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

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SUMMARY OF SUBJECT MATTER

TO: Members, Subcommittee on Aviation
FROM: Staff, Subcommittee on Aviation
RE: Subcommittee Hearing on "The Leading Edge: Innovation in U.S. Aerospace"

PURPOSE

The Subcommittee on Aviation will meet on Tuesday, April 27, 2021, at 11:00 a.m. (EDT) in 2167 Rayburn House Office Building and virtually via Zoom to hold a hearing titled, "The Leading Edge: Innovation in U.S. Aerospace." The hearing will explore the recent advances in U.S. aerospace and the National Airspace System (NAS), including emerging airspace entrants (such as drones, advanced air mobility, electric aircraft, and supersonic planes). The hearing will examine how these new aerospace users and technologies will affect the economy, transportation system, local communities, environment, and public good; their visions for and possible barriers to deployment in the United States; and the federal government's role in ensuring the safe integration of these users and technologies into the NAS. The Subcommittee will receive testimony from the City of Los Angeles; the Choctaw Nation of Oklahoma; Skydio; the National Institute for Aviation Research at Wichita State University; magniX; and Boom Supersonic.

FUTURE OF U.S. AEROSPACE

Civil aviation plays a central role in the United States, supporting more than $1.8 trillion of economic activity and nearly 11 million jobs, according to the Federal Aviation Administration (FAA).[1] While the COVID-19 pandemic devastated the U.S. aerospace industry, with commercial air travel and aviation manufacturing plummeting in 2020 as coronavirus cases surged, the sector is projected to recover in the years ahead.[2] In fact, civil aviation's economic role will only grow with the introduction of new airspace users (such as unmanned aircraft systems (UAS), advanced air mobility (AAM), electric aircraft, and supersonic planes) and the development of other new aerospace technologies that change the way we travel and transport goods and services. The FAA—

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[1] FAA, *The Economic Impact of Civil Aviation on the U.S. Economy: State Supplement*, Nov. 3, 2020, *available at* https://www.faa.gov/about/plans_reports/media/2020_nov_economic_impact_report.pdf.
[2] Leslie Josephs, *New Planes, Training and Hiring: Airlines are Planning for a Rebound After Dismal Pandemic Year*, CNBC, Mar. 2, 2021, https://www.cnbc.com/2021/03/02/how-airlines-are-preparing-for-a-travel-rebound-covid-19.html.

the federal agency responsible for ensuring the safe and efficient operation of the NAS—along with the National Aeronautics and Space Administration (NASA), aerospace industry, and labor continue to explore ways to make current airspace operations safer and more efficient, and to prepare for the integration of new technology.

UNMANNED AIRCRAFT SYSTEMS

UAS—ranging in size from handheld to those weighing more than 50,000 pounds—are proliferating in the NAS.[3] In fact, in its most recent aerospace forecast, the FAA estimates that the hobbyist (recreational) UAS fleet will grow to nearly 1.5 million units by 2024 and the commercial UAS fleet will increase to more than 800,000 units by that same year.[4] UAS are continuously maturing with advanced software, automation, and artificial intelligence skills, and can be equipped with various technologies, such as cameras and infrared or thermal sensors, offering a virtually unlimited number of potential applications.[5] UAS can perform work that manned aircraft cannot, such as close inspections of bridges, pipelines, railroad tracks, airport runways, and other critical infrastructure, and can enhance the safety of conditions for those performing such work. UAS can also be used for disaster and emergency response, precision agriculture, and delivery of packages such as medicine, medical supplies, and other consumer goods, to name just a few of their possible uses.

UAS Integration

The FAA is conducting a phased approach to safely integrate UAS operations into the NAS. There are also ongoing efforts within the FAA and coordination between the agency and its federal partners to address the continuing safety and security risks posed by unsafe or unlawful UAS operations, including risk of collision with manned aircraft and unauthorized operations over national security facilities and assets. These are some of the challenges that must be addressed to allow full integration of these users into the NAS.

