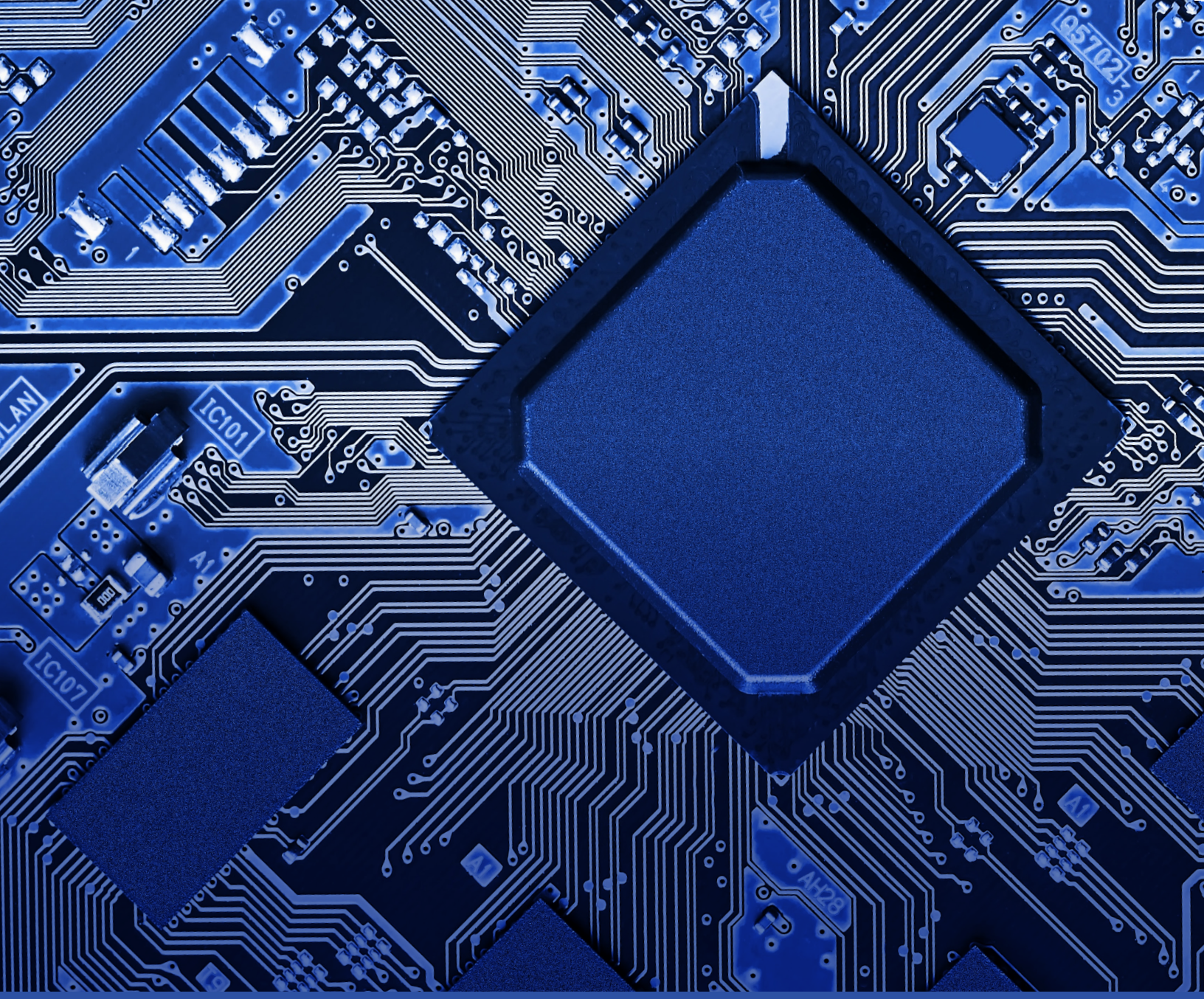


WINNING THE CHIP RACE

AMERICAN SEMICONDUCTOR INNOVATION AND COMPETITIVENESS UNDER THE TRUMP ADMINISTRATION & THE 119TH CONGRESS

January 2025

SIA SEMICONDUCTOR INDUSTRY ASSOCIATION

Dear President-elect Trump, Vice President-elect Vance, and Returning and New Members of Congress,

On behalf of SIA and our member companies, congratulations on your historic election. The next four years will be incredibly important for America and the world. The U.S. semiconductor industry stands ready to work with you to reinforce America's economic strength, national security, innovation base, and technology leadership.

To be the world's economic, technology, and security leader, America must lead the world in semiconductors.

Innovation in semiconductors drives growth throughout the economy, enabling advances in a range of critical and emerging technologies, including artificial intelligence and machine learning, aerospace and defense, quantum and high-performance computing, electronics and 5G/6G communications, transportation and infrastructure, energy and data centers, healthcare and biotechnology, and countless others.

The semiconductor was invented in America more than 65 years ago, marking an indelible point of pride in our history. In the decades since, however, governments around the world recognized the strategic importance of the chip industry and offered substantial incentives to attract semiconductor design and manufacturing to their shores. As a result, America's share of global chipmaking capacity declined sharply from 37% in 1990 to 10% by 2022. New private investment in chip R&D and design is also now increasingly taking place outside the U.S.

To counter these challenges, the Trump Administration and Congress took decisive bipartisan action in 2020 to advance the CHIPS Act — a generational commitment to ushering in American semiconductor resurgence. The incentives and investments authorized under this law are sparking a wave of domestic semiconductor manufacturing, reinvigorating the nation's chip research enterprise, and boosting American job creation, economic growth, and supply chain resilience.

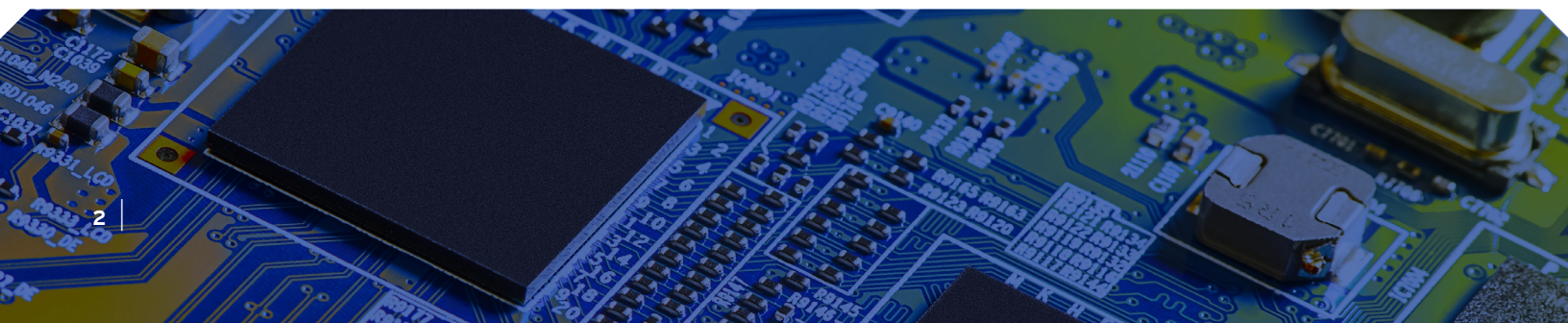
Based on our current trajectory, the U.S. is projected to triple its chipmaking capacity by 2032, growing at a rate that leads the world and increasing America's share of global capacity for the first time in four decades. Private investment in the U.S. semiconductor supply chain will total over $450 billion, creating more than 55,000 manufacturing jobs and 100,000 construction jobs, in addition to supporting hundreds of thousands of jobs throughout our economy. Industry, universities, and government are also actively partnering to build a framework for long-term national semiconductor innovation leadership. Despite our progress, competitors around the world continue their efforts to challenge U.S. leadership. America must run faster to win the technology race of the future.

