THE FLIGHT PATH TO TRANSPORTATION EQUITY: HOW LEGISLATORS CAN ENSURE THAT URBAN AIR MOBILITY DELIVERS INCLUSIVE TRANSPORTATION SERVICES

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Cities across the United States face the major issue of inequity in transportation where the benefits and costs of transportation systems are not fairly distributed amongst the population. Ironically, the increase in mobility options available in urban areas, such as car sharing and micromobility, has worsened an already inequitable transportation system. Cities will face another new form of transportation services soon: Urban Air Mobility ("UAM"). The goal of the UAM industry is to offer a safe, convenient, and affordable form of daily transportation available to the masses. Commuters would request on-demand electric Vertical Takeoff and Landing ("eVTOL") aircraft (think "flying cars") to take them between ad hoc locations within a city.

This Note argues that, without proper planning, UAM will worsen an already inequitable transportation system. Additionally, existing federal aviation regulations and state and local laws pose a significant barrier for the UAM industry to serve as an equitable form of transportation. This Note concludes by offering solutions that federal, state, and local lawmakers should adopt to ensure that UAM contributes to transportation equity.

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I. INTRODUCTION

The dynamic nature of cities has attracted the attention of innovators seeking to transform urban mobility and offer more efficient and sustainable transportation options.[1] In cities across the United States, private mobility companies offer car-sharing, ridesharing, and micromobility (*e.g.*, bikes, scooters) sharing as alternatives to public transportation and use of a private vehicle.[2] Ironically, however, this rise in mobility options over the past decade has worsened the nation's already inequitable transportation system.[3]

Cities throughout the United States face the major issue of inequity in transportation[4] where the benefits and costs of transportation systems are not fairly distributed amongst the population.[5] For example, almost 3 million people in the Chicago region live in economically isolated areas that lack affordable, safe, and reliable transportation.[6] People living in these areas are less likely to own a car

1. *See* JAVIER BURRIEZA, NEW MOBILITY OPTIONS AND URBAN MOBILITY: CHALLENGES AND OPPORTUNITIES FOR TRANSPORT PLANNING AND MODELLING 29–30 (Momentum ed., 2019), https://h2020-momentum.eu/wp-content/uploads/2020/01/MOMENTUM-D2.1-New-Mobility-Options-and-Urban-Mobility.pdf [https://perma.cc/KEH8-3TTG].

2. *See* MARTHA FEDOROWICZ, EMILY BRAMHALL, MARK TRESKON & RICHARD EZIKE, NEW MOBILITY AND EQUITY: INSIGHTS FOR MEDIUM-SIZE CITIES 6 (Urb. Inst. ed., 2020), https://www.urban.org/sites/default/files/publication/102529/new-mobility-and-equity-insights-in-medium-cities.pdf [https://perma.cc/74PK-BS3U].

3. *See id.* at 7–8.

4. *See* Robert D. Bullard, *Addressing Urban Transportation Equity in the United States*, 31 FORDHAM URB. L.J. 1183, 1183 (2003).

5. *See* TODD LITMAN, EVALUATING TRANSPORTATION EQUITY: GUIDANCE FOR INCORPORATING DISTRIBUTIONAL IMPACTS IN TRANSPORT PLANNING 2 (Victoria Transp. Pol'y Inst. ed., 2022), https://www.vtpi.org/equity.pdf [https://perma.cc/N2MK-BPYG].

6. *See* Anna Duan, *Mobility is Justice: Centering Equity in Transportation Planning*, METRO. PLAN. COUNCIL (July 21, 2020), https://www.metroplanning.org/news/8913/Mobility-is-Justice-Centering-equity-in-transportation-planning [https://perma.cc/8BY8-3P62].

and therefore must rely on unpredictable public transit schedules.[7] As a result, they face significantly longer and inconsistent commute times,[8] which serve as a barrier to maintaining employment and accessing essential needs.[9]

While greater transportation options theoretically should decrease inequities in transportation in cities,[10] new mobility services are often concentrated in areas that already have robust transportation options such as in the major parts of a city or in wealthier suburbs, thus exasperating transportation inequity.[11] Additionally, these new transportation options may be cost prohibitive for some people unless the government steps in to provide subsidies and fee incentives to satisfy the mobility companies' need to turn a profit.[12] Promoting equity is not always easy for state and local governments to do as private mobility companies often roll out their technology quickly, leaving governments struggling to provide clear and consistent guidelines, regulations, and incentives to maximize equitable access to these new transportation options.[13]

Cities will face another new form of transportation services soon: Urban Air Mobility ("UAM").[14] Technology and transportation companies seek to solve the issue of city gridlock and traffic congestion through UAM which involves using three-dimensional airspace to transport people and goods to their destinations more quickly than can be accomplished by ground transportation.[15] These companies have invested substantially in developing electric Vertical Takeoff and Landing ("eVTOL") aircraft which require nothing more than a small platform to depart.[16] Commuters would request these on-demand "flying cars" to take them between ad hoc locations within a city or between a city and the suburbs.[17]

The goal for UAM developers is to offer a safe, convenient, and affordable form of daily transportation available to the masses.[18] UAM could become a regular transportation option for a wide range of passengers as eVTOL aircraft become integrated with other transportation types and infrastructure in cities around the United States.[19]

7. *Id.*

8. *Id.*

9. *Id.*

10. *See* STUART COHEN & CLARRISSA CABANSAGAN, A FRAMEWORK FOR EQUITY IN NEW MOBILITY 10 (TransForm ed., 2017), https://www.transformca.org/sites/default/files/A%20Framework%20for%20Equity%20in%20New%20Mobility_FINAL.pdf [https://perma.cc/5NSY-WAFP].

11. FEDOROWICZ ET AL., *supra* note 2, at 7.

12. *See id.* at 6–7.

13. *Id.* at 5.

14. Timothy M. Ravich, *On-Demand Aviation: Governance Challenges of Urban Air Mobility ("UAM")*, 124 PENN ST. L. REV. 657, 659–60 (2020).

15. *Id.*

16. *Id.* at 661.

17. *Id.* at 658–60.

18. UBER ELEVATE, FAST-FORWARDING TO A FUTURE OF ON-DEMAND URBAN AIR TRANSPORTATION 3 (2016), https://evtol.news/__media/PDFs/UberElevateWhitePaperOct2016.pdf [https://perma.cc/2DJV-G8CA].

19. A. M. DIETRICH, EVTOL AIRCRAFT: WHAT THEY ARE & WHY THEY MATTER 4 (Cmty. Air Mobility Initiative ed., 2020), https://static1.squarespace.com/static/5d27bb3e330ac30001dc14fd/t/5eab41f30561f8

This Note argues that, without proper planning, UAM has the potential to serve as a catalyst for further inequity in transportation because new mobility options can exacerbate inequities already present within transportation systems across the United States.[20] Failing to develop a regulatory framework that promotes an equitable transportation system now may result in private companies controlling the growth of the UAM industry, resulting in disparities of access.[21]

In Part II, this Note discusses transportation inequity in the United States, including its major causes. Additionally, Part II provides an overview of the current state of the UAM industry and its outlook. In Part III, this Note analyzes existing federal aviation regulations and state and local laws that will pose a significant barrier for the UAM industry to serve as an equitable form of transportation. Lastly, Part IV advises that transportation equity should be a major consideration that guides the Federal Aviation Administration ("FAA") and state and local governments as they determine how to regulate the UAM industry. Part IV also offers solutions to ensure that UAM contributes to transportation equity.

II. BACKGROUND

A. Transportation Inequity in the United States

Cities across the United States do not have equitable transportation systems.[22] Despite decades of social, economic, and technological gains, equitable access to transportation remains a material issue.[23] Not only does access to transportation serve as a foundation for a healthy economy,[24] transportation also is linked to one's quality of life,[25] as it impacts access to employment, education, healthcare, necessities, and services.[26]

An equitable transportation system is one that provides affordable, convenient, reliable, and safe transportation options[27] while fairly sharing its benefits

2abf7dbbf1/1588281866166/EVTOLAircraft_CAMI.pdf [hereinafter EVTOL AIRCRAFT: WHAT THEY ARE] [https://perma.cc/QN79-JGHC].

20. FEDOROWICZ ET AL., *supra* note 2, at 7.

21. ALEXSANDRA GOMEZ, URBAN AIR MOBILITY 1 (Am. Plan. Ass'n ed., 2021), https://planning-org-uploaded-media.s3.amazonaws.com/publication/download_pdf/PAS-QuickNotes-91.pdf [https://perma.cc/X3ZW-NX34].

22. *See* Wesley Jenkins, *The Unequal Commute: Examining Inequities in Four Metro Areas' Transportation Systems*, URB. INST. (Oct. 6, 2020), https://www.urban.org/features/unequal-commute [https://perma.cc/KW2Y-ZRJW].

23. Bullard, *supra* note 4, at 1883.

24. Matt Caywood & Alex Roy, *Universal Basic Mobility Is Coming. And It's Long Overdue*, BLOOMBERG: CITYLAB (Oct. 3, 2018, 1:18 PM), https://www.bloomberg.com/news/articles/2018-10-03/universal-basic-mobility-is-a-human-right [https://perma.cc/ZC42-38FE].

25. *Smart Growth and Transportation*, U.S. ENV'T PROT. AGENCY, https://www.epa.gov/smartgrowth/smart-growth-and-transportation (last visited Oct. 29, 2022) [https://perma.cc/H7FZ-NS77].

