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(Original Signature of Member)

109TH CONGRESS
1ST SESSION

H. R. _____

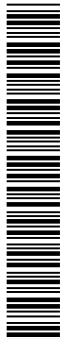
To enable the United States to maintain its leadership in aeronautics and aviation, improve its quality of life, protect the environment, support economic growth, and promote the security of the Nation by instituting an initiative to develop technologies that will enable future aircraft with significantly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

IN THE HOUSE OF REPRESENTATIVES

Mr. UDALL of Colorado introduced the following bill; which was referred to the Committee on _____

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,*

3 **SECTION 1. SHORT TITLE.**

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

6 **SEC. 2. FINDINGS.**

7 The Congress finds the following:

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

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

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

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

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



1 (6) International competitors have recognized
2 the importance of noise, emissions, fuel consump-
3 tion, and air transportation system congestion in
4 limiting the future growth of aviation, and have es-
5 tablished aggressive agendas for addressing each of
6 those concerns.

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

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

17 (B) improving the quality of life for our
18 citizens by drastically reducing the level of noise
19 due to aircraft operations;

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



1 (D) reducing the rate at which fossil fuels
2 are consumed;

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

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

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

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

23 (10) Maintenance of United States leadership
24 in aeronautics and aviation will require the produc-
25 tive collaboration of the National Aeronautics and



1 Space Administration, the Federal Aviation Admin-
2 istration, the Department of Defense, the aviation
3 industry, and the Nation's universities.

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

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

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

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

21 **SEC. 3. DEFINITIONS.**

22 For purposes of this Act—

23 (1) the term “institution of higher education”
24 has the meaning given that term by section 101 of



1 the Higher Education Act of 1965 (20 U.S.C.
2 1001);

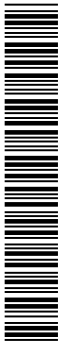
3 (2) the term “NASA” means the National Aer-
4 onautics and Space Administration; and

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

7 **TITLE I—NATIONAL POLICY FOR**
8 **AERONAUTICS RESEARCH**
9 **AND DEVELOPMENT**

10 **SEC. 101. POLICY.**

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



1 **TITLE II—NASA AERONAUTICS**
2 **BREAKTHROUGH RESEARCH**
3 **INITIATIVES**

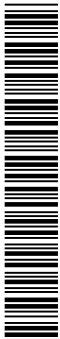
4 **SEC. 201. ENVIRONMENTAL AIRCRAFT RESEARCH AND DE-**
5 **VELOPMENT INITIATIVE.**

6 (a) OBJECTIVE.—The NASA Administrator shall es-
7 tablish an initiative with the objective of developing, and
8 demonstrating in a relevant environment, within 10 years
9 after the date of enactment of this Act, technologies to
10 enable the following commercial aircraft performance
11 characteristics:

12 (1) NOISE.—Noise levels on takeoff and on air-
13 port approach and landing that do not exceed ambi-
14 ent noise levels in the absence of flight operations in
15 the vicinity of airports from which such commercial
16 aircraft would normally operate.

17 (2) ENERGY CONSUMPTION.—Twenty-five per-
18 cent reduction in the energy required for medium to
19 long range flights, compared to aircraft in commer-
20 cial service as of the date of enactment of this Act.
21 This reduction may be achieved by a combination of
22 improvements to—

- 23 (A) specific fuel consumption;
24 (B) lift-to-drag ratio; and
25 (C) structural weight fraction.



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

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

10 (1) technological roadmaps for achieving each
11 of the performance characteristics specified in sub-
12 section (a);

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

16 (3) 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 (4) a plan for transferring the technologies to
21 industry, including the identification of requirements
22 for technology demonstrations, as appropriate.

23 (c) STUDY.—

24 (1) REQUIREMENT.—The NASA Administrator
25 shall enter into an arrangement for the National Re-



1 search Council to conduct a study to identify and
2 quantify new markets that would be created, as well
3 as existing markets that would be expanded, by the
4 incorporation of the technologies developed pursuant
5 to this section into future commercial aircraft. The
6 study shall identify whether any of the performance
7 characteristics specified in subsection (a) would need
8 to be made more stringent in order to create new
9 markets or expand existing markets. The National
10 Research Council shall seek input from at least the
11 aircraft manufacturing industry, academia, and the
12 airlines in carrying out the study.

