Committee on Transportation and Infrastructure
U.S. House of Representatives
Washington, DC 20515

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March 27, 2023

SUMMARY OF SUBJECT MATTER

TO: Members, Subcommittee on Aviation
FROM: Staff, Subcommittee on Aviation
RE: Aviation Subcommittee Hearing on "*FAA Reauthorization: Harnessing the Evolution of Flight to Deliver for the American People*"

I. PURPOSE

The Subcommittee on Aviation will meet on Thursday, March 30, 2023, at 10:00 a.m. ET in 2167 of the Rayburn House Office Building for a hearing titled, "*FAA Reauthorization: Harnessing the Evolution of Flight to Deliver for the American People*." The hearing will focus on the certification, operations and safe integration of new entrants into the National Airspace System (NAS). This hearing is in advance of Congress acting to reauthorize the Federal Aviation Administration's (FAA) statutory authorities that expire on October 1, 2023. Members will receive testimony from two panels of witnesses. The first panel will include representatives from the unmanned aircraft systems (UAS) sector: Wing; the Alaska Center for UAS Integration at the University of Alaska Fairbanks; the Chula Vista Police Department; and WakeMed Health and Hospitals. The second panel will include representatives of the advanced air mobility (AAM) sector developing manned electric vertical takeoff and landing (eVTOL) and powered-lift aircraft: BETA Technologies; Joby Aviation; Bristow Group Inc. on behalf of the Helicopter Association International (HAI); and an AAM expert and community advocate.

II. BACKGROUND

The primary mission of the FAA is to ensure civil aviation safety.[1] The agency's key mission activities include the development and promulgation of aviation regulations and guidance to ensure safety; certification of aviation products; development and operation of air traffic control and navigation procedures to ensure reasonable access to the NAS; research on new aviation technologies; and implementation of various programs to reduce disruptions to the aviation system and maintain the safety of all aerospace users and the general public.[2] The FAA

[1] FAA, *Mission, available at* https://www.faa.gov/about/mission.
[2] FAA, *What we do*, *available at* https://www.faa.gov/about/mission/activities.

has the responsibility to certify, oversee and regulate the safety and operations of the civil aviation sector, including integrating new entrants like UAS and AAM aircraft into the NAS.[3]

Congress periodically reauthorizes the FAA and Federal civil aviation programs through an FAA reauthorization bill. The FAA was last reauthorized in October 2018 in the *FAA Reauthorization Act of 2018* (*FAARA 2018),* which expires on October 1, 2023.[4] Enactment of the 2018 law followed a series of short-term extensions after the last long-term FAA reauthorization bill expired on September 30, 2015.[5] *FAARA 2018* included a subtitle intended to foster the safe, efficient and timely integration of UAS into the NAS.[6] Since the passage of *FAARA 2018,* Congress also enacted bills focused on the development and future deployment of AAM concepts, including the *Advanced Aviation Infrastructure Modernization (AAIM) Act* (Division Q of P.L. 117-73) and the *Advanced Air Mobility Coordination and Leadership Act* (P.L. 117-203).[7]

Like many other innovations of flight, UAS, also known as drones, and electric vertical takeoff and landing (eVTOL) powered-lift aircraft, commonly referred to as AAM vehicles or air taxis, have the potential to change the way we travel and transport goods and services. In the upcoming FAA reauthorization bill, Congress has an opportunity to ensure the FAA is properly positioned to support the safe integration of these new entrant technologies into United States airspace and support American innovation. Several new entrant stakeholders support the FAA building upon current research initiatives to advance the potential benefits of these new technologies for consumers and the travelling public.

A. UNMANNED AIRCRAFT SYSTEMS

By statute, an unmanned aircraft (UA) is defined as "an aircraft operated without the possibility of direct human intervention from within or on the aircraft," while a UAS is defined as a "[UA] and associated elements (including communication links and the components that control the [UA]) required for the operator to operate safely and efficiently in the [NAS]."[8]

The *FAA Modernization and Reform Act of 2012* (*FMRA*) tasked the FAA with establishing a regulatory framework that would allow for the safe integration of UAS into the NAS, including:

- Developing a comprehensive plan to safely accelerate the integration of civil UAS into the NAS;
- Publishing a final rule on small UAS for civil operations in the NAS; and