26. Bullard, *supra* note 4, at 1184.

27. INVESTING IN PLACE, INVESTING IN COMMUNITIES WITH THE GREATEST NEED: DEFINING "TRANSPORTATION EQUITY OPPORTUNITY ZONES" IN METRO'S LONG RANGE TRANSPORTATION PLAN 1 (2016), https://investinginplace.org/wp-content/uploads/2017/02/equitybriefone-pager-final.pdf [https://perma.cc/Z3K2-TPU5].

and costs across the communities that are impacted by them.[28] For example, such a system offers options for elderly people, people with disabilities, and people who work late at night in remote parts of town.[29] Just as importantly, an equitable transportation system consults community members in the planning, investment, and implementation of transportation systems.[30] Decades-long demographic shifts and government funding policy have moved the transportation landscape in the United States away from meeting this definition.[31] Higher-income individuals and younger people have increasingly been moving into the heart of major cities, causing the cost of living in these areas to increase.[32] This trend has forced lower-income residents to move into the less dense suburbs, which has created significant challenges for them as public transportation options are often scarce in these areas.[33] At the same time, government funding for transportation has historically prioritized automobile infrastructure.[34] Nationally, 80% of federal surface transportation funding is directed towards highway infrastructure and 20% is directed towards public transportation.[35] This funding policy has fueled a transportation system where the car is king, leaving affordable urban transit systems to toil with insufficient funding, limited opportunities for growth,[36] overcrowding, delays, reduced services, few connection options, and aging fleets.[37]

The inequitable transportation system in the United States encompasses three broad categories of inequity.[38] First, affordable transportation services often do not reach communities located outside the urban center, thus creating a form of geographic inequity where essential needs outside of the urban center are not met.[39] New mobility services—such as shared bikes, scooters, and cars—have the potential to solve this issue, but these options are often concentrated in high-income areas, like the urban core, as transportation companies seek to maximize use and profit by locating their services near those who can afford them.[40] Second, a form of social inequity exists since transportation benefits and burdens

28. *See* LITMAN, *supra* note 5, at 2, 6.

29. Tiasia O'Brien, *The Growing Problem of Transit Equity*, ENTREPRENEUR (Jan. 3, 2021), https://www.entrepreneur.com/article/361133 [https://perma.cc/4JDU-XJCA].

30. INVESTING IN PLACE, *supra* note 27, at 2.

31. FEDOROWICZ ET AL., *supra* note 2, at 3.

32. *Id.*

33. *Id.*

34. *Id.*

35. Jenna Fortunati, *It's Time to Fund Public Transportation and Highways Equally*, TRANSP. FOR AM. (Nov. 12, 2020), https://t4america.org/2020/11/12/its-time-to-fund-public-transportation-and-highways-equally/ [https://perma.cc/EUJ2-WPN8].

36. *See* Jonathan English, *Why Public Transportation Works Better Outside the U.S.*, BLOOMBERG: CITYLAB (Oct. 10, 2018, 8:00 AM), https://www.bloomberg.com/news/articles/2018-10-10/why-public-transportation-works-better-outside-the-u-s [https://perma.cc/EC83-MWCV]; Bullard, *supra* note 4, at 1186–87.

37. Norma Torres, *Why It's Critical to Tackle the Inequities in Transportation Infrastructure*, HILL (Apr. 28, 2021, 3:00 PM), https://thehill.com/blogs/congress-blog/politics/550722-why-its-critical-to-tackle-the-inequities-in-transportation [https://perma.cc/PK3D-BSTZ].

38. Bullard, *supra* note 4, at 1188.

39. *Id.*

40. FEDOROWICZ ET AL., *supra* note 2, at 6–7.

are not distributed evenly across the population.[41] Instead, those on the lower end of the socioeconomic spectrum disproportionately experience the burdens.[42] For example, transit subsidies often favor investment in expensive new commuter bus and rail lines that are aimed towards wealthier discretionary commuters while lower-income travelers are limited to the same inadequate public transit services.[43] These regressive policies that favor higher-income commuters contrast with progressive policies that seek to subsidize low-income travelers and offer effective transportation at an affordable price point.[44] Lastly, procedural inequity exists where lawmakers make transportation decisions without consulting a diverse community of public stakeholders from all socioeconomic statuses.[45]

Transportation inequity remains a significant issue.[46] Ultimately, a lack of affordable and convenient transportation options isolates those with lower socioeconomic status from accessing employment, education, healthcare, and services that could improve their quality of life.[47] The federal government has recently implemented new programs to combat transportation inequity including reviewing the distribution of transportation funds to states to ensure the funds are utilized equitably and investing in public transportation and new infrastructure.[48] State and local governments have also invested in expanding public transportation and improving data collection efforts to identify unmet demand for transit services and to better allocate resources.[49] Additionally, new forms of mobility increase the number of transportation options available to people and thus have the potential to reduce the transportation equity gap.[50] This potential may not be realized, however, unless legislators and policymakers build equity goals and strategy into their plans to promote and regulate new transportation options as they emerge.[51]

B. Urban Air Mobility

Technology and transportation companies are investing substantially in UAM, the on-demand transportation of people and goods by air using small electric aircraft, usually seating two to nine passengers, that can vertically take off and land.[52] These eVTOL aircraft are essentially flying cars that require nothing more than a small platform to takeoff from, such as the top of a building or a

41. Bullard, *supra* note 4, at 1188.
42. *Id.*
43. *Id.* at 1189.
44. *See* LITMAN, *supra* note 5, at 3.
45. Bullard, *supra* note 4, at 1188.
46. *Id.* at 1183.
47. *Id.* at 1184.
48. Torres, *supra* note 37.
49. TRANSITCENTER, EQUITY IN PRACTICE: A GUIDEBOOK FOR TRANSIT AGENCIES 46–48, https://www.cnt.org/sites/default/files/publications/Equity-in-Practice.pdf [https://perma.cc/4R33-GEJ6].
50. FEDOROWICZ ET AL., *supra* note 2, at 7.
51. *Id.* at 6–7.
52. Ravich, *supra* note 14, at 658–60.

floating barge.[53] Designers will incorporate multiple rotors into these aircraft, not only for redundancy and safety purposes, but also to allow the aircraft to fly vertically like a helicopter and to achieve higher forward speeds like an airplane.[54] Commuters can request an eVTOL aircraft on-demand to transport them short distances within a city or between the city and the suburbs.[55] UAM companies seek to market their services by appealing to the commuter who wants to avoid traffic in the city and ultimately increase the productivity and leisure time that is lost while commuting.[56]

1. Major UAM Developers and eVTOL Design

As futuristic as on-demand aerial transportation may sound, UAM developers plan to commence commercial operations as early as 2024.[57] More than 150 UAM developers worldwide[58]—including Archer Aviation, Joby Aviation, Airbus, Lilium, Volocopter, Hyundai, and Vertical Aerospace—are racing towards certification and the commencement of commercial service.[59] Start-ups and established corporations backed by venture capitalists are betting big[60] as analysts anticipate that the UAM industry will be worth $1 trillion by 2040 and up to $9 trillion by 2050[61] and could represent 4% of domestic trips by 2050 with 400 million passengers.[62]

One leader in the UAM industry, Archer Aviation, is designing its first eVTOL aircraft, called the "Maker," to have a top speed of 150 miles per hour ("mph") and a range of sixty miles.[63] While the Maker will not be feasible for long distance travel initially, Archer anticipates that customers will utilize these aircraft mostly for trips of twenty to thirty miles.[64] Incorporating fast-charging

53. *Id.* at 659, 661.

54. *Roadmap to Sustainable Air Mobility*, ARCHER AVIATION INC. (Oct. 16, 2018), https://www.archer.com/master-plan [https://perma.cc/C5VY-ASUN].

55. Ravich, *supra* note 14, at 659.

56. *Id.* at 661.

57. *Id.* at 659; *Is Joby Aviation Wall Street's New Darling of eVTOL?*, FLYING (Sept. 23, 2021), https://www.flyingmag.com/story/news/joby-morgan-stanley/ [https://perma.cc/85LY-49DF].

58. Thom Patterson, *5 Ways eVTOL Got Bigger in 2021*, FLYING (Dec. 27, 2021), https://www.flyingmag.com/5-ways-evtol-got-bigger-in-2021/ [https://perma.cc/J5F7-5YBD].

59. *Is Joby Aviation Wall Street's New Darling of eVTOL?*, *supra* note 57.

60. Ravich, *supra* note 14, at 659.

61. *Is Joby Aviation Wall Street's New Darling of eVTOL?*, *supra* note 57.

62. Rohit Goyal, Colleen Reiche, Chris Fernando & Adam Cohen, *Advanced Air Mobility: Demand Analysis and Market Potential of the Airport Shuttle and Air Taxi Markets*, SUSTAINABILITY, July 2, 2021, at 2; *see* Dafang Wu, *Enplaned Passengers*, DWU CONSULTING (Mar. 7, 2015), https://dwuconsulting.com/air-traffic/articles/enplaned-passengers [https://perma.cc/2RYX-WH29].

63. *Introducing Maker*, ARCHER AVIATION INC., https://www.archer.com/maker (last visited Oct. 29, 2022) [https://perma.cc/CC69-R7CP].

