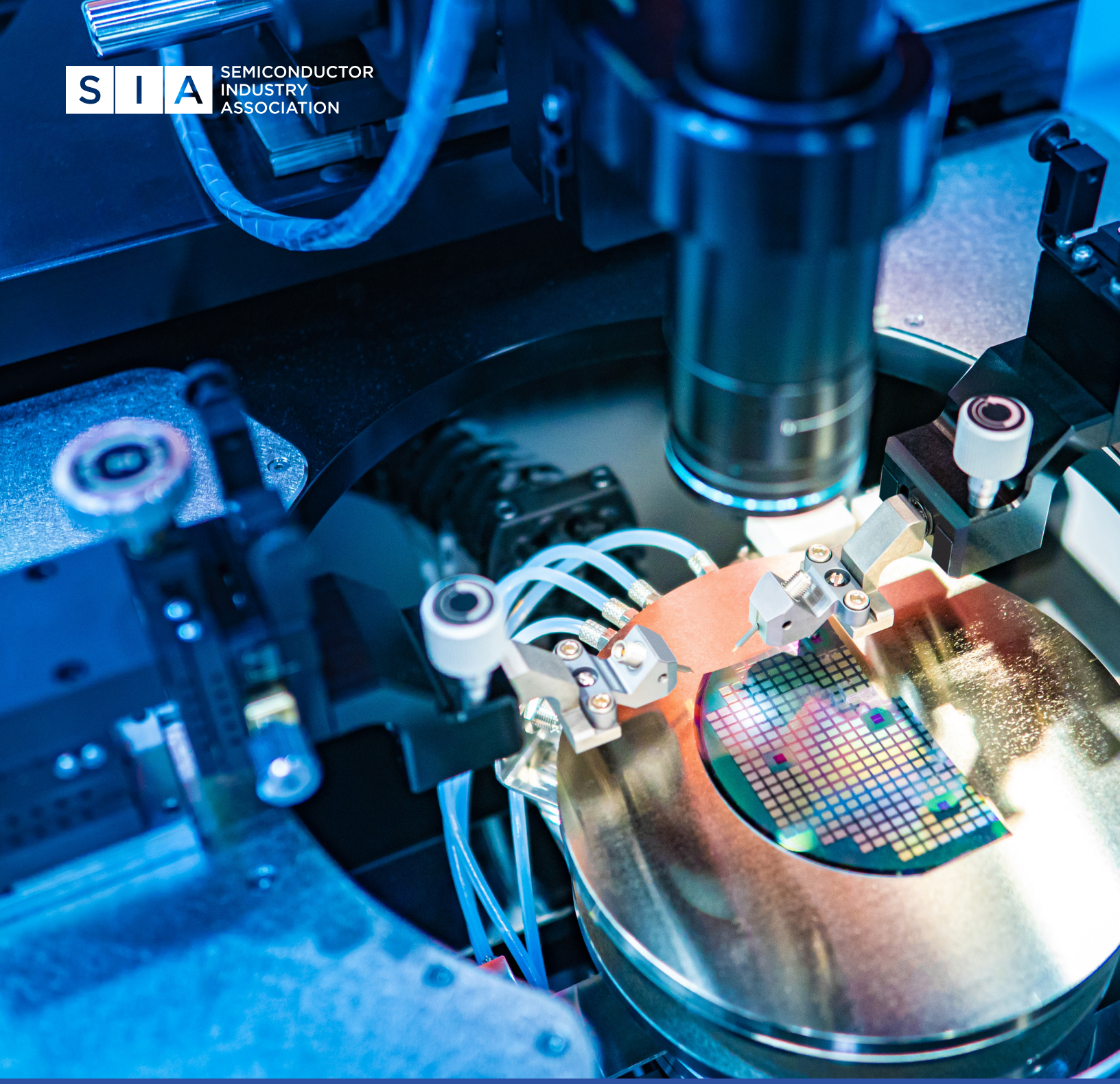


SEMICONDUCTOR INDUSTRY ASSOCIATION

STRENGTHENING THE U.S. SEMICONDUCTOR INDUSTRIAL BASE

ANALYSIS & RECOMMENDATIONS

STRENGTHENING THE U.S. SEMICONDUCTOR INDUSTRIAL BASE

The U.S. is the undisputed global leader in semiconductors, the key foundational technology for everything digital that has transformed all sectors of our economy – including the internet, telecommunications, transportation, health care, and more. The U.S. semiconductor industry is a major engine for U.S. economic growth and job creation. Semiconductors underpin the "must-win" technologies of the future, including artificial intelligence, 5G, and quantum computing. Many of today's leading chips for cutting-edge applications are currently designed by U.S. companies. Continued American leadership in semiconductors is essential to America's national security, as chips enable the U.S. to field advanced weapons systems and defend its critical infrastructure.

To keep America on top in semiconductors and ensure the enduring strength of our country's economy and national security, we call on U.S. government leaders to invest ambitiously in the U.S. semiconductor manufacturing ecosystem and in semiconductor R&D.

SEMICONDUCTORS ENABLE TECHNOLOGY BREAKTHROUGHS THAT DRIVE ECONOMIC GROWTH

Examples of new technologies enabled by semiconductor advances

LAST 50-60 YEARS	NEXT 5-10 YEARS
Mainframes (1964)	IoT and Smart cities
PCs (1981) →	Artificial intelligence
Internet (1995)	Autonomous vehicles
