is shifted forward one year compared to *COMPETES and USICA* while the total amount authorized is equivalent to what *USICA* proposed. The House and Senate struck a balance between their visions of how much funding should be authorized for TIP versus the rest of NSF, with existing NSF programs authorized at \$65 billion over the five-year period and TIP authorized for \$16 billion. The provisions authorizing the new TIP Directorate similarly balance House and Senate visions, emphasizing the focus on ten key technology areas and five critical social, national, and geostrategic challenges. The initial ten technology focus areas are identical to those in *USICA*: artificial intelligence (AI) and machine learning; high performance computing; quantum information science and technology; robotics and advanced manufacturing; disaster prevention and mitigation; advanced communications and immersive technology; biotechnology and synthetic biology; data management and cybersecurity; advanced energy and efficiency technologies; and advanced materials science. The initial five societal, national, and geostrategic challenges are similar to those in *COMPETES*: national security; manufacturing and industrial productivity; workforce development and skills gaps; climate change and environmental sustainability; and inequitable access to education, opportunity, and other services. The new directorate is authorized for all activities proposed in either bill: Regional Innovation Engines that were included in both bills, translation accelerators from *USICA*, test beds from *USICA*, capacity building activities from both bills, entrepreneurial fellowships from *COMPETES*, scholarships and fellowships from *USICA*, research and development from *USICA*, and scaling science, technology, engineering, and mathematics (STEM) innovation centers from *COMPETES*. *CHIPS+* provides specific funding authorization for most of the activities within the Directorate but does not set specific percentages for each activity as *USICA* did.

CHIPS+ includes numerous policy provisions beyond authorization of the TIP directorate. Of most significance, a compromise for the Established Program to Stimulate Competitive Research (EPSCoR) set aside is included, which makes significant changes from the *USICA* version. While the original *USICA* provision would have required NSF to immediately set aside 20 percent of its funding to the EPSCoR program, the conferenced version focuses on funding EPSCoR-eligible institutions by growing the set aside gradually from 15.5 percent in FY 2023 to 20 percent in FY 2029. The final provision also gives NSF more flexibility noting that NSF should grow EPSCoR funding to "the maximum extent practicable." For comparison, current funding to EPSCoR-eligible jurisdictions is about 12 percent of NSF funding. The agreement notes that NSF should pursue this growth to EPSCoR-eligible institutions while ensuring continued or growing success for emerging research institutions in all states and maintaining merit review to the maximum extent possible. The legislation additionally allows NSF to reconsider EPSCoR-eligibility criteria in five years.

In other policy provisions, major funding increases would be authorized for specific programs such as midscale research infrastructure, graduate fellowship and traineeships, the Noyce teacher training program, and Cyber Corps Scholarships for Service. Regarding STEM education, the *CHIPS+* would increase mentoring and other efforts to better support graduate students and postdoctoral researchers, increase support for minority serving institutions (MSIs) and other emerging research institutions, expand data collection on the STEM workforce, authorize a new AI Scholarships for Service program modeled on the current cyber-focused Scholarships for Service program, and authorizes \$60 million for a new Master STEM Teachers Corp Pilot. The bill includes other requirements to increase research accessibility, accountability, and security. These include research security provisions detailed below, authorization of a new National Security Data Service and new advanced computing planning requirements. There are also several provisions related to specific areas of research, including: climate change; social, behavioral, and economic sciences; food-energy-water; sustainable chemistry research and education; mining; unmanned maritime and aerial systems; precision agriculture; astronomy and satellite constellations; microgravity utilization; risk and resilience; and support for biological research collections. Two provisions from *COMPETES* were not included in the final version: one related to research on violence prevention and one related to research on the opioid epidemic.

Energy

The package authorizes \$68 billion in funding over five years and advances policy for major research and infrastructure initiatives at the Department of Energy (DOE) (see graphic below). These provisions have broad bipartisan support. While the current package does not provide funding for DOE—authorized activities would have to be funded through annual appropriations bills—the DOE provisions provide a useful blueprint for new initiatives, research centers, and infrastructure investments that are likely to be proposed in future president’s budget requests and funded by Congress.



The centerpiece of authorized DOE investments would be \$50.3 billion for the DOE Office of Science over the next five years. This would be a significant boost in funding for the Office of Science—from a \$7.5 billion fiscal year (FY) 2022 enacted level to close to \$11 billion by FY 2027. If realized through appropriations, this funding would boost core research in the physical sciences, help maintain and operate the largest collection of world-class scientific user facilities, expand STEM workforce programs,

and lead efforts to advance emerging technologies like quantum information science and AI. As DOE would receive no funding for microelectronics research and development in the *CHIPS Act of 2022*, a separate \$725 million authorization to establish a dedicated research and development program and up to five national microelectronics research centers was included in the legislation. Outside the Office of Science, the package provides authorization to support the national labs and research programs supported by DOE's applied energy offices—\$11.2 billion for emerging technologies research and development and \$4 billion for applied DOE national lab infrastructure. The package also includes support for nuclear energy activities, including \$800 million for advanced nuclear technologies research, development, and demonstration and \$665 million to support existing and new university research reactors and nuclear science and engineering facilities. To take advantage of these investments, the package expands DOE's technology transfer and development programs.

While Congress did not recommend specific funding levels, the legislation directs DOE to establish a low-emissions steel manufacturing research, development, and demonstration program and to advance bioeconomy research and development activities.

The bill also provides additional guidance related to the EPSCoR program. The bill requires DOE to provide no less than 10 percent of research funding awarded to institutions of higher education to EPSCoR institutions. The legislation also recommends \$375 million for the Office of Science-managed EPSCoR program, with \$50 million authorized in FY 2023 and growing to \$100 million by FY 2027. For comparison, the FY 2022 enacted funding level for EPSCoR was \$25 million. The legislation further expands research and infrastructure support to EPSCoR institutions, including research grants to early career faculty and staff in core programs and emerging technology areas and student fellowships. The legislation includes a separate authorization of \$25 million each year over five years to fund the development and purchase of state-of-the-art instruments and equipment ranging from \$500,000 to \$20 million for EPSCoR institutions. The legislation also strongly encourages DOE to expand participation of EPSCoR institution researchers and faculty on the six Office of Science advisory committees.