64. Shift: A Podcast About Mobility, *Archer Aviation's Geoff Bower Sees Smooth Skies for Air-Mobility Era (Episode 115)*, AUTO. NEWS, at 22:00 (Sept. 20, 2021, 12:00 AM), https://www.autonews.com/shift-podcast-about-mobility/archer-aviations-geoff-bower-sees-smooth-skies-air-mobility-era [https://perma.cc/VL55-WEFE].

capabilities so that operators can charge the aircraft in under ten minutes between flights will allow the aircraft to keep up with customer demand.[65]

Recognizing that the industry's safety record will prove to be a major factor in earning the public's trust,[66] Archer also plans to incorporate redundancies within the Maker's systems so that no failure will result in a complete loss of power to the rotors.[67] Highly reliable electric motors will turn the rotors at low speeds to significantly reduce noise[68] to only forty-five decibels at 2,000 feet, approximately 1,000 times quieter than a helicopter.[69] Initially, pilots will fly the Maker, since no clear pathway to certifying autonomous flight in the national airspace system currently exists under FAA regulations.[70] Archer, however, is developing autonomous technologies internally so that these technologies can be incorporated into the aircraft once the certification process becomes clearer.[71] Autonomy will eliminate the challenges associated with hiring and training qualified pilots[72] and reduce operating costs.[73] The Maker has caught the attention of United Airlines, too.[74] Archer and United announced a $1 billion deal where United would purchase eVTOL aircraft to transport customers from city centers to the air carrier's major hubs.[75] Building a fleet of eVTOL aircraft is a major step in United's effort to reduce carbon dioxide emissions and ultimately decarbonize air travel in the long-term.[76]

Joby Aviation, another major eVTOL manufacturer, is on track for aircraft certification in 2023 followed by joint venture commercial operations with Uber in 2024.[77] Joby's eVTOL aircraft will incorporate six electric motors, seating for up to four people, a range of at least 150 miles, and a top speed of 200 mph.[78] In

65. *See id.*

66. *See* A. M. DIETRICH, COMPONENTS OF PUBLIC ACCEPTANCE FOR AAM & UAM 2 (Cmty. Air Mobility Initiative ed., 2020), https://static1.squarespace.com/static/5d27bb3e330ac30001dc14fd/t/5f512185b3a9286771d5758e/1599152525417/CAMI+-+Public+Acceptance+for+UAM.pdf [https://perma.cc/H3AZ-ZQYJ] [hereinafter COMPONENTS OF PUBLIC ACCEPTANCE].

67. *Introducing Maker*, *supra* note 63.

68. *Roadmap to Sustainable Air Mobility*, *supra* note 54.

69. Woodrow Bellamy III, *Archer Aviation VP of Design Talks Developing a Human-centric eVTOL*, AVIATION TODAY (Oct. 28, 2021), https://www.aviationtoday.com/2021/10/28/archer-aviation-vp-design-talks-developing-human-centric-evtol/ [https://perma.cc/AS6T-V2WT].

70. Shift: A Podcast About Mobility, *supra* note 64, at 22:50.

71. *Id.*

72. Jeremy Kariuki, *The Top Four Issues Facing the Future of eVTOLs*, FLYING (Sept. 29, 2021), https://www.flyingmag.com/four-issues-evtol-future/ [https://perma.cc/DHS6-NSJW].

73. Robin Riedel, *'Speeding Up Everyday Travel': Lilium Prepares for Takeoff*, MCKINSEY & CO. (Nov. 19, 2021), https://www.mckinsey.com/industries/aerospace-and-defense/our-insights/speeding-up-everyday-travel-lilium-prepares-for-takeoff [https://perma.cc/65JL-YAMG].

74. Tomi Kilgore, *Archer Aviation Gets a $1 Billion Order from United Airlines, on the Same Day It Announces a Deal to Go Public*, MARKETWATCH, https://www.marketwatch.com/story/archer-aviation-gets-a-1-billion-order-from-united-airlines-on-the-same-day-it-announces-a-deal-to-go-public-11612983906 (Feb. 10, 2021, 3:04 PM) [https://perma.cc/LP3F-7DZ4].

75. *Id.*

76. *Id.*

77. *See Our Story*, JOBY AVIATION, https://www.jobyaviation.com/about/ (last visited Oct. 29, 2022) [https://perma.cc/3LY9-2986].

78. *Electric Aerial Ridesharing*, JOBY AVIATION, https://www.jobyaviation.com (last visited Oct. 29, 2022) [https://perma.cc/5NCG-FXAZ].

July 2021, the company began the process to receive approval from the FAA so that it can commence its all-electric aerial ridesharing service soon after aircraft certification.[79]

Airbus, a major manufacturer of commercial aircraft, has also recently entered the UAM industry after it unveiled its flying air taxi called the "CityAirbus."[80] The CityAirbus's unique propulsion system features eight propellers that are optimized for hover and cruise efficiency while operating in the city.[81] The ultralow propeller speeds of 950 revolutions per minute will ensure a low acoustic footprint of only seventy decibels during landing and sixty-five decibels at altitude.[82] The eVTOL, which will be piloted remotely, will carry four passengers up to fifty miles at a top speed of seventy-five mph.[83] The aircraft will also incorporate autonomous technologies for fixed routes of up to fifteen minutes in length.[84] The first test flights are scheduled for 2023.[85]

2. UAM Industry Business Model

The United Nations predicts that two out of every three people will live in cities and urban centers by 2050.[86] This means that an additional 2.5 billion people could inhabit the world's cities by the midpoint of the century.[87] The United States alone will see its own proportion of the population living in urban areas rise to 89%.[88] As a result of this global shift to urban living, cities will experience an increase in demand for urban mobility, and demand for ground transportation in these areas will eventually reach its limit.[89] The UAM industry seeks to solve this issue by rising above the congestion and offering an alternative, sustainable

79. *Joby Begins Journey to Becoming First eVTOL Airline*, JOBY AVIATION (July 29, 2021), https://www.jobyaviation.com/news/joby-begins-journey-become-first-evtol-airline/ [https://perma.cc/L5FF-5QR9].

80. Bryan Hood, *Airbus Unveils a 4-Passenger Electric Air Taxi to Help City Dwellers Get Around Town*, ROBB REP. (Sept. 23, 2021), https://robbreport.com/motors/aviation/airbus-cityairbus-nextgen-flying-taxi-1234637400/ [https://perma.cc/4BFA-A327].

81. *Id.*

82. *See id.*; *CityAirbus NextGen: Safe, Sustainable, and Integrated Urban Air Mobility*, AIRBUS, https://www.airbus.com/innovation/zero-emission/urban-air-mobility/cityairbus.html#concept (last visited Oct. 29, 2022) [https://perma.cc/92EG-L4M4]; Dan Parsons, *City Airbus eVTOL Prototype Makes First Flight in Germany*, AVIATION TODAY (May 6, 2019), https://www.aviationtoday.com/2019/05/06/city-airbus-evtol-prototype-makes-first-flight-germany/ [https://perma.cc/RBP3-QNGQ].

83. Hood, *supra* note 80.

84. Brian Garrett-Glaser, *CityAirbus Demonstrator Makes First Untethered Flight*, AVIATION TODAY (Jan. 10, 2020) https://www.aviationtoday.com/2020/01/10/cityairbus-demonstrator-makes-first-untethered-flight/ [https://perma.cc/E8TE-A8N3].

85. Hood, *supra* note 80.

86. *Around 2.5 Billion More People Will Be Living in Cities by 2050, Projects New UN Report*, UNITED NATIONS: DEP'T ECON. & SOC. AFFS. (May 16, 2018), https://www.un.org/development/desa/en/news/population/2018-world-urbanization-prospects.html [https://perma.cc/CR93-JU5R].

87. *Id.*

88. *U.S. Cities Factsheet*, UNIV. MICH. CTR. SUSTAINABLE SYS. (Sept. 2021), https://css.umich.edu/publications/factsheets/built-environment/us-cities-factsheet [https://perma.cc/HEA3-L8LC].

89. VOLOCOPTER, THE ROADMAP TO SCALABLE URBAN AIR MOBILITY 6 (2021), https://www.volocopter.com/content/uploads/20210324_Volocopter_WhitePaper_Roadmap_to_scalable_UAM_m.pdf [https://perma.cc/L6HY-LMMG].

form of transportation through the use of eVTOL aircraft flying in low-altitude airspace.[90]

Interestingly, the UAM industry aspires to make eVTOL transportation services available and affordable to the masses,[91] thereby differentiating itself from private helicopter charter services, which are prohibitively expensive for most consumers and often not offered in dense urban areas due to noise and safety concerns.[92] As one executive of a major UAM manufacturer stated, the UAM industry is "going to be an absolute disrupter" and will "democrati[z]e air travel."[93] The World Economic Forum has called on the UAM industry to provide equitable access and affordable consumer pricing and to integrate into cities' existing transportation networks.[94] The ultimate goal is to offer UAM services at the same price as automobile ridesharing services or less.[95]

Even Uber, a major investor and developer in the UAM industry, sees the industry's aspirations as a lofty goal, stating that "[e]VTOL vehicles [initially] are likely to be very expensive"[96] as the UAM industry first emerges by offering low-volume flights along a small set of fixed routes in select cities.[97] For example, Uber predicts that an eVTOL flight from San Francisco to San Jose, a straight-line distance of forty-three miles and travel time of fifteen minutes, would initially cost $129.[98] The same trip by car using UberX would cost $111 and take almost two hours; utilizing both UberX and public transit would cost $31 and take over two hours.[99] If Uber could reach peek volumes of flights by increasing aircraft availability and demand, the same eVTOL trip to San Jose could cost as low as $20.[100]

Similarly, Vertical Aerospace, a UAM manufacturer that is working to introduce eVTOL aircraft in São Paulo, Brazil, hopes to see an operating cost of $1 per passenger over a twenty-five-mile trip if volumes can reach into the hundreds of aircraft.[101] As an executive of a leading cost analytics service supporting the UAM industry stated, manufacturers are "pushing hard" to reach the desired price point and "[t]here's definitely optimism throughout the [industry]" that they will meet their goals.[102]

90. *See id.* at 6–7.

