

109TH CONGRESS  
1ST SESSION

# H. R. 2358

To enable the United States to maintain its leadership in aeronautics and aviation, improve its quality of life, protect the environment, support economic growth, and promote the security of the Nation by instituting an initiative to develop technologies that will enable future aircraft with significantly lower noise, emissions, and fuel consumption, to reinvigorate basic and applied research in aeronautics and aviation, and for other purposes.

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## IN THE HOUSE OF REPRESENTATIVES

MAY 12, 2005

Mr. UDALL of Colorado (for himself, Mrs. JO ANN DAVIS of Virginia, Mr. GORDON, Mr. KUCINICH, Mr. SCOTT of Virginia, and Mr. LARSON of Connecticut) introduced the following bill; which was referred to the Committee on Science

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## A BILL

To enable the United States to maintain its leadership in aeronautics and aviation, improve its quality of life, protect the environment, support economic growth, and promote the security of the Nation by instituting an initiative to develop technologies that will enable future aircraft with significantly lower noise, emissions, and fuel consumption, to reinvigorate basic and applied research in aeronautics and 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,*

1 **SECTION 1. SHORT TITLE.**

2 This Act may be cited as the “Aeronautics Research  
3 and Development Revitalization Act of 2005”.

4 **SEC. 2. FINDINGS.**

5 The Congress finds the following:

6 (1) It is in the national interest of the United  
7 States to maintain international leadership in aero-  
8 nautics and aviation.

9 (2) The United States is in danger of losing its  
10 leadership in aeronautics and aviation to inter-  
11 national competitors.

12 (3) Past Federal investments in aeronautics re-  
13 search and development have benefited the economy  
14 and national security of the United States, and the  
15 quality of life of its citizens.

16 (4) Future growth in aviation increasingly will  
17 be constrained by concerns related to aircraft noise,  
18 emissions, fuel consumption, and air transportation  
19 system congestion.

20 (5) Current and projected levels of Federal in-  
21 vestment in aeronautics research and development  
22 are not sufficient to address concerns related to the  
23 growth of aviation.

24 (6) International competitors have recognized  
25 the importance of noise, emissions, fuel consump-  
26 tion, and air transportation system congestion in

1 limiting the future growth of aviation, and have es-  
2 tablished aggressive agendas for addressing each of  
3 those concerns.

4 (7) An aggressive initiative by the Federal Gov-  
5 ernment to develop technologies that would signifi-  
6 cantly reduce aircraft noise, harmful emissions, and  
7 fuel consumption would benefit the United States  
8 by—

9 (A) improving the competitiveness of the  
10 United States aviation industry through the de-  
11 velopment of new markets for aviation services  
12 and the development of superior aircraft for ex-  
13 isting markets;

14 (B) improving the quality of life for our  
15 citizens by drastically reducing the level of noise  
16 due to aircraft operations;

17 (C) reducing the congestion of the air  
18 transportation system by allowing departures  
19 and arrivals at currently underutilized airports  
20 through the use of environmentally compatible  
21 aircraft;

22 (D) reducing the rate at which fossil fuels  
23 are consumed;

1           (E) reducing the rate at which greenhouse  
2           gases and other harmful gases and particulates  
3           are added to the atmosphere by aircraft; and

4           (F) reinvigorating the human capital in  
5           aeronautics and aviation by providing a set of  
6           extremely challenging and socially beneficial  
7           goals to the next generation of engineers and  
8           scientists.

9           (8) Long-term progress in aeronautics and avia-  
10          tion requires continued Federal investment in funda-  
11          mental aeronautical research, aeronautical test facili-  
12          ties, and maintenance of a skilled workforce at the  
13          Nation’s aeronautical research centers.

14          (9) The Commission on the Future of the  
15          United States Aerospace Industry has recommended  
16          that “the Federal government significantly increase  
17          its investment in basic aerospace research, which en-  
18          hances U.S. national security, enables breakthrough  
19          capabilities, and fosters an efficient, secure, and safe  
20          aerospace transportation system”.

