REDAC
NAS Operations Subcommittee

R,E&D Budget Status

Presented to: NAS Operations Subcommittee

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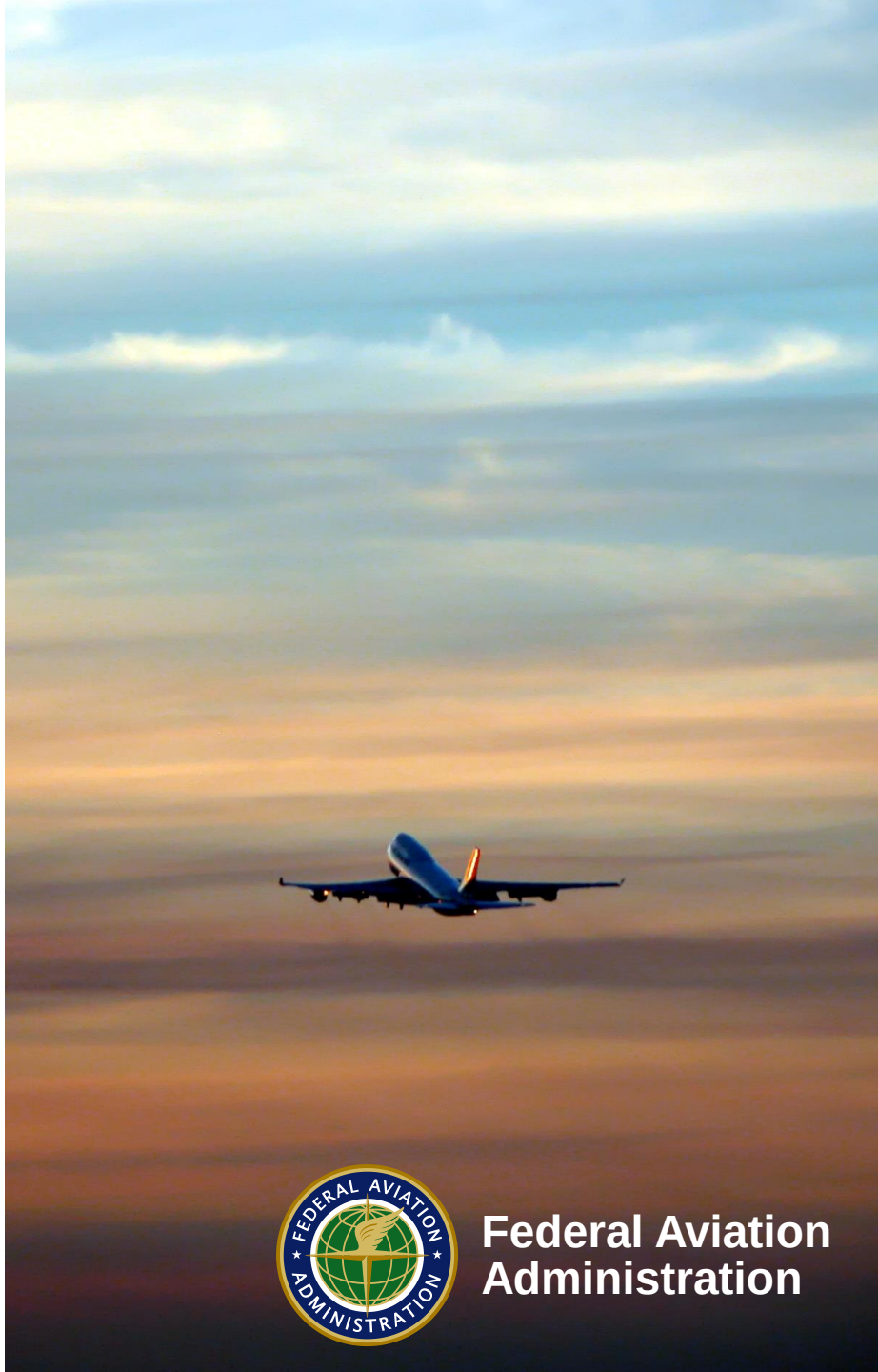

