

116TH CONGRESS  
1ST SESSION

# S. 1713

To secure the technological edge of the United States in civil and military aviation, and for other purposes.

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## IN THE SENATE OF THE UNITED STATES

JUNE 4, 2019

Mr. WARNER (for himself and Mr. MORAN) introduced the following bill; which was read twice and referred to the Committee on Commerce, Science, and Transportation

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## A BILL

To secure the technological edge of the United States in civil and military aviation, and for other purposes.

1       *Be it enacted by the Senate and House of Representa-*  
2       *tives of the United States of America in Congress assembled,*

3       **SECTION 1. SHORT TITLE.**

4       This Act may be cited as the “Aeronautics Innovation  
5       Act”.

6       **SEC. 2. FINDINGS.**

7       Congress makes the following findings:

8               (1) The United States aircraft manufacturing  
9       industry produced \$342,682,000,000 in economic ac-

1       tivity from manufacture of aircraft and parts sales  
2       and supported 547,900 direct jobs in 2016.

3           (2) Growth in the civil aircraft market is pro-  
4       jected to offer \$8,000,000,000,000 to  
5       \$10,000,000,000,000 in new aircraft sales, parts,  
6       and services over the next 17 years. International  
7       governments are boosting their research and devel-  
8       opment investments to give their domestic industries  
9       competitive advantages in the aircraft market.

10          (3) In 2015, the Department of Defense spent  
11       \$10,600,000,000 on jet fuel and \$441,600,000 on  
12       jet fuel transportation to support the warfighter.  
13       NASA's research into ultra-efficient air transport is  
14       important to the military's efforts to reduce fuel  
15       costs, logistics pressures, and the level of human  
16       risk involved with providing worldwide energy solu-  
17       tions.

18          (4) NASA's aeronautics research and collabo-  
19       rative ventures yield innovations that can eventually  
20       be utilized in the aviation sector, opening up entirely  
21       new markets, enabling the United States aviation in-  
22       dustry to grow and maintain global competitiveness,  
23       providing high-quality engineering and manufac-  
24       turing jobs, and benefiting the quality of life for our  
25       citizens.

1           (5) Continued progress in the science and tech-  
2           nology of aeronautics is crucial to the United States  
3           sustained economic success and the protection of the  
4           United States security interests at home and around  
5           the world, as acknowledged in the 2006 National  
6           Aeronautics Research and Development Policy. To  
7           ensure Federal efforts remain on a disciplined path  
8           to meet national objectives, the Director of the Of-  
9           fice of Science and Technology Policy is responsible  
10          for the implementation and biennial review of the  
11          aeronautics research and development plan of the  
12          United States.

13          (6) All of NASA's other directorates and capa-  
14          bilities, including those in space, depend on research  
15          and technology that originated and is maintained in  
16          NASA's Aeronautics Centers.

17          (7) Aeronautics plays a central role in our na-  
18          tional security strategy, and our technological advan-  
19          tage over potential adversaries must be maintained  
20          with sustained and focused research and develop-  
21          ment.

22          (8) NASA Aeronautics Research Mission Direc-  
23          torate's 6 strategic thrusts (safe, efficient growth in  
24          global operations; innovation in civil supersonic air-  
25          craft; ultra-efficient subsonic vehicles; quiet and af-

1       fordable vertical lift air vehicles; real-time, system-  
2       wide safety assurance; and assured autonomy for  
3       aviation transformation) are effective and necessary  
4       research areas for the development of next genera-  
5       tion aeronautics technology that will preserve the  
6       United States lead in the global aviation industry.

7           (9) Aeronautics research is focused on funda-  
8       mental capabilities that have the potential to open  
9       entirely new industries, including low-cost electric  
10      propulsion, advanced composite material manufac-  
11      turing, simplified air vehicle operation, and in-  
12      creased vertical takeoff and landing, that will allow  
13      for safer and more efficient aviation products and  
14      support mobility and economic growth.

15          (10) To meet the challenges of the 21st cen-  
16      tury, the United States needs to support NASA's  
17      Aeronautics Research Program at funding levels  
18      that are commensurate with its past, present, and  
19      future contributions to the economic competitiveness  
20      and national security of the United States.

21   **SEC. 3. DEFINITIONS.**

22      In this Act:

23          (1) ADMINISTRATOR.—The term “Adminis-  
24      trator” means the Administrator of NASA.