Smartphones (2007)	AR/VR

U.S. DEFENSE MODERNIZATION PRIORITIES RELY ON ADVANCED SEMICONDUCTOR TECHNOLOGIES

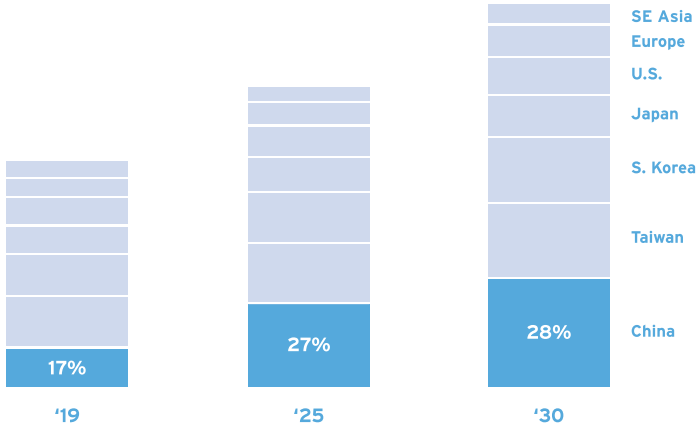
Select priority technologies identified in the 2018 US National Defense Strategy:

- 5G
- Microelectronics
- Artificial intelligence
- Autonomous systems
- Cybersecurity
- Space & hypersonics
- Directed energy (lasers)
- Quantum computing

Source: Boston Consulting Group

American leadership in this critical technology faces numerous vulnerabilities, with looming challenges over the horizon. COVID-19 has compounded these challenges, throwing into bold relief the reality that more chip manufacturing and research needs to happen on U.S. shores. Today, U.S. chip designers rely heavily on suppliers in Asia for advanced chip manufacturing. Over the long-term, China is poised to disrupt the industry with $100 billion in subsidies. The Chinese government is funding the construction of more than 60 new semiconductor fabs and is poised to have the single-largest share of chip production by 2030, nearly three times the global share of U.S. chip manufacturing. Importantly, if as projected, the U.S. loses market share in China due to increased state-backed competition and geopolitical tensions, China's share may grow even further. Given the complexity and costs involved, significant public and private investments will be required to address these issues. At the same time, trying to achieve complete onshoring of the world's most complex and costly supply chain is impractical.