Beyond the EPSCoR program, the bill proposes \$200 million over five years to grow existing programs, such as the Graduate Student and the Science Undergraduate Laboratory Internship programs, to meet growing needs for a highly trained STEM workforce. This also includes support for new, dedicated efforts to expand opportunities to increase the number and the diversity, equity, and inclusion of highly skilled STEM professionals working in DOE mission-relevant disciplines and broaden the recruitment pool to increase participation and diversity, such as expanded partnerships with minority-serving institutions, emerging research institutions, and scientific societies. The bill directs DOE to coordinate with the National Science Foundation on its Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science National Network (INCLUDES) program.

STEM Education and Broadening Participation

CHIPS+ authorizes substantial investments at the National Science Foundation (NSF) and the Department of Education (ED), and other federal agencies across all levels of science, technology, engineering, and mathematics (STEM) education. It is important to note that all programs in this section have only been authorized only and must be funded separately through the annual appropriations process.

Relevant programs include:

Provisions Related to Elementary and Secondary STEM Education:

- Centers for Transformative Education Research and Translation: Like *COMPETES*, *CHIPS+* would authorize a new grant program at NSF to provide grants to institutions of higher education and other non-profit organizations to establish Centers for Transformative Education Research and Translation. The centers will focus on scaling education innovations such as supporting STEM education infrastructure in areas such as cyberlearning technologies, research and development of alternative models to current models for educators and learners, and learning needs, especially for rural communities and students facing disabilities. This provision also encourages NSF to partner with ED to jointly fund and carry out the Centers for Transformative Education Research and Translation program.
- Supporting K-12 Informal STEM Opportunities: The bill would authorize NSF to create a program to research and develop effective approaches for engaging K-12 students in informal STEM education using before school, after school, and summer activities. The goal of the program is to expand the STEM workforce pipeline, broaden the participation of underrepresented groups in STEM, and provide teachers with new approaches to STEM concepts for students. A similar provision focused on students in grades K-8 was included in *COMPETES*.
- National STEM Teacher Corps Pilot Program: *CHIPS+* includes the provision from *USICA*, establishing a ten-year National STEM Teacher Corps pilot program to recognize STEM teachers across the country by elevating their work and best practices that emerge from the Corps to a national audience. A National STEM Advisory Board will be formed to advise the Director of NSF. Members of the Corps will receive an annual stipend of at least \$10,000.
- National Academies Study: *CHIPS+* includes the directive from *COMPETES* that NSF partner with the National Academies of Science, Engineering, and Medicine (NASEM) to study factors that impact implementation of education innovations, compile promising evidence-based STEM education innovations, and make recommendations to NSF, ED, and other stakeholders on ways to address barriers to implementation of education innovations.
- Teacher Recognition: *CHIPS+* adds teachers from the Commonwealth of the Northern Mariana Islands, American Samoa, the U.S. Virgin Islands, and Guam to be eligible to be selected for a Presidential Award for Excellence in Mathematics and Science.

Investments in Postsecondary STEM Education and Workforce:

- Undergraduate STEM Education Research: *CHIPS+* includes the provision from *COMPETES* establishing a new NSF grant program for institutions of higher education to study current and future STEM workforce needs, ways to increase collaboration between institutions of higher education and industry, strategies to expand the diversity of the STEM workforce, and methods to increase the adoption of effective STEM education practices.
- Centers of Scientific and Technical Education: *CHIPS+* updates NSF's Advanced Technological Education (ATE) program to include awards to establish centers of excellence in advanced technology fields for associate-degree granting colleges. Other non-profits and institutions of higher education may enter into a consortium with associate degree-granting colleges to develop a center that acts as a regional model for secondary schools and colleges to disseminate curricula, teaching methods, instructional material, and conduct other relevant activities. This is similar to a provision included in *COMPETES*, though in the previous version institutions of

higher education and non-profits were able to apply for the centers of excellence without an associate degree granting institution as a consortia partner.

- Course-based Undergraduate Research Experiences: *CHIPS+* includes the provision from *COMPETES* directing NSF to establish a four-year pilot program to support five centers of excellence at institutions of higher education or non-profit organizations focused on the development and scaling of course-based undergraduate research experiences.
- Graduate STEM Education Research: Like *COMPETES*, *CHIPS+* establishes a new NSF grant program for institutions of higher education to create and implement innovative strategies for facilitating graduate student career exploration, which would include work-integrated experiences. The bill directs NSF to support a five-year pilot program that would award \$2,000 research supplements to existing NSF grants to support professional development for graduate students. Additionally, *CHIPS+* directs NSF to provide grants to study effective graduate STEM education, including the impact of traineeships, research assistantships, mentoring, and graduate student mental health, among other topics.
- Graduate Research Fellowship Program: As *COMPETES* did, Congress expresses in *CHIPS+* its desire to see the Graduate Research Fellowship Program acquire at least 3,000 fellows over the next five years and calls on NSF to conduct outreach for the program across critical STEM fields and underrepresented populations. The bill also requires the NSF Director to ensure students from cybersecurity fields are being considered for the Graduate Research Fellowship Program.
- AI Traineeships and Fellowships: *CHIPS+* directs NSF to submit a report to Congress on its plans and capacity to recruit and train the next generation AI workforce. After the report evaluation, NSF is authorized to create a Federal AI Scholarship-for-Service program to provide grants to institutions of higher education to develop traineeship programs for graduate students studying artificial intelligence (AI). The provision is a less aggressive version of a similar provision in *USICA* which would have directed NSF to start the program outright without a report beforehand. The bill also directs NSF to award fellowships and traineeships to graduate and postdoctoral researchers studying AI, as the *COMPETES Act* did.
- Cybersecurity education: *CHIPS+* includes multiple provisions related to cyber education. It would direct NSF to award grants to institutions of higher education to study the cyber workforce, including factors that impact retention, pathways for entry into cyber careers, and trends within the cyber workforce, among other topics. The bill would also clarify that the NSF CyberCorps Scholarships for Service Program includes cybersecurity-related elements of other fields such as AI, quantum computing, and aerospace and directs NSF to establish a cyber workforce data initiative.
- Community College STEM Education: The bill includes the provision from *COMPETES* to establish a new NSF grant program to study how STEM is taught at community colleges and methods to improve outcomes for community college STEM students.
- Career and Technical Education: Similarly, *CHIPS+* also includes the *COMPETES* provision to establish a new grant program for institutions of higher education to provide career and technical education in STEM and computer science. Priority will be given to proposals that plan to serve members of the military and veterans.