[3] 49 U.S.C. § 106(g).
[4] *FAA Reauthorization Act of 2018*, Pub. L. No. 115-254, 132 Stat. 3186 [hereinafter *FAA Reauthorization Act of 2018*].
[5] *FAA Extension, Safety, and Security Act of 2016*, Pub. L. No.114-190, 130 Stat. 615.
[6] *Id.* at Subtitle B — Unmanned Aircraft Systems.
[7] *Advanced Aviation Infrastructure Modernization (AAIM) Act*, Pub. L. No. 117-328, Division Q*; Advanced Air Mobility Coordination and Leadership Act*, Pub. L. No. 117-203, 136 Stat. 2227.
[8] 49 U.S.C. § 44801(11)–(12).

- Establishing six UAS test sites to support the research and evaluation of UAS into the NAS, among other mandates.[9]

Pursuant to *FMRA*, the FAA initiated a five-year program to establish these UAS test sites, which became operational in April 2014.[10] The test sites are located at Griffiss International Airport, NY; New Mexico State University, NM; Northern Plains, ND; University of Nevada, Reno; Texas A&M University Corpus Christi, TX; University of Alaska Fairbanks, AK; and Virginia Polytechnic Institute & State University, VA.[11]

In June 2016, the FAA issued a final rule on the operation of small UAS (weighing less than 55 pounds) — under 14 C.F.R. Part 107 (also known as Part 107) — which significantly expanded and standardized the ability for small UAS operators to conduct commercial activities.[12] To date, Part 107 serves as the sole operating rules exclusive to UAS. Apart from its weight limitation, Part 107 imposes several operational limitations on UAS pilots, such as:

- restricting flights to no higher than 400 feet above ground level;
- requiring the UA remain within the visual line of sight of the remote pilot; and
- prohibiting a remote pilot from operating multiple UAS simultaneously.[13]

Accordingly, UAS weighing 55 pounds and heavier, as well as operations outside of the above defined limitations, must abide by conventional manned aviation regulatory rules or otherwise receive an FAA waiver or exemption.[14] The *FAARA 2018* also includes safety requirements for hobby and recreational UAS operations; supporting the testing of new UAS technologies; and directing the agency to safely enable more advanced UAS operations, such as package delivery and emergency response services.[15]

In January 2021, the FAA finalized two additional UAS rules to further enable advanced UAS operations: (1) Remote Identification of UAS (Remote ID); and (2) Operation of Small Unmanned Aircraft Systems Over People (Ops. Over People).[16] The Remote ID rule requires UAS to broadcast certain identification, location and performance information that can be received by other entities, including the FAA and law enforcement.[17] This is akin to a digital license plate, whereby anyone with a cellphone will be able to see a drone's Remote ID number, but only authorized individuals will be able to access the drone owner's personal information. All drone pilots required to register their UAS must comply with the rule's requirements beginning September 16, 2023.[18] The remote ID rule is a necessary foundational element for

[9] *FAA Modernization and Reform Act of 2012,* Pub. L. No. 112-95, 126 Stat. 11, Subtitle B — Unmanned Aircraft Systems.
[10] FAA, *UAS Test Site Program*, *available at* https://www.faa.gov/uas/programs_partnerships/test_sites.
[11] *Id*.
[12] Operation and Certification of Small Unmanned Aircraft Systems, 81 Fed. Reg. 42,064 (June 28, 2016).
[13] 14 C.F.R. Part 107 (2023).
[14] 14 C.F.R. § 11.63 (2023).
[15] *See FAA Reauthorization Act of 2018, supra* note 4.
[16] Remote Identification of Unmanned Aircraft Rule, 86 Fed. Reg. 4,390 (Jan. 15, 2021); Operation of Small Unmanned Aircraft Systems Over People Rule, 86 Fed. Reg. 4,314 (Jan. 15, 2021).
[17] *Id*.
[18] FAA, *UAS Remote Identification, available at* https://www.faa.gov/uas/getting_started/remote_id/.

more complex and routine commercial UAS operations and the FAA's overall UAS integration efforts.[19] The Ops. Over People rule created requirements for the routine operation of small UAS at night, over people, and over moving vehicles, under certain circumstances, without the need to obtain a waiver or exemption from the FAA, addressing a challenge posed by Part 107's original limitations.[20] The rule also amends the recurrent training framework for remote pilots, allowing them to remain current through online training rather than in-person testing, among other changes.[21]