In 2012, Congress directed the FAA to develop a comprehensive plan to accelerate the safe integration of civil UAS into the NAS[6] and to issue regulations applicable to the operation of small commercial UAS.[7] In June 2016, the FAA issued a final rule on commercial operations of small UAS (14 C.F.R. part 107), which significantly expanded and standardized the ability for operators of small UAS to conduct commercial activities.[8] For these commercial UAS operations, part 107 imposes requirements on UAS pilots[9] and aircraft,[10] as well as operational limitations. Most notably, the UAS must remain within the visual line of sight (VLOS) of the remote pilot in command and must not

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[3] THE HILL, *The World's Biggest Drone Debuts, and It Weighs Nearly 28 Tons*, Dec. 3, 2020, https://thehill.com/changing-america/resilience/smart-cities/528691-the-worlds-biggest-drone-debuts-and-it-weighs-nearly.
[4] FAA, *FAA Aerospace Forecast Report Fiscal Years 2020 to 2040: Unmanned Aircraft Systems*, *available at* https://www.faa.gov/data_research/aviation/aerospace_forecasts/media/Unmanned_Aircraft_Systems.pdf.
[5] *See, e.g.*, Skydio, https://www.skydio.com/.
[6] *FAA Modernization and Reform Act of 2012*, Pub. L. 112-95, § 332(a).
[7] *Id.* § 332(b).
[8] FAA, *Operation and Certification of Small Unmanned Aircraft Systems*, 14 C.F.R. § 107 (2016).
[9] A pilot must be at least 16 years old, obtain a remote pilot airman certificate (or be under the direct supervision of a certificate holder), demonstrate aeronautical knowledge in order to obtain such a certificate, and pass vetting by the Transportation Security Administration.
[10] An aircraft must weigh less than 55 pounds, and any aircraft that weighs more than 0.55 pounds must be registered with the FAA online. The aircraft must undergo a pre-flight check to ensure it is in a safe operating condition.

fly over people not involved in the operation.[11] Operations outside of the defined limitations may require an FAA-waiver or additional certification or approval signifying the FAA finds the proposed operation can be performed safely.[12] In the *FAA Reauthorization Act of 2018* (Pub. L. 115-254), Congress enacted provisions authorizing the FAA to fully regulate hobby and recreational UAS in order to ensure the safety and security of U.S. airspace; advancing the safe and efficient integration of UAS through the development and testing of new UAS technologies; and directing the FAA to move forward with authorization of certain advanced operations (e.g., package delivery).

Recent FAA Activities and Programs

In late 2020, the FAA finalized two rules to advance the integration of UAS into the NAS. The first rule requires the remote identification (remote ID) of UAS and the second rule allows more routine operations over people and at night under certain circumstances.[13] The requirement that UAS operating in the NAS have remote ID capability—the ability of a UAS to provide certain identification and location information that can be received by other parties, such as the FAA and law enforcement—is described as a necessary foundational element for more complex and routine commercial UAS operations and the FAA's overall UAS integration efforts.[14]

In 2020, the FAA also issued various planning documents, including the third edition of its UAS integration roadmap, which sets forth a five-year strategy for integration.[15] In its roadmap, the FAA provides an update on its activities and rulemakings, as well as a description of and a status update on complex challenges to UAS integration, including remote ID implementation, technological hurdles (e.g., maturity of UAS detect-and-avoid technology), airspace management, UAS noise levels, and societal acceptance.[16]

In 2020, the FAA completed its UAS Integration Pilot Program (IPP). The IPP is a program designed to accelerate the testing of UAS operations currently restricted (such as beyond-VLOS operations and flights over people) and to provide a forum for meaningful dialogue with state, local, and tribal governments on the development of federal UAS guidelines and regulations.[17] The FAA then transitioned the IPP to the BEYOND program, through which the FAA is "tackling the remaining challenges of UAS integration," by studying beyond-VLOS operations, leveraging