Investments in Broadening Participation through STEM Education:

Many of the broadening participation provisions included in *COMPETES* and *USICA* were included in the conferenced *CHIPS+* legislation. The *CHIPS+* bill includes the following provisions related to broadening participation:

- EPSCoR Program: After lengthy negotiations between the House and Senate over changes to the Established Program to Stimulate Competitive Research (EPSCoR) program proposed by *USICA* and *COMPETES*, *CHIPS+* includes a compromise that will:
 - Increases the percentage of NSF funds to be awarded to EPSCoR eligible institutions gradually starting from 15.5 percent in FY 2023 to 20 percent by FY 2029. It also gradually increases the requirement that funds appropriated to NSF for scholarships go to EPSCoR institutions to 20 percent by FY 2025.
 - The EPSCoR provision recommends the NSF Director consider prioritizing funding projects that “enable sustainable growth in the competitiveness of EPSCoR jurisdictions” and that NSF can consider changing EPSCoR eligibility requirements in five years.
 - *CHIPS+* notes that the NSF Director should, in addition to carrying out the EPSCoR program, maintain or increase proposal success rates at emerging research institutions and directs NSF to establish a five-year pilot program for grants to research partnerships between emerging research institutions and R1 institutions.
- NSF INCLUDES: Similar to *COMPETES*, *CHIPS+* will codify the NSF INCLUDES program and direct NSF to continue to award grants that help develop practices that encourage growth in participation from underrepresented groups in STEM studies and careers. *CHIPS+* also changes the name of the program to the “Eddie Bernice Johnson INCLUDES Initiative.”
- Fostering STEM Research Diversity and Capacity Program: *CHIPS+*, like *COMPETES*, establishes a grant program at NSF to provide support for institutions of higher education to develop and implement strategies to recruit and retain diverse students in STEM fields. Only institutions that are not, on average, within the top 100 institutions in federal R&D expenditures in the three years preceding the grant award would be eligible to apply.
- Robert Noyce Teacher Scholarship Program: Like *COMPETES*, *CHIPS+* updates the NSF Robert Noyce Teacher Scholarship program to require outreach to Historically Black Colleges and Universities (HBCUs), other minority-serving institutions (MSIs), institutions of higher education that are located near or serve rural communities, emerging research institutions, and higher education programs that support veterans. Unlike *COMPETES*, the conference legislation does not express Congress’ desire for NSF to increase the number of grants provided under this program by 50 percent.
- Diversity in Tech Research: Like *COMPETES*, *CHIPS+* directs NSF to award grants to non-profits and institutions of higher education to support research on evidence-based ways to improve the overall effectiveness and diversity of the technology sector.
- Chief Diversity Officer at NSF: *CHIPS+* includes the provision from both *USICA* and *COMPETES* calling on the NSF Director to appoint a chief diversity officer, who will be responsible for policies related to civil rights compliance, harassment, equal employment opportunity, and disability.
- Support for Broadening Participation in Undergraduate STEM Education: *CHIPS+* authorizes \$15 million dollars for NSF to establish a grant program to support institutions of higher education implementing evidence-based techniques to recruit and retain underrepresented undergraduate STEM students.

- Intramural Emerging Research Institutions Pilot Program: *CHIPS+* includes the provision from *USICA* to enable NSF to create pilot programs aimed at increasing the type of institutions of higher education that can successfully win NSF grants through pilot programs such as award applications writing of technical assistance, mentorship, and targeted outreach.

The *CHIPS+* legislation includes many stand-alone pieces of legislation that were incorporated into *COMPETES* and *USICA*, including:

- *STEM Opportunities Act*: *CHIPS+* like *COMPETES* calls for a government-wide effort to increase the participation of underrepresented groups in STEM education and the workforce. This would include funding for research on the trajectories of women, minorities, and other traditionally underrepresented groups in STEM education and careers, the identification of cultural barriers at federal agencies and institutions of higher education that negatively impact the recruitment and retention of underrepresented populations, and the dissemination of best practices for removing any barriers to the retention of underrepresented groups. NSF is authorized to create a new program modeled on its current ADVANCE program that would focus on recruitment, retention, and advancement of underrepresented minority faculty.
- *Rural STEM Education Research*: As in *COMPETES* and *USICA*, NSF is authorized to provide \$8 million in grants to institutions of higher education for research on high-quality STEM instruction in rural schools and \$12 million for NSF grants to study barriers that rural students face in accessing quality STEM education. *CHIPS+* also calls on the NSF Director to establish a regional cohort pilot program to provide support for rural STEM educators. *CHIPS+* also includes the provisions from *COMPETES* directing the Foundation to work with the National Academies of Sciences, Engineering, and Medicine (NASEM) on a study looking into ways to improve rural STEM education and an evaluation of past federal investments in rural STEM education. NSF is further authorized to fund grants to research online STEM education for rural students.
- *MSI STEM Achievement*: As in *COMPETES*, the Government Accountability Office (GAO) is directed to create a report on all federal competitive funding opportunities directed at Minority-Serving Institutions (MSIs) and make recommendations to federal agencies on how to improve the participation of MSIs in federal grant programs. *CHIPS+* also directs the Office of Science and Technology Policy (OSTP) to issue guidance to federal agencies on outreach to MSIs. It authorizes NSF to make grants to institutions of higher education to conduct research on the contribution of MSIs in providing STEM education to underrepresented students, fund up to five MSI Centers of Innovation, and provide support for building research capacity at MSIs.
- *Combating Sexual Harassment in Science*: As included in *USICA* and *COMPETES*, the bill would authorize NSF to make grants to study sexual harassment in the STEM workforce, require OSTP to establish an interagency working group to coordinate federal efforts to combat sexual harassment in STEM and directed a National Academies study on the impact of sexual harassment in institutions of higher education and its impact on career advancement.
- *Supporting Early Career Researchers*: This provision from both *USICA* and *COMPETES* establishes a two-year pilot program at NSF that would support highly qualified early career researchers to conduct independent research at an institution of their choice.