During the second Trump Administration and the 119th Congress, we urge you to renew your commitment to cementing America's semiconductor resurgence.

To achieve this, the Trump Administration and Congress should take bold action to advance this vital sector's innovation and competitiveness. We encourage you to support policies that: 1) incentivize domestic chip research, design, and manufacturing; 2) invest in basic research; 3) promote smart trade policies that increase global demand for our semiconductors and strengthen our supply chains; 4) advance U.S. economic and national security interests through stable and predictable policies and in partnership with industry; and 5) develop a skilled workforce with access to global talent.

The attached agenda sets forth several priorities for action. We welcome the opportunity to partner with you in the years ahead to achieve our shared goals and rise to the great challenges of our time.

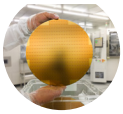
John Neuffer
President & CEO, Semiconductor Industry Association



SIA POLICY RECOMMENDATIONS

The strategy for advancing U.S. semiconductor leadership must consist of coordinated, complementary efforts to promote industry innovation and competitiveness while protecting economic and national security.

SIA stands ready to work with policymakers to adopt and implement a robust policy agenda to advance U.S. semiconductor leadership.



SEMICONDUCTOR MANUFACTURING INCENTIVES & R&D INVESTMENTS

Advance incentives for U.S. chipmaking and investments in American innovation

TAX

Ensure the U.S. remains a competitive tax destination to invest in semiconductor research, design, and manufacturing

RESEARCH

Support existing R&D initiatives and grow federal investment in semiconductor research and basic research across the physical sciences to enable U.S. technology leadership and win technologies of the future

WORKFORCE & IMMIGRATION

Grow the talent pipeline by developing, attracting, and retaining a high-skilled workforce

ECONOMIC SECURITY - TRADE & SUPPLY CHAIN RESILIENCE

Restore U.S. trade leadership, build strong and complementary global chip supply chains, and facilitate access to new and growing markets

NATIONAL SECURITY – EXPORT CONTROLS & TECHNOLOGY RESTRICTIONS

Ensure policies are carefully calibrated and targeted, effective, and do not undermine the interests they are designed to protect

CHINA

Out-compete, out-innovate, and out-flank to win the future for U.S. semiconductors

ENVIRONMENTAL & ENERGY REGULATION

Streamline regulatory and permitting requirements to promote innovation and industry growth, protect workers and the environment, and support American energy strength domestically and around the world

About SIA: The Semiconductor Industry Association (SIA) is the voice of the semiconductor industry, one of America's top export industries and a key driver of the country's economic strength, national security, and global competitiveness. Semiconductors — the tiny chips that enable modern technologies — power incredible products and services that have transformed our lives and our economy. The semiconductor industry directly employs over a quarter of a million workers in the United States. U.S. semiconductor sales totaled $264 billion in 2023. SIA members account for 99% of all U.S. semiconductor industry sales. Through this coalition, SIA seeks to strengthen leadership of semiconductor manufacturing, design, and research by working with Congress, the Administration, and key industry stakeholders around the world to encourage policies that fuel innovation, propel business, and drive international competition. Learn more at www.semiconductors.org.

SEMICONDUCTOR MANUFACTURING INCENTIVES AND R&D INVESTMENTS

Advance incentives for U.S. chipmaking and investments in American innovation

Importance

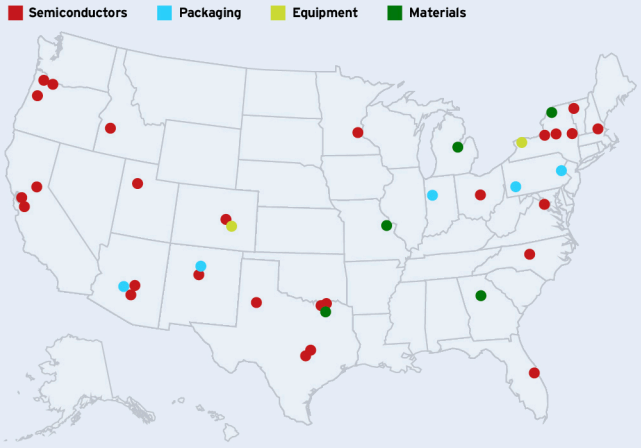
Originally conceived and authorized during the first Trump Administration to address critical national security risks and supply chain vulnerabilities facing the U.S., the CHIPS Act continues to address pressing economic and national security priorities. The law rests on two pillars: 1) incentives for manufacturing in the form of a 25% investment tax credit and $39 billion in grants; and 2) investments in chip innovation through $13 billion for research programs and infrastructure.

These incentives and investments promise powerful results for America:

- **Manufacturing incentives have sparked $450 billion in private sector investments** to revitalize the U.S. chip ecosystem, setting in motion a **tripling of U.S. chipmaking capacity** while creating over 50,000 manufacturing jobs and 80,000 construction jobs, which will support hundreds of thousands of additional jobs throughout the economy.
- **R&D investments are building the framework** to maintain and extend U.S. technology leadership, strengthening links between researchers and manufacturers to accelerate the transition of new innovations into commercial or defense products with benefits that will multiply throughout the economy and enhance our national security.
- Workforce development initiatives in partnerships between companies, community colleges, and universities are training **future semiconductor technicians, chip designers, and engineers.**

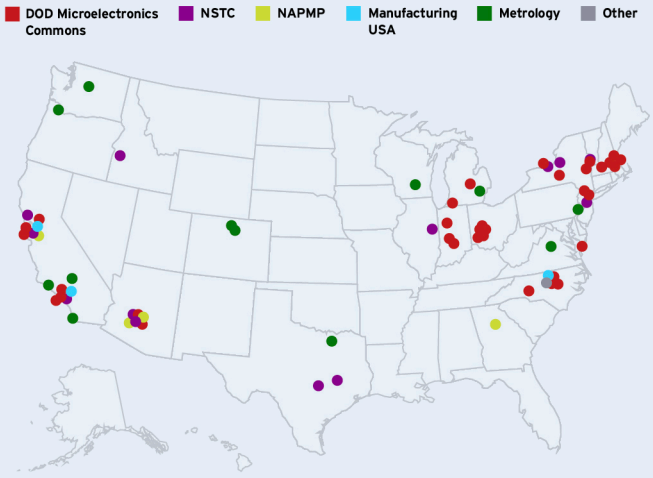
CHIPS awards announcements

Preliminary memoranda of terms (PMTs) and final agreements announced by the CHIPS Program Office



Source: SIA, CHIPS Program Office

CHIPS R&D programs awards



Source: SIA, Department of Commerce, Department of Defense

Challenges

While substantial progress has been made in implementing semiconductor manufacturing incentives and research investments since initial authorization of the CHIPS Act, substantial work remains to realize the important economic and national security objectives of the law. In the meantime, global competitors continue to invest in their semiconductor ecosystems and advance their technological capabilities.