R,ED FY 2023 Budget

- **FY 23 R,E&D Request $260.5M**
  - House Appropriation Committee
    - R,E&D funded at $260.5M
  - Senate Appropriation Committee
    - R,E&D funded at $266.1M
  - Enacted – Signed December 29, 2022
    - R,E&D funded at $255M

FAA FY 2023 Budget

Appropriations	FY 2020 Enacted	FY2021 Enacted	FY2022 Enacted	FY 2023 Request	FY 2023 House Mark	FY 2023 Senate Mark	FY 2023 Enacted	FY 2023 Enacted Delta w/Request	FY 2023 Enacted Delta w/FY 2022
Operations	$ 10,630,000,000	$ 11,001,500,000	$ 11,414,100,000	$ 11,933,821,000	$ 11,870,000,000	$ 11,900,821,000	$ 11,915,000,000	$ (18,821,000)	$ 500,900,000
Facilities & Equipment	$ 3,045,000,000	$ 3,015,000,000	$ 2,892,888,000	$ 3,015,000,000	$ 2,900,000,000	$ 3,060,000,000	$ 2,945,000,000	$ (70,000,000)	$ 52,112,000
Research, Engineering & Development	$ 192,665,000	$ 198,000,000	$ 248,500,000	$ 260,500,000	$ 260,500,000	$ 266,100,000	$ 255,000,000	$ (5,500,000)	$ 6,500,000
Grants-In-aid for Airports	$ 3,750,000,000	$ 3,750,000,000	$ 3,350,000,000	$ 3,350,000,000	$ 3,350,000,000	$ 3,350,000,000	$ 3,350,000,000	$ -	$ -
Total w/o Supplementals	**$ 17,617,665,000**	**$17,964,500,000**	**$ 17,905,488,000**	**$ 18,559,321,000**	**$ 18,380,500,000**	**$ 18,576,921,000**	**$ 18,465,000,000**	**$ (94,321,000)**	**$ 559,512,000**