The legislation additionally includes the requirement from *COMPETES* that organizations who wish to manage NSF projects through cooperative agreements demonstrate past experience in, and current

ability to broaden participation in STEM and commit to ensuring broadening participation is considered when overseeing NSF programs.

National Institute of Standards and Technology

CHIPS+ includes a conferenced version of the *National Institute of Standards and Technology for the Future Act* from *COMPETES*, which authorizes approximately \$10 billion for NIST for fiscal years (FY) 2023-2027. Authorized funding would be \$1.5 billion for FY 2023, increasing to \$2.3 billion authorized for FY 2027. The bill would authorize and expand measurement research at NIST, including but not limited to:

- Engineering biology, biomanufacturing, and biometrology R&D;
- Greenhouse gas measurement, including support for testbeds;
- Cybersecurity, privacy, software and cloud security, and privacy enhancing technologies;
- Software security and authentication;
- Digital identity management research;
- Biometric research and testing;
- Addressing and providing support for cyber risks and research at universities;
- Advanced communications research and test beds, including a national network of government, academic, and commercial test capabilities, and facilities to be known as the “National Advanced Spectrum and Communications Test Network;”
- Neutron scattering, including the requirement for NIST to develop a strategic plan for the future of the NIST Center for Neutron Research, in coordination with DOE;
- Safe and trustworthy AI and data science, including the establishment of test beds;
- Sustainable chemistry research and education; and
- Premise plumbing research related to water safety.

The bill would require NIST to increase educational outreach and support for underrepresented communities, including Historically Black Colleges and Universities (HBCUs), Tribal Colleges and Universities (TCUs), Minority-Serving Institutions (MSIs), and community colleges.

Manufacturing and Supply Chain

Similar to provisions in *COMPETES* and *USICA*, *CHIPS+* would authorize funding for industrial technology activities, including the Hollings Manufacturing Extension Partnership (MEP) program and Manufacturing USA. The bill would establish a pilot program of expansion awards for MEP centers for workforce development and supply chain resiliency and require MEP to increase outreach to underserved communities. The bill would also authorize \$131 million to establish a national supply chain database at MEP to track U.S. supply chain disruptions. Related to Manufacturing USA, the bill would establish a Manufacturing USA “council of heads” and encourage geographic diversity be considered when establishing new Manufacturing USA institutes.

National Aeronautics and Space Administration

CHIPS+ includes a revised, slimmed-down version of the NASA authorization bill—similar to what was included in *USICA*—but departs from the Senate’s proposal by omitting authorized funding levels for NASA’s mission directorates. *CHIPS+* extends the operation of the International Space Station from 2024 to 2030, require a report on the extension’s technical feasibility, and encourages prioritization of research on human exploration risk reduction, NASA’s Human Research Program, and related decadal

survey priorities. How an extension of the ISS to 2030 would be impacted by Russia's recent announcement to leave the Station in 2024 is unknown but will be significant.

The legislation also would establish a new Moon to Mars program office to oversee NASA's deep space human exploration campaign. *CHIPS+* supports the continued construction of the Space Launch System (SLS), and associated infrastructure, and would encourage NASA to launch SLS twice per year. *CHIPS+* does not include additional authorized funding or direction for NASA to select a second Human Landing System (HLS) provider, as was included in *USICA*. Although the most contentious provision in the Senate's original NASA authorization, its omission is likely due to NASA's announcement this spring to hold a competition for a second HLS contract for sustained transportation services, which made the provision moot.

CHIPS+ highlights Congress's support for a balanced and well-funded Science Mission Directorate (SMD). Specifically, it calls out the benefits of the Research and Analysis (R&A) programs to maximize scientific returns from NASA missions and train the next generation of scientists. Additionally, the legislation sets the goal for each division in SMD to allocate not less than 10 percent of their budget to their R&A programs. Language was included to support NASA's Great Observatories program which includes the development of the Nancy Grace Roman Space Telescope (Roman) and the next great observatory. *CHIPS+* would authorize NASA's ongoing Earth Science programs and continues the development of the Earth System Observatory to address the decadal recommendations. The legislation also would authorize the ongoing Planetary Defense Coordination Office to search for near Earth objects (NEO) through the development of the NEO Surveyor Mission.

CHIPS+ would authorize NASA's ongoing experimental aircraft programs, including low-boom supersonic, ultra-efficient subsonic, and electric aircraft. *CHIPS+* also includes legislation from the House to establish a new research and development initiative for the reduction of greenhouse gas emissions and noise emission from aircraft. The legislation would authorize NASA's space nuclear programs for in-space power and propulsion and prioritizes the use of low-enriched uranium technologies. *CHIPS+* grants the Office of STEM Engagement formal authorization, which oversees Space Grant, EPSCoR other STEM programs.

Research Security

Most of the more controversial research security provisions for the academic community included in *USICA* were not included in *CHIPS+*. For example, the *Safeguarding American Innovation Act*, which would have created a new research security inter-agency process under the White House Office of Management and Budget, and the *Strategic Competition Act*, which would have directed the Committee on Foreign Investment in the U.S. (CFIUS) to develop a process to vet large foreign gifts to academic institutions, were both not included in *CHIPS+* package. Nonetheless, there are several notable provisions related to research security that will impact institutions and research entities.

CHIPS+ requires NSF to maintain a Research Security office, appoint a Chief of Research Security, develop online resources on risks and research integrity, support research on research misconduct and integrity, enter into an agreement with an independent research security and integrity information sharing analysis organization (RSI-ISA), coordinate with the Director of National Intelligence to identify key technology areas that may lead to controlled unclassified or classified information; and restrict NSF funds to IHEs that maintain an agreement with a Confucius Institute, unless granted a waiver.