Despite the FAA promulgating rules for small UAS operations, more advanced commercial UAS operations have yet to be achieved in the NAS at scale.[22] Currently, there are more than 338,000 commercial UAS registered along with over 308,000 commercial UAS pilots.[23] The UAS industry believes that "… current [FAA] regulations do not enable the domestic UA beyond visual line-of-sight (BVLOS) industry to scale and achieve meaningful results. ... The current rules also do not reflect the competencies needed to safely operate highly automated UAS, which hinders the ability to expand UAS BVLOS."[24]

While the FAA has made some progress in approving BVLOS operations over the past several years, two of the primary barriers to scaling remain: safety standards for a UAS to avoid other air traffic, and a process to determine the airworthiness of a UAS.

1. Avoiding Other Air Traffic

UAS operating beyond a remote pilot's visual line of sight (commonly referred to as BVLOS) present unique challenges to the FAA's existing regulatory framework.[25] Aside from Part 107, most current aviation regulations that would apply to UAS operations assume an aircraft has an onboard pilot responsible for avoiding other aircraft.[26] UAS lack an onboard pilot and are either remotely piloted or fly pre-programmed routes autonomously.[27]A UAS's capability to be operated remotely and conduct BVLOS operations can offer economic and societal benefits.[28] Today, there are several UAS applications that the aviation industry, local communities and industrial sectors have expressed interest in and invested resources to develop

[19] *See* Remote Identification of Unmanned Aircraft Rule, *supra* note 16.
[20] *See* Operation of Small Unmanned Aircraft Systems Over People Rule, *supra* note 16.
[21] FAA, *Operations Over People General Overview, available at* https://www.faa.gov/uas/commercial_operators/operations_over_people.
[22] *See generally* Harrison Wolf, *Where Will The Drone Industry Be In 2023*, FORBES (Dec. 20, 2022), *available at* https://www.forbes.com/sites/harrisonwolf/2022/12/20/where-will-the-drone-industry-be-in-2023/?sh=7fc526e21f1e.
[23] *See* FAA, *Drones by the Numbers*, *available at* https://www.faa.gov/uas.
[24] *See* FAA, UNMANNED AIRCRAFT SYSTEMS BEYOND VISUAL LINE OF SIGHT AVIATION RULEMAKING COMMITTEE, FINAL REPORT 8, (Mar. 10, 2022), *available at* https://www.faa.gov/regulations_policies/rulemaking/committees/documents/media/UAS_BVLOS_ARC_FINAL_REPORT_03102022.pdf [*hereinafter* UAS BVLOS ARC, *Final Report*].
[25] *See generally* UAS BVLOS ARC, *Final Report*.
[26] *Id*.
[27] *Id*.
[28] *Id*.

and deploy UAS technologies.[29] Industry stakeholders argue that the FAA's existing regulatory framework should better support this evolving aviation sector.[30]

2. Airworthiness Determinations

Typically, an aircraft requires an FAA-issued airworthiness certificate to operate in United States airspace.[31] In order to receive an airworthiness certificate, the manufacturer must have their designs certified by the FAA — this is called a type certificate — and prove that they can repeatedly build an aircraft that conforms to the design — this is called a production certificate.[32] The FAA establishes airworthiness criteria and can issue type certificates for aircraft, aircraft engines, propellers, parts, or appliances.[33] In 2020, the FAA amended 14 C.F.R. Part 21 to add procedural requirements for the issuance of type certificates for special classes of aircraft.[34] In the final rule, the FAA explained that it intended the special class category to include, in part, those aircraft that would be eligible for a standard airworthiness certificate but for which certification standards do not exist due to their unique, novel, or unusual design features.[35] The BVLOS Aviation Rulemaking Committee (ARC) recommended the FAA consider alternative means to providing airworthiness certification that does not require type and production certification.[36]

Because UAS can be remotely piloted, unique configurations and applications of airframes, powerplants, fuels, and materials are possible and can result in flight characteristics different from those of conventional aircraft.[37] Further, while some UAS components are essential for safe operation, they are not permanent features of the UA.[38] Accordingly, these features are the unique, novel, and/or unusual features the special class category was designed to accommodate.[39]

