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116TH CONGRESS *2d Session*	SENATE	REPORT 116–300

INDUSTRIES OF THE FUTURE ACT OF 2020

R E P O R T

OF THE

COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

ON

S. 3191

NOVEMBER 17, 2020.—Ordered to be printed

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SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

ONE HUNDRED SIXTEENTH CONGRESS

SECOND SESSION

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INDUSTRIES OF THE FUTURE ACT OF 2020

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Mr. WICKER, from the Committee on Commerce, Science, and Transportation, submitted the following

R E P O R T

[To accompany S. 3191]

[Including cost estimate of the Congressional Budget Office]

The Committee on Commerce, Science, and Transportation, to which was referred the bill (S. 3191) to increase the capacity of research and development programs of the Federal Government that focus on industries of the future, and for other purposes, having considered the same, reports favorably thereon with amendments and recommends that the bill (as amended) do pass.

PURPOSE OF THE BILL

The purpose of S. 3191, the Industries of the Future Act of 2020, is to promote Federal investment and leadership in the industries of the future.

BACKGROUND AND NEEDS

In his 2019 State of the Union Address, President Trump highlighted the industries of the future which will drive our economy in the coming decades.[1] Since then, the White House has launched several initiatives to coordinate and advance those industries: artificial intelligence, advanced manufacturing, quantum information science, biotechnology, and developing the next generation of wireless networks and infrastructure.[2] This bill provides the framework

[1] President Donald J. Trump, *Address Before a Joint Session of the Congress on the State of the Union*, Feb. 5, 2019 (https://www.govinfo.gov/content/pkg/DCPD-201900063/html/DCPD-201900063.htm) (accessed May 20, 2020).

[2] U.S. Congress, Senate Committee on Commerce, Science, and Transportation, *Industries of the Future*, 116th Cong., 2nd sess., Jan. 15, 2020, testimony of Michael Kratsios, Chief Tech-

Continued

for advancing U.S. leadership in the industries of the future through concerted investment in research and development (R&D) for these emerging technologies.

Science and technology have a pervasive influence over a wide range of issues confronting the Nation. Public and private research and development spur scientific and technological advancement. Such advances can drive economic growth, help address national priorities, and improve health and quality of life. More than half of the economic growth in the United States during the first 50 years of the 20th century was due to technological advancements.[3] A primary driver of future economies and job creation will be innovation that is made possible through advances in science and engineering.[4] In the past century, basic research in areas from genomics to engineering have enabled entirely new industries. From the Manhattan Project during World War II to today's advances in GPS positioning, scientific discovery has allowed the United States to maintain a strategic advantage in times of war. U.S. investment in research and innovation allowed the Nation to become the strongest economy in the world.[5] The Federal Government supports scientific and technological advancement directly by funding and performing R&D and indirectly by creating and maintaining policies that encourage private sector efforts.

Between fiscal year (FY) 2000 and FY 2017, U.S. R&D funding increased from $268 billion to $548 billion in inflation adjusted dollars. Most of this increase was from an increase in R&D funding by businesses. Federal R&D only increased from $67.2 billion to $121 billion in this timeframe. From FY 2010 to 2017, Federal R&D has declined from a high of $126.6 billion in 2010 to $121 billion in 2017.[6] The decline was a reversal of sustained growth in Federal R&D funding for more than half a century, and has stirred debate about the potential long-term effects on U.S. technological leadership, innovation, competitiveness, economic growth, and job creation.

While the United States has long led the world in terms of R&D investment size, China is rapidly gaining ground, and according to the National Science Board, may have recently surpassed the United States.[7] Despite growth in nominal measures of U.S. R&D, the U.S. share of global R&D has experienced a substantial decline in recent years. Increases in Chinese R&D expenditures between 1991 and 2016 cut into the U.S. share. As China's share rose from 2.2 percent to 20 percent, the U.S. share declined from 37 percent to 25.1 percent of the global total during the same period.[8] So even with rising total R&D expenditures in the United States, increases

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nology Officer of the United States, webcast and prepared statement (https://www.commerce.senate.gov/2020/1/industries-of-the-future) (accessed May 20, 2020).

[3] Robert M. Solow, "Technical Change and the Aggregate Production Function," *The Review of Economics and Statistics* 39, no. 3 (Aug. 1957): 312–320 (https://www.jstor.org/stable/1926047?seq=9#metadata_info_tab_contents) (accessed May 20, 2020).

[4] National Academy of Sciences, National Academy of Engineering, Institute of Medicine *Rising Above the Gathering Storm, Revisited: Rapidly Approaching Category 5*, The National Academies Press, 2010 (https://www.nap.edu/read/13151/chapter/1) (accessed Sep. 14, 2020).

[5] Walter Isaacson, "How America Risks Losing Its Innovation Edge," *Time*, Jan. 3, 2019 (https://time.com/longform/america-innovation/) (accessed May 20, 2020).

[6] Mark Boroush, National Science Board, *Research and Development: U.S. Trends and International Comparisons*, Jan. 15, 2020 (https://ncses.nsf.gov/pubs/nsb20203/cross-national-comparisons-of-r-d-performance) (accessed May 20, 2020).

[7] Id.

[8] Id.

in foreign countries' R&D efforts underscore the need to maximize investments to boost U.S. competitiveness.[9]

SUMMARY OF PROVISIONS

If enacted, S. 3191 would support increased investments and leadership in the discovery and implementation of future technologies throughout the Federal Government and in non-Federal entities.