	FY2023 President's Budget
	FY2023 House Mark
	FY2023 Senate Mark
	FY2023 Enacted

FY 20, 21, 22 & 23 R,E&D Enacted

BLI Name	FY2020 Enacted $192.6M ($000s)	FY2021 Enacted $198M ($000s)	FY 2022 Enacted $248.5M ($000s)	FY2023 President's Budget $260.5M ($000s)	FY2023 House Mark $260.5M ($000s)	FY2023 Request/ FY2023 House +/- ($000s)	FY2023 Senate Mark $266.1M ($000s)	FY2023 Request/ FY2023 Senate +/- ($000s)	FY2023 Enacted $255M ($000s)	FY2023 Enacted Delta with Request +/- ($000s)	FY2023 Enacted Directed Item ($000s)
Research, Engineering & Development											
Fire Research and Safety	7,200	7,136	7,136	7,367	7,367	-	7,136	(231)	7,136	(231)	
Propulsion and Fuel Systems	2,100	4,215	3,000	5,471	5,471	-	3,500	(1,971)	3,000	(2,471)	
Advanced Materials /Structural Safety	14,720	14,720	14,720	2,886	2,886	-	14,720	11,834	14,720	11,834	12,000
Aircraft Icing	9,000	6,426	2,472	3,353	3,353	-	3,000	(353)	2,472	(881)	
Digital System Safety	-	-	3,689	5,287	5,287	-	3,689	(1,598)	3,689	(1,598)	
Continued Air Worthiness	10,269	11,269	8,829	12,430	10,430	(2,000)	10,800	(1,630)	8,829	(3,601)	
Aircraft Catastrophic Failure Prevention Research	1,565	1,565	-	-	-	-	-	-		0	
Flight deck/Maintenance/System Integration Human Factors	7,300	7,469	14,301	15,292	14,292	(1,000)	15,292	-	14,301	(991)	
System Safety Management/Terminal Area Safety	4,500	5,485	7,000	10,111	10,111	-	10,111	-	9,252	(859)	
Air Traffic Control/Technical Operations Human Factors	5,800	5,685	5,911	5,911	5,911	-	5,911	-	5,911	0	
Aeromedical Research	7,919	10,235	11,000	10,000	8,000	(2,000)	10,000	-	9,000	(1,000)	
Weather Program	12,911	6,236	13,786	16,178	13,786	(2,392)	15,178	(1,000)	13,786	(2,392)	
Unmanned Aircraft Systems Research	24,035	24,035	22,077	14,935	14,935	-	22,077	7,142	22,077	7,142	22,000
Alternative Fuels for General Aviation	1,900	2,524	5,434	12,385	12,385	-	7,500	(4,885)	10,000	(2,385)	
Emerging Technology Accelerator (ETA)	-	-	-	10,000	-	(10,000)	-	(10,000)	-	(10,000)	
Commercial Space Transportation Safety	2,500	5,840	5,708	5,708	5,708	-	5,708	-	4,708	(1,000)	
NextGen Wake Turbulence	5,000	3,698	3,728	3,728	3,728	-	3,728	-	3,728	0	
NextGen - Air Ground Integration Human Factors	5,300	6,000	3,000	-	-	-	-	-	-	0	
NextGen - Weather Technology in the Cockpit	3,144	1,982	2,659	3,028	7,600	4,572	3,028	-	4,000	972	
NextGen - Flight Data Exchange	1,005	1,000	1,000	-	-	-	-	-	-	0	
Information/Cyber Security	2,675	4,769	4,769	5,500	5,500	-	5,500	-	4,769	(731)	
Environment & Energy	18,013	20,303	22,000	21,163	22,163	1,000	22,000	837	21,000	(163)	7,500
NextGen – Environmental Research – Aircraft Technologies and Fuels	29,174	31,465	67,500	73,976	76,976	3,000	70,000	(3,976)	68,000	(5,976)	64,565
Airliner Cabin Environment Research	1,000	-	-	-	-	-	-	-	-	0	
System Planning and Resource Management	12,135	13,022	3,300	4,141	4,130	(11)	4,141	-	4,141	0	
Aviation Workforce Development	-	-	10,000	6,169	15,000	8,831	17,600	11,431	15,000	8,831	15,000
William J. Hughes Technical Center Laboratory Facilities	3,500	2,921	5,481	5,481	5,481	-	5,481	-	5,481	0	
TOTAL RE&D	**192,665**	**198,000**	**248,500**	**260,500**	**260,500**	0	**266,100**	5,600	**255,000**	(5,500)	**121,065**

	FY2023 President's Budget
	FY2023 House Mark
	FY2023 Senate Mark
	FY2023 Enacted

FY 2023 House Language

- ***Aviation climate and noise research*** —The Committee supports the FAA's research to reduce greenhouse gas emissions from aviation and strongly encourages the FAA to coordinate its multiple research activities with other Federal agencies.
- The recommendation provides $22,163,000 for **Environment and Energy** to quantify and characterize the effect of aviation on noise, air quality, and climate to, among other things, support the development of certification procedures, standards, and policies for aircraft.
- The recommendation provides $76,976,000 for **NextGen-Environmental Research-Aircraft Technologies and Fuels**, of which $45,000,000 is to support the Continuous Lower Energy, Emissions, and Noise (CLEEN) program to reduce noise and emissions at its source—the aircraft engine. The Committee is pleased that the CLEEN program added reducing community noise exposure and particulate matter emissions to its goals.
- The recommendation provides $35,500,000 for the Center of Excellence for Alternative Jet Fuels and Environment (ASCENT) to develop technologies to mitigate the environmental impact of aviation. The Committee appreciates and encourages ASCENT to continue its work on the health effects of air pollution surrounding airports, reducing noise and fuel burn of subsonic and supersonic aircraft, and sleep disturbance.

FY 2023 House Language cont.