China's Share of Global Chip Manufacturing to Nearly Double by 2030



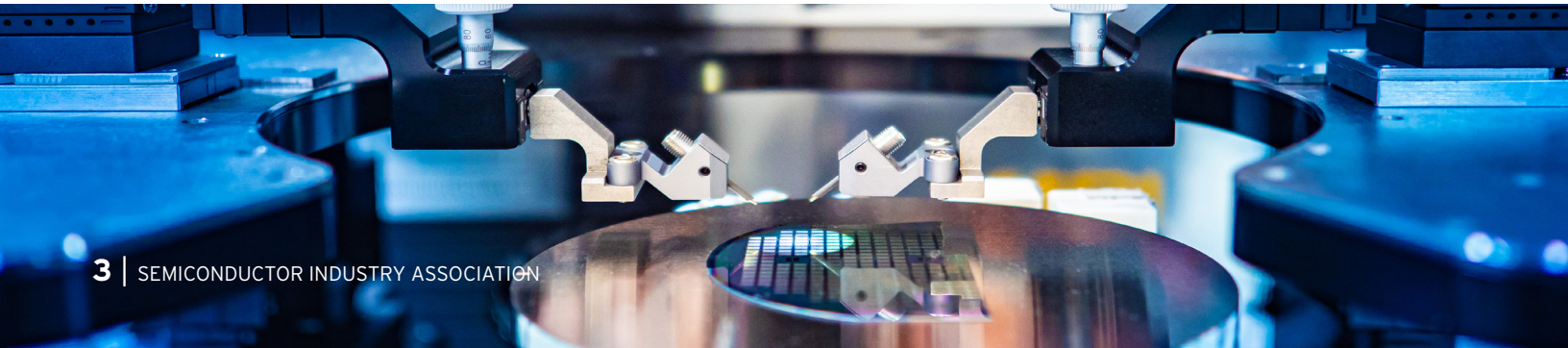
Source: VLSI/SIA Study

Because of the importance of semiconductor technology to our economy and national security, and in light of the challenges facing the U.S. in maintaining its leadership in this field, policymakers are exploring initiatives to address this issue and calling for recommendations from industry. To answer this call, SIA recommends implementation of the following targeted manufacturing incentives and research investments to strengthen the domestic U.S. semiconductor industrial base, maintain our technology leadership, and increase the security of the semiconductor supply chain:

1. **Manufacturing Grants and Tax Incentives**
Establish a new manufacturing grant program, tax incentives, and targeted security investments to spur construction of new onshore advanced semiconductor manufacturing facilities in the U.S., including leading-edge logic foundries, advanced memory, and analog fabs to supply defense, critical infrastructure, and broader essential commercial needs.

2. **R&D Investments**
Increase investment in semiconductor research – both basic and applied R&D – at federal research agencies (DoD, DoE, NSF, and NIST), manufacturing institutes, and semiconductor companies to strengthen U.S. technology leadership and build the pipeline of talent needed for future innovation.

Investing in and growing the domestic semiconductor design and manufacturing industry through these incentives will protect national security, enhance broader economic benefits, and increase U.S. jobs. By adding to the 1.25 million jobs in America the semiconductor industry supports, these investments would significantly expand our highly skilled, well-paid workforce. In addition, because of its role as a major enabler of innovation in the economy, investments in the U.S. semiconductor industry will contribute millions of jobs in industries of the future.