Recommendations

- **Ensure continuity and effective implementation of the grant program**, including the efficient disbursement of funds consistent with final awards and expediting negotiations with companies who have reached preliminary agreements but lack a final contract.
- **Expedite award agreements and improve efficiency** by streamlining and limiting requirements unrelated to U.S. economic and national security.
- **Continue rollout of the R&D programs** and ensure these initiatives drive the next generation of technology consistent with industry priorities.

TAX

Ensure the U.S. remains a competitive tax destination to invest in semiconductor research, design, and manufacturing

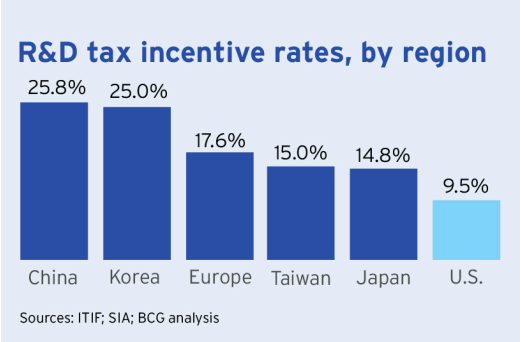
Importance

Chip leadership is critical to ensuring U.S. economic and national security, and it produces a multiplier effect in driving innovation and growth throughout the economy, including technologies of the future such as AI. A globally competitive tax code is key to ensuring the U.S. remains the leader of the chip industry and remains an attractive destination for companies to invest and innovate. For the U.S. semiconductor industry, this requires targeted tax policies to spur investment in the core activities of chip research, design, and manufacturing.

Driving technological change in the industry requires companies to develop more complex designs and process technologies, as well as introduce advanced production machinery capable of manufacturing cutting-edge chips. The ability to innovate and produce state-of-the-art semiconductors requires U.S. chip companies to invest billions of dollars in R&D annually — on average 20% of revenue — to maintain technology and market leadership, with an additional 20% of revenue on average re-invested in capital expenditures.[1]

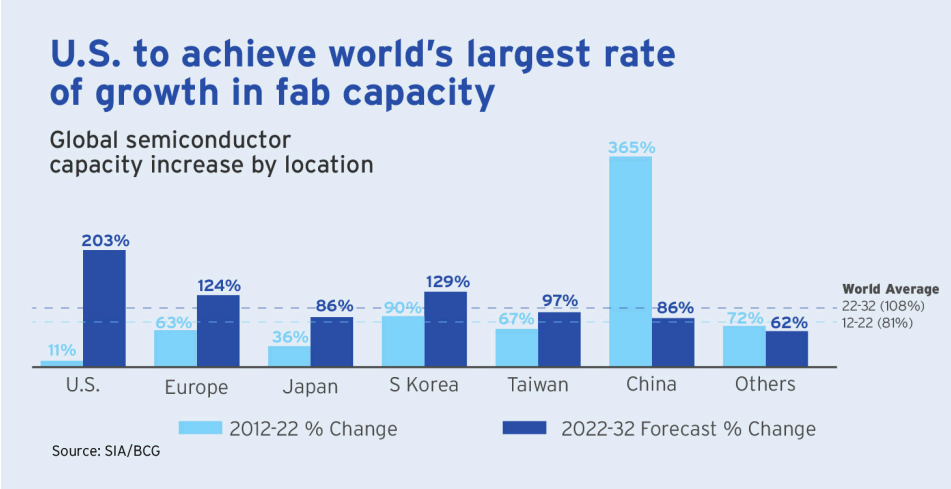
Challenges

1. **Chip Design and Other Critical Research & Development.** The U.S. continues to trail the incentives offered by global competitors for innovation in chip design and R&D investments. And the U.S. is falling even further behind due to the requirement to amortize domestic research expenditures over 5 years, rather than deducting these expenditures immediately as is the case in almost all other advanced economies. Despite the essential nature of chip design, only 27% of global semiconductor design activity is conducted in the United States.[2] Meanwhile, global competitors increasingly offer strong incentives for companies to make R&D and chip investments on their shores, including China's 220% "super deduction" for semiconductor R&D.[3] **In fact, the U.S. is the only major semiconductor region without a targeted, enhanced tax incentive for semiconductor design or R&D, placing us last among major semiconductor regions in overall R&D tax incentives.**



While competitors overseas continue to incentivize domestic chip research and design, innovation costs are rising with each new generation of technology. Foreign competition, particularly from Chinese design firms seeking to displace U.S companies, underscores the importance of ensuring the U.S. remains a competitive destination for companies to invest in chip design and R&D.

2. **Manufacturing.** Governments around the world have heavily invested in the development of their own semiconductor manufacturing industries, resulting in an unlevel playing field for investment in the U.S. Before the U.S. took steps to incentivize domestic chip manufacturing, heavy overseas subsidies created a significant cost disparity in which it cost 25-50% more to build and operate a fab in U.S. than abroad.[4] As a result, the U.S. share of global fabrication capacity declined from 37% in 1990 to 10% in 2022.[5] Incentives, such as the advanced manufacturing investment credit **(IRC §48D)** have helped start to reverse the decades-long decline in U.S. semiconductor manufacturing capacity, with the U.S. projected to triple its manufacturing capacity between 2022 and 2032. However, this credit is set to expire in 2026, thereby **threatening the ability to make sustained, long-term investments in America's chipmaking capacity.**



[1] SIA, "2024 Factbook," May 2024. https://www.semiconductors.org/wp-content/uploads/2024/05/SIA-2024-Factbook.pdf

[2] BIS, "Assessment of the Status of the Microelectronics Industrial Base in the United States," December 2023. https://www.bis.doc.gov/index.php/documents/technology-evaluation/3402-section-9904-report-final-20231221/file

[3] PWC, "People's Republic of China, Corporate – Deductions," June 2024. https://taxsummaries.pwc.com/peoples-republic-of-china/corporate/deductions

3. **Onshore Intellectual Property (IP).** Encouraged by the deduction for Foreign-Derived Intangible Income (FDII), which was established by the Tax Cuts and Jobs Act (TCJA) of 2017, many companies repatriated significant IP from abroad. The FDII provision significantly expanded the U.S. tax base, contributing to the rise in corporate taxes post-TCJA, and encourages companies to develop and maintain their valuable IP in the U.S. The current rate for this important provision is set to expire at the end of 2025.

Recommendations

Adopt policies to make the U.S. a competitive destination for semiconductor companies to invest and innovate:

1. The highly impactful **advanced manufacturing investment credit** (IRC §48D) should be **extended** beyond 2026 to incentivize the continued buildout of long-term domestic manufacturing capacity[6] and expanded to include chip design and other R&D by passing the Semiconductor Technology Advancement and Research (STAR) Act.[7] Passing this legislation would help to level the playing field between the U.S. and global competitors and ensure the U.S. continues to grow its manufacturing capacity and retains its first-mover advantage in chip design and R&D. In addition, the definition of "semiconductor" should be modified to encompass all stages of semiconductor production, such as the production of semiconductor-grade polysilicon.