91. *See, e.g.*, *Roadmap to Sustainable Air Mobility*, *supra* note 54.

92. UBER ELEVATE, *supra* note 18, at 7.

93. Tom Phillips, *Electric Air Taxis to Make Their Debut in Brazil's Most Congested City*, GUARDIAN (Sept. 21, 2021, 3:36 PM), https://www.theguardian.com/world/2021/sep/21/electric-air-taxis-sao-paulo-brazil [https://perma.cc/G4R5-K8JY].

94. *Principles of the Urban Sky: The Seven UAM Principles*, WORLD ECON. F. (Sept. 15, 2020), https://www.weforum.org/reports/principles-of-the-urban-sky/principles-of-the-urban-sky [hereinafter *The Seven UAM Principles*] [https://perma.cc/3GVA-UM6R].

95. *Roadmap to Sustainable Air Mobility*, *supra* note 54.

96. UBER ELEVATE, *supra* note 18, at 4.

97. Ravich, *supra* note 14, at 663.

98. UBER ELEVATE, *supra* note 18, at 1.

99. *Id.*

100. *See id.* at 1, 3–4.

101. Phillips, *supra* note 93.

102. Nick Zazulia, *How Uber Plans to Make Money Off Urban Air Mobility*, AVIATION TODAY (July 24, 2019), https://www.aviationtoday.com/2019/07/24/uber-price-make-money/ [https://perma.cc/85UF-BRWJ].

Ultimately, high utilization of UAM aircraft will allow operators to amortize the fixed costs over more flights.[103] High volumes of aircraft and increased demand for trips will drive cost down, thus making UAM more affordable to the masses.[104]

III. ANALYSIS

Existing federal aviation regulations and state and local laws, or the lack thereof, will pose a significant barrier for the UAM industry to reach its goal of offering high volumes of flights at lower costs from convenient locations. The result will be an exasperation of transportation inequity. This Part will examine three major categories of legislation that will act as barriers to UAM becoming a leader in alleviating transportation inequity: certification of aircraft and regulation of commercial air taxi services, airspace, and vertiport regulations.

A. Aircraft Certification and Regulation of Commercial Air Taxi Services

The UAM industry faces major hurdles of aircraft certification and commercial air carrier certification by the FAA, which will drive up the cost of eVTOL aircraft and operations.[105] The eVTOL aircraft exhibit a novel design, so UAM manufacturers will have to navigate the FAA's aircraft certification process, which is notoriously slow and costly, before production aircraft are cleared to fly.[106] Additionally, after aircraft certification, eVTOL operators must obtain a 135 Air Carrier or Operating Certificate under 14 *Code of Federal Regulations* ("C.F.R.") Part 135 ("Part 135") before revenue flights can commence,[107] which is also a time-consuming and expensive process.[108] Higher costs yield further inequities in transportation,[109] including geographic inequity where services are only located near those who can afford them and social inequity where investment policies and transportation benefits favor wealthier discretionary commuters.[110]

103. *Roadmap to Sustainable Air Mobility*, *supra* note 54.

104. UBER ELEVATE, *supra* note 18, at 72.

105. *See id.* at 4.

106. *See id.*

107. *14 CFR Part 135 Air Carrier and Operator Certification: General Information*, FED. AVIATION ADMIN., https://www.faa.gov/licenses_certificates/airline_certification/135_certification/general_info/ (Apr. 1, 2020) [https://perma.cc/7VHR-Y9JN].

108. Tulinda Larsen, *UAM Flights Need to Comply with FAA Part 135 Operating Regs*, AIRINSIGHT GRP. (Sept. 18, 2019), https://airinsight.com/uam-insight-18-september-2019-uam-flights-need-to-comply-with-faa-part-135-operating-regs/ [https://perma.cc/4T92-K499].

109. *See The Seven UAM Principles*, *supra* note 94.

110. *See* discussion *supra* Section II.A.

1. Aircraft Certification

The UAM industry will challenge the existing aircraft certification process due to the novel features of eVTOL aircraft.[111] Generally, powered aircraft are certified for flight by the FAA as an airplane or as a rotorcraft.[112] Airplanes rely on horizontal, fixed wings to produce lift while rotorcraft utilize rotor blades (or rotary wings) to generate lift.[113] In contrast, eVTOL aircraft can be thought of as a hybrid of the two: an aircraft that can fly like an airplane with horizontal, fixed wings and a rotorcraft that uses propellers to climb and descend vertically.[114] Some eVTOL designs will incorporate a tilt-thrust method where the positions of the propellers can be adjusted to produce upward lift during vertical takeoff and landing (like a rotorcraft) and forward thrust during cruise flight while the fixed wings will produce the lift (like an airplane).[115] Other designs will incorporate multiple rotors that remain in fixed positions with some propellers producing upward lift (like a rotorcraft) and some producing forward thrust (like an airplane).[116] Additional unique features include high voltage architectures, electric propulsion,[117] energy storage, and autonomous capabilities.[118] As a result of these unique designs that are unlike those found on traditional airplanes and rotorcraft, there will be a lot of trial and error under the existing certification process, which will increase time and cost to certify the aircraft due to the different routes that will be available to UAM manufacturers.[119]

UAM manufacturers can choose to certify their aircraft as a 14 C.F.R. Part 23 normal category airplane ("Part 23 Certification"), a 14 C.F.R. Part 27 normal category rotorcraft ("Part 27 Certification"), or as a special class aircraft under 14 C.F.R. Part 21.17(b) ("Part 21.17(b) Certification").[120] Part 23 Certification

111. AMANDINE COUDERT, BRANDON EICKHOFF, SHAWN KIMMEL, PHIL ZAGER & BOOZ ALLEN HAMILTON, A ROADMAP TO CERTIFY FLYING CARS 5 (Air Traffic Control Ass'n ed., 2019), https://www.atca.org/Uploads/symposium/2019/WhitePapers/A%20Roadmap%20to%20Certify%20Flying%20Cars.pdf [https://perma.cc/8NRF-ELWU].

112. *See Standard Airworthiness Certification: Regulations*, FED. AVIATION ADMIN., https://www.faa.gov/aircraft/air_cert/airworthiness_certification/std_awcert/std_awcert_regs/regs/ (June 29, 2022) [https://perma.cc/L6LF-LXC9].

113. *An Introduction to the Different Types of Rotorcraft*, MONROE AEROSPACE (May 19, 2021), https://monroeaerospace.com/blog/an-introduction-to-the-different-types-of-rotorcraft/ [https://perma.cc/B4Z2-MBGZ].

114. *See, e.g.*, J. George Gorant, *Watch: This New Hybrid eVTOL Flies Like an Airplane and Hovers Like a Chopper*, ROBB REP. (Nov. 30, 2021), https://robbreport.com/motors/aviation/emagic-one-hybrid-evtol-1234649881/ [https://perma.cc/SWS9-UFSU].

115. *See* Jordan Golson, *EVTOL: What They Are, When They'll Be Here, and How They'll Change How You Get Around*, INVERSE (Apr. 20, 2021), https://www.inverse.com/innovation/flying-cars-are-already-here [https://perma.cc/2Z3U-ZBT9].

116. *See id.*

117. Kelsey Reichmann, *eVTOL Certification: Where Are They Now and the Challenges that Still Lie Ahead*, AVIATION TODAY (May 24, 2021), https://www.aviationtoday.com/2021/05/24/evtol-certification-now-challenges-still-lie-ahead/ [https://perma.cc/B4P5-XETD].

118. COUDERT ET AL., *supra* note 111, at 5, 7.

119. *See id.* at 5.

