

117TH CONGRESS
2D SESSION

S. 4558

To amend title 51, United States Code, to direct the Administrator of the National Aeronautics and Space Administration to establish an initiative to conduct research, development, and demonstration on technologies capable of reducing greenhouse gas emissions and noise emissions from aircraft, and for other purposes.

IN THE SENATE OF THE UNITED STATES

JULY 19, 2022

Mr. CARDIN (for himself, Mrs. FEINSTEIN, Mr. VAN HOLLEN, Ms. WARREN, and Mr. KING) introduced the following bill; which was read twice and referred to the Committee on Commerce, Science, and Transportation

A BILL

To amend title 51, United States Code, to direct the Administrator of the National Aeronautics and Space Administration to establish an initiative to conduct research, development, and demonstration on technologies capable of reducing greenhouse gas emissions and noise emissions from aircraft, 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 “Cleaner, Quieter Air-
5 planes Act”.

1 **SEC. 2. FINDINGS.**

2 Congress makes the following findings:

3 (1) Air travel currently contributes approxi-
4 mately 3 percent to global carbon emissions, but
5 emissions from this sector are expected to triple by
6 2050.

7 (2) A healthy, thriving aviation sector contrib-
8 utes to the quality of life and economic well-being of
9 the United States. In 2016, the Federal Aviation
10 Administration found that civil aviation accounted
11 for 5.2 percent of the United States gross domestic
12 product, generated \$1,800,000,000,000, and sup-
13 ported 10,900,000 jobs.

14 (3) Existing aircraft technologies contribute to
15 noise pollution that has adverse impacts on the qual-
16 ity of life in affected communities. As air traffic vol-
17 umes increase and the adoption of performance-
18 based navigation technology proceeds, the problem of
19 noise pollution is becoming more severe in some
20 areas.

21 (4) The United States has adopted a goal of
22 net-zero greenhouse gas emissions from the United
23 States aviation sector by 2050.

24 (5) Research on technologies to lessen the envi-
25 ronmental and noise impacts of aviation is ongoing,
26 but should accelerate, and should include work on

1 the further maturation and integration of multiple
2 enabling technologies on production aircraft, includ-
3 ing novel integrated systems at the aircraft level.

4 **SEC. 3. NATIONAL AERONAUTICS AND SPACE ADMINISTRA-**
5 **TION INITIATIVE ON REDUCTION OF GREEN-**
6 **HOUSE GAS AND NOISE EMISSIONS FROM**
7 **AIRCRAFT.**

8 (a) INITIATIVE REQUIRED.—Section 40112 of title
9 51, United States Code, is amended—

10 (1) by redesignating subsections (b) through (f)
11 as subsections (c) through (g), respectively; and

12 (2) by inserting after subsection (a) the fol-
13 lowing:

14 “(b) RESEARCH AND DEVELOPMENT INITIATIVE ON
15 REDUCTION OF GREENHOUSE GAS AND NOISE EMIS-
16 SIONS FROM AIRCRAFT.—

17 “(1) IN GENERAL.—The Administrator shall es-
18 tablish an initiative to research, develop, and dem-
19 onstrate new technologies and concepts—

20 “(A) to reduce greenhouse gas emissions
21 from aviation, including carbon dioxide, nitro-
22 gen oxides, other greenhouse gases, water
23 vapor, particulates, black carbon and sulfate
24 aerosols, and increased cloudiness due to con-
25 trail formation;

1 “(B) to reduce noise emissions from air-
2 craft; and

3 “(C) to enable associated aircraft perform-
4 ance characteristics.

5 “(2) GOALS.—The goals of the initiative shall
6 be—

7 “(A) to ensure United States leadership in
8 research and technology innovation leading to
9 substantial reductions in aviation noise and
10 greenhouse gas emissions;

11 “(B) to enhance and expand basic re-
12 search, and the translation of basic research
13 into applications, that may lead to trans-
14 formational advances in reducing aviation noise
15 and greenhouse gas emissions;

16 “(C) to accelerate research and develop-
17 ment that contributes to maturing new tech-
18 nologies for reducing aircraft noise and green-
19 house gas emissions; and

20 “(D) to obtain and disseminate associated
21 testing and performance data that facilitates
22 the incorporation of new technologies into com-
23 mercial aircraft development as soon as prac-
24 ticable.

1 “(3) OBJECTIVES.—The objectives of the initia-
2 tive and goals in paragraph (1) shall include—

3 “(A) a reduction of greenhouse gas emis-
4 sions from new and replacement aircraft to the
5 extent necessary to achieve net-zero greenhouse
6 gas emissions from United States aviation by
7 2050;

8 “(B) noise levels from aircraft throughout
9 all phases of flight that do not exceed ambient
10 noise levels in the absence of flight operations
11 in the vicinity of the flight route; and

12 “(C) demonstration of new technologies
13 and integrated technology suites developed pur-
14 suant to such initiative on new and replacement
15 aircraft.”.