2. **Restore the full and immediate expensing of all R&D expenditures under IRC Section 174** on a permanent basis to support sustained innovation.

3. **Maintain the current Foreign-Derived Intangible Income deduction** to protect the U.S. tax base and encourage companies to develop and mature their intellectual property in the U.S. rather than abroad.

[4] SIA/BCG, "Government Incentives and U.S. Competitiveness in Semiconductor Manufacturing," September 2020. https://www.semiconductors.org/wp-content/uploads/2020/09/Government-Incentives-and-US-Competitiveness-in-Semiconductor-Manufacturing-Sep-2020.pdf

[5] SIA/BCG, "Emerging Resilience in the Semiconductor Supply Chain," May 2024. https://www.semiconductors.org/emerging-resilience-in-the-semiconductor-supply-chain/

[6] The credit has proven to drive private investment and provide significant economic, national security, and supply chain benefits, and the Joint Committee on Taxation estimates the cost of a 10-year extension to be only $8.445 billion.
Congressional Budget Office, "Budgetary Outcomes Under Alternative Assumptions About Spending and Revenues," May 2024, citing Joint Committee on Taxation estimates. https://www.cbo.gov/system/files/2024-05/60114-Budgetary-Outcomes.pdf.

[7] H.R. 9183 in the 118th Congress. https://www.congress.gov/bill/118th-congress/house-bill/9183

RESEARCH & DEVELOPMENT:

Support existing R&D initiatives and grow federal investment in semiconductor research and basic research across the physical sciences to enable U.S. technology leadership and win technologies of the future

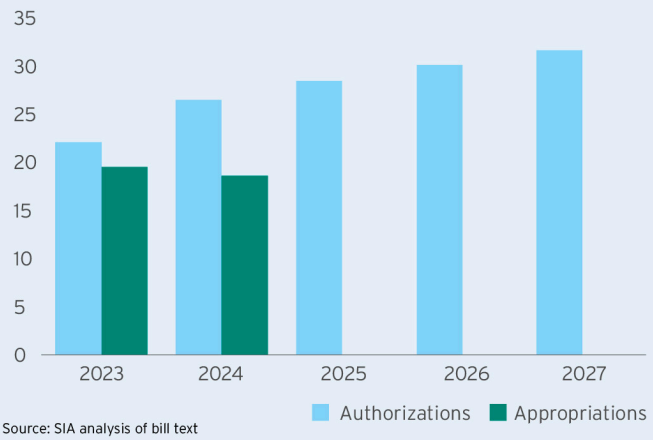
Importance

Given the critical enabling role of semiconductors in advancing innovations in technologies of the future – such as AI, quantum computing, energy, and 5G/6G – continued U.S. investment in semiconductor R&D is essential for the U.S. to lead the world in these technologies. Federally funded basic and applied research conducted at national labs and universities drives the next generation of technology, fueling economic growth and national security. Existing and new research programs established under the CHIPS and Science Act are supporting a new framework and infrastructure for continued U.S. leadership in semiconductor technology by bridging the gap from "lab to fab," driving innovation in advanced packaging, and jumpstarting initiatives in metrology and digital twins.[8]

These investments and other federal investments in semiconductor R&D provide an outsized return on investment through huge benefits across the entire economy: we estimate that every $1 invested by the federal government into semiconductor research has increased overall U.S. gross domestic product (GDP) by $16.50.[9]

CHIPS & science authorizations vs. appropriations

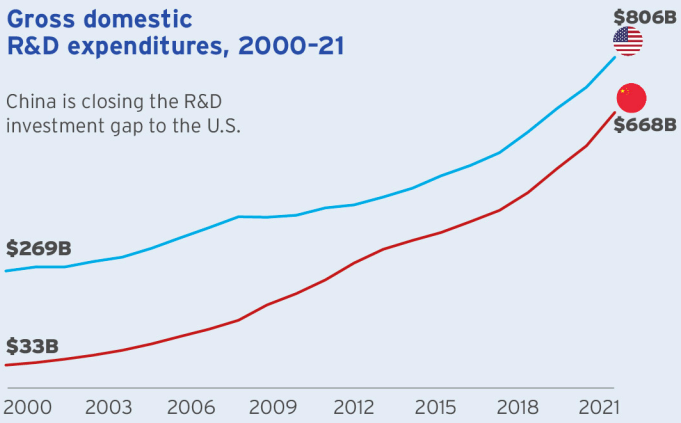
NSF, NIST, DOE-Science total funding ($ in billions)



Source: SIA analysis of bill text

Gross domestic R&D expenditures, 2000-21

China is closing the R&D investment gap to the U.S.



Current PPP dollars
Source: National Science Board Indicators, OECD, MSTI

Challenges

While the CHIPS and Science Act made historic investments in semiconductor research, these investments need to be sustained. In addition, federal investments in basic research across the physical sciences have failed to keep pace with the rising costs of developing new technology. Meanwhile, global competitors are investing heavily to challenge U.S. scientific leadership. Congress authorized significant investments in the federal R&D enterprise at the National Science Foundation, the National Institute for Standards and Technology, and the Department of Energy Office of Science, but appropriations for these agencies have remained fixed near FY23 levels and are more than $10 billion behind the levels authorized.

Recommendations

- **Fund federal research at authorized levels** to ensure the U.S. remains the global leader in innovation, enabling researchers to make discoveries today that will transform semiconductor technology in the next decade while building the pipeline of scientists and engineers needed to maintain technology leadership.
- **Ensure continued progress in the execution of the CHIPS R&D programs**, expediting implementation where possible, establishing affiliated technical centers of the National Semiconductor Technology Center (NSTC)[10] to focus on R&D in specific technology domains (e.g., memory or analog-mixed signal), and prioritizing support for industry research roadmaps, as well as to promote transfer to the defense industrial base.
- **Promote the long-term success of semiconductor R&D programs** by authorizing future funding beyond 2026, collaborating on research with allies and partners, and scaling federal R&D and public-private partnerships dedicated to AI and quantum computing.

[8] Research programs under the CHIPS Act include the National Semiconductor Technology Center (NSTC), the National Advanced Packaging Manufacturing Program (NAPMP), the CHIPS Metrology Program, the SMART USA Manufacturing USA Institute, and the Department of Defense Microelectronics Commons.

[9] SIA, "Sparking Innovation: How Federal Investment in Semiconductor R&D Spurs U.S. Economic Growth and Job Creation," June 2020. https://www.semiconductors.org/sparking-innovation/

[10] The NSTC, which is a public-private partnership operated by the National Center for the Advancement of Semiconductor Technology, intends to extend U.S. leadership in semiconductor technology, reduce the time and cost to prototype ideas, and advance semiconductor workforce development.

