MARCH 2021

# TECHVISION21
## INSIDE VIEW

# Keeping Defense on the Leading Edge

### National Defense Authorization Act (NDAA) for FY 2021:

On January 1, the FY 2021 NDAA became law, after Congress overrode President Trump's veto. While the authorization act does not provide appropriations, it does provide significant program direction to the Department of Defense (DoD). In addition, several major technology bills were rolled into the NDAA, including the Creating Helpful Incentives to Produce Semiconductors for America (CHIPS Act), and the National Artificial Intelligence Initiative Act of 2020 (more details below).

NDAA program direction includes: senior DoD official-led research and technology development planning, road-mapping, coordination, and U.S. critical technology capability assessment; sustainable chemistry grants and partnerships; programs and incentives to engage DoD contractors in STEM education; and efforts to enhance small business engagement in the national technology and defense industrial base. The NDAA also calls for an effort to support partnerships between DoD and academic institutions, firms, accelerators, incubators, and others to transition technologies into DoD. The Space Development Agency will transfer to the Space Force by October 2022.

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## National Defense Authorization Act (NDAA) for FY 2021 ctd:

With growing alarm about China's efforts to acquire foreign technology, and arrests of U.S. researchers who failed to disclosure their financial and research ties to China when applying for Federal research grants, the NDAA sets mandatory disclosures of funding sources in applications for Federal R&D awards with various penalties for failure to disclose.

## One Step Closer to CHIPS—Creating Helpful Incentives to Produce Semiconductors for America:

Alarm within both the Federal Executive and Legislative Branches is growing over U.S. vulnerabilities in microelectronics needed for national defense and other critical applications in areas such as banking, infrastructure, and transportation. Semiconductor industrial capacity is increasingly found outside of the United States, and the U.S. supply of microchips is being fabricated largely in factories spread across Asia—putting the supply of microelectronics for U.S. critical needs at risk for production disruptions, counterfeiting, tampering and insertion of malicious code, and intellectual property theft. There is also growing concern about China's $150 billion plan targeting development of the entire semiconductor ecosystem. The CHIPS Act seeks to bolster U.S. domestic semiconductor manufacturing, and ensure continued U.S. leadership is this foundational critical technology:

- Grants up to $3 billion (or larger with the President's approval) for investing in U.S. semiconductor fabrication facilities, or assembly, testing, advanced packaging, or advanced R&D
- Formation of one or more consortia of U.S. companies to develop and produce advanced secure microelectronics for use by DoD, the intelligence community, critical infrastructure, other national security applications
- National Network for Microelectronics Research
- Development of a National Strategy on Semiconductor Research
- National Semiconductor Technology Center, which includes: research, prototyping, National Advanced Packaging Manufacturing Program, fund to support start-ups and industry-university collaborations, education and training programs, and a Manufacturing USA Institute

Momentum for action is building with the recent shortage of microchips that has curtailed output in some and temporarily shuttered three U.S. automotive plants. Overseas plants are also feeling the pinch.

The microchip supply problem is largely the result of a market shift driven by the COVID-19 pandemic, exacerbated by microchip factory shutdowns during the recent extreme weather in Texas. With months of lock-downs and tight budgets, consumers held back on new car purchases, driving auto producers to cut back on vehicle production and their orders for microchips that go in their products. At the same time, due to lock-downs, and the massive shift to telework and on-line learning, demand for digital products and the microchips that go in them soared, tying up semiconductor production capacity and schedules. As lock-downs have eased and consumers' financial situation brightened, demand for new vehicles and their microchips has increased. It will take some time to shift the semiconductor industry's production to fully serve their automotive customers again.

This situation led Governors from auto producing states, leaders from the auto and other microchip-dependent industries, the United Auto Workers, and the U.S. Chamber of Commerce to pressure the White House and Congress to do something about it, including funding the CHIPS Act. Senate Majority Leader Schumer has signaled support for action. CHIPS has broad bi-partisan support, so look for future funding in another legislative vehicle.