3. FAA's Role

Several offices within the FAA are responsible for various approvals for the integration of UAS. However, the complexity of the issues and the agency's current organizational structure remains a challenge for many applicants. While the FAA's UAS Integration Office (AUS) is responsible for leading the FAA's efforts to safely integrate UAS operations into the NAS, it does not have any authority to act on the certification or operational approvals of UAS or their operations.[40]

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[29] Michael, Healander, *Cities' role to play in America's growing drone economy*, NAT'L LEAGUE OF CITIES (2023), *available at* https://www.nlc.org/article/2023/02/17/cities-role-to-play-in-americas-growing-drone-economy/.
[30] *See* UAS BVLOS ARC, *Final Report*, *supra* note 24.
[31] 49 U.S.C. §§ 44702(a) & 44704(d) (2023).
[32] 14 C.F.R. Part 21 Subpart B (2023); 14 C.F.R. Part 21 Subpart G (2023).
[33] 14 C.F.R. Part 21 (2023).
[34] *Id*.
[35] *Id*.
[36] *See* UAS BVLOS ARC, *Final Report*, *supra* note 24.
[37] *See supra* note 33.
[38] *Id*.
[39] *Id*.
[40] FAA, *UAS Integration Office, available at* https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aus.

Since Congress's 2012 directive to integrate UAS into the NAS, the FAA has only granted five Part 135 air carrier certificates for UAS and type certificated only a single UAS model.[41] The UAS industry's consensus is that current FAA regulations do not enable UAS operations to scale in an economically viable and effective manner.[42] To date, the FAA has only type certified one UAS, the Matternet M2 — a 29-pound UAS — which took more than four-and-a-half-years for FAA to certify using special class criteria.[43] This raises the question from some stakeholders as to whether it is appropriate for a small UAS with limited operations should need to go through the same safety approval processes (Part 21) as a larger transport category aircraft that will be in service for several decades.

B. ADVANCED AIR MOBILITY - eVTOL & POWERED-LIFT AIRCRAFT

Advances in technology, such as increased battery density and distributed electric propulsion, are allowing for the development of novel aircraft with the potential to be quieter, safe, and sustainable.[44] These improvements have led to the emergence of new aircraft designs that use advanced propulsion systems to generate lift and thrust including all-electric, hybrid-electric, hydrogen, and hydrogen-electric.[45] Designs for these aircraft are diverse, but can largely be classified as vertical takeoff and landing (VTOL), short takeoff and landing (STOL), or conventional takeoff and landing (CTOL) aircraft.

New operational and commercial concepts for eVTOLs first received widespread attention in the late 2010s following the publication of an industry white paper discussing on-demand urban air transportation and additional follow-on papers, roadmaps, and research from the National Aeronautics and Space Administration (NASA).[46] This work led to the development of Urban Air Mobility (UAM) and regional air mobility (RAM) concepts — collectively referred to as advanced air mobility (AAM) — that involve moving people and/or property intracity or intercity by air. A recent industry report projects AAM growth of up to hundreds or even thousands of simultaneous operations within a region at altitudes reaching nearly 5,000 feet.[47]

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[41] *See* FAA, *FAA-certificated Aircraft Operators (Legal Part 135 holders)*, (last updated Mar. 13, 2023), *available at* ; Paul Brinkmann, *Armed with an FAA type certificate, this drone company plans its next moves*, AM. INST. OF AERONAUTICS AND ASTRONAUTICS (Nov. 3, 2022), *available at* https://aerospaceamerica.aiaa.org/armed-with-an-faa-type-certificate-this-drone-company-plans-its-next-moves/.

[42] *See generally* UAS BVLOS ARC, *Final Report*, *supra* note 24.

[43] *See Airworthiness Criteria: Special Class Airworthiness Criteria for the Matternet, Inc. M2,* 85 Fed. Reg. 74,294 (Nov. 20, 2020) (showing that Matternet applied to the FAA in 2018 for a type certificate); *see also* Paul Brinkmann, *supra* note 41.