1           (2) AERONAUTICS STRATEGIC IMPLEMENTA-  
2           TION PLAN.—The term “Aeronautics Strategic Im-  
3           plementation Plan” means the Aeronautics Strategic  
4           Implementation Plan issued by the NASA Aero-  
5           nautics Research Mission Directorate.

6           (3) AIR TRAFFIC MANAGEMENT SYSTEM.—The  
7           term “air traffic management system” means the  
8           procedures, technology, and human resources to  
9           guide aircraft through the sky and on the ground  
10          and to manage low- and high-altitude airspace use.

11          (4) NASA.—The term “NASA” means the Na-  
12          tional Aeronautics and Space Administration.

13          (5) UNMANNED AIRCRAFT.—The term “un-  
14          manned aircraft” means an aircraft that is operated  
15          without the possibility of direct human intervention  
16          from within or on the aircraft.

17          (6) UNMANNED AIRCRAFT SYSTEM.—The term  
18          “unmanned aircraft system” means an unmanned  
19          aircraft and associated elements (including commu-  
20          nication links and the components that control the  
21          unmanned aircraft) that are required for the pilot in  
22          command to operate safely and efficiently in the na-  
23          tional airspace system.

1 **SEC. 4. EXPERIMENTAL PLANE PROGRAMS.**

2 (a) SENSE OF CONGRESS.—It is the sense of Con-  
3 gress that—

4 (1) developing high-risk, precompetitive aero-  
5 nautics technologies and demonstration aircraft for  
6 which there is not yet a profit rationale is a funda-  
7 mental NASA role;

8 (2) near-full-scale to laboratory and flight vehi-  
9 cle flight test experimentation and validation are  
10 necessary for—

11 (A) transitioning new technologies and ma-  
12 terials, as well as their associated manufac-  
13 turing processes, for general aviation, commer-  
14 cial, and military aeronautics use; and

15 (B) capturing the full breadth of benefits  
16 from the Aeronautics Research Mission Direc-  
17 torate’s investments in priority programs called  
18 for in—

19 (i) the National Aeronautics Research  
20 and Development Plan issued by the Na-  
21 tional Science and Technology Council in  
22 February 2010;

23 (ii) the NASA 2014 Strategic Plan;

24 (iii) the Aeronautics Strategic Imple-  
25 mentation Plan; and

1 (iv) any updates to the programs  
2 called for in the plans described in clause  
3 (i) through (iii); and

4 (3) a level of funding that adequately supports  
5 full-scale experimentation and related infrastructure  
6 must be assured over a sustained period of time to  
7 restore NASA's capacity to see legacy priority pro-  
8 grams through to completion and achieve national  
9 economic and security objectives.

10 (b) NATIONAL POLICY.—It is the policy of the United  
11 States to maintain world leadership in military and civil-  
12 ian aeronautical science and technology, global air power  
13 projection, and industrial leadership. To this end, one of  
14 the fundamental objectives of NASA aeronautics research  
15 is the steady progression and expansion of flight research  
16 and capabilities, including the science and technology of  
17 critical underlying disciplines and competencies, chief  
18 among which are computational-based analytical and pre-  
19 dictive tools and methodologies, aerothermodynamics,  
20 flight propulsion, high-temperature structures and mate-  
21 rials, and flight controls.

22 (c) ESTABLISHMENT OF PROGRAMS OR PROJECTS.—  
23 The Administrator shall establish the following programs  
24 or projects:

1           (1) A low-boom supersonic aircraft program or  
2 project that will—

3               (A) demonstrate supersonic aircraft de-  
4 signs and technologies that reduce sonic boom  
5 noise to levels that encourage the repeal of do-  
6 mestic and international bans on supersonic  
7 flight overland; and

8               (B) gather the data needed to support in-  
9 formed decisions of the Federal Aviation Ad-  
10 ministration regarding overland supersonic  
11 flight.

12           (2) A subsonic flight program of flight tech-  
13 nology demonstrations that use existing aircraft and  
14 multiple large-scale X-Plane demonstrators devel-  
15 oped sequentially or in parallel, each of which is  
16 based on a set of new configuration concepts or  
17 technologies determined by the Administrator—

18               (A) to demonstrate aircraft vehicle and  
19 propulsion concepts and technologies and re-  
20 lated advances in alternative propulsion and en-  
21 ergy; and

22               (B) to enable significant increases in en-  
23 ergy efficiency and lower life cycle emissions in  
24 the aviation system while achieving a step  
25 change in noise emissions.