21          (10) Maintenance of United States leadership  
22          in aeronautics and aviation will require the produc-  
23          tive collaboration of the National Aeronautics and  
24          Space Administration, the Federal Aviation Admin-

1       istration, the Department of Defense, the aviation  
2       industry, and the Nation’s universities.

3               (11) It is in the interest of the United States  
4       to maintain a vigorous capability in basic and ap-  
5       plied research and development of technologies re-  
6       lated to rotorcraft and other runway-independent air  
7       vehicles.

8               (12) Continued research is needed into the  
9       flight crew and controller training needed to accom-  
10      modate new aircraft and air transportation system  
11      technologies and procedures.

12              (13) Improvements to our understanding of  
13      convective weather phenomena and of aircraft wake  
14      turbulence would significantly improve the perform-  
15      ance and safety of the Nation’s air transportation  
16      system.

17              (14) The National Aeronautics and Space Ad-  
18      ministration should continue to pursue research and  
19      development in hypersonics.

20 **SEC. 3. DEFINITIONS.**

21       For purposes of this Act—

22              (1) the term “institution of higher education”  
23      has the meaning given that term by section 101 of  
24      the Higher Education Act of 1965 (20 U.S.C.  
25      1001);

1           (2) the term “NASA” means the National Aer-  
2           onautics and Space Administration; and

3           (3) the term “NASA Administrator” means the  
4           Administrator of NASA.

5 **TITLE I—NATIONAL POLICY FOR**  
6 **AERONAUTICS           RESEARCH**  
7 **AND DEVELOPMENT**

8 **SEC. 101. POLICY.**

9           It shall be the policy of the United States to reaffirm  
10 the National Aeronautics and Space Act of 1958 and its  
11 identification of aeronautical research and development as  
12 a core mission of NASA. Further, it shall be the policy  
13 of the United States to promote aeronautical research and  
14 development that will expand the capacity, ensure the  
15 safety, and increase the efficiency of the Nation’s air  
16 transportation system, promote the security of the Nation,  
17 protect the environment, and retain the leadership of the  
18 United States in global aviation.

19 **TITLE II—NASA AERONAUTICS**  
20 **BREAKTHROUGH RESEARCH**  
21 **INITIATIVES**

22 **SEC. 201. ENVIRONMENTAL AIRCRAFT RESEARCH AND DE-**  
23 **VELOPMENT INITIATIVE.**

24           (a) OBJECTIVE.—The NASA Administrator shall es-  
25 tablish an initiative with the objective of developing, and

1 demonstrating in a relevant environment, within 10 years  
2 after the date of enactment of this Act, technologies to  
3 enable the following commercial aircraft performance  
4 characteristics:

5 (1) NOISE.—Noise levels on takeoff and on air-  
6 port approach and landing that do not exceed ambi-  
7 ent noise levels in the absence of flight operations in  
8 the vicinity of airports from which such commercial  
9 aircraft would normally operate.

10 (2) ENERGY CONSUMPTION.—Twenty-five per-  
11 cent reduction in the energy required for medium to  
12 long range flights, compared to aircraft in commer-  
13 cial service as of the date of enactment of this Act.  
14 This reduction may be achieved by a combination of  
15 improvements to—

16 (A) specific fuel consumption;

17 (B) lift-to-drag ratio; and

18 (C) structural weight fraction.

19 (3) EMISSIONS.—Nitrogen oxides on take-off  
20 and landing that are reduced by 50 percent relative  
21 to aircraft in commercial service as of the date of  
22 enactment of this Act.

23 (b) IMPLEMENTATION.—Not later than 270 days  
24 after the date of enactment of this Act, the NASA Admin-  
25 istrator shall provide to Congress a plan for the implemen-

1 tation of the initiative described in subsection (a). Such  
2 implementation plan shall include—

3 (1) technological roadmaps for achieving each  
4 of the performance characteristics specified in sub-  
5 section (a);

6 (2) an estimate of the 10-year funding profile  
7 required to achieve the objective specified in sub-  
8 section (a);

9 (3) a plan for carrying out a formal quantifica-  
10 tion of the estimated costs and benefits of each tech-  
11 nological option selected for development beyond the  
12 initial concept definition phase; and

13 (4) a plan for transferring the technologies to  
14 industry, including the identification of requirements  
15 for technology demonstrations, as appropriate.