[44] See FAA, NEXT GEN, CONCEPT OF OPERATIONS, v1.0, UAM, 2 – 4, (June 26, 2020), *available at* https://wordpress-387766-2876614.cloudwaysapps.com/wp-content/uploads/2020/07/UAM_ConOps_v1.0.pdf.

[45] VERTICAL FLIGHT SOCIETY, *eVTOL Aircraft Directory* (2023), *available at* https://www.evtol.news/aircraft.

[46] UBER ELEVATE, FAST-FORWARDING TO A FUTURE OF ON-DEMAND URBAN AIR TRANSPORTATION (Oct. 27, 2016), *available at* https://evtol.news/__media/PDFs/UberElevateWhitePaperOct2016.pdf; NASA, *Advanced Air Mobility*, *available at* https://www.nasa.gov/aam.

[47] Brock Lascara, *Urban Air Mobility Airspace Integration Concepts*, THE MITRE CORP. (June 2019), *available at* https://www.mitre.org/sites/default/files/publications/pr-19-00667-9-urban-air-mobility-airspace-integration.pdf.

It is estimated that the AAM industry has the potential to add 234,000 jobs and $115 billion annually to the United States economy by 2035.[48] Furthermore, it is estimated the UAM market in the United States is projected to see dramatic and sustained growth for decades to come, reaching a projected $255 billion by 2040, $1 trillion by 2045, and over $2.4 trillion by 2050.[49]

1. Certification & Production

Currently, several eVTOL manufacturers are in discussions with the FAA regarding type certification of their aircraft under Part 21. Most of these manufacturers are in the pre-project familiarization or certification plan stages.[50] To date, the FAA has published proposed airworthiness criteria for two aircraft in the Federal Register for public comment.[51] Following receipt of airworthiness criteria, an applicant and the FAA must agree on a means of compliance, determine testing and validation plans, and execute those plans. The FAA then issues a Type Inspection Authorization (TIA), the applicant completes their final flight tests and undergoes conformity inspections, and the FAA reviews the manuals associated with the aircraft before certificated operations can occur.[52] In most cases, this process takes years.

a. FAA's Certification Basis Shift to Part 21.17(b)

In 2011, the FAA chartered an ARC to review and rewrite 14 C.F.R. Part 23 (Part 23), the airworthiness requirements for normal category aircraft, or small aircraft.[53] In August 2017, a new set of performance-based rules went into effect.[54] Several eVTOL aircraft manufacturers going through pre-project and certification planning phases with the FAA expressed a preference to use the industry consensus standards previously accepted under these Part 23 rules to comply with the applicable certification requirements.[55] However, the FAA determined that Part 23 may not adequately account for many of these designs.[56] Instead, applicants were told the FAA would require a special class airworthiness certificate under Part 21.17(b) and would consider the aircraft as powered-lift aircraft.[57] Under the procedures in Part 21.17(b), the airworthiness

[48] Aijaz Hussain & David Silver, *Advanced Air Mobility – Can the United States afford to lose the race?*, DELOITTE (Jan. 26, 2021), *available at* https://www2.deloitte.com/us/en/insights/industry/aerospace-defense/advanced-air-mobility.html.
[49] MORGAN STANLEY RESEARCH, EVTOL/URBAN AIR MOBILITY TAM UPDATE: A SLOW TAKE-OFF, BUT SKY'S THE LIMIT, (May 6, 2021), *available at* https://assets.verticalmag.com/wp-content/uploads/2021/05/Morgan-Stanley-URBAN_20210506_0000.pdf.
[50] Type Certification, FAA Order No. 8110.4C (Mar. 6, 2017) *available at* https://www.faa.gov/documentLibrary/media/Order/FAA_Order_8110_4C_Chg_6.pdf.
[51] Airworthiness Criteria: Special Class Airworthiness Criteria for the Joby Aero, Inc. Model JAS4-1 Powered-Lift, 87 Fed. Reg. 67,399 (Nov. 8, 2022); Airworthiness Criteria: Special Class Airworthiness Criteria for Archer Aviation Inc. Model M001 Powered-Lift, 87 Fed. Reg. 77,.749 (Dec. 20, 2022).
[52] Order 8110.4, *supra* note 52.
[53] 14 C.F.R. § 23 (2023).
[54] *Id*.
[55] U.S. GOV'T ACCOUNTABILITY OFF., GAO-22-105020, TRANSFORMING AVIATION: STAKEHOLDERS IDENTIFY ISSUES TO ADDRESS FOR 'ADVANCED AIR MOBILITY' (2022) *available at* https://www.gao.gov/assets/gao-22-105020.pdf.
[56] *Id*.
[57] Jessica Reed, *The FAA confirms Changes to Regulatory Approach for powered-Lift Certification*, AVIATION TODAY, (May 26, 2022), *available at* https://www.aviationtoday.com/2022/05/26/powered-lift-faa/.