1           (3) An advanced structures, materials, and  
2       manufacturing program that—

3               (A) leverages advances in composite mate-  
4       rial and structures design, certification, and  
5       manufacturing technologies for use in commer-  
6       cial and military aircraft that have been en-  
7       abled by the Advanced Composites Project and  
8       the Advanced Composite Consortium;

9               (B) drastically reduces the nonrecurring  
10      time and cost for design, manufacturing tech-  
11      nology development, and certification of ad-  
12      vanced and nontraditional composite materials  
13      and manufacturing processes;

14              (C) makes time reduction improvements to  
15      increase recurring production rates; and

16              (D) includes, as focus areas—

17                   (i) the leveraging of advances in com-  
18                   puter modeling and simulation in virtual  
19                   allowables, automated design tools, and  
20                   manufacturing process development;

21                   (ii) the enabling of rapid design, auto-  
22                   mated manufacturing technology, inspec-  
23                   tion, process control, and certification for  
24                   nonorthogonal lay-ups, nontraditional  
25                   preforms, thermoplastics, ceramics, ad-

1 vanced resin infusion processes, and addi-  
2 tive manufacturing for primary aircraft  
3 structure; and

4 (iii) the advancement of manufac-  
5 turing processes, technologies, inspection  
6 methods, and certification pathways for  
7 bonded and integrated fail-safe damage  
8 tolerant aircraft structures.

9 (d) PROGRAM ELEMENTS.—

10 (1) For each of the programs established under  
11 subsection (c), the Administrator shall—

12 (A) include development of experimental  
13 aircraft (X-Plane), experimental systems (X-  
14 System), multiple technologies, and all nec-  
15 essary supporting flight assets;

16 (B) pursue a robust technology maturation  
17 and flight validation program that addresses  
18 challenges in technology development and matu-  
19 ration;

20 (C) improve necessary facilities, flight test-  
21 ing capabilities, and computational tools to sup-  
22 port the program;

23 (D) only award primary contracts for de-  
24 sign, procurement, and manufacture to United

1 States companies, consistent with international  
2 obligations and commitments;

3 (E) coordinate research and flight dem-  
4 onstration activities with other Federal agen-  
5 cies, as appropriate, and the United States  
6 aviation manufacturing community; and

7 (F) ensure that the program remains  
8 aligned with the Aeronautics Strategic Imple-  
9 mentation Plan, and any updates to such plan.

10 (2) For the advanced structures, materials, and  
11 manufacturing program, the Administrator shall—

12 (A) offer to enter into a public-private  
13 partnership, which shall be known as the “Ad-  
14 vanced Structures, Materials, and Manufac-  
15 turing Program”, between—

16 (i) NASA; and

17 (ii) appropriate public and private en-  
18 tities;

19 (B) ensure a 50-percent Federal cost share  
20 for applicable research;

21 (C) include as a key partner the Federal  
22 Aviation Administration;

23 (D) include as a partner any other Federal  
24 agency the participation of which the Adminis-

1           trator determines will further the purpose of  
2           the partnership; and

3                   (E) provide a structure for managing intel-  
4           lectual property generated by the program  
5           based on or consistent with the structure estab-  
6           lished for NASA's Advanced Composites Con-  
7           sortium.

8           (e) ON-DEMAND AVIATION.—Congress makes the fol-  
9   lowing findings:

10           (1) Fuller utilization of high-speed air transpor-  
11          tation, small airports, helipads, vertical flight infra-  
12          structure, and other infrastructure can alleviate  
13          transportation congestion and support economic  
14          growth within cities.

15           (2) NASA should continue to develop and test  
16          air vehicles, different propulsion systems, network  
17          systems, unmanned aircraft system traffic manage-  
18          ment systems, and technology that can be utilized in  
19          on-demand air transportation.

20           (3) NASA should actively support the research  
21          around the use of airspace for on-demand aviation.

22           (4) This work should leverage NASA's ongoing  
23          efforts in developing advanced technologies for large,  
24          high-volume commercial aircraft applications and  
25          airspace operations. The Administrator should as-

1        sess which air traffic concepts perform most effi-  
2        ciently, taking into consideration factors such as ex-  
3        isting city infrastructure, small airports, and current  
4        airspace operations.

5        (f) DEFINITION OF UNITED STATES COMPANY.—In  
6        this section, the term “United States company” means a  
7        private entity—

8                (1) organized under the laws of the United  
9        States; and

10               (2) that has one or more existing facilities lo-  
11        cated in the continental United States, including in-  
12        frastructure and staffing, capable of meeting the ob-  
13        jectives of the program in which the company seeks  
14        to participate, as determined by the Administrator.