16 (c) STUDY.—

17 (1) REQUIREMENT.—The NASA Administrator  
18 shall enter into an arrangement for the National Re-  
19 search Council to conduct a study to identify and  
20 quantify new markets that would be created, as well  
21 as existing markets that would be expanded, by the  
22 incorporation of the technologies developed pursuant  
23 to this section into future commercial aircraft. The  
24 study shall identify whether any of the performance  
25 characteristics specified in subsection (a) would need

1 to be made more stringent in order to create new  
2 markets or expand existing markets. The National  
3 Research Council shall seek input from at least the  
4 aircraft manufacturing industry, academia, and the  
5 airlines in carrying out the study.

6 (2) REPORT.—A report containing the results  
7 of the study conducted under paragraph (1) shall be  
8 provided to Congress not later than 18 months after  
9 the date of enactment of this Act.

10 **SEC. 202. CIVIL SUPERSONIC TRANSPORT RESEARCH AND**  
11 **DEVELOPMENT INITIATIVE.**

12 (a) OBJECTIVE.—The NASA Administrator shall es-  
13 tablish an initiative with the objective of developing, and  
14 demonstrating in a relevant environment, within 20 years  
15 after the date of enactment of this Act, technologies to  
16 enable overland flight of supersonic civil transport aircraft  
17 with at least the following performance characteristics:

18 (1) Mach number of at least 1.4.

19 (2) Range of at least 4,000 nautical miles.

20 (3) Payload of at least 24 passengers.

21 (4) Noise levels on takeoff and on airport ap-  
22 proach and landing that meet community noise  
23 standards in place at airports from which such com-  
24 mercial supersonic aircraft would normally operate

1 at the time the aircraft would enter commercial serv-  
2 ice.

3 (5) Shaped sonic boom signatures sufficiently  
4 low to permit overland flight over populated areas.

5 (6) Nitrogen oxide, carbon dioxide, and water  
6 vapor emissions consistent with regulations likely to  
7 be in effect at the time of this aircraft's introduc-  
8 tion.

9 (b) IMPLEMENTATION.—Not later than 270 days  
10 after the date of enactment of this Act, the NASA Admin-  
11 istrator shall provide to Congress a plan for the implemen-  
12 tation of the initiative described in subsection (a). Such  
13 implementation plan shall include—

14 (1) technological roadmaps for achieving each  
15 of the performance characteristics specified in sub-  
16 section (a);

17 (2) an estimate of the 10-year funding profile  
18 required to achieve the objective specified in sub-  
19 section (a);

20 (3) a plan for carrying out a formal quantifica-  
21 tion of the estimated costs and benefits of each tech-  
22 nological option selected for development beyond the  
23 initial concept definition phase;

1           (4) a plan for transferring the technologies to  
2 industry, including the identification of requirements  
3 for technology demonstrations, as appropriate;

4           (5) a plan for research to quantify, within 3  
5 years after the date of enactment of this Act, the  
6 limits on sonic boom parameters, such as over-  
7 pressure and rise time, that would be acceptable to  
8 the general public; and

9           (6) a plan for adjusting the noise reduction re-  
10 search and development activities as needed to ac-  
11 commodate changes in community noise standards  
12 that may occur over the lifetime of the initiative.

13 **SEC. 203. ROTORCRAFT AND OTHER RUNWAY-INDE-**  
14 **PENDENT AIR VEHICLES RESEARCH AND DE-**  
15 **VELOPMENT INITIATIVE.**

16       (a) **OBJECTIVE.**—The NASA Administrator shall es-  
17 tablish a rotorcraft and other runway-independent air ve-  
18 hicles initiative with the objective of developing and dem-  
19 onstrating in a relevant environment, within 10 years after  
20 the date of enactment of this Act, technologies to enable  
21 significantly safer, quieter, and more environmentally  
22 compatible operation from a wider range of airports under  
23 a wider range of weather conditions than is the case for  
24 rotorcraft and other runway-independent air vehicles in  
25 service as of the date of enactment of this Act.