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[11] FAA, *Summary of Small Unmanned Aircraft Rule (Part 107)*, https://www.faa.gov/uas/media/Part_107_Summary.pdf. The UAS must also fly under 400 feet and at or below 100 miles per hour, during the day, yield right of way to manned aircraft, and not from a moving vehicle.
[12] *See* FAA, *Advanced Operations*, https://www.faa.gov/uas/advanced_operations/.
[13] FAA, *Remote Identification of Unmanned Aircraft*, Final Rule, 86 Fed. Reg. 4390 (Jan. 15, 2021), *available at* https://www.govinfo.gov/content/pkg/FR-2021-01-15/pdf/2020-28948.pdf; FAA, *Operation of Small Unmanned Aircraft Systems Over People*, Final Rule, 86 Fed. Reg. 4314 (Jan. 15, 2021), *available at* https://www.govinfo.gov/content/pkg/FR-2021-01-15/pdf/2020-28947.pdf.
[14] FAA, *UAS Remote Identification Overview*, https://www.faa.gov/uas/getting_started/remote_id/.
[15] FAA, *Integration of Civil UAS in the NAS Roadmap, Third Edition* (2020), *available at* https://www.faa.gov/uas/resources/policy_library/media/2019_UAS_Civil_Integration_Roadmap_third_edition.pdf.
[16] *See id.* at 15–16, 20–22.
[17] FAA, *Research and Development*, https://www.faa.gov/uas/research_development/; FAA, *UAS Integration Pilot Program*, https://www.faa.gov/uas/programs_partnerships/uas_integration_pilot_program.

industry operations to better analyze the benefits of UAS operations, and focusing on community engagement efforts to collect, analyze, and address community concerns.[18]

The FAA, NASA, other federal agencies, and industry are also working closely on the development of UAS Traffic Management (UTM).[19] Similar to how air traffic systems manage manned aircraft operations today, UTM is envisioned to include the systems necessary to manage UAS traffic in low-altitude airspace, allowing the FAA to communicate real-time airspace status and constraints to operators, and provide services to prohibit UAS from operating in certain airspace or colliding with other aircraft.[20] Thus, UTM will enable complex UAS operations, such as beyond-VLOS operations, which will be critical to the full integration of UAS into the NAS.

State and Local Participation

State and local governments may not enforce requirements regarding civil aviation, including safety regulations, the use of navigable airspace, and aircraft certification, because the federal government has pervasively occupied the field of civil aviation regulation through statutes and regulations.[21] "While FAA states that it has authority to create a comprehensive regulatory system addressing UAS operations at ground level as part of ensuring aviation safety and the efficient use of airspace, some state and local governments and legal commentators, in addition to [a]…federal district court … have questioned FAA's authority to regulate UAS operations at low altitudes, at least those conducted purely intrastate and over private property."[22] In the UAS context, states and cities have sought to enact laws and regulations that control or restrict UAS operations, potentially in contradiction to federal law.

In recognition of the issues related to UAS regulation, Congress directed the Government Accountability Office (GAO) to study and report on key legal issues. Specifically, section 373 of the *FAA Reauthorization Act of 2018* directed a GAO study on the relative roles and authorities of the federal, state, local, and tribal governments in the regulation and oversight of low-altitude UAS operations. Section 358 of the *FAA Reauthorization Act of 2018* called for a study of UAS-related personal privacy issues and the federal, state, and local laws that currently address them. The GAO issued its report in September 2020 and presented "substantial information and analysis regarding these UAS legal jurisdiction and privacy issues."[23] The GAO concluded that "[t]he law regarding a number of UAS jurisdiction and privacy matters is in a state of flux, both because the federal government is still developing key aspects of its UAS safety and security requirements and because there have been relatively few court decisions to date addressing whether these requirements are

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[18] FAA, *BEYOND*, https://www.faa.gov/uas/programs_partnerships/beyond/. According to the FAA, BEYOND "will focus on operating under established rules rather than waivers, collecting data to develop performance-based standards, collecting and addressing community feedback and understanding the societal and community benefits, and to streamline the approval processes for UAS integration."

[19] FAA, *UAS Traffic Management*, https://www.faa.gov/uas/research_development/traffic_management/.

[20] *Id.; See also* NASA, *UAS Traffic Management*, https://utm.arc.nasa.gov/index.shtml.