WORKFORCE & IMMIGRATION:

Grow the talent pipeline by developing, attracting, and retaining a high-skilled workforce

Importance

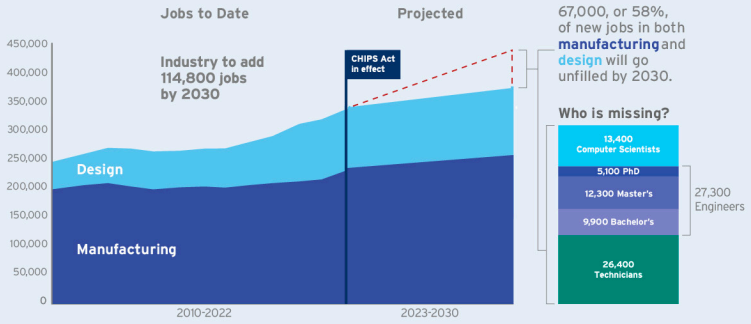
To drive semiconductor innovation and U.S. economic competitiveness, America needs to adopt and update policies to educate, attract, and retain the top engineering, scientific, and technical talent in the world and train a skilled workforce for the U.S. semiconductor industry and other strategic technology sectors. From manufacturing technicians with a short-term certificate to chip design engineers with advanced degrees, a growing semiconductor talent pipeline provides career opportunities for all Americans.

Challenges

The competitive position of the U.S. semiconductor industry, as well as other critical and emerging technology industries of strategic importance, depends on an American workforce that is the best educated and trained in the world. Unfortunately, the industry's need for a skilled workforce greatly exceeds the available talent developed through our U.S. education system and existing training programs. At current rates, the U.S. will not keep up with demand for skilled workers in the semiconductor industry — including for the construction of new fabs — and among all critical technology sectors.[11]

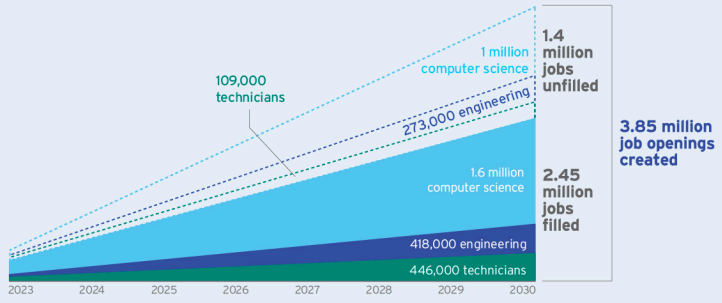
Addressing this shortfall requires a comprehensive approach. More must be done to encourage U.S. students to: 1) pursue education and training in critical areas for the industry; 2) engage in semiconductor-related research and pursue advanced degrees in larger numbers; and 3) choose the semiconductor industry over other competing technology fields. The U.S must also improve access to international students at U.S. universities, where foreign nationals currently comprise approximately 60% of advanced degree STEM graduates in key areas for the industry. Unfortunately, current U.S. immigration policies create obstacles for these highly educated foreign students to stay in this country over the long term, where they could contribute to economic growth and discoveries that support U.S. competitiveness and technology leadership.

Historical semiconductor workforce and projected 2023-2030 gap



Source: SIA/Oxford Economics

Projected U.S. demand for computer sciences, engineers, and technicians, 2023-2030



Source: SIA/Oxford Economics

Recommendations

- Increase and sustain funding for federal R&D programs at NSF, NIST, DOE, and DOD to train and build the pipeline of scientists and engineers needed to drive innovation in the semiconductor industry and other strategic technologies. Programs should be targeted at encouraging U.S. students to pursue advanced degrees and engage in research in areas of critical need.
- Expand skills training initiatives, including increased funding for apprenticeship programs and university chip design programs, reauthorization of the Workforce Innovation and Opportunity Act (WIOA) and Perkins Career and Technical Education Act (CTE), and continuation of workforce development efforts within the CHIPS R&D program and Department of Labor.
- Support opportunities for underrepresented sources of talent, including veterans and military spouses, workers seeking new career paths, rural students, traditionally underrepresented students, and other economically disadvantaged individuals.
- Improve affordability, such as by increasing the availability of federal funding for scholarships, fellowships, and other programs that encourage enrollment in critical areas of study, as well as expanding Pell grants to include short-term training.
- Advance targeted immigration policies that reduce the employment-based green card backlog and improve the industry's ability to attract and retain foreign national workers with critical skills, particularly at the advanced degree level.

[11] SIA/Oxford Economics, "Chipping Away: Assessing and Addressing the Labor Market Gap Facing the U.S. Semiconductor Industry," July 2023. https://www.semiconductors.org/chipping-away-assessing-and-addressing-the-labor-market-gap-facing-the-u-s-semiconductor-industry/

ECONOMIC SECURITY: TRADE & SUPPLY CHAIN RESILIENCE

Restore U.S. trade leadership, build strong and complementary global chip supply chains, and facilitate access to new and growing markets

Importance

Supply-side investments in the United States are helping to reverse a decades-long downward trajectory in the share of semiconductor manufacturing capacity in the U.S. To justify long-term, capital-intensive investments in U.S. semiconductor production, chipmakers need confidence that their products will have access to global markets. Roughly 75% of U.S. semiconductor industry revenue comes from overseas sales, which are essential to ensuring the U.S.-based semiconductor industry remains the global leader, as well as a core driver of innovation and growth for the U.S. economy. But while the U.S. sits on the sidelines, competitor nations have continued to negotiate preferential trade deals and forge supply chain networks that put U.S. industry at a competitive disadvantage.

Challenges

To complement efforts to run faster here at home and ensure our companies remain globally competitive, the U.S. must pursue a proactive, market-opening trade and investment agenda that creates new demand for Made-in-America chips overseas and facilitates U.S. semiconductor sales in new and emerging markets. The U.S. government must also stand up for American companies when they face unfair treatment in overseas markets. Semiconductors have long been a top U.S. export. American semiconductor exports, however, fell by nearly 16% from 2022 to 2023. And despite U.S.-government led efforts to strengthen economic ties in the Indo-Pacific, Asia's (excluding China) share of overall U.S. semiconductor revenue is actually declining, dropping from 35% in 2021 to 32% in 2023. By contrast, China has active free trade agreements with 26 countries and territories and is negotiating an additional eight agreements aimed at bolstering its domestic industry and capturing a greater share of global semiconductor demand.

Recommendations

- **Promote investment in U.S.-based chip research, design, and manufacturing:** Healthy trade and supply chain resilience require a foundation of sustained domestic investments in semiconductor innovation and competitiveness.
- **Pursue smart trade and supply chain deals that create demand for Made-in-America chips and downstream products:** Negotiate reciprocal trade and other economic deals with partners and allies that facilitate increased sales of U.S. semiconductors globally, create preferential markets for our chips and downstream electronics products, encourage investments by international semiconductor firms here in America, and incentivize the creation of trusted supply chains. Build on existing bilateral and plurilateral trade platforms with a view to strengthen trusted semiconductor supply chains and reduce America's and its allies' dependence on less reliable trade partners.
- **Stand up for U.S. companies and restore reciprocity:** Leverage a comprehensive and varied toolbox to aggressively combat discriminatory barriers and non-market policies and practices in other countries that unfairly tilt the playing field, undercut U.S. competitiveness, and create strategic dependencies and overconcentration. Work with trusted partners and allies to impose coordinated, multi-country responses that maximize impact and minimize potential free-riding and backfilling.
- **Build resilient and diverse semiconductor supply chains:** Work with supply chain partners and likeminded governments to build global supply chain capabilities that complement and support semiconductor industry operations in the U.S., including diverse and secure sourcing alternatives both for upstream semiconductor materials, like critical minerals and specialized chemicals, and for downstream markets, like automotive, industrial, and electronics. Ensure U.S.-headquartered companies enjoy nondiscriminatory access to semiconductor incentive programs offered by governments in foreign markets and align U.S. incentive programs to attract investment from allies and partners.
- **Advance policies that help chip companies operate more efficiently:** Promote trade facilitation policies globally that enable the smooth functioning of semiconductor supply chains, such as dismantling customs barriers, improving transparency, expediting customs clearance procedures, and ensuring the free movement of semiconductor data across borders.