120. Mallory S. Graydon, Natasha A. Neogi & Kimberly S. Wasson, *Guidance for Designing Safety into Urban Air Mobility: Hazard Analysis Techniques*, AM. INST. AERONAUTICS & ASTRONAUTICS SCITECH 2020 F., Jan. 2020, at 2, https://www.researchgate.net/profile/Mallory-Graydon/publication/338399413_Guidance_for

provides standards for certifying aircraft weighing 19,000 pounds or fewer and offering a maximum capacity of nineteen passengers.[121] It incorporates performance-based standards and consensus-based compliance methods[122] that are developed by ASTM International,[123] an organization that develops and publishes technical standards for testing and classifying materials.[124] Part 27 Certification provides standards for certifying rotorcraft with a passenger capacity of nine or fewer and weighing up to 7,000 pounds.[125] Part 21.17(b) Certification offers an alternate avenue to certification where an eVTOL aircraft would be certified as a "special class" aircraft, which involves the FAA tailoring the certification process to each aircraft model individually by implementing existing airworthiness requirements from other aircraft types as necessary.[126]

Each pathway to certification has its advantages and disadvantages.[127] The industry is trending towards the Part 23 Certification process due to the regulation's recent overhaul that makes it "more inclusive of [new] technology."[128] Part 23 Certification, however, misses the unique flight-test techniques and aircraft-handling characteristics associated with vertical flight because this regulation is intended for airplanes.[129] Furthermore, Part 23 Certification and Part 27 Certification will require applicants to seek special conditions and exemptions to deal with unique aircraft features that are not found on typical normal category aircraft and rotorcraft.[130] But this exemption framework will prove to be unsustainable in the long term because the FAA will not be able to efficiently

_Designing_Safety_into_Urban_Air_Mobility_Hazard_Analysis_Techniques/links/5ed0119a4585152945 1b4902/Guidance-for-Designing-Safety-into-Urban-Air-Mobility-Hazard-Analysis-Techniques.pdf [https://perma.cc/RFN9-PWN6].

121. *New Certification Rule for Small Airplanes Becomes Effective*, FED. AVIATION ADMIN. (Sept. 5, 2017), https://www.faa.gov/newsroom/new-certification-rule-small-airplanes-becomes-effective [https://perma.cc/CH86-Z7AQ].

122. *Id.*

123. *GAMA Applauds FAA's Acceptance of Means of Compliance Consensus Standards*, AVIATIONPROS (Sept. 29, 2020), https://www.aviationpros.com/education-training/trade-associations-events/press-release/21156322/general-aviation-manufacturers-association-gama-gama-applauds-faas-acceptance-of-means-of-compliance-consensus-standards [https://perma.cc/X3FW-GSCU]; *see* Joe Koury, *Committee F44 on General Aviation Aircraft*, ASTM INT'L, https://www.astm.org/get-involved/technical-committees/committee-f44/scope-f44 (last visited Oct. 29, 2022) [https://perma.cc/7MEZ-52CJ] ("The scope of the [ASTM] Committee [on General Aviation Aircraft] shall be the development and maintenance of standards and guidance materials intended to be acceptable means of compliance for general aviation aircraft rules and regulations around the world.").

124. *ASTM International*, AM. NAT'L STANDARDS INST. WEBSTORE, https://webstore.ansi.org/sdo/astm (last visited Oct. 29, 2022) [https://perma.cc/U8B2-Z6MH].

125. 14 C.F.R. § 27.1(a) (1999).

126. 14 C.F.R. § 21.17(b) (2021); Jennifer Trock & Alexander Ellis Matthews, *FAA Releases Policy for the Type Certification of Unmanned Aircraft Systems*, LEXOLOGY (Feb. 25, 2020), https://www.lexology.com/library/detail.aspx?g=327ecf2c-9608-457d-bf17-b5d80f40e202 [https://perma.cc/2MTF-4WYP].

127. *See* Graydon et al., *supra* note 120, at 2–3.

128. Kerry Lynch, *Flexibility Over Certification Boosts Confidence in Urban Air Mobility Progress*, FUTUREFLIGHT (July 6, 2021), https://futureflight.aero/news-article/2021-07-06/flexibility-over-certification-boosts-confidence-urban-air-mobility [https://perma.cc/GZ62-BJVR].

129. *Id.*

130. *See* Graydon et al., *supra* note 120, at 2.

accommodate the rise in exemption requests as the number of eVTOL aircraft models seeking certification increases.[131]

Part 21.17(b) Certification presents a major benefit over both Part 23 and Part 27 Certifications in that it accommodates any type of design immediately.[132] Still, this avenue to certification presents significant issues to the industry, including greater difficulty for manufacturers to plan for the cost and certification effort without clear standards and the inability to obtain reciprocal airworthiness agreements with other countries that do not recognize the FAA's "special class" aircraft category.[133]

Without clear certification standards, UAM manufacturers are bound to face a higher burden of compliance costs as the industry and regulators determine the best path forward.[134] As a result, the cost of eVTOL aircraft will increase as the burden of compliance will be passed along to the consumer,[135] eventually yielding a more inequitable transportation system that can only be utilized by high-income passengers.[136]

2. Regulation of Commercial Air Taxi Services

In addition to the manufacturers obtaining certification of the aircraft itself, eVTOL operators must obtain a 135 Air Carrier or Operating Certificate under Part 135 ("Part 135 Certification") before they may begin offering commercial transportation services.[137] Part 135 Certification requires the air carrier applicant to demonstrate that it can offer the highest level of safety to its customers.[138] Not only will Part 135 Certification help to ensure a safe industry, state and city legislatures will also be more comfortable approving eVTOL flights in metropolitan areas if operators have been certified by the FAA for meeting established safety standards.[139]

Not all air carrier operations are of equal risk, so the FAA has designed its regulations to require that operators flying higher-risk flights face more stringent safety standards compared to operators flying lower-risk flights.[140] Since UAM is an emerging industry, the level of risk mitigation for on-demand eVTOL flights is unclear, which complicates Part 135 Certification.[141]

131. *See* Trock & Matthews, *supra* note 126.
132. *See* Graydon et al., *supra* note 120, at 2.
133. *Id.* at 2–3.
134. *See* COUDERT ET AL., *supra* note 111, at 5.
135. *See* UBER ELEVATE, *supra* note 18, at 4.
136. *See The Seven UAM Principles*, *supra* note 94.
137. *14 CFR Part 135 Air Carrier and Operator Certification: General Information*, *supra* note 107.
138. MATTHEW SIMMONDS, MIKE MCCULLOUGH & STEVE KIPER, STARTING A PART 135 OPERATION: A GUIDE TO APPLYING FOR CHARTER CERTIFICATION 2 (Nat'l Bus. Aviation Ass'n ed., 2018), https://nbaa.org/wp-content/uploads/2018/06/starting-a-part-135-operation.pdf [https://perma.cc/3VS8-V7VX].
139. Larsen, *supra* note 108.
140. SIMMONDS ET AL., *supra* note 138, at 2–3.
141. *See* Graydon et al., *supra* note 120, at 3.

Part 135 certificates require three steps of certification: (1) type; (2) kind; and (3) scope.[142] UAM operators first choose the type of certificate they wish to pursue, which can either be an Air Carrier Certificate or an Operating Certificate.[143] An Air Carrier Certificate will permit the applicant to conduct interstate and foreign transportation while an Operating Certificate will limit the applicant solely to intrastate transportation.[144]

Next, the applicant determines the kind of operations it wishes to conduct.[145] Since UAM operators will mostly conduct on-demand flights, they will likely select the "on-demand" kind,[146] which generally limits operations to unscheduled flights in airplanes with thirty seats or fewer and a maximum payload capacity of 7,500 pounds or any rotorcraft.[147] As an alternative, the "commuter kind" permits both scheduled operations and on-demand operations.[148]

Third, the applicant must assess the scope of its desired operations.[149] The "basic scope" will generally limit the certificate holder to operating a maximum of five aircraft with nine passenger seats or less, which will be flown by a maximum of five named pilots.[150] As an alternative, the "standard scope" does not have any preset limits, but the applicant must apply for and obtain approval for each type of operation he or she wishes to conduct.[151] The approved operations will then be listed in the Operations Specifications ("Ops Specs") of the "standard scope" certificate, and the operator cannot deviate from the specified operations without obtaining additional approval and an updated Ops Specs.[152] UAM operators will have to pursue the "standard scope" to operate large quantities of eVTOL aircraft.[153] It is at this point that determining the Ops Specs—which may contain limits on geographic areas for operations, airport and landing area limitations, weather minimums, and other operating limitations[154]—will prove to be challenging as the risk levels of eVTOL operations in various environments are not yet known.[155]

These uncertainties will add to the already existing challenges associated with the traditionally cumbersome and costly Part 135 Certification.[156] The application process for Part 135 Certification typically takes two years to complete and can cost upwards of $90,000, or even more for the most complex

142. *14 CFR Part 135 Air Carrier and Operator Certification: General Information*, *supra* note 107.
143. *Id.*
144. *Id.*
145. *Id.*
146. Graydon et al., *supra* note 120, at 3.
147. *14 CFR Part 135 Air Carrier and Operator Certification: General Information*, *supra* note 107.
148. *Id.*
149. *Id.*
150. *Id.*
151. *Id.*
152. *Id.*
153. *See* Graydon et al., *supra* note 120, at 3.
154. RICHIE LENGEL, EVERYTHING EXPLAINED FOR THE PROFESSIONAL PILOT 288 (13th ed. 2019).
155. *See* Graydon et al., *supra* note 120, at 3.
156. *See* Larsen, *supra* note 108.

applications.[157] The FAA has yet to provide further guidance on how Part 135 Certification can be streamlined for eVTOL operators, and as a result, the certification process may unnecessarily add to the cost of UAM operations, deter potential operators from entering the industry,[158] or worse, lure prospective operators into intentionally conducting illegal commercial operations.[159] An operator conducts an illegal on-demand charter for compensation if it does so without first having attained Part 135 Certification, even if the pilot is properly certified and the aircraft is airworthy.[160] The FAA has warned about the increasing number of illegal charter operations that pose as certified charter operations.[161] Operators who conduct illegal charter flights often do so because of the high costs and long wait times associated with Part 135 Certification.[162] Not only do these illegal operators jeopardize the safety and integrity of the charter industry, but they also degrade fair competition[163] and the aviation industry's reputation.[164] Ultimately, illegal charters impact the financial viability of the industry.[165]

Aviation regulators globally have been criticized for not doing enough to combat illegal charter operations.[166] Legitimate charter businesses have demanded stiffer penalties, including fines and the revocation of pilot's licenses, to deter illegal charter operations.[167] Since 2019, the FAA has implemented a number of tactics to curb the rise in illegal charters including providing additional training to aviation safety inspectors and pilots, briefing the insurance industry on what to look for and avoid when underwriting charter flights,[168] encouraging people to report suspected illegal operations, and advising the public to research the charter business before flying.[169] Additionally, the Department of Justice has

157. Dean Kantis, *Purchasing an Existing Part 121, 135, or 145 Certificate: Part 2–Steps in Purchasing or Applying for a Certificate*, UNIVERSAL WEATHER & AVIATION, INC. (May 14, 2014), https://www.universalweather.com/blog/purchasing-an-existing-part-121-135-or-145-certificate-part-2-steps-in-purchasing-or-applying-for-a-certificate/ [https://perma.cc/KXF3-HGSY].