[21] *See, e.g.*, *City of Burbank v. Lockheed Air Terminal, Inc.*, 411 U.S. 624, 638–39 (1973) (recognizing the need for a "uniform and exclusive system of federal regulation if the congressional objectives underlying the Federal Aviation Act are to be fulfilled").

[22] *Huerta v. Haughwout*, 2016 WL 3919799 (D. Conn. 2016); GAO Report, *Unmanned Aircraft Systems: Current Jurisdictional, Property, and Privacy Legal Issues Regarding the Commercial and Recreational Use of Drones*, GAO-B-330570 (Sept. 16, 2020), https://www.gao.gov/assets/b-330570.pdf.

[23] *See* GAO Report, *supra* note 22.

consistent with statutory authorities…."[24] Defining and delineating federal, state, and local responsibilities with respect to small UAS will continue to be topics of discussion and need to be addressed as these operators are safely integrated into the NAS.

ADVANCED AIR MOBILITY AND ELECTRIC AIRCRAFT

In 2019, Americans lost an average of 99 hours due to traffic congestion in the United States, costing them nearly $88 billion, according to a recent industry report.[25] These gridlocks not only affect drivers, but also have harmful effects on local businesses and the environment.[26] With recent advances in aerospace technology, new aircraft designs—including flying cars, passenger air vehicles or taxis, and electric aircraft—have the potential to reduce traffic congestion on U.S. roads, improve mobility options for commuters and cargo (in urban and rural environments), and lessen the current burden on surface infrastructure.[27]

Vertical Takeoff and Landing. AAM aircraft will be small and lightweight when compared to conventional aircraft, so many concepts rely on batteries and electric propulsion systems. While some concepts are designed to drive short distances before transitioning to flight mode with airplane-like wings, others are designed to operate as electric vertical takeoff and landing (eVTOL) aircraft, with multiple small helicopter-like rotors.[28] As such, eVTOL aircraft will be able to lift off from existing physical infrastructure (e.g., modified parking garage rooftops or retrofitted heliports) instead of airports or long runways.[29] To support this effort, several AAM operators have released various vertiport designs and are partnering with federal agencies and local governments to develop and deploy these concepts.[30]

Anticipated Operations. Unlike conventional aircraft, AAM aircraft are intended to fly at low altitudes and across short to medium distances, often in heavily congested areas. 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.[31] Some eVTOL concepts include plans to fly more than 150 miles per hour and cover nearly 150 miles on a single battery charge.[32] Currently, proposed aircraft can seat anywhere from one to seven passengers.[33] Additionally, some

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[24] *See id.*
[25] INRIX, *Congestion Costs Each American 100 Hours, $1,400 A Year* (Mar. 9, 2020), https://inrix.com/press-releases/2019-traffic-scorecard-us.
[26] *See id.*
[27] *See* FAA, *UAM Concept of Operations (Volume 1.0)*, at 2–4, https://nari.arc.nasa.gov/sites/default/files/attachments/UAM_ConOps_v1.0.pdf.
[28] *See, e.g.*, Terrafugia, *The Transition*, https://terrafugia.com/transition/; *see also* Joby Aviation, *Joby Aviation Generates First Revenue, Takes Key Step Towards Certifying Aircraft* (Feb. 9, 2021), https://www.jobyaviation.com/news/joby-aviation-generates-first-revenue-takes-key-step-towards-certifying-aircraft.
[29] *See* Gideon Lichfield, *When Will We Have Flying Cars? Maybe Sooner Than You Think*, MIT TECH. REV. (Feb. 13, 2019), https://www.technologyreview.com/s/612891/when-will-we-have-flying-cars-maybe-sooner-than-you-think/.
[30] *See e.g.*, *Lilium, Designing a Scalable Vertiport,* https://lilium.com/newsroom-detail/designing-a-scalable-vertiport; *see also*, Urban Movement Labs, *The Urban Air Mobility Partnership,* https://www.urbanmovementlabs.com/programs-projects.
[31] Brock Lascara, *Urban Air Mobility Airspace Integration Concepts*, THE MITRE CORP. (June 2019), https://www.mitre.org/sites/default/files/publications/pr-19-00667-9-urban-air-mobility-airspace-integration.pdf.
[32] *See* Joby Aviation, *supra* note 28.
[33] *See* Andrew J. Hawkins, *Flying Taxi Startup Lilium Goes Public via SPAC, Unveils its New Electric Aircraft*, THE VERGE (Mar. 30, 2021), https://www.theverge.com/2021/3/30/22358027/lilium-flying-taxi-evtol-spac-electric-aviation-gm-engle.

