

**AMENDMENT IN THE NATURE OF A SUBSTITUTE  
TO H.R. 3559  
OFFERED BY MR. LUCAS OF OKLAHOMA**

Strike all after the enacting clause and insert the following:

**1 SECTION 1. SHORT TITLE; TABLE OF CONTENTS.**

2 (a) SHORT TITLE.—This Act may be cited as the  
3 “FAA Research and Development Act of 2023”.

4 (b) TABLE OF CONTENTS.—The table of contents for  
5 this Act is as follows:

- Sec. 1. Short title; table of contents.
- Sec. 2. Definitions.
- Sec. 3. Authorization of appropriations.

**TITLE I —FAA RESEARCH AND DEVELOPMENT ORGANIZATION**

Sec. 101. Report on implementation; funding for safety research and development.

**TITLE II —FAA RESEARCH AND DEVELOPMENT ACTIVITIES**

- Sec. 201. Aviation fuel research, development, and usage.
- Sec. 202. Continuous lower energy, emission, and noise (CLEEN).
- Sec. 203. Strategy on hydrogen aviation research and development.
- Sec. 204. Air traffic surveillance over oceans and other remote locations.
- Sec. 205. Utilization of space-based assets to improve air traffic control and aviation safety.
- Sec. 206. Aviation weather technology review.
- Sec. 207. Air traffic surface operations safety.
- Sec. 208. Airport and airfield pavement technology research program.
- Sec. 209. Technology review of artificial intelligence and machine learning technologies.
- Sec. 210. Research plan for commercial supersonic research.
- Sec. 211. Electromagnetic spectrum research and development.
- Sec. 212. Aviation structures, materials, and advanced manufacturing research and development.
- Sec. 213. Research plan on the remote tower program.
- Sec. 214. Air traffic control training.

Sec. 215. Report on aviation cybersecurity directives.

Sec. 216. Rule of construction regarding collaborations.

1 **SEC. 2. DEFINITIONS.**

2 In this Act:

3 (1) ADMINISTRATOR.—The term “Adminis-  
4 trator” means the Administrator of the Federal  
5 Aviation Administration.

6 (2) APPROPRIATE COMMITTEES OF CON-  
7 GRESS.—The term “appropriate committees of Con-  
8 gress” means the Committee on Science, Space, and  
9 Technology of the House of Representatives and the  
10 Committee on Commerce, Science, and Transpor-  
11 tation of the Senate.

12 (3) FAA.—The term “FAA” means the Fed-  
13 eral Aviation Administration.

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

16 (5) SECRETARY.—The term “Secretary” means  
17 the Secretary of Transportation.

18 **SEC. 3. AUTHORIZATION OF APPROPRIATIONS.**

19 Subsection (a) of section 48102 of title 49, United  
20 States Code, is amended—

21 (1) in paragraph (14), by striking “and”;

22 (2) in paragraph (15) by striking the period at  
23 the end and inserting a semicolon; and

1           (3) by adding at the end the following new  
2 paragraphs:

3           “(16) \$255,130,000; for fiscal year 2024;

4           “(17) \$261,000,000 for fiscal year 2025;

5           “(18) \$267,000,000 for fiscal year 2026;

6           “(19) \$273,000,000 for fiscal year 2027; and

7           “(20) \$279,000,000 for fiscal year 2028.”.

8           **TITLE I —FAA RESEARCH AND**  
9           **DEVELOPMENT ORGANIZATION**

10          **SEC. 101. REPORT ON IMPLEMENTATION; FUNDING FOR**  
11                                   **SAFETY RESEARCH AND DEVELOPMENT.**

12           Not later than one year after the date of the enact-  
13 ment of this Act, the Comptroller General of the United  
14 States shall submit to the appropriate committees of Con-  
15 gress a report on the allocation of funding pursuant to  
16 section 48102 of title 49, United States Code, to the Sec-  
17 retary of Transportation to conduct civil aviation research  
18 and development and to assess the implementation of sec-  
19 tion 48102(b)(2) of such title.