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

17 **SEC. 202. CIVIL SUPERSONIC TRANSPORT RESEARCH AND**
18 **DEVELOPMENT INITIATIVE.**

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

25 (1) Mach number of at least 1.4.



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

2 (3) Payload of at least 24 passengers.

3 (4) Noise levels on takeoff and on airport ap-
4 proach and landing that meet community noise
5 standards in place at airports from which such com-
6 mercial supersonic aircraft would normally operate
7 at the time the aircraft would enter commercial serv-
8 ice.

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

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

15 (b) IMPLEMENTATION.—Not later than 270 days
16 after the date of enactment of this Act, the NASA Admin-
17 istrator shall provide to Congress a plan for the implemen-
18 tation of the initiative described in subsection (a). Such
19 implementation plan shall include—

20 (1) technological roadmaps for achieving each
21 of the performance characteristics specified in sub-
22 section (a);

23 (2) an estimate of the 10-year funding profile
24 required to achieve the objective specified in sub-
25 section (a);



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

5 (4) a plan for transferring the technologies to
6 industry, including the identification of requirements
7 for technology demonstrations, as appropriate;

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

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

17 **SEC. 203. ROTORCRAFT AND OTHER RUNWAY-INDE-**
18 **PENDENT AIR VEHICLES RESEARCH AND DE-**
19 **VELOPMENT INITIATIVE.**

20 (a) **OBJECTIVE.**—The NASA Administrator shall es-
21 tablish a rotorcraft and other runway-independent air ve-
22 hicles initiative with the objective of developing and dem-
23 onstrating in a relevant environment, within 10 years after
24 the date of enactment of this Act, technologies to enable
25 significantly safer, quieter, and more environmentally



1 compatible operation from a wider range of airports under
2 a wider range of weather conditions than is the case for
3 rotorcraft and other runway-independent air vehicles in
4 service as of the date of enactment of this Act.

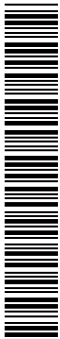
5 (b) IMPLEMENTATION.—Not later than 270 days
6 after the date of enactment of this Act, the NASA Admin-
7 istrator shall provide a plan to the Congress for the imple-
8 mentation of the initiative described in subsection (a). The
9 implementation plan shall include—

10 (1) a set of performance characteristics, devel-
11 oped in consultation with the National Research
12 Council, that shall quantify the objectives specified
13 in subsection (a);

14 (2) technological roadmaps for achieving each
15 of the performance characteristics developed under
16 paragraph (1);

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

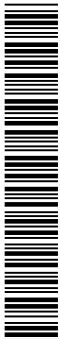
20 (4) a plan for carrying out a formal quantifica-
21 tion of the estimated costs and benefits of each tech-
22 nological option selected for development beyond the
23 initial concept definition phase; and



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

4 **SEC. 204. REVIEW.**

5 The NASA Administrator shall enter into an ar-
6 rangement with the National Research Council for the re-
7 view, within 18 months after the date of enactment of this
8 Act, of the adequacy of the implementation plans provided
9 under sections 201(b), 202(b), and 203(b) to achieve the
10 objectives described in sections 201(a), 202(a), and
11 203(a). In addition, the NASA Administrator shall enter
12 into an arrangement with the National Research Council
13 for the review, every 3 years subsequent to the initial re-
14 view under this section, of NASA's progress in achieving
15 the objectives described in sections 201(a), 202(a), and
16 203(a), including recommendations for changes to
17 NASA's research and development program as needed, as
18 well as recommendations for changes to the desired per-
19 formance characteristics as needed. The results of each
20 review shall be provided to Congress within 30 days after
21 completion of the review.