companies are retrofitting small commuter aircraft with electric propulsion technology to carry passengers up to 1,000 miles.[34]

Ownership and Access. While some of these concepts contemplate personal ownership and use, other companies' models rely on ridesharing (i.e., air taxis) to reduce operational costs and improve accessibility. Although these companies anticipate that their AAM concepts will be an affordable option for the traveling public, especially in urban areas, questions have been raised about how to ensure equitable access to these technologies for low-income and underserved communities.[35]

AAM Integration

Safety and Security. Unlike small UAS, which generally weigh less than 55 pounds, AAM concepts are heavier and typically have a pilot and one or more passengers on board. Not unlike other small manned aircraft, a mid-flight event, such as a failed battery or structural failure, could pose significant safety risks to the vehicle's occupants and to people and property on the ground, particularly in congested urban areas. AAM concepts, like small UAS, will fly in low-altitude airspace, and will need to be safely integrated with conventional airspace users, especially around airports.

Air Traffic Management. Like small UAS, AAM aircraft would access and generally operate in low-altitude airspace; however, some may fly as high as 5,000 feet above ground level. Technologies currently in development such as UTM—a system that can provide airspace design, dynamic geofencing, conflict avoidance, and separation and sequencing for small UAS—may assist the FAA in safely separating AAM aircraft from other aircraft.[36]

Pilot Training and Certification. The FAA is charged with ensuring aviation safety, which includes establishing the requirements for a pilot's license and the standards for the design, production, and maintenance of aircraft. In many cases, the FAA's current regulatory framework does not contemplate AAM concepts and their anticipated business models.[37] The FAA must provide the framework necessary to allow the safe integration of these new technologies and operations. In partnership with the U.S. Air Force, the FAA and other agencies launched the Agility Prime program to support the certification of commercial and defense AAM concepts.[38] Recently, the FAA reached a "G-1" certification agreement for an AAM concept, detailing the specific requirements for commercial operation under the FAA's Part 23 certification framework.[39]

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[34] *See* Dominic Gates, *Electric Aviation Startup MagniX Opens New Headquarters and Production Facility in Everett*, THE SEATTLE TIMES (Jan. 19, 2021), https://www.seattletimes.com/business/boeing-aerospace/electric-aviation-startup-magnix-opens-new-headquarters-and-production-facility-in-everett.
[35] *See* MIT, *supra* note 29; *see also* Adam Cohen, *Advanced Air Mobility: Community Integration and Public Acceptance,* UC BERKLEY (Mar. 4, 2021), https://aam-cms.marqui.tech/uploads/aam-portal-cms/originals/542db455-f781-4109-8d43-94521d2e6553.pdf.
[36] *See* Lillian Gipson, *UTM 101*, NASA (June 26, 2020), https://www.nasa.gov/aeroresearch/utm-101.
[37] *See* MIT, *supra* note 29.
[38] U.S. Air Force, *AFWERX Agility Prime Announces, "Flying Car" Military Airworthiness, Infrastructure Milestones* (Dec. 20, 2020), https://www.af.mil/News/Article-Display/Article/2452683/afwerx-agility-prime-announces-flying-car-military-airworthiness-infrastructure.
[39] *See* Joby Aviation, *supra* note 28.

