U.S. SENATE COMMITTEE ON
COMMERCE, SCIENCE & TRANSPORTATION
Senator Maria Cantwell, Chair

The Chips and Science Act (H.R. 4346)

Targeted Investment: Invest in critical technologies:

- **Key Technology Focus Areas.** Directs the Department of Energy (DOE) and National Science Foundation (NSF) to identify and invest in ten key technology competition areas, which are:
    - Artificial intelligence
    - High-performance computing
    - Quantum technology
    - Robotics
    - Natural disaster prevention and mitigation
    - Advanced communications technology
    - Biotechnology
    - Data storage
    - Clean energy and industrial efficiency
    - Material science
- **Solutions-focused science**. Directs NSF to invest in technology development important to resolving national, societal, and geo-strategic challenges, including security, environmental sustainability, and access to services.
- **Research Coordination.** Directs NSF, DOE, and other leading agencies to annually review, identify, and coordinate on science and technology areas critical to long-term U.S. competitiveness.
- **NSF Research Funding.** Authorizes more than a doubling of the NSF annual budget over five years, from $9 billion in FY2022 to $19 billion in FY2027.
    - Within that doubling, authorizes a 50% increase in annual funding for NSF's core basic and fundamental research activities, the seed corn for new technologies, from $8 billion in FY2022 to $12 billion in FY2027.

Tech Transfer: Help American scientists turn their innovations into American-made products

- **NSF Technology Directorate.** Creates a new, first-of-its-kind $20 billion NSF Directorate to accelerate domestic development and translation of technologies from lab to market.
- **Patent Protection.** Invests in university technology transfer offices, to identify promising technologies and to protect research products through domestic and international patenting.
- **Breakthrough Technology Demonstrations.** Authorizes new DARPA-like technology projects within NSF, working with universities and the private sector to rapidly demonstrate revolutionary technology advances.
- **University Technology Centers.** Within TIP, authorizes $6.5 billion for more than 30 Translation Accelerators and Regional Innovation Engines, to support university and industry multi-disciplinary research in critical technology areas.

STEM Education and Manufacturing: Train the diverse STEM-educated workforce we need to win the 21st century

- **STEM Education.** Authorizes $13 billion in NSF investment in STEM education and workforce development, to grow STEM activities from $1 billion in FY2022 to $3 billion in FY202 and to address workforce gaps.
    - Authorizes $4 billion, sufficient to support nearly 40,000 scholarships, fellowships, and other awards
- **Emerging Research Institutions.** Increases educational and research capacity at the nation's institutions, including authorized investments of $750 million in emerging research institutions and $1.2 billion in minority-serving institutions.
- **Broad STEM Participation.** Creates an NSF Chief Diversity Officer, to ensure NSF meets its Congressionally-directed mission to improve geographic diversity in STEM and to grow the research participation of underrepresented populations.
- **Geographic Diversity.** Gradually increases NSF investment in institutions and researchers in 28 EPSCoR states and jurisdictions, to 20% of key research and STEM accounts by fiscal year 2029, consistent with merit-review.
- **Small Manufacturers.** Authorize a tripling of the NIST Manufacturing Extension Partnership (MEP), from $158M to $550M annually, to support small- and medium-sized manufacturers with cybersecurity, workforce training, and supply chain resiliency.
- **Supply Chain.** Authorizes the creation of a new MEP national database, to help connect manufacturers to domestic suppliers and to combat supply chain disruptions.
- **Advanced Manufacturing.** Authorizes new industry/university manufacturing improvement partnerships, sufficient to create ten new geographically-diverse

collaborative research institutes and for new investment in workforce development, with advice from the United States Manufacturing Council.

Regional Innovation: More development opportunities in more places

- **Regional Technology Hubs.** Authorizes a new $10 billion Department of Commerce (DOC) program to build locally-driven regional technology hubs that attract private sector investment and develop the local workforce.
- **Distressed Area Program.** Authorizes a new $1 billion DOC "Recompete Pilot Program" to support persistently distressed communities.

Department of Energy Research

- **National Labs.** Authorizes $16.9 billion increase for DOE cutting edge basic and applied research, development, and deployment activities. Much of this work is performed by DOE's 17 National Laboratories, including the Pacific Northwest National Lab (PNNL) in Washington state, which employ thousands of scientists and maintain one-of-a-kind, world-class research capabilities and user facilities that are utilized by over 36,000 university and industrial researchers every year. Supercharging research in areas like energy storage, grid modernization, and carbon capture, is essential to affordably reducing greenhouse gases and rebuilding domestic manufacturing of clean energy solutions.
- **Office of Science.** Reauthorizes $50.3 billion for DOE Office of Science, supporting a broad range of basic science research programs in areas like quantum computing, artificial photosynthesis, coastal zone research, high energy physics, and climate and earth modeling.

CHIPS, O-RAN, and ITC: A $76 billion investment to reestablish U.S. leadership in semiconductor manufacturing and wireless technology

- **Manufacturing Incentives.** Funds $39 billion in direct assistance to build new semiconductor plants in the United States, including $2 billion for mature technologies critical to products like cars, trucks, tractors, and medical devices.
- **Manufacturing Tax Credits.** Enables investment tax credits (ITC) to drive additional domestic semiconductor manufacturing.
- **Advanced Research and Development.** Provides $11 billion for government/industry research to collaboratively prototype, test, and manufacture the next generation of semiconductor technologies in the United States.
- **Military Research and Development.** Allocates $2 billion to prototype chips at leading universities, including chips critical to national security.
- **Wireless Supply Chains.** Provides $1.5 billion to support innovative, leap-ahead Open Radio Access Network (O-RAN) technology for U.S. mobile broadband.
- **IT Security.** Funds $500 million to support the State Department to ensure broad adoption of secure and trusted telecommunications technologies.
- **Workforce Development.** Funds a $200 million National Science Foundation (NSF) initiative to grow the semiconductor workforce.

Research Security: Develop American research in America

- **Foreign Recruitment Programs.** Prohibits Federal research personnel from participating in foreign talent recruitment programs and Federally-funded researchers from foreign talent recruitment program of countries of concern, including China and Russia.
- **Training.** Requires researchers to complete annual research security training, including on topics of cybersecurity, foreign interference, improper use of funds, and conflict of interest.
- **Cybersecurity.** Directs NIST to consider the needs of universities in developing guidance on cybersecurity and NSF to support the development of secure computing enclaves at universities, as a shared resource.
- **CHIPS.** Prohibits companies that accept CHIPS funding from building advanced semiconductor manufacturing facilities in countries of concern.
- **NSF Research Security Office.** Requires NSF to properly fund an Office of Research Security and Policy, to identify and address research security risks, including through proactive risk assessments.

NASA: Keep our astronauts safe on the way to the Moon and Mars

- **Moon to Mars.** Ensures U.S. leadership in space, by establishing a Moon to Mars Program, to include the Artemis missions to place the first American woman and person of color on the Moon and achieve human exploration of Mars.
- **International Space Station (ISS).** Extends ISS operations through 2030, and prioritizes efforts to reduce risks for exploration and to advance basic and applied research.
- **Aeronautics Leadership.** Establishes U.S. policy to maintain world leadership in aeronautics, including through demonstration of advanced, ultra-efficient and low emissions aircraft.
- **Advanced Manufacturing.** Authorizes an advanced materials and manufacturing technology program, to address U.S. competitiveness in aerospace.
- **STEM Engagement**. Ensures that NASA continue to invest in attracting broad participation in the STEM fields.
- **NASA Workforce**. Requires NASA strategies for ensuring the capabilities of the NASA workforce, skills-base, and modeling and test facilities.