20          **TITLE II —FAA RESEARCH AND**  
21          **DEVELOPMENT ACTIVITIES**

22          **SEC. 201. AVIATION FUEL RESEARCH, DEVELOPMENT, AND**  
23                                   **USAGE.**

24           (a) ROADMAP.—Not later than nine months after the  
25 date of the enactment of this Act, the Secretary of Trans-

1 portation shall coordinate with the Administrator of  
2 NASA, the Secretary of Energy, and the Administrator  
3 of the Environmental Protection Agency, and consult rel-  
4 evant stakeholders, including those in industry and aca-  
5 demia, to prepare and submit to the appropriate commit-  
6 tees of Congress a coordinated research and development  
7 roadmap to safely eliminate the use of leaded aviation fuel  
8 in existing and future certified piston-engine aircraft.  
9 Such roadmap shall—

10           (1) identify activities to accelerate the develop-  
11           ment, testing, and certification of safe and lead-free  
12           fuel for use in general aviation aircraft, including  
13           requisite airport refueling infrastructure; and

14           (2) consider the feasibility of widespread use of  
15           such safe and lead-free aviation fuel by not later  
16           than 2028.

17           (b) PARTNERSHIP WITH PRIVATE INDUSTRY.—The  
18 Administrator shall coordinate with industry regarding re-  
19 search programs for mass production and distribution of  
20 unleaded aviation gasoline for market viability, and define  
21 criteria to explore incentive programs to reduce lead emis-  
22 sions for communities in need.

1 **SEC. 202. CONTINUOUS LOWER ENERGY, EMISSION, AND**  
2 **NOISE (CLEEN).**

3 The Administrator shall consider expanding the  
4 CLEEN program under section 47511 of title 49, United  
5 States Code, and broadening eligibility for the CLEEN  
6 program to new entrants to the aviation system.

7 **SEC. 203. STRATEGY ON HYDROGEN AVIATION RESEARCH**  
8 **AND DEVELOPMENT.**

9 (a) IN GENERAL.—The Administrator, in consulta-  
10 tion with the Administrator of NASA and the heads of  
11 other relevant Federal agencies, shall lead the develop-  
12 ment of a research and development strategy on the safe  
13 use of hydrogen as part of a sustainable future for avia-  
14 tion. Such strategy shall consider the following:

15 (1) The feasibility, opportunities, challenges,  
16 and pathways toward the potential uses of hydrogen  
17 in aviation.

18 (2) The use of hydrogen in addition to research  
19 and development efforts, including electrification,  
20 operational efficiencies and other alternatives to tra-  
21 ditional aviation fuel.

22 (b) TRANSMITTAL.—Not later than one year after the  
23 date of the enactment of the Act, the Administrator shall  
24 transmit to the appropriate committees of Congress the  
25 research and development strategy required under sub-  
26 section (a).

1           (c) RESEARCH AND DEVELOPMENT.—Based on the  
2 results of the research and development strategy under  
3 subsection (a), the Administrator, in coordination with the  
4 Administrator of NASA, may conduct research and devel-  
5 opment activities into the following:

6           (1) The qualification of hydrogen aviation fuel.

7           (2) The safe transition to such fuel for aircraft.

8           (3) The advancement of certification efforts for  
9 such fuel.

10 **SEC. 204. AIR TRAFFIC SURVEILLANCE OVER OCEANS AND**  
11 **OTHER REMOTE LOCATIONS.**

12           (a) AIR TRAFFIC SURVEILLANCE OVER OCEANS.—  
13 Subject to the availability of appropriations for such pur-  
14 pose, the Administrator, in consultation with the Adminis-  
15 trator of NASA and the heads of other relevant Federal  
16 agencies, shall carry out research, development, dem-  
17 onstration, and testing on civilian air traffic surveillance  
18 over oceans and other remote locations.

19           (b) REQUIREMENTS.—In carrying out the research,  
20 development, demonstration, and testing under subsection  
21 (a), the Administrator shall—

22           (1) consider the need for international inter-  
23 operability of technologies, data, operations, and air  
24 traffic control systems;

1           (2) examine the status of using air traffic sur-  
2           veillance technologies, including space-based Auto-  
3           matic Dependent Surveillance-Broadcast, to facili-  
4           tate the implementation of minimal separation  
5           standards over United States-controlled oceanic air-  
6           space;

7           (3) identify mitigating approaches to reducing  
8           any operational challenges, associated costs, or work-  
9           load impacts; and

10          (4) use testing, data collection, evaluation, and  
11          analysis on the use of air traffic surveillance tech-  
12          nologies, including space-based Automatic Depend-  
13          ent Surveillance-Broadcast, to support the activities  
14          described in paragraphs (1) through (3).