15        **SEC. 5. UNMANNED AIRCRAFT SYSTEMS.**

16        (a) SENSE OF CONGRESS.—It is the sense of Con-  
17        gress that—

18                (1) to ensure United States competitiveness on  
19        the global stage, the Federal Government must work  
20        with the private sector to safely integrate the in-  
21        creasing number of commercial applications for un-  
22        manned aircraft systems; and

23                (2) the sustained, efficient growth of the United  
24        States transportation system will require harnessing  
25        the safety and efficiency benefits of automated sys-

1       tems to relieve pressure on infrastructure and traffic  
2       management.

3       (b) POLICY.—It is the policy of the United States  
4       Government to be an active partner with the private sector  
5       in the development of technologies, capabilities, and oper-  
6       ating procedures for the safe, efficient integration of un-  
7       manned aircraft systems into the national airspace, while  
8       ensuring current and future air traffic management sys-  
9       tems are able to manage unmanned aircraft systems.

10       (c) UNMANNED AIRCRAFT SYSTEMS OPERATION  
11       PROGRAM.—To advance the national policy described in  
12       subsection (b), the Administrator shall—

13               (1) research, develop, and test capabilities and  
14       concepts, including unmanned aircraft systems com-  
15       munications and spectrum-related resources, for in-  
16       tegrating unmanned aircraft systems into the na-  
17       tional airspace system;

18               (2) leverage NASA’s partnership with industry  
19       focused on the advancement of technologies for fu-  
20       ture air traffic management systems for unmanned  
21       aircraft for low- and high-altitude operations;

22               (3) leverage industry’s advancement of tech-  
23       nologies for unmanned aircraft to inform regulatory  
24       and standards requirements for various sizes of civil  
25       unmanned aircraft systems;

1           (4) consider the needs of United States indus-  
2       try, especially as operations transition to more auto-  
3       mated systems; and

4           (5) continue to align its research and testing  
5       portfolio to inform unmanned aircraft system inte-  
6       gration consistent with public safety and national se-  
7       curity objectives.

8       (d) COORDINATION WITH THE FEDERAL AVIATION  
9       ADMINISTRATION.—It is the sense of Congress that—

10           (1) NASA should continue to coordinate with  
11       the Federal Aviation Administration on research on  
12       air traffic management systems for unmanned air-  
13       craft systems and assist in the establishment of the  
14       pilot program required under section 2208 of the  
15       FAA Extension, Safety, and Security Act of 2016  
16       (49 U.S.C. 40101 note) and the subsequent imple-  
17       mentation of unmanned aircraft system traffic man-  
18       agement systems; and

19           (2) unmanned aircraft system integration and  
20       unmanned traffic management research should con-  
21       tinue to leverage the resources available through the  
22       unmanned aircraft system test ranges designated by  
23       the Federal Aviation Administration under section  
24       332 of the FAA Modernization and Reform Act of  
25       2012 (Public Law 112–95; 49 U.S.C. 40101 note).

1 **SEC. 6. 21ST CENTURY AERONAUTICS RESEARCH CAPABILI-**  
2 **TIES INITIATIVE.**

3 (a) ESTABLISHMENT.—The Administrator shall es-  
4 tablish a 21st Century Aeronautics Capabilities Initiative,  
5 within the Construction and Environmental Compliance  
6 and Restoration Account, to ensure that NASA possesses  
7 the infrastructure capabilities and computational tools  
8 necessary to conduct proposed flight demonstration  
9 projects across the range of NASA aeronautics interests.  
10 As part of such Initiative, the Administrator shall carry  
11 out the following activities:

12 (1) Any investments necessary to upgrade and  
13 create facilities for civil and national security aero-  
14 nautics research to support advancements in long-  
15 term foundational science and technology, advanced  
16 aircraft systems, air traffic management systems,  
17 fuel efficiency and electric propulsion technologies,  
18 systemwide safety assurance, autonomous aviation,  
19 and supersonic and hypersonic aircraft design and  
20 development.

21 (2) Any measures supporting flight testing ac-  
22 tivities, to include continuous refinement and devel-  
23 opment of free-flight test techniques and methodolo-  
24 gies, upgrades and improvements to real-time track-  
25 ing and data acquisition, and any other measures re-  
26 lated to aeronautics research support and mod-



1 ernization as the Administrator may consider appro-  
2 priate to carry out the scientific study of the prob-  
3 lems of flight, with a view to their practical solution.