Noise and Emissions. Many AAM concepts rely on electric propulsion technology to operate and as a result, these aircraft contribute no direct pollutant emissions and produce little noise relative to conventional airplanes and large trucks. Developments in onboard energy storage, full and hybrid-electric engines, and resilient charging infrastructure will be critical to AAM deployment.[40] Low noise and pollutant emissions will also be necessary for community acceptance and utility of these aircraft across the nation, especially in residential areas.[41]

State and Local Participation. As stated previously, state and local governments may not enforce requirements regarding civil aviation, including safety regulations, the use of navigable airspace, and aircraft certification, because the federal government has pervasively occupied the field of civil aviation regulation through statutes and regulations.[42] The supremacy of federal authority has led to a consistent regulatory structure for all airspace users, ensuring safety and efficiency across the NAS.[43] However, as noted earlier, in the UAS context, states and cities have sought to enact laws and regulations that control or restrict UAS operations.[44] Additionally, according to GAO, the law in this area is in a state of flux.[45] Therefore, defining and delineating federal, state, and local responsibilities with respect to both small UAS and AAM will continue to be topics of discussion and need to be addressed as these operators are safely integrated into the NAS.

SUPERSONIC AIRCRAFT

Supersonic flight is any flight faster than the speed of sound, which, depending on altitude and ambient conditions, exceeds 750 miles per hour.[46] The Concorde aircraft, the product of a state-subsidized joint venture between Aerospatiale of France and the British Aircraft Corporation, performed the first commercial trans-oceanic supersonic passenger flight in 1976, flying at twice the speed of sound and at a cruising altitude of 65,000 feet. Concorde flights could cut the duration of a subsonic trans-Atlantic flight in half. During its lifetime, more than 2.5 million passengers flew at supersonic speeds between New York and London and Paris, as well as some other routes from time to time, until fuel prices and a fatal accident resulted in the Concorde's retirement from passenger service in 2003. No supersonic passenger aircraft have flown since that time.[47]

According to the FAA, several factors contributed to the Concorde's retirement, including high operating costs, such as high fuel consumption and the high cost of meeting environmental restrictions on sonic booms.[48] Unlike traditional subsonic flight, the Concorde created a shock wave when traveling at supersonic speeds, experienced by people on the ground as a "sonic boom" as it passed overhead. This aircraft noise led to many countries banning supersonic flights from their

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40 *See* Robin Lineberger et al., *Advanced Air Mobility: Can the United States Afford to Lose the Race?*. DELOITTE INSIGHTS (Jan. 26, 2021), https://www2.deloitte.com/us/en/insights/industry/aerospace-defense/advanced-air-mobility.html.
41 *See* Mark Huber, *Noise Critical Issue for eVTOL Acceptance*, AVIATION INT'L NEWS (Jan. 29, 2020), https://www.ainonline.com/aviation-news/general-aviation/2020-01-29/noise-critical-issue-evtol-acceptance.
42 *See, e.g.*, City of Burbank, *supra* note 21.
43 *See* GAO Report, *supra* note 22.
44 *See id.*
45 *See id.*
46 CRS, *Supersonic Passenger Flights*, 1 (Nov. 14, 2018), *available at* https://fas.org/sgp/crs/misc/R45404.pdf.
47 *Id.* at 1–3.
48 *See id. See also* FAA, *Fact Sheet – Supersonic Flight* (Nov. 25, 2020), https://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=22754.

airspace, limiting the ability for the Concorde to travel at supersonic speeds and thus the number of practical Concorde routes.[49]

There has been a revival of interest in supersonic flight since the end of the Concorde. In addition to the time that can be saved traveling at supersonic speeds, the advancement of technology, materials and composites, aircraft design, and manufacturing can make the aircraft lighter, improve fuel efficiency, and reduce noise impacts. Several domestic and foreign airlines have already purchased options for supersonic aircraft in design and testing, and there is interest at state and local levels to establish designated airspace corridors for the testing of civilian supersonic aircraft over land in the United States.[50]

Supersonic Aircraft Integration

There are several challenges to the integration of supersonic aircraft into U.S. airspace, beyond aircraft design and public acceptance. Today, there are no internationally agreed upon certification, noise, or emission standards for supersonic aircraft under development.[51] As such, there is concern that varying operational standards from country-to-country will prohibit many routes at the start. For instance, FAA regulations currently prohibit supersonic flight in the continental United States that cause a sonic boom.[52]