NATIONAL SECURITY: EXPORT CONTROLS & TECH RESTRICTIONS

Ensure policies are carefully calibrated and targeted, effective, and do not undermine the interests they are designed to protect

Importance

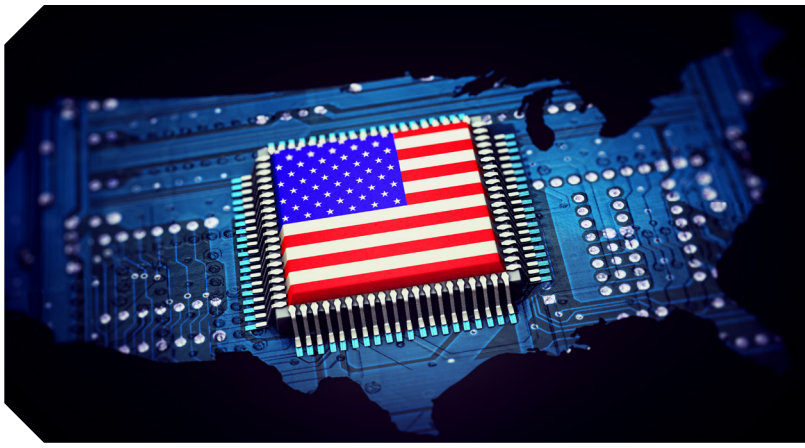
Continued U.S. leadership in semiconductor technology and innovation across the supply chain — logic, memory, analog, advanced packaging, equipment, and materials — is critical to America's national security and economic strength. American military systems are the most advanced and capable in the world. This would not be possible without American semiconductor technology. Chips underpin critical infrastructure systems, the U.S. industrial base, and "must-win" technologies of the future, including AI, 5G, and quantum computing.

But the fact remains, the health and vitality of the U.S. semiconductor industry is dependent on our companies' ability to fulfill overseas demand. Roughly 75% of U.S. chip industry revenue comes from sales to overseas customers. Export controls, outbound investment restrictions, and other policies are necessary tools for safeguarding national security. However, poorly calibrated and excessive regulations, developed without sufficient industry expertise, risk ceding strategic markets and weakening American semiconductor competitiveness globally.

Challenges

The U.S. semiconductor industry understands the need for targeted policies designed to achieve specific national security objectives. But this must be done without unduly harming commercial innovation, manufacturing, employment, and continued American leadership in critical technologies. The U.S. government has issued multiple, consequential – and often unilateral – semiconductor-focused restrictions intended to protect U.S. national security and economic security under a "small yard, high fence" doctrine. In the past few years, however, the "small yard" of strategic technologies has grown substantially bigger. These regulations are reshaping semiconductor supply chains and the global competitive landscape for chips and downstream chips-consuming firms alike, causing too many customers around the globe to shift reliance to non-U.S. chips suppliers, and prompting retaliatory actions designed to degrade U.S. semiconductor competitiveness. These policies require review and re-evaluation to assess whether they are achieving their intended objectives or whether they are hindering the U.S. technology base and our technology leadership.

Recommendations



- **Pursue coordinated, targeted actions with key supplier nations:** Export controls and other technology restrictions should be narrowly targeted to meet specific national security objectives and pursued in alignment with other key supplier nations. The joint pursuit of such technology restrictions not only ensures that the national security objectives of those actions are actually met, but also that the U.S. semiconductor industry can compete on a level playing field around the world. It is equally important to pursue policies that increase the market base and boost demand for U.S. chips both domestically and in foreign markets.
- **Evaluate impact:** The government should undertake a comprehensive evaluation of past semiconductor-focused technology restrictions to determine whether they have achieved their specific national security and foreign policy objectives, understand the collateral impact on the U.S. national security innovation base — including the degree to which U.S. semiconductor technologies are "designed out" globally and replaced by foreign alternatives — and assess whether other policy tools may be more effective.
- **Reduce regulatory burdens:** Reform regulations and processes to ease restrictions on export-controlled trade to trusted partners and allies to foster cooperative technological innovation, support security/defense partnerships, facilitate investments in each other's markets, and expand the market base for Made-in-America chips. Avoid creating incentives for the development of new technologies outside the U.S., including by modernizing outdated controls. The Commerce Department should, where possible, allow for delayed implementation of regulations to give the private sector time to adjust and build the necessary compliance capabilities.
- **Consult industry:** Government should work closely with industry to ensure controls are crafted in a manner that enhances our national security while still enabling the U.S. semiconductor industry to compete, grow, and innovate. The Commerce Department should establish the long-delayed President's Export Council Subcommittee on Export Administration (PECSEA), update membership on technical advisory committees, and put in place other channels for regular engagement with industry leaders.

CHINA

Out-compete, out-innovate, and out-flank to win the future for U.S. semiconductors