requirements for special class aircraft can be comprised of portions of the requirements in various FAA regulations, including but not exclusively Part 23.[58] Some stakeholders received this change in approach with consternation, and are concerned the FAA will be challenged to establish criteria and determine a means of compliance for a special airworthiness certificated powered-lift aircraft in a reasonable amount of time.[59] Based on public statements, it appears the FAA has minimized the disruption for some manufacturers; however, some stakeholders may remain concerned.[60]

b. International Validation

In 2011, the United States and European Union entered into a bilateral aviation safety agreement (BASA).[61] This bilateral agreement facilitated cooperation on airworthiness certification of civil aviation products imported and exported between the two regions.[62] More specifically, it was intended to (1) promote reciprocal acceptance of safety findings and approvals and (2) leverage the resources and expertise of each certification system.[63]

Like the FAA, the European Union Aviation Safety Agency (EASA) is using an atypical process to certify eVTOL aircraft called Special Condition VTOL (SC-VTOL).[64] The novel nature of these aircraft and processes, which were not envisioned in the BASA, among other issues, have raised questions about the feasibility of international validation of eVTOL aircraft in the near-term while maintaining the FAA's approach to certification.[65]

2. Entry into Service

Most eVTOLs are expected to enter service with a pilot on board, flying under visual flight rules (VFR), predominantly using existing infrastructure, communicating with air traffic, fully equipped with automatic dependent surveillance broadcast (ADS-B), and using established

[58] Airworthiness Criteria: Special Class Airworthiness Criteria for the Joby Aero, Inc. Model JAS4-1 Powered-Lift, 87 Fed. Reg. 67,400 (Nov. 8, 2022).
[59] Thom Patterson, *GAMA Has Questions for the FAA About eVTOL Certification,* FLYING MAGAZINE, (June 22, 2022), *available at* https://www.flyingmag.com/gama-has-questions-for-the-faa-about-evtol-certification/.
[60] Press Release, JOBY, *Joby Completes Second Stage of certification Process*, (Feb. 9, 2023), *available at* https://www.jobyaviation.com/news/joby-completes-second-stage-certification-process/.
[61] Agreement Between the United States of America and the European Community on Cooperation in the Regulation of Civil Aviation Safety*,* U.S.-E.U., (Dec. 6, 2013), *available at* https://www.faa.gov/aircraft/air_cert/international/bilateral_agreements/baa_basa_listing/media/EU-US-agreement-R0A5.pdf.
[62] *Id*.
[63] FAA*, The Aviation Safety Agreement Between the US and the EU*, (2011), *available at* https://www.faa.gov/aircraft/repair/media/EASA_EU_roadshows.pdf [hereinafter *Aviation Safety Slides*].
[64] EASA, THIRD PUBLICATION OF MEANS OF COMPLIANCE WITH THE SPECIAL CONDITION VTOL-MOC-3 SC-VTOL ISSUE 1 (June 29, 2022), *available at* https://www.easa.europa.eu/en/document-library/product-certification-consultations/special-condition-vtol.
[65] Cathy Buyck, *EASA To Strengthen Safety Reviews of U.S.-certified Aircraft*, AINONLINE, (Jan. 25, 2021), *available at* https://www.ainonline.com/aviation-news/air-transport/2021-01-25/easa-strengthen-safety-reviews-us-certified-aircraft; THE STANDARDS MANAGEMENT TEAM, AIR, THE SAFETY CONTINUUM – A DOCTRINE FOR APPLICATION, (Sept. 2014), *available at* https://downloads.regulations.gov/FAA-2015-1621-0018/attachment_1.pdf; Elan Head, *Special Report: The number at the center of an eVTOL safety debate*, THE AIR CURRENT, (Jan. 9, 2023), *available at* https://theaircurrent.com/industry-strategy/special-report-evtol-safety-continuum-10-9/.

