

EXECUTIVE OFFICE OF THE PRESIDENT  
PRESIDENT'S COUNCIL OF ADVISORS ON SCIENCE AND TECHNOLOGY  
WASHINGTON, D.C. 20502

President Joseph R. Biden, Jr.  
The White House  
Washington, D.C.

August 9, 2022

Dear Mr. President:

In the context of your imminent signing of the CHIPS and Science Act, we, the members of your President's Council of Advisors on Science and Technology (PCAST), are writing to offer recommendations about the optimal use of the \$11 billion specifically appropriated in that bill for semiconductor research and development.

Americans rely on semiconductors every day without even realizing it. They are used in mundane tasks—such as making a phone call, washing clothes, or taking public transportation—and in not-so-mundane tasks—such as providing the “intelligence” for smart weapons and autonomous surveillance. These tiny devices have become essential to every aspect of modern life, underpinning the global economy and our national security. Semiconductors are the fourth largest U.S. export, and the industry directly employs nearly 300,000 Americans and indirectly accounts for another 1.6 million jobs.

Since the 1940s, the federal government has played a central role in the development of the semiconductor industry through a strong partnership with industry and academia that has enabled the United States to become the world leader in semiconductor revenue. But that leadership position is being challenged like never before. The global share of semiconductors manufactured in the United States has declined from thirty-seven percent in 1990 to just twelve percent today, and ninety percent of leading-edge semiconductor manufacturing is now done outside the United States, mostly in Asia.

You have been clear that maintaining our global leadership in semiconductors is a national priority to ensure both economic prosperity and national security. We agree. Without action, America stands to suffer lost jobs, stunted technological growth, considerable supply chain risk, and reduced economic opportunities.

We enthusiastically support Congress' recent bipartisan passage of the CHIPS and Science Act, which provides a once-in-a-generation opportunity to decisively strengthen the U.S. semiconductor ecosystem in the face of increasing global competition. By signing the CHIPS and Science Act into law, you are demonstrating our national commitment to sustain and grow our domestic semiconductor ecosystem and reap the benefits, including high-quality jobs, technological innovation, and scientific discovery. The federal government and private sector are poised to accelerate semiconductor manufacturing in the United States with a number of new projects ready to break ground.

Therefore, we have focused our forthcoming report on the transformative investments in research and development, startups, education, and workforce that are essential to the

long-term health and competitiveness of the U.S. semiconductor ecosystem. The report will provide recommendations for opportunities to maximally leverage this historic \$11 billion commitment.

The recommendations in our report will include actions to:

**Build a broad coalition:** Several recommendations will describe how the Department of Commerce can be the leader in establishing the National Semiconductor Technology Center (NSTC) and the National Advanced Packaging Manufacturing Program (NAPMP) pursuant to the CHIPS and Science Act. Our recommendations will provide a framework for how the public-private partnership should be structured to share the benefits of good jobs and educational opportunities across the United States.

**Focus on education and the future workforce:** The United States has the most talented workers in the world. Our recommendations will emphasize creating opportunities to educate and train the next generation for good-paying jobs in the semiconductor ecosystem. There is already a shortage of skilled semiconductor workers, and the CHIPS and Science Act will lead to the creation of many thousands of new jobs, increasing demand for these workers. To meet these needs, we will recommend that a portion of the CHIPS and Science Act funds go towards creating a national microelectronics training network. This network would support upgrading laboratory facilities at dozens of geographically distributed universities and colleges, including community colleges and minority serving institutions, such as Historically Black Colleges and Universities, Hispanic-Serving Institutions, Asian American and Pacific Islander Serving Institutions, and Tribal Colleges and Universities. It also would promote curriculum development and dissemination to universities, colleges, and trade schools, and it would support students across the educational spectrum with scholarships and research assistantships.

**Foster innovation:** Developing a new semiconductor product requires an investment of hundreds of millions of dollars—a cost many startup companies and academic researchers cannot afford. To lower the cost of entry, we will recommend that a portion of the CHIPS and Science Act funds be used to provide startup companies and academic researchers with financial support and essential access to prototyping tools and facilities. Enabling access to these resources can level the playing field and restore healthy competition to the market. We also will recommend that a “chiplet platform”—a chip that includes the common, non-innovative parts of a product—be developed to enable startups and academic researchers to more rapidly innovate and drastically reduce their development costs. Other countries, particularly in Asia, are making investments to lower the cost of market entry and seeing results. For example, six times more semiconductor startup companies are created in China each year than in the United States. We believe that investing in these domestic shared resources is critical for reversing this trend.

**Set a national research agenda:** To sow the seeds for the future of our semiconductor ecosystem, it is critical to support fundamental research in such areas as processes, materials, and packaging; energy efficient computing; security; and applications to the life sciences. We will recommend leveraging the CHIPS and Science Act funds to set new

national “grand challenges” to ensure that the United States leads the world in semiconductor innovation. For example, the United States should be the first country to build a “zettascale supercomputer,” which would be 1000 times faster than the fastest supercomputer that is available today. This incredible amount of computing capacity would enable extremely complex calculations to be accomplished much faster than is possible with current technology, while also increasing energy efficiency of computing power. This will unleash a wave of new scientific discoveries in predicting climate change, understanding and predicting wildfire activity, designing vaccines, personalizing cancer treatment, understanding the human brain, and much more.

We expect to provide our final report to you in the coming weeks. We are excited about the possibilities that funds from the CHIPS and Science Act will offer the American people in terms of economic potential and national security.

Sincerely,

Your President’s Council of Advisors on Science and Technology

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