15          (c) PILOT PROGRAM.—The Administrator may carry  
16          out a pilot program to test and evaluate air traffic surveil-  
17          lance equipment over United States-controlled oceanic air-  
18          space and other remote locations.

19          (d) REPORT.—Not later than one year after the date  
20          of the enactment of this Act, the Administrator shall sub-  
21          mit to the appropriate committees of Congress a report  
22          on the activities carried out under this section.

1 **SEC. 205. UTILIZATION OF SPACE-BASED ASSETS TO IM-**  
2 **PROVE AIR TRAFFIC CONTROL AND AVIA-**  
3 **TION SAFETY.**

4 (a) IN GENERAL.—Subject to the availability of ap-  
5 propriations for such purpose, the Administrator, in co-  
6 ordination with the Administrator of NASA, and in con-  
7 sultation with industry stakeholders, shall carry out re-  
8 search, development, and testing of the use of air traffic  
9 Space-Based Automatic Dependent Surveillance-Broad-  
10 cast (ADS-B) data.

11 (b) RESEARCH ACTIVITIES.—In carrying out the re-  
12 search, development, and testing under subsection (a) the  
13 Administrator shall focus on the following:

14 (1) Monitoring and automatically reporting air  
15 turbulence events.

16 (2) Providing space-based multilateration sur-  
17 veillance.

18 (3) Identifying global positioning system (GPS)  
19 and global navigation satellite system (GNSS) dis-  
20 ruptions affecting air traffic services and assessing  
21 the impact of such events on the safety of air traffic  
22 and the National Airspace System.

23 (4) Evaluating the feasibility of implementing  
24 and using aviation safety technologies and systems  
25 using space-based Automatic Dependent Surveil-  
26 lance-Broadcast data.



1 (c) REPORT.—Not later than 180 days after the date  
2 of the enactment of this Act, the Administrator shall pro-  
3 vide to the appropriate committees of Congress a report  
4 on the research and development under subsection (a) and  
5 the activities researched pursuant to subsection (b).

6 **SEC. 206. AVIATION WEATHER TECHNOLOGY REVIEW.**

7 (a) REVIEW.—The Administrator, in consultation  
8 with the Administrator of the National Oceanic and At-  
9 mospheric Administration, shall conduct a review of cur-  
10 rent and planned research, modeling, and technology capa-  
11 bilities that have the potential to more accurately detect  
12 and predict weather impacts to aviation, inform how ad-  
13 vanced predictive models can enhance aviation operations,  
14 and increase national airspace system safety and effi-  
15 ciency.

16 (b) REPORT.—Not later than one year after the date  
17 of the enactment of this Act, the Administrator shall sub-  
18 mit to the appropriate committees of Congress a report  
19 containing the results of the review conducted under sub-  
20 section (a).

21 **SEC. 207. AIR TRAFFIC SURFACE OPERATIONS SAFETY.**

22 (a) RESEARCH.—Subject to the availability of appro-  
23 priations for such purpose, the Administrator, in consulta-  
24 tion with the Administrator of NASA and the heads of  
25 other appropriate Federal agencies, shall continue to carry

1 out research on technologies and operations to enhance air  
2 traffic surface operations safety.

3 (b) REQUIREMENTS.—The research program under  
4 subsection (a) shall examine the following:

5 (1) The safety of current air traffic control op-  
6 erations related to air traffic surface operations.

7 (2) Emerging in-cockpit technologies to enhance  
8 ground situational awareness.

9 (3) Emerging technologies to enhance air traffic  
10 control situational awareness.

11 (4) Air traffic surface operations safety for di-  
12 verse advanced air mobility operations.

13 (5) Safety and operational data needed to in-  
14 form current and future safety programs on ad-  
15 vanced air mobility vehicles.

16 (c) REPORT.—Not later than 18 months after the  
17 date of the enactment of this Act, the Administrator shall  
18 submit to the appropriate committees of Congress a report  
19 on the research carried out under this section, including  
20 regarding the transition into operational use of such re-  
21 search.

1 **SEC. 208. AIRPORT AND AIRFIELD PAVEMENT TECH-**  
2 **NOLOGY RESEARCH PROGRAM.**

3 Section 744 of the FAA Reauthorization Act of 2018  
4 (Public Law 115–254; 49 U.S.C. 44505 note) is amend-  
5 ed—

6 (1) in paragraph (3), by striking “and”;

7 (2) in paragraph (4), by striking “durable air-  
8 field pavements.” and inserting “resilient and sus-  
9 tainable airfield pavements; and”; and

10 (3) by adding at the end the following new  
11 paragraph:

12 “(5) develop sustainability and resiliency guide-  
13 lines to improve long-term pavement performance  
14 and reduce carbon emissions.”.