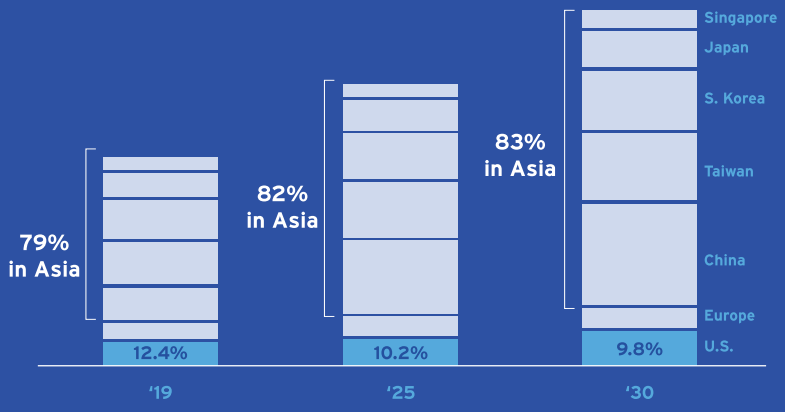
INCENTIVES TO ENCOURAGE ADVANCED SEMICONDUCTOR MANUFACTURING IN THE USA

THE LANDSCAPE

The U.S. has a stable manufacturing footprint, with commercial fabs in 18 states and semiconductors being our nation's fifth-largest export. Today, however, the U.S accounts for only 12 percent of global semiconductor manufacturing capacity. In terms of global capacity share, America has lost ground to overseas competitors that are investing significantly to win the race to build the next fab within their borders. As a result, by 2030, 83 percent of global fab capacity is projected to be located in Asia, with China accounting for the greatest growth. To be sure, global supply chains are – and should continue to be – critical to the semiconductor industry's success. The COVID-19 crisis, however, has underscored the need to strike the right balance between a dependence on global supply chains and ensuring enough production occurs in the U.S., especially when it comes to components the Pentagon is reliant on to drive key weapons systems and secure our digital infrastructure.

Asia Projected to Capture Nearly All Manufacturing Growth

2019-2030 Installed Global Wafer Capacity Projection



Source: VLSI

THE CHALLENGE

Growth in capital-intensive fab construction in countries around the world has been driven largely by government incentives. The U.S. fails to offer comparable support. While the U.S. has taken steps to improve the competitiveness of its corporate tax system, it has weak incentives for capital investment and currently lacks federal incentive programs for semiconductor manufacturing. While some states offer helpful incentives, they are insufficient to compete with the significant offerings of other countries. Governments around the world offer generous cash grants, other subsidies, and tax incentives exceeding 40 percent of the costs of constructing and operating a fab. As the chart below indicates, U.S. semiconductor manufacturing growth lags global leaders largely due to a lack of incentives.

SEMICONDUCTOR INCENTIVES SPUR MANUFACTURING GROWTH

	CHINA	S. KOREA	SINGAPORE	TAIWAN	U.S.
Country					
Federal Semiconductor Manufacturing Incentives	Direct grants, free land, equity investments	Direct Grants, infrastructure support, tax incentives	Direct grants, tool incentives, and tax incentives	Free land, tax incentives, and hiring credits	None
Average Growth Rate of 300mm Manufacturing Capacity 2013-2020	15.7% CAGR	11.3% CAGR	10% CAGR	6.5% CAGR	2.2% CAGR

Source: OECD and IC Insights, Inc. - Strategic Reviews Fab Database

INCREASE MANUFACTURING INCENTIVES

To strengthen our economy, enhance national security, and promote supply chain resilience, the U.S. needs to compete with other countries in attracting the construction and operation of new fabs by establishing grant and tax incentives, including the following:

- **A new federal grant program that would provide grants for incentivizing new domestic semiconductor manufacturing facilities** (fabrication, assembly, test, and advanced development) that align with our nation's strategic priorities. These federal grants would be in addition to state-level incentives.
- **Federal funding to develop an advanced logic foundry ecosystem to address U.S. national security concerns.** This would include investments in secure design systems, assurance and security technologies, and funding for new commercial approaches to onshore fabrication for the U.S. national security community for both leading-edge logic (minimum 7nm EUV capable and below) and specialty process technologies.
- **Tax incentives for semiconductor manufacturing,** such as a refundable investment tax credit for placing into service new semiconductor manufacturing equipment, as well as fab infrastructure and capital costs.

