

April 1, 2022

MEMORANDUM

RE: H.R. 4521, the America Creating Opportunities for Manufacturing, Pre-Eminence in Technology and Economic Strength (or COMPETES)

Summary

ASCE has a long history of supporting research and development (R&D) across all disciplines and has been closely following efforts by Congress over the past year to invest in critical R&D programs. Over the past several months, both the House and the Senate have developed and passed legislation that would increase funding for the National Science Foundation (NSF), the National Institute of Standards and Technology (NIST), the Department of Energy (DOE), and other federal programs that support the nation's R&D enterprise. This work has resulted in S. 1260, the Senate's U.S. Innovation and Competition Act (USICA) and H.R. 4521, the House's America Creating Opportunities for Manufacturing, Pre-Eminence in Technology and Economic Strength (COMPETES).

On March 28th, the Senate approved the House passed the COMPETES Act, by a bipartisan vote of [68 to 28](#). The Senate vote followed House action on H.R. 4521, which passed the legislation by a vote of [222 – 210](#) on February 4th. However, the Senate swapped out the House language with an amended version of USICA, setting up a conference between the House and Senate to reconcile the two bills. The Senate had previously passed USICA in July 2021, however this latest procedural vote put the Senate on proper footing for a negotiation with the House.

Therefore, it is now up to congressional leaders to reach a compromise that can pass both Houses of Congress before the end of the year. The Biden Administration is supportive of both efforts, with the President noting that he looks forward "to the House and Senate quickly coming together to find a path forward and putting a bill on my desk as soon as possible for my signature. America can't afford to wait."

ASCE strongly supports the funding boosts for NSF, NIST, and DOE in both bills and urges Congress to move quickly to reach a compromise. ASCE believes that federal research is critical to enhance economic vitality, while assuring public health, safety, welfare, quality of life, sustainability, and resilience. It is also a critical component of engineering education and the training of the next generation of civil engineers.

Just as the Infrastructure Investment and Jobs Act (IIJA) targets many of the points raised in ASCE's 2021 [Report Card for America's Infrastructure](#) and will go a long way toward raising the grades, so too can comprehensive legislation increasing the US commitment to R&D. In a [recent](#) letter to Congressional leadership, ASCE stated that IIJA should be coupled with a significant investment in R&D, which will permit the development of new and innovative materials and processes to cut cost and facilitate a durable, secure, sustainable, and resilient infrastructure network that will meet future needs and ensure the best possible infrastructure for the 21st century. Both the COMPETES Act and USICA represent the significant investment that will be required.

USICA and the America COMPETES Act

In broad terms, both the House and Senate bills aimed to counter China's growing economic power and focus on expanding the role for the federal government in "strategic sectors" – including semiconductors, drones, wireless broadband, and artificial intelligence – with increased funding, and regulation of various industries. Both bills would fund domestic semiconductor chip manufacturing, revive several lapsed trade programs, and re-orient the United States' international posture towards competition with China and other foreign competitors. Also, both bills address more equitable distribution of research grants including provisions for geographic balance of grant awards.

It should be noted that, the Senate bill includes the entirety of the H.R. 2731, Endless Frontiers Act, which ASCE supported in the past. The legislation invests \$100 billion in U.S. education, science, and technology, as well as research and development over a five-year period. Meanwhile, the America COMPETES Act incorporates H.R. 2255, the National Science Foundation for the Future Act, H.R. 3593, the Department of Energy Office of Science Future Act, and H.R.4609, the National Institute for Standards and Technology Future Act, all legislation that ASCE supported. However, ASCE does not have policy on many of the high-profile issues in either USICA or the America COMPETES Act, such as support for semi-conductor manufacturing, tariffs, export restrictions, and others. Therefore, ASCE's engagement with both bills remains focused on those provisions where the organization has a long record of public policy advocacy, primarily the R&D funding.

Overall, USICA focuses on encouraging cutting-edge technologies, such as artificial intelligence (AI) and quantum computing. America COMPETES, by contrast, gives more flexibility to federal science officials to decide which new ideas deserve to be jump-started. Compared with USICA, America COMPETES also targets more funding and policy changes toward issues such as climate change, human rights, and domestic social inequality. For example, the House version includes \$8 billion to help developing countries convert to cleaner sources of energy. Another key difference is the House's inclusion of a new, \$45 billion fund to provide grants and loans to strengthen U.S. supply chains and manufacturing.