15 **SEC. 209. TECHNOLOGY REVIEW OF ARTIFICIAL INTEL-**  
16 **LIGENCE AND MACHINE LEARNING TECH-**  
17 **NOLOGIES.**

18 (a) REVIEW.—The Administrator shall conduct a re-  
19 view of current and planned artificial intelligence and ma-  
20 chine learning technologies to improve airport efficiency  
21 and safety.

22 (b) SUMMARIES.—The review conducted under sub-  
23 section (a) shall include examination of the application of  
24 artificial intelligence and machine learning technologies to  
25 the following:

26 (1) Jet bridges.

1           (2) Airport service vehicles on airport move-  
2           ment areas.

3           (3) Aircraft taxi.

4           (4) Any other areas the Administrator deter-  
5           mines necessary to help improve airport efficiency  
6           and safety.

7           (c) REPORT.—Not later than one year after the date  
8           of the enactment of this Act, the Administrator shall sub-  
9           mit to the appropriate committees of Congress a report  
10          containing the results of the review conducted under sub-  
11          section (a).

12       **SEC. 210. RESEARCH PLAN FOR COMMERCIAL SUPERSONIC**  
13                               **RESEARCH.**

14          Not later than one year after the date of the enact-  
15          ment of this Act, the Administrator, in consultation with  
16          the Administrator of NASA and industry, shall submit to  
17          the appropriate committees of Congress a comprehensive  
18          research plan to build on existing research and develop-  
19          ment activities and identify any further research and de-  
20          velopment needed to inform the development of Federal  
21          and international policies, regulations, standards, and rec-  
22          ommended practices relating to the certification and safe  
23          and efficient operation of civil supersonic aircraft and su-  
24          peronic overland flight.

1 **SEC. 211. ELECTROMAGNETIC SPECTRUM RESEARCH AND**  
2 **DEVELOPMENT.**

3 (a) IN GENERAL.—The Administrator shall conduct  
4 research, engineering, and development related to the ef-  
5 fective and efficient use and management of radio fre-  
6 quency spectrum in the civil aviation domain, including for  
7 aircraft, unmanned aircraft systems, and advanced air  
8 mobility. Such research, engineering, and development  
9 shall, at a minimum, address the following:

10 (1) How reallocation or repurposing of radio  
11 frequency spectrum adjacent to spectrum allocated  
12 for communication, navigation, and surveillance may  
13 impact the safety of civil aviation.

14 (2) The effectiveness of measures to identify  
15 risks, protect, and mitigate against spectrum inter-  
16 ference in frequency bands used in civil and commer-  
17 cial aviation operations to ensure public safety.

18 (3) The implications, including risks, of new or  
19 emerging technologies or other factors on the envi-  
20 ronment for radio frequency spectrum interference.

21 (4) How various new or emerging technologies  
22 may enable improvements in the prevention of, miti-  
23 gation of, or resilience to interference.

24 (b) REPORT.—Not later than one year after the date  
25 of the enactment of this Act, the Administrator shall sub-  
26 mit to the appropriate committees of Congress a report

1 containing the results of the research, engineering, and de-  
2 velopment conducted under subsection (a).

3 **SEC. 212. AVIATION STRUCTURES, MATERIALS, AND AD-**  
4 **VANCED MANUFACTURING RESEARCH AND**  
5 **DEVELOPMENT.**

6 (a) IN GENERAL.—Using the amounts available  
7 under section 48102(a) of title 49, United States Code,  
8 the Administrator, in coordination with the Director of the  
9 National Institute of Standards and Technology, shall  
10 carry out a research and development program for advanc-  
11 ing aviation structures, materials, and manufacturing for  
12 the safe use in and on aircraft.

13 (b) INCLUSION.—The program under subsection (a)  
14 shall, to the extent practicable, include research and devel-  
15 opment relating to the following:

16 (1) Metallic and non-metallic based additive  
17 materials and processes, composites, and other ad-  
18 vanced materials.

19 (2) Process development for the development of  
20 design and manufacturing standards for aviation  
21 structures, materials, and additive manufacturing.

22 (3) Improving certification efficiency of aviation  
23 structures, materials, and additively manufactured  
24 aviation products and components.