158. *See* Larsen, *supra* note 108.

159. *See Beware the Growing Trend of Illegal Jet Charters*, XO, https://flyxo.com/blog/beware-growing-trend-illegal-jet-charters/ (last visited Oct. 29, 2022) [https://perma.cc/8DKH-PTS3].

160. *Id.*

161. *Id.*

162. *Id.*

163. *NATA Forms Illegal Charter Task Force to Address a Top Industry Concern*, NAT'L AIR TRANSP. ASS'N (May 30, 2018), https://www.nata.aero/pressrelease/default.aspx?id=969 [https://perma.cc/ZF6A-5YPW].

164. GORDON GARDINER, JAMES JORDAN & JEFF CHIANG, HFW & ASBAA SURVEY: ILLEGAL CHARTER 4 (Holman Fenwick Willan ed., 2021), https://www.hfw.com/downloads/002600-HFW-AsBAA-Survey-Illegal-Charter-Jan-2021.pdf [https://perma.cc/8DW6-XYDU].

165. *Id.*

166. *Id.* at 5.

167. *Id.* at 4–5.

168. Jim Tise, *FAA's Illegal Air Charter Effort Moving Forward on Several Fronts*, MEDIUM (Dec. 20, 2021), https://medium.com/faa/faas-illegal-air-charter-effort-moving-forward-on-several-fronts-a157f12f9fdd [https://perma.cc/AZ8H-BCRE].

169. *See id.*

begun to file civil lawsuits against offenders at the direction of the FAA and impose high-dollar civil penalties.[170]

The lack of guidance on navigating Part 135 Certification[171] and the risk of illegal charter operations[172] will add to the cost of eVTOL operations[173] and impact the financial viability and growth of the UAM industry,[174] thus yielding further inequities in cities' transportation systems.[175]

B. Airspace

After receiving aircraft certification and Part 135 Certification, the UAM industry will find that the complexities of the national airspace system will limit the volumes of eVTOL flights.[176] Lower volumes of eVTOL flights will increase the cost to consumers,[177] which will result in further inequities in transportation,[178] including geographic inequity where flights will only be offered near those who can afford them and social inequity where the benefits of UAM favor wealthier discretionary commuters.[179]

A high number of eVTOL operations conducted at low altitudes in urban areas, which are often located underneath complex airspace and near major airports, will stretch the capabilities of the air traffic control system as it is managed today.[180] The primary purpose of air traffic control is to maintain separation of aircraft and to manage the flow of air traffic.[181] Air traffic control's ability to provide these services is limited by air traffic controller workload.[182] Once demand for air traffic control services exceeds capacities, ground delays commence where aircraft are held at their departure points for minutes or hours at a time until capacity exceeds demand.[183]

The national airspace system consists of five different types of controlled airspace where air traffic control services are provided: Classes A, B, C, D, and

170. David G. Mayer, *AINsight: FAA Actively Pursues Illegal Flight Ops*, AINONLINE (Jan. 10, 2019, 6:28 PM), https://www.ainonline.com/aviation-news/blogs/ainsight-faa-actively-pursues-illegal-flight-ops [https://perma.cc/Y2WJ-Z38K].

171. *See* Larsen, *supra* note 108.

172. *See Beware the Growing Trend of Illegal Jet Charters*, *supra* note 159.

173. *See* Larsen, *supra* note 108.

174. *See* GARDINER ET AL., *supra* note 164, at 4.

175. *See The Seven UAM Principles*, *supra* note 94.

176. *See* Aleksandar Bauranov & Jasenka Rakas, *Designing Airspace for Urban Air Mobility: A Review of Concepts and Approaches*, *in* 125 PROGRESS IN AEROSPACE SCIENCES 1, 2 (I. Gursul & M.F. Platzer eds., 2021).

177. *See* UBER ELEVATE, *supra* note 18, at 3–4.

178. *See The Seven UAM Principles*, *supra* note 94.

179. *See* discussion *supra* Section II.A.

180. *See* Bauranov & Rakas, *supra* note 176, at 2.

181. FED. AVIATION ADMIN., PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE 15-7 (2016) [hereinafter PILOT'S HANDBOOK].

182. *Id.*

183. FAA AIR TRAFFIC ORG., TRAFFIC FLOW MANAGEMENT IN THE NATIONAL AIRSPACE SYSTEM 21 (2009), https://www.fly.faa.gov/Products/Training/Traffic_Management_for_Pilots/TFM_in_the_NAS_Booklet_ca10.pdf [https://perma.cc/BF4R-E4WU].

E.[184] Class A airspace generally includes all airspace at and above 18,000 feet.[185] Class B airspace surrounds the nation's busiest airports and contains complex layers and sectors of airspace that start and end at specified altitudes.[186] Examples of Class B airports surrounded by Class B airspace include Los Angeles (LAX), Atlanta (ATL), Chicago (ORD), New York (JFK and LGA), and San Francisco (SFO).[187] When near a major Class B airport, the Class B airspace begins at the surface level and typically extends upwards to 10,000 feet above sea level.[188] As the horizontal distance from the Class B airport increases, the base of the Class B airspace rises to a specified altitude and extends upwards, typically still to 10,000 feet above sea level.[189] The Class B airspace profile can best be pictured as an upside-down wedding cake with each layer corresponding to a ring of airspace.[190] Given the large volumes of aircraft departing from and arriving to these major Class B airports, all aircraft operating in the airspace are required to receive a clearance from air traffic control prior to entering it and must comply with air traffic control separation instructions.[191]

Class C and D airspace surround airports that have fewer aircraft operations than Class B airports.[192] These airspace types have a smaller footprint than Class B airspace, with Class C airspace usually extending up to 4,000 feet above the airport with a ten-nautical-mile radius and Class D airspace usually extending up to 2,500 feet above the airport.[193] Each aircraft must establish two-way radio communications with air traffic control prior to entering the Class C or D airspace and must comply with air traffic separation services.[194]

Class E airspace is any controlled airspace that is not classified as Class A, B, C, or D airspace.[195] It usually begins at either 700 feet or 1,200 feet above ground level.[196] Airspace below Class E is designated as uncontrolled Glass G airspace, which extends from the surface up to the base of Class E.[197] Air traffic control has no authority or responsibility to control air traffic in Class G airspace.[198] Contact with air traffic control is usually not required when operating in Class E airspace unless the flight takes place during instrument meteorological

184. PILOT'S HANDBOOK, *supra* note 181, at 15-2.
185. *Id.*
186. *Id.*
187. Robert N. Rossier, *Class B Basics: The ABCs of Class B Airspace*, AVWEB, https://www.avweb.com/flight-safety/class-b-basics-the-abcs-of-class-b-airspace/ (June 12, 2019) [https://perma.cc/CJL3-2B9E].
188. PILOT'S HANDBOOK, *supra* note 181, at 15-2.
189. *See id.*
190. *Id.*
191. *Id.*
192. *See id.*
193. *Id.*
194. *Id.*
195. *Id.*
196. *Id.* at 15-3.
197. *Id.*
198. *Id.*

(nonvisual) conditions.[199] Unless a special restriction applies, contact with air traffic control is never required in Class G airspace.[200]

UAM flights will occur in all types of controlled airspace, except Class A airspace (the floor of this airspace is much too high and therefore unfeasible for short flights), assuming the national airspace system remains structured the same.[201] Large volumes of eVTOL aircraft will quickly overwhelm air traffic control as it is managed now,[202] especially in Class B airspace, which largely involves aircraft flying established and charted arrival and departure procedures as they arrive at and depart from major airports.[203] These charted procedures greatly reduce air traffic control workload[204] as both air traffic control and pilots know the charted path and altitudes that will be flown when departing from or arriving at an airport without the need for multiple communications and air traffic control clearances.[205] Charted procedures ultimately yield an increase in the capacity of controlled airspace and availability of air traffic control services.[206]

In contrast to charted arrival and departure procedures, which begin and end at a designated point such as an airport or an airborne waypoint,[207] eVTOL aircraft will conduct short flights within controlled airspace between potentially an infinite number of possible departure and arrival points within a city.[208] Without the ability to chart all of these possible routes, air traffic control workload would increase and airspace capacity would diminish.[209] The air traffic control system, therefore, will not be able to manage large volumes of flights, thus preventing the industry from achieving lower operating costs[210] and promoting transportation equity.[211]