Congress sought to address some of these issues in the *FAA Reauthorization Act of 2018*. The law requires the FAA to exercise international leadership in the creation of federal and international policies and standards regarding the certification and operation of supersonic aircraft. The law also requires that the FAA issue notices of proposed rulemaking to update noise standards for supersonic aircraft and to modernize the application process to operate supersonic aircraft.[53]

Responding to the 2018 law, the FAA issued a proposed rulemaking in March 2020 to set takeoff and landing noise certification standards for new supersonic aircraft, and in January 2021, to facilitate supersonic flight testing and safe development of such aircraft, the FAA issued a final rule "modernizing the procedure for requesting a special flight authorization to operate in excess of

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[49] *See* CRS, *supra* note 46 at 1–3.
[50] *See, e.g.*, Thomas Black, *Buffet's NetJets to Buy 20 Supersonic Luxury Planes from Aerion*, BLOOMBERG, Mar. 3, 2021, https://www.bloomberg.com/news/articles/2021-03-03/buffett-s-netjets-to-buy-20-supersonic-luxury-planes-from-aerion *and* Ankit Ajmera, *Japan Airlines Invests $10 Million in Supersonic Jet Company Boom*, REUTERS, Dec. 5, 2017, https://www.reuters.com/article/us-boom-japan-airlines/japan-airlines-invests-10-million-in-supersonic-jet-company-boom-idUSKBN1DZ1N2; *see also* Office of the Governor of Kansas, *Governor Laura Kelly Announces Kansas, FAA Sign Deal for Supersonic Flight Corridor* (Dec. 17, 2020), https://governor.kansas.gov/governor-laura-kelly-announces-kansas-faa-sign-deal-for-supersonic-flight-corridor/ *and* Supersonic Flight Alliance, https://ssfa.aero/ (declaring its mission to "[c]reate a 800-mile civilian supersonic and hypersonic corridor over Eastern Washington in partnership with the FAA, State government and the aerospace industry").
[51] CRS, *supra* note 46 at 7.
[52] 14 C.F.R. § 91.817.
[53] *See* Pub. L. 115-294, § 181.

Mach 1 over land."[54] However, "[o]utside the context of special flight authorizations under this final rule, the FAA continues generally to prohibit civil supersonic flight over land in the United States."[55]

OTHER FUTURE AEROSPACE TECHNOLOGIES

As the aerospace sector continues to innovate, there are several promising technologies, designs, and operational concepts with the potential to transform U.S. transportation. Advances in fully automated aircraft, commercial space transportation launch vehicles, engine designs, hydrogen-propulsion technology, and lightweight composite wings and parts are under development and promise more efficient and sustainable operations. Additionally, the industry is embracing alternative fuels and fuel sources as part of a comprehensive effort to reduce aviation's environmental footprint. Technologies to improve air traffic management and space situational awareness will need to meet the demands of new airspace entrants, aerospace technologies, and business models. In the upcoming decades, American innovation and ingenuity will propel the aerospace sector in the global landscape and improve the safety, availability, and efficiency of transportation for future generations.

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[54] FAA, *Noise Certification of Supersonic Airplanes*, Proposed Rule, 85 Fed. Reg. 20431 (Apr. 13, 2020), *available at* https://www.govinfo.gov/content/pkg/FR-2020-04-13/pdf/2020-07039.pdf; FAA, *Special Flight Authorizations for Supersonic Aircraft*, Final Rule, 86 Fed. Reg. 3782 (Jan. 15, 2021), *available at* https://www.govinfo.gov/content/pkg/FR-2021-01-15/pdf/2021-00113.pdf. *See also* FAA, *Press Release – FAA Announces Final Rule to Facilitate the Reintroduction of Civil Supersonic Flight* (Jan. 6, 2021), https://www.faa.gov/news/press_releases/news_story.cfm?newsId=25581.
[55] *Id.*

WITNESSES

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