1 (b) IMPLEMENTATION.—Not later than 270 days  
2 after the date of enactment of this Act, the NASA Admin-  
3 istrator shall provide a plan to the Congress for the imple-  
4 mentation of the initiative described in subsection (a). The  
5 implementation plan shall include—

6 (1) a set of performance characteristics, devel-  
7 oped in consultation with the National Research  
8 Council, that shall quantify the objectives specified  
9 in subsection (a);

10 (2) technological roadmaps for achieving each  
11 of the performance characteristics developed under  
12 paragraph (1);

13 (3) an estimate of the 10-year funding profile  
14 required to achieve the objective specified in sub-  
15 section (a);

16 (4) a plan for carrying out a formal quantifica-  
17 tion of the estimated costs and benefits of each tech-  
18 nological option selected for development beyond the  
19 initial concept definition phase; and

20 (5) a plan for transferring the technologies to  
21 industry, including the identification of requirements  
22 for technology demonstrations, as appropriate.

23 **SEC. 204. REVIEW.**

24 The NASA Administrator shall enter into an ar-  
25 rangement with the National Research Council for the re-

1 view, within 18 months after the date of enactment of this  
2 Act, of the adequacy of the implementation plans provided  
3 under sections 201(b), 202(b), and 203(b) to achieve the  
4 objectives described in sections 201(a), 202(a), and  
5 203(a). In addition, the NASA Administrator shall enter  
6 into an arrangement with the National Research Council  
7 for the review, every 3 years subsequent to the initial re-  
8 view under this section, of NASA's progress in achieving  
9 the objectives described in sections 201(a), 202(a), and  
10 203(a), including recommendations for changes to  
11 NASA's research and development program as needed, as  
12 well as recommendations for changes to the desired per-  
13 formance characteristics as needed. The results of each  
14 review shall be provided to Congress within 30 days after  
15 completion of the review.

16 **TITLE III—OTHER NASA AERO-**  
17 **NAUTICS RESEARCH AND DE-**  
18 **VELOPMENT ACTIVITIES**

19 **SEC. 301. FUNDAMENTAL RESEARCH AND TECHNOLOGY**  
20 **BASE PROGRAM.**

21 (a) OBJECTIVE.—In order to ensure that the Nation  
22 maintains needed capabilities in fundamental areas of  
23 aeronautical research, the NASA Administrator shall es-  
24 tablish a program of long-term fundamental research in

1 aeronautical sciences and technologies that is not tied to  
2 specific development projects.

3 (b) ASSESSMENT.—The NASA Administrator shall  
4 enter into an arrangement with the National Research  
5 Council for an assessment of the Nation’s future require-  
6 ments for fundamental aeronautics research and whether  
7 the Nation will have a skilled research workforce and re-  
8 search facilities commensurate with those requirements.  
9 The assessment shall include an identification of any pro-  
10 jected gaps, and recommendations for what steps should  
11 be taken by the Federal Government to eliminate those  
12 gaps.

13 (c) REPORT.—The NASA Administrator shall trans-  
14 mit the assessment, along with NASA’s response to the  
15 assessment, to Congress not later than 2 years after the  
16 date of enactment of this Act.

17 **SEC. 302. AIRSPACE SYSTEMS RESEARCH.**

18 (a) OBJECTIVE.—The Airspace Systems Research  
19 program shall pursue research and development to enable  
20 revolutionary improvements to and modernization of the  
21 National Airspace System, as well as to enable the intro-  
22 duction of new systems for vehicles that can take advan-  
23 tage of an improved, modern air transportation system.

24 (b) ALIGNMENT.—Not later than 2 years after the  
25 date of enactment of this Act, the NASA Administrator

1 shall align the projects of the Airspace Systems Research  
2 program so that they directly support the objectives of the  
3 Joint Planning and Development Office’s Next Generation  
4 Air Transportation System Integrated Plan.

5 **SEC. 303. AVIATION SAFETY AND SECURITY RESEARCH.**

6 (a) OBJECTIVE.—The Aviation Safety and Security  
7 Research program shall pursue research and development  
8 activities that directly address the safety and security  
9 needs of the National Airspace System and the aircraft  
10 that fly in it. The program shall develop prevention, inter-  
11 vention, and mitigation technologies aimed at causal, con-  
12 tributory, or circumstantial factors of aviation accidents.

