Senate Chips and Science Bill Overview

Funding for Emerging Technologies and Challenges

The *Chips and Science Bill* would provide major investment in early research, education, training, facilities, and entrepreneurship to support the U.S. leadership position in key emerging technologies, including:

- Artificial intelligence, machine learning, autonomy, and related advances;
- High performance computing, semiconductors, and advanced computer hardware and software;
- Quantum information science and technology;
- Robotics, automation, and advanced manufacturing;
- Natural and anthropogenic disaster prevention or mitigation;
- Advanced communications technology and immersive technology;
- Biotechnology, medical technology, genomics, and synthetic biology;
- Data storage, data management, distributed ledger technologies, and cybersecurity, including biometrics;
- Advanced energy and industrial efficiency technologies, such as batteries and advanced nuclear technologies; and
- Advanced materials science, including composites 2D materials, other next-generation materials, and related manufacturing technologies.

The final bill also added a list of societal, national, and geostrategic challenges to guide activities under the bill, including:

- national security,
- manufacturing,
- workforce development,
- climate change, and
- inequitable access to education.

These initial lists will be reviewed and modified, if necessary, on an annual basis.

NSF Directorate for Technology, Innovation, and Partnerships

The bill provides $20 billion for a recently established NSF Directorate of Technology, Innovation, and Partnerships (TIP) which will leverage public-private partnerships through several different programs to provide increased investment in research, education, training, facilities, and entrepreneurship to support the U.S. leadership position in key emerging technologies. Key programs identified in the bill include:

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- **Regional innovation engines**: Leverage expertise of public-private partnerships to develop scientific, innovation, entrepreneurial and STEM educational capacity within a dedicated region. This program has already been launched by the TIP Directorate due to previously approved congressional funding.
- **Translation accelerator**: Further research and development of innovation in key technology focus areas through public-private partnerships.
- **Test beds:** Universities or consortia-led organizations to establish and operate test bed and fabrication facilities to advance the operation, integration, and deployment of innovative technologies developed by public or private entities.
- **Planning and capacity building awards**: Consortia-led organizations to identify research with potential for technology transfer and commercialization, revise institution policies to implement relevant best practices for academic tech transfer, funding entities/competitions for students and faculty to illustrate commercialization potential of ideas (including through venture funds of universities) and building local networks to transfer ideas into commercial use. This section also creates a collaborative innovation resource center program to promote regional tech transfer through providing resources and entrepreneurial training to startups.
- **R&D awards:** Accelerate technology advancements and adoption in key focus areas through university-led consortia that will be able to award direct grants to entities pursuing frontier technology research. Awards can also be made through SBIR/STTR programs to expedite short-term technology deployment.

Regional Technology and Innovation Hubs

A Regional Technology Hub Program under the Department of Commerce would establish twenty regional innovation hubs to diffuse resources and expand opportunity throughout the country. Regional technology hubs will provide $10 billion in funding for regional economic development planning through public-private partnerships. The bill instructs the program to consider key factors in granting funds, including engagement and partnership with private sector to commercialize new technologies identified as a key technology focus area, attract investment, and launch new companies.

Additional Programs for Emerging Technologies

There are also tens of billions of dollars authorized for several dozen other programs in the package that will impact the technology ecosystem. These programs are generally focused on the core technology and challenges outlined above, and include public-private partnerships, direct grants for frontier technologies and manufacturing, basic research investments, workforce development, and government technology transfer and entrepreneurship programs.

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We are still digging through the details, but below are some examples of programs with the most significant potential to impact frontier technology startups. We will be out with a broader analysis in the coming weeks.

Education and Workforce Development
There are a range of technology-related workforce development programs that will be administered by several agencies. These include skill development in fields such as cybersecurity, semiconductor production, microelectronics, quantum and accelerator technology, K-12 STEM education, and more.

Climate
Among a range of programs focused on climate, the package includes a major overhaul and authorizes a significant increase in funds for the Department of Energy Office of Science, including for basic research and technology commercialization. There is also funding authorized to create a new regional clean energy innovation program.

Microelectronics
There are research grants, technology transfer and workforce development programs focused on microelectronic technologies, and funding authorized for four new Microelectronics Science Research Centers.

Domestic Manufacturing
There are significant expansions to several domestic manufacturing programs, and funds authorized for technology manufacturing workforce development.

Semiconductors
There are several programs to encourage more semiconductor research, workforce development, and domestic production.

There is also a tax credit for 25 percent of qualified investment into building or reconstructing facilities that manufacture semiconductors or semiconductor manufacturing equipment. This credit includes a direct pay mechanism that allows startups to monetize the value of the credit in the year that it is generated.

Quantum
There will be a new Quantum User Expansion for Science and Technology Program administered by DOE-s Office of Science, as well as a workforce development program and an

effort to open access to government quantum hardware and computing clouds to outside entities.