flight paths.[66] Through at least the end of the decade, eVTOL aircraft operators plan to use existing operating procedures and concepts similar to traditional aviation. Doing so will either require an eVTOL aircraft to be added to an existing air carrier operating certificate under Part 135 or the establishment of a new licensed air carrier. Some manufacturers intend to operate the aircraft themselves, others plan to both operate and sell aircraft, and others may just sell their aircraft and offer maintenance services.[67] Several traditional operators plan to purchase these aircraft and bring them onto their existing operating certificate.[68]

a. Regulatory Environment

In order to leverage existing aviation rules for a new class of aircraft, the FAA needs to update its regulations and provide clarity around pilot privileges — including the use of type ratings, privileges of rotorcraft and airplane pilot certificates, instructor qualifications, and establishment of a powered-lift category — around air traffic procedures — including VFR, instrument flight rules (IFR), right-of-way and altitude rules, crew responsibilities, and clearances — and other requirements where powered-lift aircraft are not listed as an allowable user or where regulations are not applicable as written.[69] In order to meet the target service dates of many eVTOL manufacturers and operators, the FAA has stated it will publish a final Special Federal Aviation Regulation (SFAR) by "the fourth quarter of 2024".[70] Additionally, the Department of Transportation (DOT) is in the process of updating its air carrier definitions to include powered-lift.[71]

AAM manufacturers and future operators will have to create pilot training programs, recruit instructors and pilots, develop and implement maintenance manuals, and procure

[66] HAI, ROADMAP OF ADVANCED AIR MOBILITY OPERATIONS, (Feb. 2023), *available at* https://rotor.org/wp-content/uploads/2023/03/HAI_Advanced_Air_Mobility_Report_03072023_pages.pdf.
[67] Press Release, JOBY, *Joby Receives Part 135 Certification from the FAA* (May 26, 2022), *available at*, https://ir.jobyaviation.com/news-events/press-releases/detail/40/joby-receives-part-135-certification-from-the-faa; Charles Alcock, *Archer Tells Shareholders it is on track with eVTOL Aircraft Development Plans,* FUTURE FLIGHT (Mar. 15, 2022), *available at* https://www.futureflight.aero/news-article/2022-03-15/archer-tells-shareholders-it-track-evtol-aircraft-development-plans; Press Release, ARCHER, *Archer Receives $10 Million Pre-Delivery Payment From United Airlines For 100 EVTOL Aircraft* (Aug. 10, 2022), *available at* https://www.archer.com/news/archer-receives-10-million-pre-delivery-payment-from-united-airlines-for-100-evtol-aircraft-advances-path-to-commercialization; Press Release, EVE AIR MOBILITY, *United Invests Another $15 Million in Electric Flying Taxi Market with Eve*, (Sept. 8, 2022), *available at* https://eveairmobility.com/united-invests-another-15-million-in-electric-flying-taxi-market-with-eve/.
[68] Bristow Group, *Elevated for the Future* (last visited Mar. 1, 2023), *available at* https://www.bristowgroup.com/services/advanced-air-mobility.
[69] Letter from Jens Hennig, Vice Pres., Operations, Gen'l Aviation Mfrs. Assoc'n (GAMA) and Walter Desrosier, Vice President, Engineering & Maintenance, GAMA to Mr. David Boulter, Assoc. Adm'r, Aviation Safety, FAA, Ms. Lirio Liu, Exec. Dir., Aircraft Certification Service, FAA, & Mr. Larry Fields, Exec. Dir., Flight Standards Serv., FAA (July 21, 2022), *available at* https://aerospaceamerica.aiaa.org/wp-content/uploads/2022/09/GAMA22-28-Recommendations-Powered-Lift-SFAR-220721.pdf.
[70] Revise Airplane Definition to Incorporate Powered-lift Operations, RIN 2120-AL72, Unified Agenda, Office of Information and Regulatory Affairs; *FAA Reauthorization: Enhancing America's Gold Standard in Aviation Safety*, *Hearing Before the Subcomm. on Aviation of the H. Comm. on Transp. and Infrastructure*, 118th Cong. (Feb. 7, 2023) (statement of David Boulter, Acting Assoc. Admin. for Aviation Safety, FAA).
[71] Update to Air Carrier Definitions, 87 Fed. Reg. 74,995 (Dec. 7, 2022).