CHIPS+ does not include modifications to the Department of Education's (ED) current requirements for higher education institutions to report foreign gift and contracting, known as Higher Education Act (HEA) Section 117, nor does it include a new HEA Section 124 related reporting requirement, as offered in both *USICA* and *COMPETES*. However, NSF will now annually require recipient institutions and related entities to disclose foreign-sourced gifts or contracts received directly or indirectly valued at \$50,000 or more from a foreign country of concern. Institutions will be required to maintain true copies of the associated agreements, which NSF may request. Failure to comply with NSF's new foreign gift reporting rules could result in award termination.

Within DOE, *CHIPS+* requires the Department to develop tools and processes to manage research security threats and designate an officer to coordinate the effort and support development of security training. No foreign entity of concern or individual controlled by the entity of concern may receive covered DOE support. For NIST, *CHIPS+* will require a GAO study of NIST's research security policies and protocols.

OSTP is required to define foreign talent recruitment programs and publish uniform guidelines for federal agencies related to those programs that include prohibitions of federal employees, contract employees, visiting scientists, and others from participating in such foreign talent programs. Additionally, individuals participating in maligned foreign talent recruitment programs will be prohibited from federal R&D awards and projects. Federal R&D agencies will be required to update proposal requirements, after a 60-day public comment window, to include certifications from individuals that they are not involved with foreign talent recruitment programs and organizations will have to certify that covered individuals are aware of such requirements. Federal agencies will require award recipients to provide research security training on maligned foreign talent programs. Federal research agencies will have new authority to request from institutions or other awardee organizations copies of foreign contracts or agreements related to foreign appointments of individuals on R&D award applications or require organizations to review such documents for compliance. Within one-year, federal R&D agencies will have to require applicants to have research security training and agencies will require related proposal certifications of individuals and applicant organizations. OSTP is required to develop training program guidelines and consult with federal R&D agencies in the development of online research security training modules, which shall include a process for stakeholder feedback. Federal research agencies would have authority to ask organizations seeking funding to provide documentation (including copies of contracts and grants) on foreign engagement and support for covered individuals listed on an award application. *CHIPS+* includes a prohibition on individuals or entities affiliated with Chinese Military Companies as defined under previous National Defense Authorization Acts from participating or being supported under the NSF TIP Directorate, Department of Commerce Regional Innovation hubs, or Manufacturing USA programs.

Bioeconomy

CHIPS+ includes the *Bioeconomy Research and Development Act*, which was originally introduced last Congress in the House as the *Engineering Biology Research and Development Act* and was included in both *USICA* and *COMPETES*. The legislation would establish a National Engineering Biology Research and Development Initiative through the Office of Science and Technology Policy (OSTP) to:

- Advance research and development;
- Advance biomanufacturing;
- Develop the future bioeconomy workforce;
- Facilitate interdisciplinary bioeconomy research teams covering multiple federal agencies;

- Support the creation of databases and tools for bioeconomy-relevant research efforts;
- Expand public-private partnerships to accelerate the translation and commercialization of new products;
- Provide research and development direction to key federal agencies supporting bioeconomy-relevant efforts, including NSF, NIST, NASA, DOE, the Department of Defense (DOD), the National Oceanographic and Atmospheric Administration (NOAA), the Department of Health and Human Services (HHS), the United States Department of Agriculture (USDA), and Environmental Protection Agency (EPA);
- Support research in ethical, legal, environmental, safety, security, and societal issues; and
- Direct the National Academies to review ethical, legal, environmental, safety, security, and societal issues related to engineering biology.

Similar to its predecessors, *CHIPS+* emphasizes the need for improved domestic biomanufacturing and scale up capacity and directs the Initiative to provide “support for a national network of testbeds [...] that would enable scale up of laboratory engineering biology research.” It also encourages the Initiative to expand outreach to primarily undergraduate institutions, HBCUs, TTUs, and MSIs to help facilitate research partnerships between those institutions and research-intensive universities.

Additionally, the bill would direct OSTP to establish an interagency committee to help facilitate federal coordination of biotechnology research and development. The committee is tasked with developing a strategic plan that will guide the goals and activities of the Initiative and reporting on these activities to Congress. In a nod to the expansive nature of the federal bioeconomy, *CHIPS+* adds reporting requirements to additional committees beyond those included in *USICA* and *COMPETES*. The *CHIPS+* version expands the required report to Congress to include the House and Senate Agriculture Committees as well as the Senate Small Business Committee, in addition to the previously named House Science, Space, and Technology; House Energy and Commerce; Senate Commerce, Science, and Transportation; and Senate Health, Education, Labor, and Pensions Committees. The *CHIPS+* version also requires this report be made every five years rather than every three.

The bill also would direct OSTP to establish an advisory committee on engineering biology research and development comprised of representatives from research and academic institutions as well as industry that will be tasked with advising Congress and the Administration on the current state of U.S. biotechnology competitiveness, market barriers to expanded commercialization of biotechnology, and goals met by the Initiative. This advisory committee would also be tasked with reporting to the aforementioned congressional committees every five years.

Like its predecessors, this legislation includes activities that relevant federal agencies would be directed to undertake as part of their participation in a National Engineering Biology Research and Development Initiative. These activities broadly include the expansion of research grants and centers, infrastructure support, workforce development and training opportunities, user facilities, technology transfer, risk assessment, and curriculum development.

Regional Innovation: Economic Development and Technology Hubs

Regional Technology Hubs: *CHIPS+* would authorize \$10 billion, the same level as included in *USICA*, for a Regional Technology and Innovation Hubs program to be carried out by the Department of Commerce (DOC). The program would create 20 large-scale, geographically diverse hubs to stimulate economic growth and expand innovation capacity in areas of national need. The language designates that there

be three hubs per EDA region with two additional hubs in areas with a high likelihood of success. Additional parameters include that one-third of the hubs must benefit small and rural communities (population of less than 250,000), one-third must contain an EPSCoR member, and one hub must be located in an EPSCoR state. Each hub is expected to have a myriad of partners to support workforce, infrastructure, and technology development activities around a common goal.