1 **TITLE III—OTHER NASA AERO-**
2 **NAUTICS RESEARCH AND DE-**
3 **VELOPMENT ACTIVITIES**

4 **SEC. 301. FUNDAMENTAL RESEARCH AND TECHNOLOGY**
5 **BASE PROGRAM.**

6 (a) OBJECTIVE.—In order to ensure that the Nation
7 maintains needed capabilities in fundamental areas of
8 aeronautical research, the NASA Administrator shall es-
9 tablish a program of long-term fundamental research in
10 aeronautical sciences and technologies that is not tied to
11 specific development projects.

12 (b) ASSESSMENT.—The NASA Administrator shall
13 enter into an arrangement with the National Research
14 Council for an assessment of the Nation's future require-
15 ments for fundamental aeronautics research and whether
16 the Nation will have a skilled research workforce and re-
17 search facilities commensurate with those requirements.
18 The assessment shall include an identification of any pro-
19 jected gaps, and recommendations for what steps should
20 be taken by the Federal Government to eliminate those
21 gaps.

22 (c) REPORT.—The NASA Administrator shall trans-
23 mit the assessment, along with NASA's response to the
24 assessment, to Congress not later than 2 years after the
25 date of enactment of this Act.



1 **SEC. 302. AIRSPACE SYSTEMS RESEARCH.**

2 (a) OBJECTIVE.—The Airspace Systems Research
3 program shall pursue research and development to enable
4 revolutionary improvements to and modernization of the
5 National Airspace System, as well as to enable the intro-
6 duction of new systems for vehicles that can take advan-
7 tage of an improved, modern air transportation system.

8 (b) ALIGNMENT.—Not later than 2 years after the
9 date of enactment of this Act, the NASA Administrator
10 shall align the projects of the Airspace Systems Research
11 program so that they directly support the objectives of the
12 Joint Planning and Development Office’s Next Generation
13 Air Transportation System Integrated Plan.

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

15 (a) OBJECTIVE.—The Aviation Safety and Security
16 Research program shall pursue research and development
17 activities that directly address the safety and security
18 needs of the National Airspace System and the aircraft
19 that fly in it. The program shall develop prevention, inter-
20 vention, and mitigation technologies aimed at causal, con-
21 tributory, or circumstantial factors of aviation accidents.

22 (b) PLAN.—Not later than 1 year after the date of
23 enactment of this Act, the NASA Administrator shall
24 transmit to Congress a 5-year prioritized plan for the re-
25 search to be conducted within the Aviation Safety and Se-
26 curity Research program. The plan shall be aligned with



1 the objectives of the Joint Planning and Development Of-
2 fice's Next Generation Air Transportation System Inte-
3 grated Plan.

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

5 (a) OBJECTIVE.—The NASA Administrator shall es-
6 tablish a zero-emissions aircraft research program whose
7 objective shall be to develop and test concepts to enable
8 a hydrogen fuel cell-powered aircraft that would have no
9 hydrocarbon or nitrogen oxide emissions into the environ-
10 ment.

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

16 **SEC. 305. MARS AIRCRAFT RESEARCH.**

17 (a) OBJECTIVE.—The NASA Administrator shall es-
18 tablish a Mars Aircraft project whose objective shall be
19 to develop and test concepts for an uncrewed aircraft that
20 could operate for sustained periods in the atmosphere of
21 Mars.

22 (b) APPROACH.—The NASA Administrator shall es-
23 tablish a program of competitively awarded grants avail-
24 able to teams of researchers that may include the partici-



1 pation of individuals from universities, industry, and gov-
2 ernment for the conduct of this research.

3 **SEC. 306. HYPERSONICS RESEARCH.**

4 (a) OBJECTIVE.—The NASA Administrator shall es-
5 tablish a hypersonics research program whose objective
6 shall be to explore the science and technology of
7 hypersonic flight using air-breathing propulsion concepts,
8 through a mix of theoretical work, basic and applied re-
9 search, and development of flight research demonstration
10 vehicles.

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

16 **SEC. 307. NASA AERONAUTICS SCHOLARSHIPS.**

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



1 (b) IMPLEMENTATION.—Not later than 180 days
2 after the date of enactment of this Act, the NASA Admin-
3 istrator shall publish regulations governing the scholarship
4 program under this section.