Importance

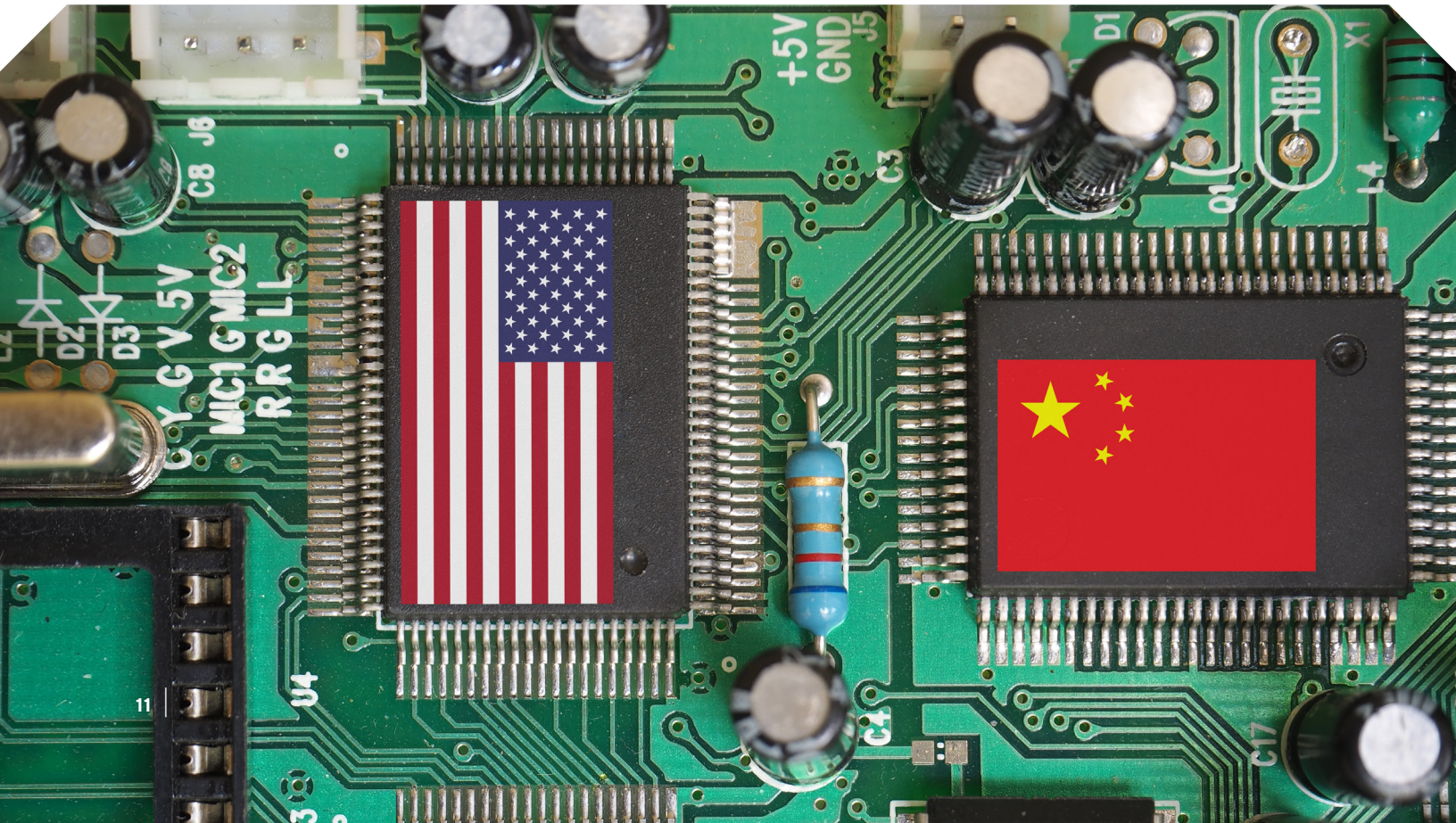
China is a major player in the global semiconductor industry, both as the world's largest market for semiconductors and as a serious and growing producer and competitor. As the world's largest electronics manufacturing hub, China consumed 31% of U.S. chip sales in 2023. As a producer, China commands roughly 20% of front-end and nearly 40% of back-end semiconductor manufacturing capacity. For mature-node semiconductors (≥28nm), roughly 37% of wafer-manufacturing capacity is projected to be concentrated in China by 2027. In May 2024, China launched Phase 3 of its National Integrated Circuit Fund, funneling $47.5 billion in government subsidies to China's domestic semiconductor ecosystem in an effort to achieve self-sufficiency.

Challenges

As outlined in its 14th Five-Year Plan and its "Made in China 2025" strategy, Beijing is working to develop an "independent and controllable" semiconductor industry in China through both supply-side and demand-side measures. China pursues a wide array of industrial policies and non-market practices designed to displace U.S. and foreign-made chips in its domestic market, and ultimately globally. The U.S. must meet the so-called "China Challenge" with strength – by pursuing smart "promote" policies with partners and allied countries that help us pedal faster on the global stage.

Recommendations

- **Build and expand America's Semiconductor Strength:** Double down on investments in U.S. semiconductor R&D, advanced manufacturing, and workforce development to strengthen our domestic base and ensure American companies remain at the forefront of innovation and market position. Invest in supply chain capabilities in the U.S. and in partner countries that support and complement U.S. semiconductor industry operations, including for upstream materials production and back-end assembly, test, and packaging.
- **Counter Unfair, Non-Market Practices:** Utilize a varied toolbox to counter practices that distort markets, drive strategic overdependencies, undermine fair competition, and discriminate against U.S. semiconductor companies and their products, based on the principle of reciprocity.
- **Lead Allies and Partners in Common Cause:** Work closely with partners to advance shared objectives and strategic interests, and counter unfair, non-market, and coercive practices through coordinated, joint policy actions.



ENVIRONMENTAL & ENERGY REGULATION

Streamline regulatory and permitting requirements to promote innovation and industry growth, protect workers and the environment, and support American energy strength domestically and around the world

Importance

Semiconductor fabrication operations and continued innovation require dependable on access to key inputs such as specialized chemicals and gases and reliable and cost-efficient sources of clean energy. Accordingly, efficient regulatory and permitting processes are critical to the industry's ability to maintain and expand domestic operations, maximize American manufacturing competitiveness, and continue innovating while enhancing protection of the environment and workers. Semiconductors enable technologies critical to advancing energy efficiency, emissions reductions, and environmental sustainability throughout the economy. Ensuring growth in the semiconductor industry itself advances our national energy goals and maintains America's competitive strength.[12]

Challenges

Specialized chemicals, gases, and materials used in semiconductor fabrication possess specific functional attributes needed to manufacture at the molecular scale. Use of certain materials may pose concerns and lack substitutes that currently meet the industry's exacting performance requirements. Semiconductor companies and their suppliers are constantly searching for alternatives, but the invention, qualification, and integration of a new substance into high-volume manufacturing can take years or decades, and in some cases may not be possible. Accordingly, future policies should ensure the semiconductor supply chain has a sufficient runway to allow for an orderly transition to alternative substances.

While the industry employs extensive controls to manage these chemicals, to reduce environmental releases,[13] and to minimize human exposures, the industry needs an effective regulatory system to remain innovative and competitive and to continue to achieve high standards of worker safety and environmental protection. Ensuring continued use of existing chemicals and driving timely approvals of new chemicals are necessary to sustain business operations and continued innovation, and to preserve American leadership in this critical sector. Without access to critical substances that are otherwise readily available abroad, the U.S. will not be able to compete with foreign jurisdictions.

Permitting and other regulatory challenges have created obstacles to accessing sources of carbon-free energy for current and future U.S. fabs, especially when energy demand is expected to soar as companies must move with agility and speed to maintain America's lead the AI race. Given the importance of semiconductor manufacturing, it is critical the industry has access to abundant, affordable, and carbon-free energy.

Recommendations

- **Reform the Toxics Substances Control Act (TSCA)** to advance environmental protections while ensuring the efficient, streamlined review and approval of new substances necessary for innovation in domestic semiconductor manufacturing. Congress should provide sufficient appropriations for the EPA New Chemicals Program to implement this goal.
- **Augment industry and university research** to find suitable alternatives to chemicals of concern, identify effective abatement techniques, and develop methods to detect and treat substances like PFAS or greenhouse gases necessary for semiconductor production.
- **Where restrictions on chemicals or gases are necessary and appropriate, regulations should protect the industry's ability to manufacture and innovate** by providing critical-use exemptions for essential materials and allow sufficient time for research on alternatives, adoption of mitigation technologies, and orderly substitution.
- **Streamline permitting requirements** to site new transmission infrastructure, upgrade existing infrastructure, and ensure access to cost-competitive, reliable clean energy to make American manufacturing as competitive as possible.