1           (4) Evaluating long-term material and struc-  
2           tural behavior and associated maintenance, including  
3           support for fatigue life determination, structural  
4           changes related to fatigue, thermal, corrosive envi-  
5           ronments, and expected maintenance of such mate-  
6           rials, including recommended repair techniques.

7           (5) Partnering with commercial entities to ma-  
8           ture and certify, as appropriate, the following capa-  
9           bilities for use in aircraft manufacturing:

10           (A) Additive manufacturing, including  
11           large-scale additive manufacturing.

12           (B) Aviation structures.

13           (C) Advanced materials capabilities, in-  
14           cluding the development and qualification of  
15           new material chemistries.

16           (c) REPORT.—Not later than 180 days after the date  
17           of the enactment of this Act, the Administrator shall pro-  
18           vide to the appropriate committees of Congress a report  
19           on the findings of the research under subsection (a).

20           **SEC. 213. RESEARCH PLAN ON THE REMOTE TOWER PRO-**  
21           **GRAM.**

22           (a) IN GENERAL.—Not later than 180 days after the  
23           date of the enactment of this Act, the Administrator shall  
24           submit to the appropriate committees of Congress a com-  
25           prehensive plan for research, development, testing, and

1 evaluation needed to mature remote tower technology and  
2 provide a strategic roadmap to support standards develop-  
3 ment, validation, and operational certification of such  
4 technology.

5 (b) CONSIDERATIONS.—As part of the plan required  
6 under subsection (a), the Administrator should consider  
7 the use of remote tower technologies for advanced air mo-  
8 bility operations.

9 **SEC. 214. AIR TRAFFIC CONTROL TRAINING.**

10 (a) RESEARCH.—Subject to the availability of appro-  
11 priations for such purpose, the Administrator shall carry  
12 out a research program to evaluate opportunities to mod-  
13 ernize, enhance, and streamline training time to become  
14 a Certified Professional Controller.

15 (b) REQUIREMENTS.—The research under subsection  
16 (a) shall—

17 (1) assess the use of advanced technologies,  
18 such as artificial intelligence, machine learning,  
19 adaptive computer-based simulation, virtual reality,  
20 or augmented reality, to enhance controller knowl-  
21 edge retention, improve performance, and improve  
22 the effectiveness of training time;

23 (2) develop a timeline to deploy proven ad-  
24 vanced technologies and associated processes for ac-



1       creditation in training programs and training facili-  
2       ties within the national airspace system; and

3             (3) include collaboration with labor organiza-  
4       tions and other stakeholders.

5       (c) REPORT.—Not later than one year after the date  
6 of the enactment of this Act, the Administrator shall sub-  
7 mit to the appropriate committees of Congress a report  
8 on the findings of the research under subsection (a).

9       **SEC. 215. REPORT ON AVIATION CYBERSECURITY DIREC-**  
10            **TIVES.**

11       Not later than 180 days after the date of enactment  
12 of this Act, the Administrator shall submit to the appro-  
13 priate committees of Congress a report on the status of  
14 the FAA’s implementation of section 2111 of the FAA Ex-  
15 tension, Safety, and Security Act of 2016 (Public Law  
16 114–190; 49 U.S.C. 44903 note; relating to the develop-  
17 ment of a comprehensive and strategic aviation cybersecu-  
18 rity framework and establishment of a research and devel-  
19 opment plan to mitigate cybersecurity risks in the Na-  
20 tional Airspace System). The report, at minimum, shall  
21 include the following:

22             (1) A description of the FAA’s progress in de-  
23       veloping, implementing, and updating such frame-  
24       work.

1           (2) A description of prioritized research and de-  
2           velopment activities for the most needed improve-  
3           ments, with target dates, to safeguard the National  
4           Airspace System.

5           (3) An explanation for any delays or challenges  
6           in so implementing such section.

7   **SEC. 216. RULE OF CONSTRUCTION REGARDING COLLABO-**  
8                           **RATIONS.**

9           Nothing in this Act may be construed as modifying  
10          or limiting existing collaborations, or limiting potential en-  
11          gagement on future collaborations, between the Adminis-  
12          trator, stakeholders, and labor organizations, including  
13          the exclusive bargaining representative of air traffic con-  
14          trollers certified under section 7111 of title 5, United  
15          States Code, pertaining to Federal Aviation Administra-  
16          tion research, development, demonstration, and testing ac-  
17          tivities.