insurance, among other requirements.[72] Most of these activities require continued FAA involvement and approvals.

b. Physical Infrastructure

In addition to existing aviation infrastructure, some AAM concepts are expected to lift off from existing physical infrastructure (e.g., modified parking garage rooftops or retrofitted heliports).[73] In September 2022, the FAA published Engineering Brief (EB) 105, guidance for airport sponsors, heliport owners, developers of new infrastructure, states and communities for the design of vertiports.[74] This guidance was largely based on FAA's Heliport Design Advisory Circular and was published for industry input.[75] The FAA maintains that this is an initial step, and they intend to update their guidance after receiving additional operational data from aircraft manufacturers.[76] This guidance is meant to help relevant entities plan for and design infrastructure to support AAM.[77] It includes information about required airspace safeguards, touchdown and lift-off area designs, charging capabilities and utility connections, and fire protection systems.[78] Unlike certified airports, the designs of many general aviation facilities are not regulated by the Federal government.[79] Instead, they are overseen by state and local regulations that manage land-use and permitting.[80]

To support this effort, several AAM operators have released various vertiport designs and are working with Federal agencies and local governments to design, develop, and deploy these concepts.[81] In December 2022, as part of the *Consolidated Appropriations Act, 2023* (P.L. 117-328), Congress passed the *Advanced Air Mobility Infrastructure Pilot Program*, which authorized $25 million for eligible entities at the state, local, and tribal levels to begin planning for the integration of AAM infrastructure into communities and transportation systems.[82] Over

[72] 14 C.F.R. § 135 (2023).
[73] *See* Gideon Lichfield, *When Will We Have Flying Cars? Maybe Sooner Than You Think*, MIT TECH. REV. (Feb. 13, 2019), *available at* https://www.technologyreview.com/s/612891/when-will-we-have-flying-cars-maybe-sooner-than-you-think/.
[74] Memorandum, from Mr. Michael A.P. Meyers, Manager, Airport Engineering Division, FAA, to All Airports Regional Division Managers (Sept. 21, 2022), *available at* https://www.faa.gov/sites/faa.gov/files/eb-105-vertiports.pdf.
[75] *See* FAA, *Vertiport Design Engineering Brief Industry Day (Discusses Draft Guidance)*, YOUTUBE (Oct. 11, 2022) *available at* https://www.youtube.com/watch?v=1WwJD6XPyQE.
[76] Presentation, FAA, *Vertiport Design Standards for eVTOL/UAM Vehicles* (Mar. 2, 2021)*, available at* https://www.faa.gov/about/office_org/headquarters_offices/ang/redac/media/airports/2021/march/airports-mar2021-VertiportDesignStandardsforeVTOLUAMVehicles.pdf.
[77] *See* Memorandum, *supra* note 74.
[78] *Id*.
[79] 14 C.F.R. § 139 (2023).
[80] Heliport Design, FAA, Advisory Circular 150/5390-2D, (Jan. 5, 2023), *available at* https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_150_5390_2D_Heliports.pdf.
[81] *See e.g.*, LILIUM*, Designing a Scalable Vertiport, available at* https://lilium.com/newsroom-detail/designing-a-scalable-vertiport; *see also*, URBAN MOVEMENT LABS, *The Urban Air Mobility Partnership, available at* https://www.urbanmovementlabs.com/programs-projects.
[82] *See supra* note 7.

time, if AAM proliferates as predicted, the FAA's processes and technology, as well as the physical infrastructure supporting these operations, will need to grow and adapt.[83]

III. WITNESSES

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Founder and CEO
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Mr. Christopher Bradshaw
President and CEO
Bristow Group Inc.
on behalf of the
Helicopter Association International

Mr. Clint Harper
AAM Expert and Community Advocate

[83] UAM AIRSPACE RESEARCH ROADMAP, NASA (Sept. 2021), *available at* https://ntrs.nasa.gov/api/citations/20210019876/downloads/NASA-TM-20210019876Final.pdf.