Below you will find an analysis of those provisions that ASCE is tracking, as well as ASCE’s preferred language in those areas that differ in America COMPETES and USICA.

National Science Foundation

USICA would rename NSF the National Science and Technology Foundation and establish two Deputy Directors, one for Science and one for Technology. The Deputy Director of Technology would oversee the newly created Directorate of Technology with the aim of strengthening leadership in critical technologies and promoting education in ten key technology areas, including AI, quantum computing and cybersecurity.

Additionally, both the House and Senate bills would significantly increase funding for the NSF over five years. A breakdown of that funding by year is below:

Fiscal Year	America COMPETES	USICA
2022	\$12.5 billion	\$10.8 billion
2023	\$14.6 billion	\$12.8 billion
2024	\$15.9 billion	\$16.6 billion
2025	\$17.0 billion	\$19.5 billion
2026	\$17.9 billion	\$21.3 billion

A primary difference between both bills is the degree to which NSF would be changed – the Senate bill would have a much larger impact and place more emphasis on directed and applied research, while the House bill would increase directed and applied research, but maintain NSF’s more traditional science-based approach.

ASCE Position: ASCE supports the mission of the NSF and its research across all disciplines of basic scientific research to promote the progress of science; to advance the national health, prosperity, and welfare; and to secure national defense. ASCE supports making the research and education activities of NSF a national priority for funding. Additionally, ASCE urges that the current system of support for basic research based upon excellence, competitive scientific merit and peer review be preserved.

Newly Created Directorates

Both America COMPETES and USICA would create a new Directorate at the National Science Foundation focused on technology and innovation; however, those new directorates differ significantly.

USICA would provide \$1.8 billion in FY22 for a new **Directorate for Technology and Innovation**, with that funding increasing annually until reaching \$9.3 billion in FY26. By FY26 the new Directorate would account for 43 percent of the total budget for the NSF,

up from just 16 percent in the first fiscal year of the legislation. The new Directorate would be responsible for:

- strengthening the leadership of the U.S. in critical technologies,
- addressing challenges integral to the geostrategic position of the U.S.,
- enhancing the competitiveness of the U.S. by improving education in key technology areas,
- accelerating the translation and development of scientific advances in key technology focus areas, and
- utilizing the full potential of the U.S. workforce by avoiding undue geographic concentration of research and development and education funding.

America COMPETES would instead establish a Directorate of Science and Engineering Solutions, with \$1.4 billion authorized in FY22 and incrementally increasing annually until reaching \$3.4 billion in FY26. Additionally, unlike the Senate Directorate, which focuses on technology innovation and competitiveness, the House Directorate would prioritize advances in R&D solutions that address societal and national challenges, including climate change, environmental sustainability, domestic job creation in critical technologies, cybersecurity, national security, STEM education, and social and economic inequality.

It is important to note that the Senate Directorate also would give preference to awarding funds to areas that already have buy in from industry and requires metrics related to commercialization. Both distinctions are lacking from the House Directorate.

ASCE Position: ASCE has not taken a position on the House versus Senate approaches but has urged Congress to include a new Directorate that would focus on technology and innovation and spur commercialization of resulting innovations. ASCE does have some concern the major changes envisioned in the Senate bill will impact the traditional and needed basic research mission of NSF.

National Institute of Standards and Technology

Only the House's America COMPETES Act would make significant funding increases at the National Institute of Standards and Technology (NIST).

The House would reauthorize NIST for five years by increasing funding from \$1.4 billion in FY22 to \$1.8 billion in FY26 for a total of \$7.9 billion over five years. For comparison, NIST historically received approximately \$1 billion annually from the federal government. The Senate version does not provide additional funding for NIST.

Furthermore, America COMPETES requires NIST to create a R&D program to inform best practices and standards for the measurement of greenhouse gas emissions and to establish a pilot program to expand awards to centers focused on strengthen workforce training, expanding advanced technology services, or improving the resilience of domestic supply chains.

ASCE Position: ASCE supports the House provisions related to NIST, as ASCE has long supported NIST and its mission of promoting U.S. innovation and competitiveness by anticipating and meeting the needs for measurement science, standards, and technology. ASCE supports these new initiatives to expand the research effort in man-made and natural hazards; their effects on structures and building equipment; and the mitigation of their impacts - including new metrics to enable proper assessment of infrastructure resilience and life-cycle performance. These initiatives require increased funding like that provided by the House bill.