[12] Innovation and growth of the semiconductor industry enables substantial GHG emissions reductions in other sectors and throughout the economy; indeed, for every unit of emissions generated by the semiconductor industry, it has helped avoid 5 times more emissions for end-customers. Goldman Sachs Asset Management, "Green Capex Capturing the Opportunities," 2022. gsam.com/content/gsam/us/en/institutions/market-insights/gsamconnect/2022/Green_Capex_Capturing_the_Opportunities.html

[13] For example, the industry has taken measures to minimize emissions of greenhouse gases semiconductor manufacturing in the United States. The semiconductor industry represents about 0.068% of all greenhouse gas (GHG) emissions and about 0.29% of industrial sector emissions in the U.S. The industry's GHG emissions have been virtually flat since 2005, despite increasing output and process complexity. EPA, "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2022." Similarly, data available in the EPA Toxics Release Inventory (TRI) show the semiconductor manufacturing sector represents only 0.17% of all releases for relevant substances. EPA Toxics Release Inventory (TRI) Program, 2023. https://www.epa.gov/toxics-release-inventory-tri-program. The semiconductor industry has also been a leader in phasing out and reducing use of chemicals of concern in response to evolving science on chemical risks, eliminating substances such as TCE, EGEs, and TCA, which are the chemicals cited as chemicals of concern in industry health studies from the 1980s and 1990s.

FACT SHEET: BUILDING AMERICA'S INNOVATION ECONOMY

A diverse and innovative U.S. semiconductor industry is critical to America's economic and national security strength.

Semiconductors are the brains of modern electronics, enabling advances in medical devices and health care, communications, computing, defense and aerospace, transportation and infrastructure, energy, and technologies of the future such as artificial intelligence, quantum computing, and advanced wireless networks. A globally competitive U.S. semiconductor industry will allow us to contest global challenges, boost our economy, enhance national security, and lead the technology race of the 21st century.

As of 2023, the last full year of available data:

The U.S. semiconductor industry is the worldwide industry leader with **50.2%** of global market share and sales of **$264 billion**.[14]

The semiconductor industry directly employs **334,000** people in the U.S. With a jobs multiplier of **5.7**, the industry supports nearly **2 million additional jobs** in the wider U.S. economy.[15]

The United States exported **$52.7 billion** in semiconductors, making semiconductors America's **#6 export**.[16]

The U.S. maintains a consistent **trade surplus** in **semiconductors**, including with major trading partners such as China and the EU, as over **75%** of U.S. semiconductor companies' sales are to overseas customers, enabling sustained investment in R&D and new capital expenditures in the U.S. and around the world.[17]

The U.S. semiconductor industry annually invests about **20%** of its revenue into R&D, which is the **second-highest** share of any major U.S. industry, behind only the pharmaceutical industry. U.S. headquartered companies spent **$59.3** billion on R&D.[18]

The U.S. semiconductor industry is America's **#1 contributor to labor productivity growth**. Semiconductor innovation has made virtually all sectors of the U.S. economy — agriculture, manufacturing, transportation, healthcare, etc. — more effective and efficient.[19]

Rapid innovation has enabled the semiconductor industry to produce exponentially more advanced products at a lower cost. A single smartphone today has far more computing power than the computers used by NASA to land a person on the moon in 1969. Today, the smallest feature on a commercially available leading-edge chip is **3nm** — just **5 atoms thick** and **30,000x thinner** than a human hair.

[14] World Semiconductor Trade Statistics, "Bluebooks." Based on total semiconductor shipments (T99) in 2023.

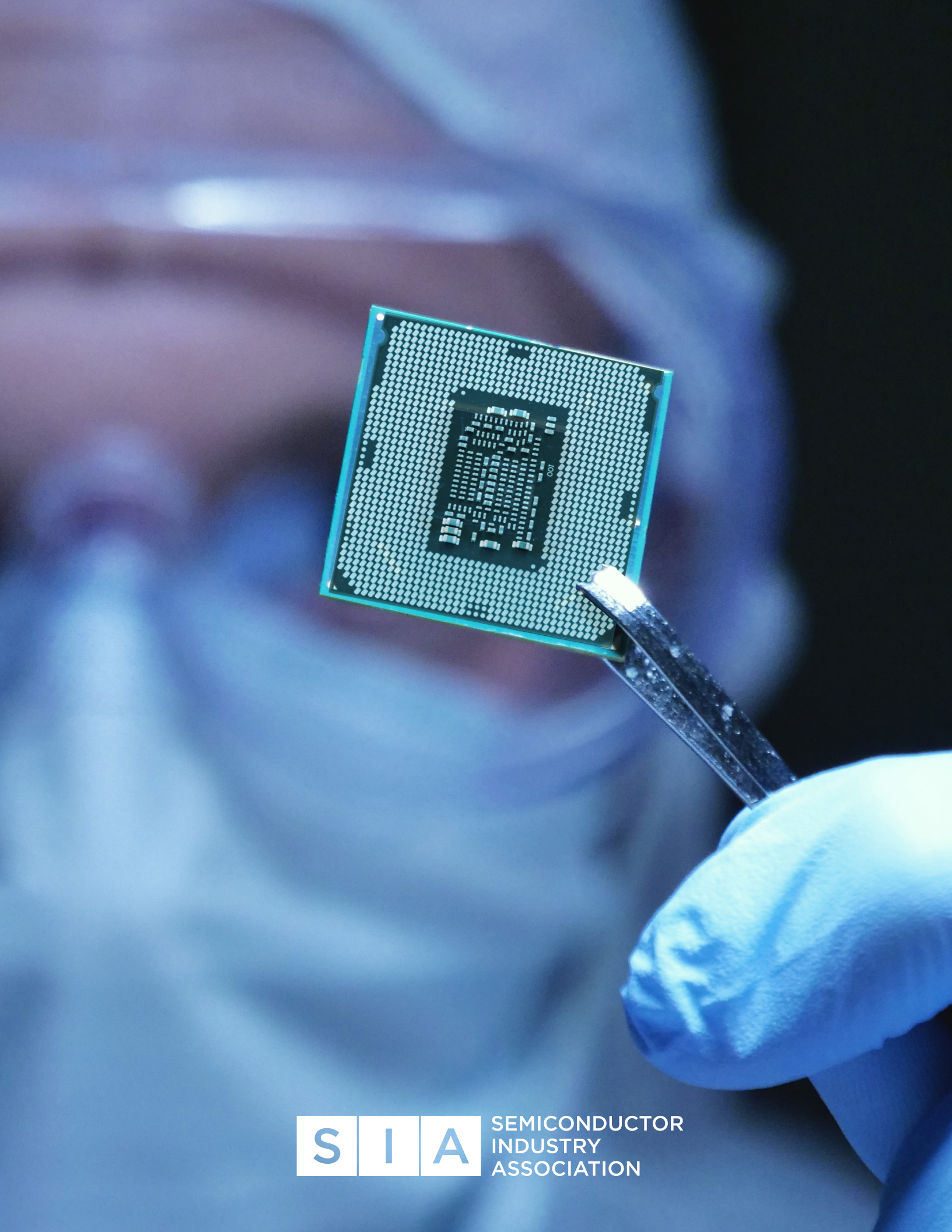
[15] SIA, "2024 SIA Databook," p. 59.

[16] United States International Trade Commission, "DataWeb," August 2024. Industry defined as NAICS codes 334413.

[17] SIA, "2024 State of the U.S. Semiconductor Industry," September 11, 2024, p. 21.

[18] SIA "2024 SIA Databook," pp. 36 and 39.

[19] Oxford Economics & SIA, "The Positive Impact of the Semiconductor Industry on the American Workforce and How Federal Industry Incentives Will Increase Domestic Jobs," May 2021, p. 14.



SEMICONDUCTOR INDUSTRY ASSOCIATION