CHIPS+ encourages regions to focus on identified key technology areas, such as artificial intelligence, high performance computing, quantum networking and communications, robotics, advanced manufacturing, disaster prevention or mitigation, advanced communications technology and immersive technology, biotechnology, data, advanced energy and industrial efficiency technologies, and advanced materials science, or other technology or innovation sectors critical to national and economic security and competitiveness. The program supports both strategy and implementation grants, and the bill gives the Secretary of Commerce flexibility in administering the competition, including determining the ultimate number and size of awards based on available appropriations.

RECOMPETE Program: *CHIPS+* would authorize the RECOMPETE Pilot program, which was included in the *COMPETES Act*, and will provide development and implementation grants to support long-term, place-based economic development in persistently distressed labor markets and underserved communities. The program will be administered through the Economic Development Administration (EDA) and could support proposals that target activities like workforce development, business and entrepreneur development, infrastructure, and/or other predevelopment and technical assistance efforts. *CHIPS+* would authorize \$1 billion for the RECOMPETE Pilot program, \$3 billion less than the authorizing language included in *COMPETES*, with individual awards being no less than \$20 million for the Implementation phase. There is early momentum around RECOMPETE as the FY 2023 President's budget request, and both House and Senate appropriations bill included support for the launch of the program.

Additional programs: There are regional innovation provisions throughout the bill beyond DOC, including the DOE Regional Clean Energy Innovation program; the DOE National Clean Energy Incubator program; NSF Regional Innovation Engines; NSF capacity-building awards to support academic technology transfer including new Collaborate Innovation Resource Centers, other programs through the authorization of the NSF Technology, Innovation, and Partnerships Directorate; and more. *CHIPS+* further underscores an emerging trend that fostering regional innovation is a "whole of government" concern.

Miscellaneous Science and Technology Provisions

Wireless

In addition to the Public Wireless Supply Chain Innovation Fund highlighted above, the *CHIPS+* bill includes authorization and policy for other programs to advance wireless adoption in the United States. A provision included in *CHIPS+* which was originally included in *COMPETES* directs the Secretary of Commerce to spearhead a prize competition, awarding up to \$5 million for research and development proposals outlining a plan to deploy affordable and reliable broadband to rural and/or underserved rural communities. Additionally, the *CHIPS+* legislation would authorize the creation of the National Advanced Spectrum and Communications Test Network (NASCTN), directing NIST to work with the NTIA to bring together public and private sector stakeholders, as well as academic and commercial entities and facilities to coordinate research, modeling, testing, and evaluation of telecommunications sciences

and improve the nation's ability to tolerate, respond to, and mitigate electromagnetic spectrum interference. However, *CHIPS+* leaves out previously included language in *USICA* explicitly authorizing \$20 million for the program and instead does not provide an authorized funding level.

Among the provisions previously proposed in *USICA* and/or *COMPETES*, but NOT included in *CHIPS+* were a series of directives establishing public-private task forces and working groups examining 6G, communications security, and broadband research and development.

Early Career Research Support

CHIPS+ authorizes \$250 million for NSF to establish a new 2-year pilot program which would support awards to early career researchers to initiate an independently led research program.

Ocean Acidification Research and Innovation

The *CHIPS+* legislation supports the establishment of an Ocean Acidification Working Group with participation from DOE, NIST, USDA, the Environmental Protection Agency (EPA), the Bureau of Indian Affairs, Bureau of Ocean Energy Management, Department of the Navy, Department of State, National Park Service, Smithsonian Institution, and the Wildlife Service. The Working Group will also be informed by an advisory board with members from industry and academia. The two bodies will be tasked with developing a five-year strategic research plan for ocean acidification.

CHIPS+ would reauthorize and make slight changes to the existing ocean acidification research programs at NSF, NOAA, and NASA to include coastal acidification as an added focus area.

National Science and Technology Strategy

CHIPS+ requires the Director of OSTP to submit to Congress a four-year national science and technology (S&T) strategy, with a primary focus on economic security. This strategy is required to be consistent with other federal strategies, including the national defense strategy. The S&T strategy will outline objectives and research priorities to ensure U.S. S&T leadership in key technology areas and technologies needed to address societal and national challenges. The strategy will outline programs, policies, and activities across federal agencies to ensure U.S. leadership in key technologies; job creation and sustainability; and global trends in S&T along with opportunities for international collaborations. The reporting requirement would expire after 10 years. *CHIPS+* also requires the Director of OSTP to provide a security-focused science and technology strategy in support of the existing National Security Strategy; and a quadrennial review of the U.S. S&T enterprise.

Blockchain Specialist

CHIPS+ directs OSTP to create or appoint a cryptocurrency and blockchain advisory specialist within the office to serve as a presidential advisor on research and development related to blockchain, cryptocurrency, and distributed ledger technologies. This provision was originally included in *COMPETES*.

Crosswalk of Key Provisions in House and Senate Innovation Bills

Agency or Issue and Total Authorized Funding Level	House <i>COMPETES Act</i> Provisions	Senate <i>USICA</i> Provisions	CHIPS + Provisions
<p>\$78 billion-\$81 billion National Science Foundation (NSF)</p>	<p>The House <i>COMPETES Act</i> would authorize \$78 billion for NSF over five years to increase funding for NSF research, support STEM Education at all levels, increase opportunities for broadening participation, and would create a new Directorate for Science and Engineering Solutions (SES) to address societal grand challenges. Compared to <i>USICA</i>, more of the House funding would go to existing NSF activities rather than the new directorate. The proposed new SES Directorate would support collaborative, use-inspired and translational research and in general the House bill is less prescriptive than <i>USICA</i>.</p>	<p><i>USICA</i> would authorize \$81 billion for the (NSF) over the next five years. Key elements include the new TIP Directorate that would fund research in key technology areas, University Technology Centers, research testbeds, workforce development, and commercialization efforts; significantly expand the EPSCoR program; and create other capacity building programs to diversify the recipients of NSF funding.</p>	<p><i>CHIPS+</i> would authorize \$81 billion for the National Science Foundation (NSF) over the next five years, growing annual authorized funding to \$19 billion in FY 2027. Key elements include the new TIP Directorate that would fund research, innovation, and education in key technology areas and five critical social, national, and geostrategic challenges; significantly expansion of funding to EPSCoR institutions; and many provisions related to research areas, research security, research infrastructure, STEM education, and broadening participation.</p>