- The Committee notes that the CLEEN program is an important public-private partnership in the development of alternative and sustainable jet fuels and that ASCENT is evaluating the barriers to scaling production to meet the commercial demand for alternative and sustainable jet fuels. The Committee encourages the FAA to share the combined findings of the CLEEN program and ASCENT with the relevant other Federal agencies to increase the production and use of alternative and sustainable jet fuels in aviation.
- The Committee is encouraged that the FAA and industry stakeholders recently formed the Eliminate Aviation Gasoline Lead Emissions (EAGLE) initiative to eliminate the use of leaded aviation fuel by the end of 2030 without adversely affecting the existing piston-engine fleet. The FAA should provide the House and Senate Committees with updates on EAGLE's objectives and activities as they come into focus.
- ***Aviation professionals*** —The Committee supports increasing the strength and number of aviation professionals who are well-trained and can be relied upon to make air travel safe and efficient. To that end, the Committee provides $10,000,000 for the aviation maintenance technician development program and $5,000,000 for aviation workforce development program in accordance with section 625 of the FAA Reauthorization Act of 2018.

FY 2023 House Language Cont.

- ***Crew complements*** – The presence of two well-trained, qualified pilot in commercial aircraft is another example of safety through redundancy. Funding made available in this Act to study alternative crew complements for flight decks in commercial operations should prioritize the safety effects relative to two-person flights. This direction is not intended to limit the FAA's research and development activities to unmanned aerial vehicles.
- ***Emissions reduction plan*** —The Committee appreciates that DOT updated its U.S. Aviation Greenhouse Gas Emission Reduction Plan, now referred to as the U.S. Aviation Climate Action Plan, in November 2021 in support of achieving net-zero emissions, economy- wide by 2050 and then subsequently released it FY2022–2026 Strategic Plan in April 2022. The key performance indicator for the FAA in the strategic plan is to reduce greenhouse gas emissions from aviation to at or below 2019 levels and the details on how the U.S. could reach this goal are in the climate action plan using, among other things, sustainable aviation fuels, new aircraft technologies, fleet renewal, and operational improvements. Since progress will require coordinated action by the aviation industry and the Federal government, the Committee directs the FAA to brief the House and Senate Committees on Appropriations on the expected timeline, sequence, and effect of actions; the roles and responsibilities of Federal agencies and private industry; and metrics for measuring progress.

FY 2023 House Language Cont.

- ***Liquid oxygen (LOX)/methane research*** —The Committee directs the FAA to continue prioritizing its research on the explosive yield and environmental effects of LOX/methane on public health and safety in partnership with other Federal agencies and the commercial space industry.
- ***Radio altimeters*** —The Committee shares the FAA's safety concern about the potential for interference from 5G C-Band signals on aircraft radio altimeters from transmitters located near airports. The immediate, intermediate, and long-term solutions to safe operations in the national airspace system requires early and continuous cooperation of wireless service providers, altimeter and aircraft manufacturers, airlines, airports, the Federal Communications Commission, the National Telecommunications and Information Administration, and the Departments of Transportation, Commerce, and Defense. The immediate solution of unpowered or low powered transmitters is already giving way to the intermediate solution of retrofitting radio altimeter with filters, which will eventually be replaced by a long-term solution of more robust performance standards for radio altimeters. The Committee directs the FAA to dedicate not less than $5,000,000 towards its own altimeter research (such as designing and conducting flight tests) and to support voluntary forums with industry partners, such as the FAA 5G Roundtable and the RTCA (formerly the Radio Technical Commission for Aeronautics), to not only develop new altimeter performance standards for 5G, but also prepare for future 6G and 7G rollouts.

FY 2023 House Language Cont.

- ***Unmanned aircraft systems (UAS) research*** —The Committee supports the safe integration of UAS into the national airspace system, including the continued development of a low-altitude UAS traffic management system and low altitude authorization and notification capability program. The Committee provides up to $12,400,000 for the Center of Excellence for UAS Research.

FY 2023 Senate Language

- ***Advanced Materials/Structural Safety*** – The Committee recommendation includes a total of $14,720,000 for advanced materials/structural safety. The Committee is aware that the primary challenge in additive manufacturing for aerospace applications is the certification of airworthiness of complex processes used within the additive manufactured components. The Committee recommendation includes $6,000,000 to advance the use of these new additive materials (both metallic and non-metallic based additive processes) in the commercial aviation industry, as well as $4,000,000 to advance the use of fiber reinforced composite materials in commercial aviation industry through the FAA Joint Advanced Materials and Structures Center of Excellence. The Committee is also encouraged by the potential impact that stitched resin composites can have on the aviation industry and includes $2,000,000 for the FAA to continue its work with existing public private partnerships that provide leading-edge research, development, and testing of composite materials and structures.
- ***Safety Systems Management/Terminal Safety*** – The Committee recommendation includes $10,111,000 and encourages the FAA To conduct research on the development, collection, and maintenance of safety critical data for vertical flight operations, infrastructure, and technology concepts using subject matter experts and laboratory facilities at FAA's William J. Hughes Technical Center (WJHTC). This research should include a revised heliport/vertiport facility

FY 2023 Senate Language Cont.