## Government Gears-up for the Age of AI—The National Artificial Intelligence Initiative Act of 2020:

The Act establishes authority for a National Artificial Intelligence Initiative which includes: a strong focus on sustained support for AI R&D grants, cooperative agreements, testbeds, and access to data and computing resources; support for AI workforce development across the education and training continuum; field specific research, education, and training; coordination of Federal AI R&D; support for a network of AI research institutes; prize competitions; and international cooperation.

Specific efforts will be carried out at NIST, the National Science Foundation (NSF), and the Department of Energy. For example, an NSF task force will develop a plan for a National AI Research Resource (shared computing infrastructure), and NSF will financially support National Artificial Intelligence Research Institutes. These institutes are to be focused on particular economic sectors or social challenges such as health, education, manufacturing, agriculture, security, energy, and the environment, or cross-cutting challenges such as AI trustworthiness or foundational science. (NSF is already funding National AI Institutes in areas such as human-AI interaction and collaboration, AI-augmented learning, AI to advance biology, AI in agriculture and the food system, as well as AI for optimization, cyber infrastructure, and dynamic systems.)

These AI efforts are being over seen by a recently established National Artificial Intelligence Initiative Office in the White House Office of Science and Technology Policy, which will also operate an Interagency AI Committee and a National AI Advisory Committee.

| Select FY 2021 Federal Spending on Artificial Intelligence R&D | |
|---|---|
| Department of Defense-unclassified (including autonomy) | $2.5B |
| Department of Energy Office of Science | $100M |
| National Institutes of Health | $105M |
| NIST | $30M |
| National Science Foundation | $868M |

## Big Energy Agenda—Energy Policy Act of 2020:

Incorporated into the Consolidated Appropriations Act of 2021, the bi-partisan Energy Policy Act of 2020 is the first comprehensive national energy policy update in 13 years. While not including appropriations, it authorizes about $35 billion over five years for a wide range of research, technology development, demonstration, infrastructure, education, and workforce development programming on clean energy and energy efficiency. While advanced nuclear technologies and carbon mitigation are bigger winners, the Act—if funded—would provide significant funding to advance other energy-related technologies including: smart buildings, energy storage, marine energy, geothermal, wind, solar, smart manufacturing, smart grids, hydrogen, bioenergy, and clean and energy efficient vehicles. A table describing authorized funding is appended to Inside View. TechVision21 can provide more detailed information on the programming described in the table upon request.

**The Act reauthorizes existing and establishes new offices and initiatives:**

- Nexus of Energy and Water Sustainability Research, Development, and Demonstration Office at the Department of Energy (DOE) and Interagency Coordinating Committee in cooperation with the Department of the Interior to coordinate efforts related to water needed to produce fuels, electricity, and other forms of energy; water needed to transport them; and water and waste water treatment;

- DOE Office of Technology Transitions and Chief Commercialization Officer to improve technology commercialization and the commercial impact of DOE's research investments. In connection with this mission, the Act authorizes the Secretary of Energy to support regional innovation and clean energy incubators, provide small business vouchers, and assist entrepreneurial fellowships.

- Lab Partnering Service Pilot program to provide services that encourage and support partnerships between the national laboratories and the private sector;

- Technology Commercialization Fund using nine-tenths of one percent of the appropriations made available to DOE for applied energy research, development, demonstration, and commercial application each year. Funds would be provided to private partners and national laboratories to promote promising energy technologies for commercial purposes;

- Veterans Health Initiative would tap DOE expertise in AI and high-performance computing to support basic research to improve health outcomes for veterans, including maximizing the impact of the VA's health and genomics data housed at DOE, and data from other sources. This effort includes establishing multiple scientific computing facilities, promoting research collaboration among Federal, university, and non-profit institution researchers. It also includes a research and development program with $75 million authorized over five years;

- National Renewable Energy Coordination Office at the Department of Interior—with state, district, or field offices as appropriate—to facilitate siting of wind, solar, or geothermal energy generation projects on Federal lands under Interior's jurisdiction.