LEGISLATIVE HISTORY

S. 3191, the Industries of the Future Act of 2020, was introduced on January 14, 2020, by Senator Wicker (for himself and Senators Gardner, Baldwin, and Peters) and was referred to the Committee on Commerce, Science, and Transportation of the Senate. On March 11, 2020, the Committee met in open Executive Session and, by voice vote, ordered S. 3191 reported favorably with amendments. On October 21, 2020, Senator Hassan became an additional cosponsor.

A companion bill, H.R. 6145, was introduced on March 9, 2020, by Representative Baird (for himself and Representatives Foster, Lucas, and Stevens) and was referred to the Committee on Science, Space, and Technology of the House of Representatives. Representatives Mast, Young, and Yoho are additional cosponsors.

Hearing

On January 15, 2020, the Committee held a hearing entitled "Industries of the Future." Members of key Federal agencies involved in the research, development, and deployment of such industries testified.

ESTIMATED COSTS

In accordance with paragraph 11(a) of rule XXVI of the Standing Rules of the Senate and section 403 of the Congressional Budget Act of 1974, the Committee provides the following cost estimate, prepared by the Congressional Budget Office:

[9] Congressional Research Service, *Global Research and Development Expenditures: Fact Sheet*, updated Apr. 29, 2020 (https://fas.org/sgp/crs/misc/R44283.pdf) (accessed May 20, 2020).

S. 3191, Industries of the Future Act of 2020
As ordered reported by the Senate Committee on Commerce, Science, and Transportation on March 11, 2020

By Fiscal Year, Millions of Dollars	2021	2021-2025	2021-2030
Direct Spending (Outlays)	0	0	0
Revenues	0	0	0
Increase or Decrease (-) in the Deficit	0	0	0
Spending Subject to Appropriation (Outlays)	*	*	not estimated

Statutory pay-as-you-go procedures apply?	No	Mandate Effects	
Increases on-budget deficits in any of the four consecutive 10-year periods beginning in 2031?	No	Contains intergovernmental mandate?	No
		Contains private-sector mandate?	No

* = between zero and $500,000

S. 3191 would require the Office of Science and Technology Policy (OSTP) to report to the Congress on the federal government's research and development, infrastructure, and workforce development in what the bill calls industries of the future. Those industries include artificial intelligence, quantum information science, biotechnology, next generation wireless networks, advanced manufacturing, and synthetic biology. In addition, the bill would establish an Industries of the Future Coordination Council within OSTP. The council would provide the OSTP with advice on all matters related to those industries and the federal government. The council would sunset in six years.

Using information from OSTP, CBO expects that S. 3191 would codify and expand on OSTP's current efforts. On that basis, CBO estimates that implementing the bill would cost less than $500,000 over the 2021–2025 period. Any spending would be subject to the availability of appropriated funds.

The CBO staff contact for this estimate is Matthew Pickford. The estimate was reviewed by H. Samuel Papenfuss, Deputy Director of Budget Analysis.

REGULATORY IMPACT STATEMENT

In accordance with paragraph 11(b) of rule XXVI of the Standing Rules of the Senate, the Committee provides the following evaluation of the regulatory impact of the legislation, as reported:

Number of Persons Covered

S. 3191, as reported, would not create any new programs or impose any new regulatory requirements, and therefore will not subject any individuals or businesses to new regulations.

Economic Impact

S. 3191 is not expected to have a negative impact on the Nation's economy.

Privacy

S. 3191 would not impact the personal privacy of individuals.

Paperwork

S. 3191 would increase paperwork by requiring a report from the White House Office of Science and Technology Policy (OSTP) on Federal research and development focused on industries of the future.

CONGRESSIONALLY DIRECTED SPENDING

In compliance with paragraph 4(b) of rule XLIV of the Standing Rules of the Senate, the Committee provides that no provisions contained in the bill, as reported, meet the definition of congressionally directed spending items under the rule.

SECTION-BY-SECTION ANALYSIS

Section 1. Short title.

This section would provide that the bill may be cited as the "Industries of the Future Act of 2020".

Section 2. Sense of Congress on investment in research and development.

This section would state the importance of the United States leading the global community in industries of the future through the identification of key research and infrastructure investments that enable technological breakthroughs, as well as encouraging collaboration between the Federal Government and the private sector.

Section 3. Report on Federal research and development focused on industries of the future.

This section would require the Director of OSTP to submit a report to Congress on R&D investments, infrastructure, and workforce development by the Federal Government that would enable continued U.S. leadership in industries of the future no later than 120 days after the enactment of the Act. The report would contain an assessment of baseline investments, plans to increase Federal investments in industries of the future, a plan to use said Federal investment to elicit complimentary investments from non-Federal entities, and proposed legislation to implement such plans.

Section 4. Industries of the Future Coordination Council.

This section would require the President to establish or designate an Industries of the Future Coordination Council (Council) to advise the OSTP Director on matters relevant to the Director and the industries of the future. Specifically, the Council would provide the Director with advice on ways the United States can continue to lead the world in energy technologies, including investments, further workforce development, leveraging the strength of the U.S. R&D ecosystem, and through leveraging existing partnerships and creating new ones to advance industries of the future. This Council would be would be composed of members of the Federal Government, including one appointed by the OSTP Director and one appointed by the Director of the Office of Management and

Budget. It would also include the chairpersons of the National Science and Technology Council (NSTC) Committees on Artificial Intelligence, Advanced Manufacturing, and Quantum Information Science and other members from the Federal Government the President considers appropriate. The council, in execution of its duties, would coordinate with existing NSTC committees to minimize duplicative effort. The Council would terminate 6 years after the date of enactment of this Act.

CHANGES IN EXISTING LAW

In compliance with paragraph 12 of rule XXVI of the Standing Rules of the Senate, the Committee states that the bill as reported would make no change to existing law.

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