C. Vertiport Regulations

The UAM industry will rely heavily on a physical infrastructure network called vertiports.[212] Vertiports will serve as takeoff and landing sites for eVTOL aircraft,[213] accommodate passengers, and offer ground support and

199. *See id.*
200. *See id.*
201. Bauranov & Rakas, *supra* note 176, at 2.
202. *See id.*
203. *See* Rossier, *supra* note 187.
204. *See* FED. AVIATION ADMIN., INSTRUMENT PROCEDURES HANDBOOK 1-26 (2017) [hereinafter INSTRUMENT PROCEDURES].
205. *See id.* at 3-15.
206. *See id.* at 1-26.
207. *See id.* at 1-26–1-27.
208. *See* UBER ELEVATE, *supra* note 18.
209. *See* INSTRUMENT PROCEDURES, *supra* note 204, at 1-26.
210. *See* UBER ELEVATE, *supra* note 18, at 3, 5.
211. *See The Seven UAM Principles*, *supra* note 94.
212. NAT'L AIR TRANSP. ASS'N, URBAN AIR MOBILITY: CONSIDERATIONS FOR VERTIPORT OPERATION 3 (2019), https://www.nata.aero/assets/Site_18/files/GIA/NATA%20UAM%20White%20Paper%20-%20FINAL%20cb.pdf [https://perma.cc/747D-RPPN].
213. VOLOCOPTER, *supra* note 89, at 25.

maintenance.[214] Existing buildings, such as the top of a parking garage or flat-roof building, can be readily converted for use as a vertiport, or new infrastructure can be built.[215] Vertiports will need to be conveniently located throughout a city for the UAM industry to reach the high volumes of flights[216] necessary to reduce costs for consumers.[217] Otherwise, higher costs and further transportation inequities will result.[218]

Currently, no comprehensive regulatory guidance governing vertiport operations exists.[219] Vertiports are more likely to be operated as private-use facilities,[220] meaning that they will be privately owned and operated and require the owner's permission prior to use.[221] The FAA does not regulate private facilities and instead leaves this task to state and local legislatures.[222] At least sixteen states have passed laws that regulate, explicitly or implicitly, vertiports.[223] Illinois requires vertiports to have specified markings and minimum dimensions, flight path approach angles, and obstruction clearances[224] before it will grant a certificate of approval to the vertiport.[225] California plans to develop a regulatory framework where the California Department of Transportation will assess vertiports' effects on surrounding communities and issue permits to owners to operate them.[226] This comprehensive regulatory void may discourage early investment in vertiports as many localities may refuse to issue required permitting or licensing to build the facilities to support eVTOL aircraft.[227] Additionally, without comprehensive regulatory guidance, the UAM industry will need to adopt multiple business model variations to comply with differing state and local government policies.[228] The result will be higher operating costs for eVTOL operators.[229]

214. NAT'L AIR TRANSP. ASS'N, *supra* note 212, at 3.

215. VOLOCOPTER, *supra* note 89, at 25.

216. Tore Johnston, Robin Riedel & Shivika Sahdev, *To Take Off, Flying Vehicles First Need Places to Land*, MCKINSEY & CO. (Aug. 31, 2020), https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/to-take-off-flying-vehicles-first-need-places-to-land [https://perma.cc/8GDZ-DXHH].

217. *See* UBER ELEVATE, *supra* note 18, at 3–4, 7.

218. *See The Seven UAM Principles*, *supra* note 94.

219. NAT'L AIR TRANSP. ASS'N, *supra* note 212, at 9.

220. *See id.* at 10.

221. Dawn M.K. Zoldi, *Vertiport Infrastructure: New Tech, Old Regulations*, INSIDE UNMANNED SYS. (Aug. 28, 2020), https://insideunmannedsystems.com/vertiport-infrastructure-new-tech-old-regulations/ [https://perma.cc/Y68U-XR3Y].

222. NAT'L AIR TRANSP. ASS'N, *supra* note 212, at 12.

223. Zoldi, *supra* note 221 ("At least 16 states have passed laws addressing heliports and, either explicitly or implicitly, vertiports.").

224. ILL. ADMIN. CODE tit. 92, § 14.APPENDIX G (2018).

225. ILL. ADMIN. CODE tit. 92, § 14.510 (2018).

226. *See generally* CAL. DEP'T TRANSP. DIV. AERONAUTICS, CALIFORNIA AVIATION SYSTEM PLAN 2020 (2020), https://dot.ca.gov/-/media/dot-media/programs/aeronautics/documents/2020-casp-preliminary-draftdor110620.pdf [https://perma.cc/4WTG-W6KA].

227. *See id.*

228. Zoldi, *supra* note 221.

229. *Id.*

Furthermore, since vertiports are expected to see high volumes of eVTOL aircraft and passengers, and will be built with scalability in mind,[230] surrounding communities will experience negative effects including additional traffic, noise, and potentially an increase in urban sprawl near the vertiports.[231] As a result, the UAM industry will face a significant challenge of gaining social and community acceptance[232] and potentially further social inequity as these communities experience the burdens that come with eVTOL flights.[233] To add to the difficulty, general aviation, particularly helicopters, has historically faced widespread public resistance due to noise and safety concerns, so the UAM industry should expect skepticism and an uphill battle toward gaining public trust if it does not take the right actions.[234] The rapid growth and high volumes of flights that the UAM industry aspires to see will not become reality unless the industry is met with acceptance by communities surrounding the vertiports.[235]

IV. RECOMMENDATION

As legislators prepare to regulate the UAM industry, they should consider changes to existing regulations and offer new legislation that promotes equitable transportation in UAM. The same three categories of legislation examined in the Part above—certification of aircraft and regulation of commercial air taxi services, airspace, and vertiport regulations—can successfully promote transportation equity if appropriate changes and additions are implemented.

A. Aircraft Certification and Regulation of Commercial Air Taxi Services

The FAA needs to incorporate predictable aircraft certification and Part 135 Certification pathways for UAM manufacturers and operators to follow so that eVTOL operating costs can be reduced. Unpredictability in the regulatory environment discourages investment and development of aircraft and diminishes investors' confidence in the UAM business model, ultimately driving up costs.[236] Reducing cost is critical to promoting equity in transportation.[237]

1. Aircraft Certification

The FAA should adopt a certification process designed specifically for eVTOL aircraft like its counterpart in Europe, the European Union Aviation Safety

230. *See* VOLOCOPTER, *supra* note 89, at 25–26.

231. *See* COMPONENTS OF PUBLIC ACCEPTANCE, *supra* note 66, at 4.

232. Raoul Rothfeld, Anna Straubinger, Mengying Fu, Christelle Al Haddad & Constantinos Antoniou, *Urban Air Mobility*, *in* DEMAND FOR EMERGING TRANSPORTATION SYSTEMS: MODELING ADOPTION, SATISFACTION, AND MOBILITY PATTERNS 267, 268 (Constantinos Antoniou, Emmanouil Chaniotakis & Dimitrios Efthymiou eds., 2020).

233. *See* discussion *supra* Section II.A.

234. *See* COMPONENTS OF PUBLIC ACCEPTANCE, *supra* note 66, at 2–3.

235. *See id.* at 3.

236. *See* Lynch, *supra* note 128.

237. *See The Seven UAM Principles*, *supra* note 94.

Agency ("EASA"), is planning to do.[238] The EASA has recognized that traditional European certification guidelines devised specifically to certify fixed-wing airplanes and rotorcrafts do not wholly apply to eVTOL aircraft.[239] As one EASA administrator stated, the current certification process for airplanes and rotorcrafts would be "very cumbersome" to adapt to the novel features of eVTOL aircraft, particularly the autonomous technologies that manufacturers plan to incorporate as their designs evolve.[240]

As a solution, the EASA devised its own airworthiness standards for eVTOL aircraft and subsequently published a "Special Condition" memorandum in July 2019 that provides "a complete set of dedicated technical specifications" for certifying this unique aircraft type.[241] The EASA's publication is the first standard proposed by any aviation authority for certifying eVTOL aircraft.[242]

The Special Condition offers objective certification requirements while providing the "necessary flexibility to certify innovative state-of-the-art designs and technology."[243] It includes certification standards that apply specifically to the design and operation of distributed propulsion systems (*i.e.*, two or more lift/thrust units), which differentiate eVTOL aircraft from a rotorcraft, and to the vertical takeoff and landing capability, which differentiates eVTOL aircraft from airplanes.[244]

The Special Condition also creates two certification categories, "enhanced" and "basic," that are proportionate to the nature and risk of the eVTOL aircraft's expected operations.[245] The "enhanced" category applies to eVTOL aircraft that will land and depart from congested areas, which carries a greater risk.[246] These aircraft will be required to demonstrate the ability to continue flight to a suitable vertiport in the event of a propulsion failure.[247] The "basic" category, in contrast, applies to eVTOL aircraft operating in lower-risk environments away from congested areas.[248] These aircraft need only demonstrate the ability to enter a

238. *Air Taxi Certification Isn't Impossible. Here's What the FAA, EASA, and Other Agencies Are Doing to Help*, TRANSP. UP (Feb. 23, 2019), https://transportup.com/editorials/air-taxi-certification-isnt-impossible-heres-what-the-faa-easa-and-other-agencies-are-doing-to-help/ [https://perma.cc/WF4P-6JLV].