Department of Energy's (DOE) Office of Science

America COMPETES provides the first ever comprehensive authorization for the DOE's Office of Science, which operates ten of DOE's national laboratories and manages 29 national scientific user facilities. In total, the House bill authorizes a total of \$50.2 billion over five years for the office, starting at \$8.8 billion in FY22 and increasing to \$11.1 billion in FY26. This is compared to just \$7 billion for the office in FY21. The bill also establishes the mission of the Office of Science and directs the Secretary of Energy to coordinate the office's activities to support advancements in research areas shared between federal agencies and DOE program.

USICA refrains from making policy changes or providing any congressional direction to the DOE, however the Senate bill does authorize \$17 billion in funding for DOE and links that research back to the key technology focus areas in the new Directorate of Science and Innovation at NSF.

ASCE Position: ASCE supports the America COMPETES' provision for the inaugural comprehensive authorization for the DOE's Office of Science. ASCE policy notes the need for continued economical, reliable, and environmentally responsible energy development and production in the United States. This is critical to industrial and commercial expansion, economic growth and stability, and enhanced energy security. The planning and development of energy sources in a responsible manner has long been a role of civil engineers. A national energy policy that prioritizes short- and long-term needs and better aligns funding mechanisms and sustainable energy systems is needed.

Diversity, Equity, and Inclusion

America COMPETES includes provisions that would direct more than \$1 billion toward increasing diversity of the scientists, researchers and technologists who drive the innovation economy. The measure includes \$900 million for grants and partnerships with Historically Black Colleges and Universities, \$164 million to study barriers for people of color in the field and \$17.5 million to combat sexual harassment. Additionally, the House bill would include creation of a chief diversity officer at NSF. While USICA has many similar provisions, the Senate provisions are not as robust as the House bill.

The Senate version would create an intensive capacity building program for minority-serving institutions or institutions with established STEM programs focused on traditionally underrepresented populations at NSF. It would authorize \$150 million per year for FY 2022 – FY 2026 for the program from otherwise authorized funds.

ASCE Position: ASCE is supportive of provisions in both bills that prioritize diversity, equity, and inclusion. ASCE is committed to inclusive engineering problem solving that recognizes, values, and addresses the unique needs of diverse demographic, social, economic, and cultural groups when considering, balancing, and mitigating societal, environmental, and economic impacts.

STEM Programs

Both the House and Senate bills include STEM education programs. These provisions within NSF include:

- New grant programs for K-12 STEM education at the Department of Education is authorized in the Senate bill, but no additional funds are authorized.
- New competitive grant program for states to expand postsecondary STEM pathways, such as dual enrollment and early college high school programs, both House and Senate bills would fund this through existing programs.
- New programs to build higher education STEM programs across the nation and increase the participation of those underrepresented in STEM, including through support for early-career researchers, emerging research institutions, minority serving institutions, rural institutions, and institutions that participate in the Established Program to Stimulate Competitive Research, to reduce geographic concentration of R&D and education. Both bills have similar provisions and would be funded by drawing fund from already the authorized Title VI of the Elementary and Secondary Education Act which is authorized at \$203 million annually for support for elementary programs.
- Provisions of reporting and restricting foreign gifts in higher education
- The House bill authorizes \$10 billion over 5-years for university technology centers and innovation institutes to conduct research on the key focus areas.

ASCE Position: ASCE strongly supports programs that foster an appreciation for, education in, and pursuit in careers related to the STEM fields.

Other Provisions

Beyond NSF, NIST and DOE, both bills contain provisions that are supported by ASCE. The bills would, at differing levels:

- Help spur innovation in advanced wireless technologies, including \$1.5 billion in the Senate bill dedicated to broadband technologies

- Require that the iron, steel, manufactured products, and construction materials used in federally funded infrastructure projects be produced in the United States.
- Direct the President to use the full range authority to impose sanctions against people or entities that have stolen US trade secrets or benefited from such theft, as well as sanctions against foreign entities or people that have supported or engaged in cyberattacks or otherwise undermined US cybersecurity.
- The Senate bill authorize \$1.5 billion, across several agencies, to help spur innovation in broadband technologies. The House has similar a provision.

Further Action

ASCE is pleased that Congress is working towards bipartisan passage the America COMPETES Act and urges Congress to move quickly to reach final legislation that would significantly increase support for National Science Foundation (NSF), the National Institute of Standards and Technology (NIST), and the Department of Energy, as well as the other provisions that further the U.S. research and development enterprise.

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