16 (b) TECHNOLOGY FOCUS AREAS.—In carrying out
17 the research and development initiative established under
18 section 40112(b) of title 51, United States Code, the Ad-
19 ministrators of the National Aeronautics and Space Admin-
20 istration (referred to in this Act as the “Administrator”)
21 shall advance research, development, and demonstration
22 projects on promising technologies such as—

23 (1) advanced subsonic propulsion technology,
24 design, and integration;

1 (2) electric and hybrid-electric propulsion, in-
2 cluding battery electric and hydrogen fuel cell elec-
3 tric systems;

4 (3) direct burn of liquid hydrogen through ad-
5 vanced turbofan optimization for burning liquid hy-
6 drogen and minimizing associated water vapor emis-
7 sions;

8 (4) airframe concepts and configurations that
9 simultaneously reduce noise and greenhouse gas
10 emissions;

11 (5) analysis of technology options, including
12 cost-benefit analysis of greenhouse gas and noise
13 emissions reduction technologies;

14 (6) analytical tools for system-level and system-
15 of-systems-level modeling and integration;

16 (7) airspace operations improvements;

17 (8) noise emissions reduction; and

18 (9) any other effort, as determined by the Ad-
19 ministrator, that contributes to a sustainable future
20 for aviation.

21 (c) IMPLEMENTATION.—In implementing the initia-
22 tive established under section 40112(b) of title 51, United
23 States Code, the Administrator shall, to the extent prac-
24 ticable—

1 (1) ensure that testing and performance data
2 integrates the results of community acceptance sur-
3 veys conducted by the Federal Aviation Administra-
4 tion and other relevant studies, including studies on
5 the impacts of new noise effects from novel propul-
6 sion systems and from airspace operations changes;

7 (2) provide testing and performance data on the
8 technologies described in subsection (b) of this sec-
9 tion to the Administrator of the Federal Aviation
10 Administration to facilitate the work of the Federal
11 Aviation Administration in identifying new require-
12 ments for policy, infrastructure, and administrative
13 capacity necessary to enable the safe integration of
14 such technologies on aircraft;

15 (3) pursue partnerships with organizations, cur-
16 rent commercial production aircraft providers, aca-
17 demic institutions, small businesses, and new en-
18 trants, including partnerships to advance research
19 and development activities related to both regional
20 aircraft and aircraft designed to accommodate more
21 than 125 passengers;

22 (4) include universities, academic institutions,
23 and other research organizations in the partnerships
24 under paragraph (3);

25 (5) expand basic research;

1 (6) ensure equity in research sponsorship and
2 partnership opportunities with underrepresented stu-
3 dents, faculty, and minority-serving institutions;

4 (7) continue to coordinate with the Department
5 of Energy on battery technology research;

6 (8) make available the research and develop-
7 ment carried out under the initiative established
8 under subsection (b) of section 40112 of title 51,
9 United States Code, to help enable an industry-wide
10 shift toward aircraft concepts that reduce green-
11 house gas emissions and aircraft noise to achieve the
12 goals and objectives under paragraphs (2) and (3) of
13 such subsection; and

14 (9) continue to support research, development,
15 and demonstration of aircraft concepts, including
16 systems architecture, materials and components, in-
17 tegration of systems and airframe structures, human
18 factors, airspace planning and operations, and the
19 integration of related advanced technologies and con-
20 cepts, with the goal of carrying out test flights with
21 integrated subsystems by 2025.

22 (d) ANNUAL REPORT.—Not later than 1 year after
23 the date of the enactment of this Act, and annually there-
24 after, the Administrator shall submit a report to the Com-
25 mittee on Commerce, Science, and Transportation of the

1 Senate and the Committee on Science, Space, and Tech-
2 nology of the House of Representatives on the progress
3 of the efforts carried out under the initiative established
4 under subsection (b) of section 40112 of title 51, United
5 States Code, including—

6 (1) measured progress toward net-zero green-
7 house gas emissions and reduced noise emissions
8 from United States aviation;

9 (2) an updated, anticipated timeframe for read-
10 iness of technologies and aircraft to be adopted by
11 industry with the emissions reduction levels directed
12 under such subsection; and

13 (3) an identification of fundamental aeronautics
14 research activities contributing to achieving the goals
15 and objectives of such initiative, as described in
16 paragraphs (2) and (3) of that subsection, and a de-
17 scription of any obstacles to achieving such goals
18 and objectives.

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