- obstruction policy, development of geospatial data standards, which define a data model for accuracy, standards, and maintenance updates, as well as instrument flight procedure (IFP) development, automation, simulation and flight test data collection and evaluation, and technologies to support safer low-altitude operations.
- **UAS Research** – The Committee recommendation includes $22,077,000 for UAS research. Of this amount: (1) $12,000,000 is directed to support the expanded role of the UAS COE in areas of UAS research, including cybersecurity, agricultural applications, beyond visual line of sight technology, studies of advanced composites and other non-metallic engineering materials not common to manned aircraft but utilized in UAS, the STEM program, and to study appropriate safety standards for UAS to develop and validate certification standards for such systems at the Center; (2) $2,000,000 is for the COE's role in transportation disaster preparedness and response, partnering with institutions that have demonstrated experience in damage assessment, collaboration with State transportation agencies, and applied UAS field testing; and (3) $8,000,000 is to support UAS research activities at the FAA Technical Center and other FAA facilities.

FY 2023 Senate Language Cont.

- ***Alternative Fuels for General Aviation*** – The Committee recommendation includes $7,500,000 and directs the FAA to prioritize funding to the testing and identification of unleaded fuels that can be safely used in piston-engine aircraft fleet. The Committee remains disappointed that despite a decade of work through the piston aviation fuel initiative, leaded fuels continue to be used in piston-engine aircraft. The FAA should continue to work collaboratively with stake holders to find an unleaded fuel that can be used in piston-engine aircraft safely. The FAA is currently evaluating applications for supplemental type certificates that, if approved, would permit the use of proprietary unleaded aviation gas in certain aircraft and aircraft engines, which could help eliminate the health risks of lead emissions. The Committee directs the FAA to prioritize the identification and testing of unleaded replacement fuels that are viable candidates of fleet authorization, including those related to issuance of supplemental type certificates, without compromising safety standards, and directs the FAA to brief the House and Senate Committees on Appropriations with 120 days of enactment of this act on the progress it has made on these pending applications. The Committee is also aware that the Environmental Protection Agency (EPA) is expected to issue an endangerment finding for leaded fuels soon and expects the FAA to move forward expeditiously on any rulemakings triggered by such a finding.

FY 2023 Senate Language Cont.

- ***Environment and Energy*** – The Committee recommendation includes $22,000,000 for environment and energy, of which $7,500,000 shall be for the aviation sustainability center (ASCENT) COE on sustainable aviation fuels (SAFs).

- ***NextGen-Environmental Research-Aircraft Technologies and Fuels*** – The Committee recommendation includes $70,000,000 of which $27,500,000 shall be for the ASCENT COE on SAFs and aviation noise, and $40,000,000 shall be for the continuous lower energy, emissions, and noise program. The Committee continues to direct the FAA to prioritize research related to SAFs and certification of SAFs, which is particularly important for implementation of the international civil aviation organization's carbon offsetting and reduction scheme for international aviation. The Committee is aware of the challenges associated with the SAF supply chain and expects this research to help identify and overcome key barriers to entry. APL and the Office of Airports should work together to identify SAF related projects at airports that can be funded from AIP

FY 2023 Senate Language Cont.

- ***Aviation Workforce Development Programs*** – The Committee recommendation includes $17,600,000 for the Aviation Workforce Development Programs as authorized by section 625 of the FAA Reauthorization Act of 2018. Of the amounts provided, $12,600,000 is for the aircraft pilot workforce and $5,000,000 is for the aviation maintenance workforce. Funds provided for aircraft pilot workforce should be prioritized for applicants that can help increase the number of qualified pilots in commercial service and that demonstrate the ability to leverage private sector investments.