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The Act also expands the types of production facilities and projects that employ advanced energy technologies that would qualify for loan guarantees under DOE's Title 17 Loan Program. These include: manufacturing of nuclear supply components for advanced nuclear reactors; carbon capture, utilization, and sequestration practices and technologies; and energy storage technologies for residential, industrial, transportation, and power generation applications. The expansion also covers technologies or processes for reducing greenhouse gas emissions from industrial applications, including: iron, steel, cement, and ammonia production; hydrogen production; and the generation of high-temperature heat.

**TechVision21 has helped clients secure hundreds of millions in direct grant funding. We expect an expansion of Federal funding opportunities and grants across a spectrum of research and technology. We are ready to help you pinpoint Federal funding and connect with funders, build out your concepts, find partners, and develop competitive proposals. Contact TechVision21 at (202) 966-6610, kcarnes@techvision21.com, techvision21.com**

| HIGHLIGHTS: Energy Act of 2020<br>Research, Development, and Demonstration | |
|---|---|
| **Programming** | **Authorized Funding (over 5 years)** |
| **Smart Buildings** (R&D, demonstration of components/capabilities to integrate smart buildings into the grid, roadmap, smart building demonstration accelerators, Federal smart building program) | - |
| **Nuclear Energy** (R&D, demonstration, university research, scholarships and fellowships, research infrastructure) | $14.9B |
| **Marine Energy** (R&D, demonstration, National Marine Energy Centers) | $687M |
| **Geothermal** (R&D, FORGE field research sites, demonstration, computing and data science, workforce development, international geothermal energy development) | $850M |
| **Wind Energy** (grants for pre-competitive R&D on topics ranging from siting, hardware, operations, and integration with the grid to materials, manufacturing, installation, environmental issues and distributed wind power; competition for demonstrations every two years; training; recycling of wind energy materials and components) | $625M |
| **Solar Energy (PV and CSP)** (grants for precompetitive R&D on topics ranging from materials, hardware, software, design, and siting to energy storage, manufacturing, installation, integration with the grid, and environmental issues; grants for Advanced Solar Manufacturing Initiative; recycling program) | $1.5B |
| **Sustainable Transportation (**R&D, demonstration, and commercial application activities in hydrogen, vehicle, and bioenergy technologies) | $2.6B (3 years) |
| **Energy Storage** (R&D on: systems, components, materials for large scale commercial deployment and distributed applications; building-grid integration; energy storage for transportation, including vehicle-to-grid integration; and energy storage manufacturing. Also, testing and validation; recycling and repurposing energy storage systems technologies, minerals, and critical materials; demonstration projects; microgrid assistance program) | $1.1B |
| **Carbon Capture, Storage, Removal, Utilization** (R&D, pilot projects, demonstrations, test centers, testing and validation, and prize competition) | $6.4B |
| **Industrial and Manufacturing Technologies** (competitive R&D and demonstration grants on smart manufacturing, digital manufacturing, data analytics, modeling, monitoring and sensing, to improve energy and resource efficiency, reduce negative environmental impacts and waste, and design of products for reuse, refurbishment, remanufacture, and recycling. Focus on energy intensive industries) | $500M |
| **Critical Materials** (R&D and demonstration on recycling, innovation, efficiency, and alternatives for critical materials; Materials Consortium; Critical Materials Supply Chain Research Facility) | $675M |
| **Grid Modernization and Smart Grid** (R&D and demonstration on integrated energy systems; smart grid modeling, visualization, architecture, and controls; integrating renewable energy and electric vehicles into the grid; regional smart grid demonstration initiative; distributed grid demonstration; and micro-grid systems program) | $2.2B |
| **ARPA-E** | $2.9B |