THE U.S. NEEDS TO INCREASE INVESTMENTS IN SEMICONDUCTOR RESEARCH

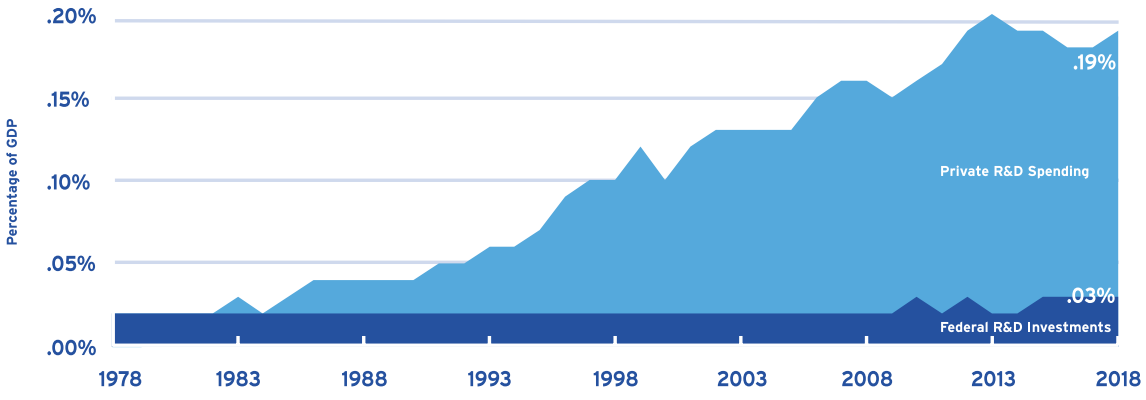
THE LANDSCAPE

U.S. semiconductor design and manufacturing companies invest approximately 18 percent of revenue in R&D – almost $40 billion in 2019 – the second-highest rate of research investment of any industry. This high level of investment has propelled the rapid pace of innovation in semiconductor design and manufacturing technology and has driven growth and innovation throughout the economy.

THE CHALLENGE

Federal investment in semiconductor research amounted to approximately $1.7 billion in FY2019, or roughly 4 percent of total U.S. semiconductor R&D. While U.S. federal funding has been relatively flat for many years, China and others are increasing their government research investments and are projected to overtake U.S. spending in semiconductor R&D in the next several years. In the absence of increased federal investment, the U.S. will fail to drive the innovations and workforce of the future.

As a Percentage of GDP, Semiconductor and Related Research has Remained Flat Over the Past 40 Years, While Private Industry Investment has Increased 10-fold.



INCREASED R&D INVESTMENTS

The U.S. needs to significantly increase federal investments in semiconductor design and manufacturing research within the next decade, including the following:

- **U.S. federal investments in basic semiconductor research** at federal research agencies (DoD, DoE, NSF and NIST) to enable fundamental technology breakthroughs necessary to maintain and look beyond Moore's Law and train the scientists and engineers needed to drive future innovations.
- **Grants for federal applied semiconductor R&D** through programs such as the DARPA Electronics Resurgence Initiative to enable U.S. companies to maintain their technological edge and strengthen supply chain security in semiconductor materials, process technology, architectures, designs, and applications.
- **Federal funding to help establish a public-private consortium to build and operate a National Semiconductor Technology Center** to serve as a hub for conducting advanced semiconductor research and prototyping that strengthens the domestic ecosystem. The Center would bring together industry, government, national labs, and academia around a common roadmap to drive innovations in semiconductors and develop the semiconductor workforce.

CALL TO ACTION

As Congress and the Administration consider policies to advance semiconductor design and manufacturing development in the U.S., significant incentives for fab construction and research in the U.S. are needed to ensure the next generation of semiconductor innovation will be developed in the U.S. These policies will require significant expenditures, but the cost of failing to do so would be far greater. The U.S. must retain its leadership position in this vital technology to ensure our economic strength, national security, and supply chain resilience.