13 (b) PLAN.—Not later than 1 year after the date of  
14 enactment of this Act, the NASA Administrator shall  
15 transmit to Congress a 5-year prioritized plan for the re-  
16 search to be conducted within the Aviation Safety and Se-  
17 curity Research program. The plan shall be aligned with  
18 the objectives of the Joint Planning and Development Of-  
19 fice’s Next Generation Air Transportation System Inte-  
20 grated Plan.

21 **SEC. 304. ZERO-EMISSIONS AIRCRAFT RESEARCH.**

22 (a) OBJECTIVE.—The NASA Administrator shall es-  
23 tablish a zero-emissions aircraft research program whose  
24 objective shall be to develop and test concepts to enable  
25 a hydrogen fuel cell-powered aircraft that would have no

1 hydrocarbon or nitrogen oxide emissions into the environ-  
2 ment.

3 (b) APPROACH.—The NASA Administrator shall es-  
4 tablish a program of competitively awarded grants avail-  
5 able to teams of researchers that may include the partici-  
6 pation of individuals from universities, industry, and gov-  
7 ernment for the conduct of this research.

8 **SEC. 305. MARS AIRCRAFT RESEARCH.**

9 (a) OBJECTIVE.—The NASA Administrator shall es-  
10 tablish a Mars Aircraft project whose objective shall be  
11 to develop and test concepts for an uncrewed aircraft that  
12 could operate for sustained periods in the atmosphere of  
13 Mars.

14 (b) APPROACH.—The NASA Administrator shall es-  
15 tablish a program of competitively awarded grants avail-  
16 able to teams of researchers that may include the partici-  
17 pation of individuals from universities, industry, and gov-  
18 ernment for the conduct of this research.

19 **SEC. 306. HYPERSONICS RESEARCH.**

20 (a) OBJECTIVE.—The NASA Administrator shall es-  
21 tablish a hypersonics research program whose objective  
22 shall be to explore the science and technology of  
23 hypersonic flight using air-breathing propulsion concepts,  
24 through a mix of theoretical work, basic and applied re-

1 search, and development of flight research demonstration  
2 vehicles.

3 (b) PLAN.—Not later than 1 year after the date of  
4 enactment of this Act, the NASA Administrator shall de-  
5 velop a 10-year hypersonics research plan and shall have  
6 that plan reviewed by the National Research Council. The  
7 results of that review shall be provided to Congress.

8 **SEC. 307. NASA AERONAUTICS SCHOLARSHIPS.**

9 (a) ESTABLISHMENT.—The NASA Administrator  
10 shall establish a program of scholarships for full-time  
11 graduate students who are United States citizens and are  
12 enrolled in, or have been accepted by and have indicated  
13 their intention to enroll in, accredited Masters degree pro-  
14 grams in aeronautical engineering at institutions of higher  
15 education. Each such scholarship shall cover the costs of  
16 room, board, tuition, and fees, and may be provided for  
17 a maximum of 2 years.

18 (b) IMPLEMENTATION.—Not later than 180 days  
19 after the date of enactment of this Act, the NASA Admin-  
20 istrator shall publish regulations governing the scholarship  
21 program under this section.

22 (c) COOPERATIVE TRAINING OPPORTUNITIES.—Stu-  
23 dents who have been awarded a scholarship under this sec-  
24 tion shall have the opportunity for paid employment at  
25 one of the NASA Centers engaged in aeronautics research

1 and development during the summer prior to the first year  
2 of the student's Masters program, and between the first  
3 and second year, if applicable.