5 (c) COOPERATIVE TRAINING OPPORTUNITIES.—Stu-
6 dents who have been awarded a scholarship under this sec-
7 tion shall have the opportunity for paid employment at
8 one of the NASA Centers engaged in aeronautics research
9 and development during the summer prior to the first year
10 of the student’s Masters program, and between the first
11 and second year, if applicable.

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

13 The NASA Administrator shall establish a policy of
14 charging users of NASA’s aeronautical test facilities for
15 the costs associated with their tests, but shall not seek
16 to recover the full costs of the operation of those facilities
17 from the users. The NASA Administrator shall establish
18 a core funding account that shall be used to maintain the
19 operation and viability of NASA’s aeronautical test facili-
20 ties during periods of low utilization. The NASA Adminis-
21 trator shall not close or mothball any aeronautical test fa-
22 cilities identified in the 2003 independent assessment by
23 the RAND Corporation, entitled “Wind Tunnel and Pro-
24 pulsion Test Facilities: An Assessment of NASA’s Capa-
25 bilities to Serve National Needs” as being part of the min-



1 imum set of those facilities necessary to retain and man-
2 age to serve national needs until such time as the Office
3 of Science and Technology Policy of the Executive Office
4 of the President has commissioned and received the results
5 of an independent review of the Nation's long term stra-
6 tegic needs for aeronautical test facilities and transmitted
7 the results of that review to Congress.

8 **SEC. 309. AVIATION WEATHER RESEARCH.**

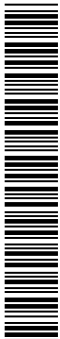
9 The NASA Administrator shall carry out a program
10 of collaborative research with the National Oceanic and
11 Atmospheric Administration on convective weather events,
12 with the goal of significantly improving the reliability of
13 2-hour to 6-hour aviation weather forecasts.

14 **SEC. 310. ASSESSMENT OF WAKE TURBULENCE RESEARCH**
15 **AND DEVELOPMENT PROGRAM.**

16 (a) ASSESSMENT.—The NASA Administrator shall
17 enter into an arrangement with the National Research
18 Council for an assessment of Federal wake turbulence re-
19 search and development programs. The assessment shall
20 address at least the following questions:

21 (1) Are the Federal research and development
22 goals and objectives well defined?

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



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

6 (b) REPORT.—A report containing the results of the
7 assessment conducted pursuant to subsection (a) shall be
8 provided to Congress not later than 1 year after the date
9 of enactment of this Act.

10 **SEC. 311. UNIVERSITY-BASED CENTERS FOR RESEARCH ON**
11 **AVIATION TRAINING.**

12 (a) IN GENERAL.—The NASA Administrator shall
13 award grants to institutions of higher education (or con-
14 sortia thereof) to establish one or more Centers for Re-
15 search on Aviation Training.

16 (b) PURPOSE.—The purpose of the Centers shall be
17 to investigate the impact of new technologies and proce-
18 dures, particularly those related to the aircraft flight deck
19 and to the air traffic management functions, on training
20 requirements for pilots and air traffic controllers.

21 (c) APPLICATION.—An institution of higher edu-
22 cation (or a consortium of such institutions) seeking fund-
23 ing under this section shall submit an application to the
24 NASA Administrator at such time, in such manner, and
25 containing such information as the NASA Administrator



1 may require, including, at a minimum, a 5-year research
2 plan.

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

6 (1) satisfactory performance in meeting the
7 goals of the research plan proposed by the Center in
8 its application under subsection (c); and

9 (2) other requirements as specified by the
10 NASA Administrator.

11 **TITLE IV—AUTHORIZATION OF** 12 **APPROPRIATIONS**

13 **SEC. 401. TOTAL AUTHORIZATIONS.**

14 The total amounts authorized to be appropriated for
15 aeronautics research, development, and demonstration ac-
16 tivities at NASA, including the amounts authorized by this
17 Act, are—

18 (1) \$1,057,000,000 for fiscal year 2006;

19 (2) \$1,089,000,000 for fiscal year 2007;

20 (3) \$1,121,000,000 for fiscal year 2008;

21 (4) \$1,155,000,000 for fiscal year 2009; and

22 (5) \$1,190,000,000 for fiscal year 2010.