<p>\$50 billion-\$17 billion Department of Energy (DOE)</p>	<p><i>COMPETES</i> includes the previously passed <i>DOE Science for the Future Act</i> and would authorize \$50 billion for the DOE Office of Science over five years. <i>COMPETES</i> would expand and create new research programs for the Office of Science and is much broader than just the key technology areas.</p> <p><i>COMPETES</i> also includes authorized funding for a regional clean energy innovation program, and clean energy technology transfer programs.</p>	<p><i>USICA</i> would authorize \$16.9 billion to support the DOE) and its national laboratories in advancing the same ten key technologies areas that would be a major focus for NSF's new technology directorate, such as artificial intelligence, advanced computing, resilience, advanced communications, wireless research, energy innovation, and biotechnology. It does not include a full DOE Office of Science authorization.</p> <p><i>USICA</i> does not include any funding directed towards clean energy.</p>	<p><i>CHIPS+</i> includes <i>DOE Science for the Future</i> and other <i>COMPETES provisions related to energy</i>. It would authorize \$68 billion over five years to advance major DOE research and infrastructure initiatives. The final legislation blends provisions from <i>USICA and COMPETES</i>, including authorization of \$50.3 billion for the Office of Science, \$15.2 billion for emerging technologies and lab infrastructure for applied energy offices, \$1.5 billion for advanced nuclear energy research and development and university nuclear infrastructure, \$725 million for microelectronics research and development and national centers, and \$505 million for technology transfer and development programs.</p>
<p>STEM Education</p>	<p><i>COMPETES</i> would authorize a variety of STEM education provisions including a new grant program at NSF to provide grants to higher-ed and non-profits establishing at least three Centers for Transformative Education Research and Translation, stand up new grant programs through the NSF for postsecondary STEM</p>	<p><i>USICA</i> included some provisions similar to the House package for postsecondary STEM education research, AI traineeships, and cybersecurity education.</p> <p>Also contained within the Senate package is the Rural STEM Education Act, Combatting Sexual Harassment in Science Act, and the Supporting Early-Career</p>	<p><i>CHIPS+</i> includes almost all STEM and broadening participation provisions found in both <i>COMPETES</i> and <i>USICA</i> bills.</p>

	<p>education research, AI traineeships, and cybersecurity education.</p> <p><i>COMPETES</i> also incorporates previously passed House bills related to broadening participation in STEM: the STEM Opportunities Act, Rural STEM Education Research Act the Early Career Research Act, the Combatting Sexual Harassment in Science Act, and the MSI STEM Achievement Act.</p>	<p>Researchers Act. <i>USICA</i> does not include the MSI Achievement Act or the STEM Opportunities Act.</p>	
<p>\$8 billion National Institutes of Standards and Technology (NIST)</p>	<p><i>COMPETES</i> includes the <i>National Institute of Standards and Technology for the Future Act of 2021</i>. The bill would provide an average of \$1.5 billion to NIST from FY 2022-FY 2026 and directs NIST to expand measurement research in new areas of interest.</p>	<p><i>USICA</i> would not reauthorize NIST or expand its research areas.</p>	<p><i>CHIPS+</i> includes <i>NIST for the Future</i> and authorizes nearly \$10 billion in total funding for NIST, including \$6.9 billion in research funding for industries of the future.</p>
<p>\$50 billion for Semiconductors</p>	<p><i>COMPETES</i> would create the CHIPS for America Fund, appropriating \$50.2 billion in funding for the fabrication, assembly, testing, or advanced packaging of semiconductors as authorized under <i>CHIPS</i>. The bill would also appropriate \$2 billion for the Department of Defense (DOD) and \$500 million for fiscal years 2022-2026 to support international</p>	<p><i>USICA</i> would appropriate the same amount of funding for <i>CHIPS</i>.</p>	<p><i>CHIPS+</i> would appropriate \$50 billion for the CHIPS for America Fund, \$2 billion for the CHIPS for America Defense Fund under DOD, and \$500 million for the CHIPS for America International Technology Security and Innovation Fund.</p> <p><i>CHIPS+</i> also includes a new \$200 million fund for CHIPS for America</p>

	information and communications, semiconductor supply chain activities, and other supply chain activities for emerging technologies.		Workforce and Education providing funding to NSF.
Supply Chain and Manufacturing	<p><i>COMPETES</i> would authorize \$282 million in funding for Manufacturing USA and \$1.5 billion for the NIST Manufacturing Extension Partnership and Manufacturing USA over FY 2022 – FY 2027.</p> <p>The package would also establish a National Manufacturing Advisory Council at the Department of Commerce and authorize \$45 billion for manufacturing activities related to the critical supply chain resilience program.</p> <p>It includes supply chain resilience provisions related to NIST assessment of supply chain risk and resiliency.</p> <p>In addition to critical materials supply chain, the package would authorize \$100 million at FDA for National Centers of Excellence in Advanced and Continuous</p>	<p><i>USICA</i> would authorize \$1.2 billion in total funding for Manufacturing USA and \$2.4 billion for the NIST Manufacturing Extension Partnership over FY 2022-2026.</p> <p>The Senate package would also establish a National Manufacturing Advisory Council and contains a broader suite of manufacturing provisions as part of the Ensuring Domestic Manufacturing Capabilities title that are not part of <i>COMPETES</i>.</p> <p><i>USICA</i> would also authorize a new Department of Commerce supply chain resiliency program but does not contain specific provisions for FDA or medical supply chain issues.</p>	<p><i>CHIPS+</i> would authorize \$2 billion for the Hollings Manufacturing Extension Partnership (MEP) at NIST, which would triple program funding. The legislation also creates a National Supply Chain Database through MEP and authorizes \$829 million to expand Manufacturing USA institutes.</p>