4 (b) AUTHORIZATION OF APPROPRIATIONS.—For the  
5 purpose of carrying out this section, there are authorized  
6 to be appropriated to NASA \$100,000,000 for each of fis-  
7 cal years 2020 through 2024, to be derived from amounts  
8 otherwise authorized to be appropriated to NASA.

9 (c) REPORT.—

10 (1) REPORT REQUIRED.—Not later than 120  
11 days after the date of enactment of this Act, the Ad-  
12 ministrator shall transmit to Congress a report con-  
13 taining a 5-year plan for the implementation of the  
14 21st Century Aeronautics Research Capabilities Ini-  
15 tiative.

16 (2) ELEMENTS.—The report required by this  
17 subsection shall include—

18 (A) a description of proposed projects;

19 (B) a description of the manner in which  
20 such projects align with the Aeronautics Stra-  
21 tegic Implementation Plan or the roadmap de-  
22 veloped by the joint technology office on  
23 hypersonics under section 218(d) of the John  
24 Warner National Defense Authorization Act for

1 Fiscal Year 2007 (10 U.S.C. note), and any up-  
2 dates to such plan or roadmap; and

3 (C) a timetable for carrying out activities  
4 and initiatives authorized under this section.

5 **SEC. 7. AUTHORIZATIONS OF APPROPRIATIONS.**

6 (a) FISCAL YEAR 2020.—There are authorized to be  
7 appropriated to NASA Aeronautics Research Mission Di-  
8 rectorate for fiscal year 2020, \$840,000,000, as follows:

9 (1) For Airspace Operations and Safety Pro-  
10 gram, \$159,000,000.

11 (2) For Advanced Air Vehicles Program,  
12 \$280,000,000.

13 (3) For Integrated Aviation Systems Program,  
14 \$251,000,000.

15 (4) For Transformative Aero Concepts Pro-  
16 gram, \$100,000,000.

17 (5) For Advanced Materials and Manufacturing  
18 Program, \$50,000,000.

19 (b) FISCAL YEAR 2021.—There are authorized to be  
20 appropriated to NASA Aeronautics Research Mission Di-  
21 rectorate for fiscal year 2021, \$930,000,000, as follows:

22 (1) For Airspace Operations and Safety Pro-  
23 gram, \$165,000,000.

24 (2) For Advanced Air Vehicles Program,  
25 \$303,000,000.

1           (3) For Integrated Aviation Systems Program,  
2     \$300,000,000.

3           (4) For Transformative Aero Concepts Pro-  
4     gram, \$112,000,000.

5           (5) For Advanced Materials and Manufacturing  
6     Program, \$50,000,000.

7     (c) FISCAL YEAR 2022.—There are authorized to be  
8     appropriated to NASA Aeronautics Research Mission Di-  
9     rectorate for fiscal year 2022, \$974,000,000, as follows:

10           (1) For Airspace Operations and Safety Pro-  
11     gram, \$170,000,000.

12           (2) For Advanced Air Vehicles Program,  
13     \$290,000,000.

14           (3) For Integrated Aviation Systems Program,  
15     \$350,000,000.

16           (4) For Transformative Aero Concepts Pro-  
17     gram, \$114,000,000.

18           (5) For Advanced Materials and Manufacturing  
19     Program, \$50,000,000.

20     (d) FISCAL YEAR 2023.—There are authorized to be  
21     appropriated to NASA Aeronautics Research Mission Di-  
22     rectorate for fiscal year 2023, \$996,000,000, as follows:

23           (1) For Airspace Operations and Safety Pro-  
24     gram, \$175,000,000.

1           (2) For Advanced Air Vehicles Program,  
2     \$295,000,000.

3           (3) For Integrated Aviation Systems Program,  
4     \$360,000,000.

5           (4) For Transformative Aero Concepts Pro-  
6     gram, \$116,000,000.

7           (5) For Advanced Materials and Manufacturing  
8     Program, \$50,000,000.

9     (e) FISCAL YEAR 2024.—There are authorized to be  
10  appropriated to NASA Aeronautics Research Mission Di-  
11  rectorate for fiscal year 2024, \$1,030,000,000, as follows:

12           (1) For Airspace Operations and Safety Pro-  
13     gram, \$180,000,000.

14           (2) For Advanced Air Vehicles Program,  
15     \$300,000,000.

16           (3) For Integrated Aviation Systems Program,  
17     \$382,000,000.

18           (4) For Transformative Aero Concepts Pro-  
19     gram, \$118,000,000.

20           (5) For Advanced Materials and Manufacturing  
21     Program, \$50,000,000.

○