4 **SEC. 308. NASA AERONAUTICAL TEST FACILITIES POLICY.**

5       The NASA Administrator shall establish a policy of  
6 charging users of NASA's aeronautical test facilities for  
7 the costs associated with their tests, but shall not seek  
8 to recover the full costs of the operation of those facilities  
9 from the users. The NASA Administrator shall establish  
10 a core funding account that shall be used to maintain the  
11 operation and viability of NASA's aeronautical test facili-  
12 ties during periods of low utilization. The NASA Adminis-  
13 trator shall not close or mothball any aeronautical test fa-  
14 cilities identified in the 2003 independent assessment by  
15 the RAND Corporation, entitled "Wind Tunnel and Pro-  
16 pulsion Test Facilities: An Assessment of NASA's Capa-  
17 bilities to Serve National Needs" as being part of the min-  
18 imum set of those facilities necessary to retain and man-  
19 age to serve national needs until such time as the Office  
20 of Science and Technology Policy of the Executive Office  
21 of the President has commissioned and received the results  
22 of an independent review of the Nation's long term stra-  
23 tegic needs for aeronautical test facilities and transmitted  
24 the results of that review to Congress.

1 **SEC. 309. AVIATION WEATHER RESEARCH.**

2       The NASA Administrator shall carry out a program  
3 of collaborative research with the National Oceanic and  
4 Atmospheric Administration on convective weather events,  
5 with the goal of significantly improving the reliability of  
6 2-hour to 6-hour aviation weather forecasts.

7 **SEC. 310. ASSESSMENT OF WAKE TURBULENCE RESEARCH**  
8 **AND DEVELOPMENT PROGRAM.**

9       (a) **ASSESSMENT.**—The NASA Administrator shall  
10 enter into an arrangement with the National Research  
11 Council for an assessment of Federal wake turbulence re-  
12 search and development programs. The assessment shall  
13 address at least the following questions:

14           (1) Are the Federal research and development  
15 goals and objectives well defined?

16           (2) Are there any deficiencies in the Federal re-  
17 search and development goals and objectives?

18           (3) What roles should be played by each of the  
19 relevant Federal agencies, such as NASA, the Fed-  
20 eral Aviation Administration, and the National Oce-  
21 anic and Atmospheric Administration, in wake tur-  
22 bulence research and development?

23       (b) **REPORT.**—A report containing the results of the  
24 assessment conducted pursuant to subsection (a) shall be  
25 provided to Congress not later than 1 year after the date  
26 of enactment of this Act.

1 **SEC. 311. UNIVERSITY-BASED CENTERS FOR RESEARCH ON**  
2 **AVIATION TRAINING.**

3 (a) **IN GENERAL.**—The NASA Administrator shall  
4 award grants to institutions of higher education (or con-  
5 sortia thereof) to establish one or more Centers for Re-  
6 search on Aviation Training.

7 (b) **PURPOSE.**—The purpose of the Centers shall be  
8 to investigate the impact of new technologies and proce-  
9 dures, particularly those related to the aircraft flight deck  
10 and to the air traffic management functions, on training  
11 requirements for pilots and air traffic controllers.

12 (c) **APPLICATION.**—An institution of higher edu-  
13 cation (or a consortium of such institutions) seeking fund-  
14 ing under this section shall submit an application to the  
15 NASA Administrator at such time, in such manner, and  
16 containing such information as the NASA Administrator  
17 may require, including, at a minimum, a 5-year research  
18 plan.

19 (d) **AWARD DURATION.**—An award made by the  
20 NASA Administrator under this section shall be for a pe-  
21 riod of 5 years and may be renewed on the basis of—

22 (1) satisfactory performance in meeting the  
23 goals of the research plan proposed by the Center in  
24 its application under subsection (c); and

25 (2) other requirements as specified by the  
26 NASA Administrator.

1     **TITLE IV—AUTHORIZATION OF**  
2                     **APPROPRIATIONS**

3     **SEC. 401. TOTAL AUTHORIZATIONS.**

4             The total amounts authorized to be appropriated for  
5 aeronautics research, development, and demonstration ac-  
6 tivities at NASA, including the amounts authorized by this  
7 Act, are—

- 8                     (1) \$1,057,000,000 for fiscal year 2006;  
9                     (2) \$1,089,000,000 for fiscal year 2007;  
10                    (3) \$1,121,000,000 for fiscal year 2008;  
11                    (4) \$1,155,000,000 for fiscal year 2009; and  
12                    (5) \$1,190,000,000 for fiscal year 2010.

○