FY 2023 Enacted

- ***Advanced Materials/Structural Safety*** – The agreement includes $14,720,000 for advanced materials/structural safety, of which: (1) $6,000,000 is to advance the use of these new additive materials (both metallic and non-metallic based additive processes) in the commercial aviation industry; (2) $4,000,000 is to advance the use of fiber reinforced composite materials in the commercial aviation industry through the FAA joint advanced materials and structures center of excellence; and (3) $2,000,000 is for the FAA to continue its work with existing public-private partnerships that provide leading-edge research, development, and testing of composite materials and structures.
- ***Aviation Emissions and Noise*** – *The* agreement includes $21,000,000 for **Environment and Energy**, of which $7,500,000 is to conduct research within the aviation sustainability center (ASCENT) center of excellence (COE). The agreement includes $68,000,000 for **NextGen Environmental Research-Aircraft Technologies and Fuels**, of which $26,565,000 is for ASCENT and $38,000,000 is for the continuous lower energy, emissions, and noise (CLEEN) program. The agreement directs the FAA to prioritize research related to sustainable aviation fuels [SAFs] and certification of SAFs and expects this research to help identify and overcome key barriers to entry to the SAF market.

FY 2023 Enacted

- ***Aviation Workforce Development Programs*** - Within amounts for the section 625 program, the agreement provides $10,000,000 for the aviation maintenance workforce and $5,000,000 for the aircraft pilot workforce. Funds provided for aircraft pilot workforce should be prioritized for applicants that can increase the number of pilots across the aviation industry, including commercial service.
- ***UAS Research*** - The agreement includes $22,077,000 for UAS research. Of this amount: (1) $12,000,000 is directed to support the expanded role of the UAS COE in areas of UAS research, including cybersecurity, agricultural applications, beyond visual line of sight technology, studies of advanced composites and other non-metallic engineering materials not common to manned aircraft but utilized in UAS, the STEM program, and to continue efforts with the UAS safety standards for U AS and to develop and validate certification standards for such systems; (2) $2,000,000 for the Center's role in transportation disaster preparedness and response, partnering with institutions that have demonstrated experience in damage assessment, collaboration with state transportation agencies, and applied UAS field testing; and (3) $8,000,000 is to support UAS research activities at the FAA technical center and other FAA facilities.

FY 2023 Enacted

- ***Alternative Fuels for General Aviation*** - The agreement directs the FAA to prioritize funding to the testing and identification of unleaded fuels that can be safely used in piston-engine aircraft fleet. The agreement directs the FAA to prioritize the identification and testing of unleaded replacement fuels that are viable candidates for fleet authorization and to brief the House and Senate Committees on Appropriations within 120 days of enactment of this act on the progress it has made on these pending applications. The FAA is expected to move forward expeditiously on a rulemaking triggered by the Environmental Protection Agency's [EPA's] endangerment finding for lead emissions from aircraft engines that operate on leaded fuel.
- ***Safety Systems Management/Terminal Area Safety*** - The agreement encourages the FAA to conduct research on the development, collection, and maintenance of safety critical data for vertical flight operations, infrastructure, and technology concepts using subject matter experts and laboratory facilities at the FAA' s William J. Hughes technical center. This research should include a revised heliport/vertiport facility obstruction policy, development of geospatial data standards, which define a data model for accuracy, standards, and maintenance updates, as well as instrument flight procedure development, automation, simulation and flight test data collection and evaluation, and technologies to support safer low-altitude operations.

FY 2024 Budget

- **President's Budget Submission – Tentative March 9, 2023**

R,E&D FY 2025 Budget

- **FY 2025 target $?**
- **Deliver to OST June 2023**
- **FY 2025 remaining schedule (tentative)**
  - Submit to OMB mid September
  - Submit President's request to Congress Feb. 2024

Out Year Targets

- **Targets – Awaiting Targets**
  - FY 25 - ?
  - FY 26 - ?
  - FY 27 - ?
  - FY 28 - ?
  - FY 29 - ?
- **Expect targets to change**

FAA Reauthorization

- **Reauthorization expires on September 30, 2023.**