	Pharmaceutical Manufacturing and would authorize \$1.5 billion to establish a supply chain flexibility manufacturing pilot through HHS.		
\$17.5 billion DARPA	<i>COMPETES</i> has no provisions authorizing funding for the Defense Advanced Research Projects Agency (DARPA).	<i>USICA</i> would authorize \$3.5 billion in annual funding for DARPA over the next five years.	<i>CHIPS+</i> has no provisions authorizing funding for DARPA.
Research Security	<p><i>COMPETES</i> does not include provisions for the Committee on Foreign Investments in the United States (CFIUS) related to universities.</p> <p><i>COMPETES</i> retains the research security provisions of the <i>NSF for the Future Act</i> that would be preferred by the higher education community. For example, it would enable NSF to request documentation for foreign employment. It would not mandate that NSF create a process for identifying controlled research areas.</p> <p><i>COMPETES</i> would lower the Department of Education’s Section 117 foreign gift reporting threshold to gifts totaling \$100,000 per</p>	<p><i>USICA</i> has a number of research security provisions that have troubled the higher education community. Of most concern, it includes a provision that would create a new CFIUS review process for vetting of foreign gifts to researchers.</p> <p><i>USICA</i> would require NSF to collect documentation and contracts related to financial transactions with Chinese entities and the bill would also mandate that NSF create a process for identifying controlled research areas.</p> <p><i>USICA</i> would lower the Section 117 foreign gift reporting threshold to \$50,000 and implement additional changes.</p>	<p>Of note, <i>CHIPS+</i> does not include new CFIUS reviews of academic research, new OMB led research security reviews, nor changes to the Department of Education foreign gift and contract reporting requirements. However, the package will expand research security requirements across federal R&D agencies in other ways.</p> <p>NSF will require summary reports of foreign gifts and contracts of for institutions and related entities over \$50,000 annually from foreign countries of concern. Organizations will have to maintain true copies of associated agreements, which NSF could request.</p> <p>OSTP will lead development of uniform foreign talent recruitment prohibitions and certifications, as well as research security training efforts.</p>

	<p>country annually or \$250,000 per country over three years.</p> <p><i>COMPETES</i> would bar federal funding from institutions with Confucius Institutes.</p>	<p><i>USICA</i> would bar federal funding from institutions with Confucius Institutes.</p>	
Bioeconomy	<p><i>COMPETES</i> includes the <i>Bioeconomy Research and Development Act</i>, with minor language differences as compared to its <i>USICA</i> counterpart.</p>	<p><i>USICA</i> includes the <i>Bioeconomy Research and Development Act</i>, originally introduced in the 116th Congress.</p>	<p><i>CHIPS+</i> includes the <i>Bioeconomy Research and Development Act</i>, with minor language differences compared to its legislative predecessors.</p>
\$7 billion-\$10 billion Regional Technology Hubs and other Economic Development	<p><i>COMPETES</i> would authorize the creation of a minimum of 10 Regional Technology Hubs at the Department of Commerce authorized at \$7 billion.</p> <p>It would also authorize additional programs at EDA.</p>	<p><i>USICA</i> would authorize the creation of a minimum of 18 Regional Technology Hubs at the Department of Commerce authorized at \$10 billion.</p> <p>The package does not include language authorizing additional programs at EDA.</p>	<p><i>CHIPS +</i> would authorize \$10 billion to support 20 Regional Technology and Innovation Hubs.</p> <p>The package also would authorize \$1 billion for a “Recompete Pilot Program,” which would provide flexible support for economic development planning and activities in areas of need.</p>
Wireless	<p><i>COMPETES</i> included \$1.5 billion for the Public Wireless Supply Chain Innovation Fund. It would also create a 6G Task Force at the Federal Communications Commission (FCC), establish and Office of Policy Development and Cybersecurity at NTIA, establish a Communications Security Advisory Council at FCC, authorize a \$5</p>	<p><i>USICA</i> would include \$1.5 billion for the Public Wireless Supply Chain Innovation Fund.</p> <p>It also would authorize an \$100 million Telecommunications Workforce Training Grant Program at the National Telecommunications and Information Administration (NTIA)</p>	<p><i>CHIPS+</i> includes \$1.5 billion for the Public Wireless Supply Chain Innovation Fund among other investments</p> <p>NOT included in <i>CHIPS+</i> were a series of directives establishing public-private task forces and working groups examining advanced wireless topics.</p>

	million Rural Connectivity Prize Competition at NIST, and direct NIST to establish a broadband research and development group.	and \$50 million for NTIA to create a testbed to develop open network architecture technologies.	
NASA/Space	<i>COMPETES</i> does not include any NASA or space-focused legislation.	<i>USICA</i> includes a broad NASA authorization and several other space-related provisions relating to lunar lander contracts and the <i>SPACE Act</i> that would authorize Department of Commerce space situational awareness activities and research.	<i>CHIPS +</i> includes broad NASA authorization from <i>USICA</i> , however, it does not include the funding levels of other space-related provisions. It also includes new provisions from House bills, including establishing a Moon to Mars program office and a new clean aviation program

Sources and Additional Information:

- The full *CHIPS+* bill text can be found at <https://www.commerce.senate.gov/services/files/CFC99CC6-CE84-4B1A-8BBF-8D2E84BD7965> and the section-by-section summary can be found at <https://www.commerce.senate.gov/services/files/1201E1CA-73CB-44BB-ADEB-E69634DA9BB9>.
- Lewis-Burke's full analysis of the *American COMPETES Act* can be found at <https://lewisburke.sharepoint.com/:b:/s/LinkShare/EQKK-prVFC9LINCy1oa6R3EBmMko1EkVoubTF9tJ8-HrhQ?e=OojeZJ>.
- Lewis-Burke's full analysis of *USICA* can be found at <https://lewisburke.sharepoint.com/:b:/s/LinkShare/ER71hb0FDttAozWfiUPYSSIBibMe6ZEeYuz0hlbrGka2jg?e=ajHzSM>.