239. *Id.*

240. Gerrard Cowan, *EASA Continues to Develop VTOL Certification Framework*, EVTOL (Oct. 5, 2020), https://evtol.com/features/easa-vtol-certification-framework-progress/ [https://perma.cc/7Z5H-B4VU] ("The current regulations are not fit for [the novel features of eVTOL aircraft] and it would be very cumbersome to adapt them, instead of starting with a blank sheet of paper.").

241. EUR. UNION AVIATION SAFETY AGENCY, DOC. NO: SC-VTOL-01, SPECIAL CONDITION FOR SMALL-CATEGORY VTOL AIRCRAFT, at i (2019), https://www.easa.europa.eu/sites/default/files/dfu/SC-VTOL-01.pdf [https://perma.cc/37KU-XBYW] [hereinafter SPECIAL CONDITION FOR SMALL-CATEGORY VTOL AIRCRAFT].

242. *EASA Publishes Vertical Takeoff and Landing Certification Special Condition*, NAT'L BUS. AVIATION ASS'N (July 18, 2019), https://nbaa.org/aircraft-operations/international/europe/easa-publishes-vertical-takeoff-landing-certification-special-condition/ [https://perma.cc/Y3CD-7RBW].

243. SPECIAL CONDITION FOR SMALL-CATEGORY VTOL AIRCRAFT, *supra* note 241, at 4.

244. *Id.*

245. *See id.* at 5.

246. *Id.*

247. *Id.*

248. *Id.*

controlled glide, or autorotation, in the event of a propulsion failure,[249] similar to the current certification requirements for rotorcrafts.[250]

The EASA has since published a "Proposed Means of Compliance" that clarifies the EASA's interpretation of its certification requirements detailed in the Special Condition and offers possible ways to demonstrate compliance with them.[251] The EASA will continue to provide updates as it gains better insight into the characteristics of eVTOL aircraft through consultation with manufacturers and public input.[252]

The EASA's approach to certifying eVTOL aircraft has thus far been fundamentally different from the FAA's approach.[253] As opposed to developing industry-wide certification standards, the FAA has planned to take an individual approach to each eVTOL model as manufacturers apply for certification.[254] The issue with the FAA's approach is that UAM manufacturers may face a higher burden of compliance during the certification process without clear, industry-wide standards that they can anticipate.[255] The FAA should adopt the EASA's planned approach to certifying eVTOL aircraft so that the UAM industry can expect clear standards that are consistent globally.[256] Predictability in the regulatory environment encourages investment and streamlines the certification process, ultimately reducing cost[257] and therefore promoting equity in transportation.[258]

2. Regulation of Commercial Air Taxi Services

The FAA should require Part 135 eVTOL operators to adopt a Safety Management System ("SMS"). Establishing eVTOL operators' Ops Specs during Part 135 Certification will prove to be challenging given the limited available data pertaining to risk in eVTOL operations.[259] A SMS, which is a set of procedures that operators establish and follow to manage risk in their commercial

249. *Id.*

250. *See generally* FED. AVIATION ADMIN., A.C. NO. 27-1B, CERTIFICATION OF NORMAL CATEGORY ROTORCRAFT (2016), https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_27-1B_with_changes_1-7.pdf [https://perma.cc/72K2-KRRQ] [hereinafter CERTIFICATION OF NORMAL CATEGORY ROTORCRAFT].

251. EUR. UNION AVIATION SAFETY AGENCY, DOC. NO: MOC SC-VTOL, PROPOSED MEANS OF COMPLIANCE WITH THE SPECIAL CONDITION VTOL 1 (2020), https://www.easa.europa.eu/sites/default/files/dfu/proposed_moc_sc_vtol_issue_1.pdf [https://perma.cc/LB76-24GJ] [hereinafter PROPOSED MEANS OF COMPLIANCE].

252. *See id.* at 1–2.

253. *Air Taxi Certification Isn't Impossible. Here's What the FAA, EASA, and Other Agencies Are Doing to Help*, *supra* note 238.

254. *EASA Publishes Vertical Takeoff and Landing Certification Special Condition*, *supra* note 242.

255. *See* COUDERT ET AL., *supra* note 111, at 5 (discussing how "[a]ircraft certification can act as a barrier for promoting rapid integration of emerging technologies").

256. *See EASA Publishes Vertical Takeoff and Landing Certification Special Condition*, *supra* note 242.

257. *See* Lynch, *supra* note 128.

258. *See The Seven UAM Principles*, *supra* note 94.

259. *See* LENGEL, *supra* note 154; *see also* Graydon et al., *supra* note 120, at 3.

aircraft operations,[260] will aid in gathering data,[261] thus reducing some of the uncertainty and cost in acquiring and maintaining a Part 135 certificate.[262]

The FAA does not currently require Part 135 commercial aircraft operators to implement a SMS for their operations.[263] Nevertheless, the FAA has advocated for commercial aircraft operators to adopt a SMS given that "the rapid increase in the volume and variety of aviation operations push the limitations of current safety strategies and practices."[264] An effective SMS requires the operator to follow a detailed roadmap for monitoring safety-related processes and risk-mitigation strategies.[265] Not only does a SMS promote safety, but it requires the operator to collect data pertaining to safety and risk levels.[266] The data in turn could serve as a useful tool when operators interface with the FAA to acquire, maintain, or modify their Part 135 certificates and Ops Specs.[267] The resulting reduction in cost in acquiring and maintaining a Part 135 certificate[268] will help promote equity in UAM.[269]

B. Airspace

The FAA should revise its structure of the national airspace system in preparation for eVTOL flights. UAM operations should be conducted in separate airspace called flyways and corridors, which should be designated as either Class E or G airspace. The FAA should create more flyways and corridors near urban areas to accommodate high volumes of air traffic so that eVTOL aircraft operating costs can remain low while also maintaining safety. Lower costs will help promote UAM as a more inclusive form of transportation.[270]

The FAA has created sectors of airspace called flyways and corridors for air traffic to transition through some of the nation's busiest airspace without needing to contact air traffic control.[271] The FAA created these sectors to prevent air traffic control from being overburdened by low-altitude aircraft flying in or

260. *See* ANDREAS BENTZ, A SYSTEM FOR MANAGING RISK 2 (Nat'l Bus. Aviation Ass'n ed., 2017), https://nbaa.org/wp-content/uploads/2017/12/20080519bentzsystemformanagingrisk.pdf [https://perma.cc/T6MB-XJ5J].

261. Brett L. Bergin, *Safety Management Systems: Management's Role at Part 135 Carriers*, AVIATION TECH. GRADUATE STUDENT PUBL'NS, Apr. 2013, at 5.

262. *See* Graydon et al., *supra* note 120, at 3; *see also* Lynch, *supra* note 128.

263. Bergin, *supra* note 261, at 4.

264. FED. AVIATION ADMIN., A.C. NO. 120-9, INTRODUCTION TO SAFETY MANAGEMENT SYSTEMS FOR AIR OPERATORS 2 (2006), https://nbaa.org/wp-content/uploads/2017/12/AC120-92.pdf [https://perma.cc/4V2D-RABW] [hereinafter INTRODUCTION TO SAFETY MANAGEMENT SYSTEMS FOR AIR OPERATORS].

265. *Id.*

266. Bergin, *supra* note 261, at 5.

267. *See* INTRODUCTION TO SAFETY MANAGEMENT SYSTEMS FOR AIR OPERATORS, *supra* note 264, at 18.

268. *See* Graydon et al., *supra* note 120, at 3; *see also* Lynch, *supra* note 128.

269. *See The Seven UAM Principles*, *supra* note 94.

270. *See id.*

271. *See* FED. AVIATION ADMIN., AERONAUTICAL INFORMATION MANUAL 3-5-5 (2021) [hereinafter AIM].

near busy airspace.[272] Additionally, sufficient radar coverage often is not available to monitor these low-flying aircraft.[273]

Flyways are charted areas beneath busy controlled airspace where aircraft can fly without needing to communicate with air traffic control.[274] Specified altitudes and directions found on aeronautical charts allow aircraft to safely navigate below busy airspace while maintaining visual separation from other aircraft also operating in the same flyway.[275] One of the best-known and most utilized flyways is the Hudson River Flyway where aircraft can navigate along the Hudson River below New York City's busy airspace above.[276] Small aircraft and helicopters regularly utilize the flyway to navigate around New York City without needing to overburden New York air traffic control.[277] Additional popular flyways exist in Chicago, Atlanta, Detroit, Houston, and Dallas,[278] all potentially strong markets for UAM.[279]

The FAA has also designed corridors, which are "holes" with lateral and vertical limits through busy airspace where aircraft can navigate without needing to maintain communications with air traffic control.[280] A popular corridor exists in Los Angeles that passes directly over Los Angeles International Airport ("LAX").[281] Aircraft can fly northbound or southbound between 3,500 and 4,500 feet without needing to receive a clearance from air traffic control as all airline traffic is either landing or departing LAX below.[282] With charted altitudes, directions, and speeds for aircraft to fly, the Los Angeles corridor has proven itself to be a safe and efficient route for low-flying aircraft as no midair collisions have occurred despite the unavailability of air traffic control services.[283]

Given the proven efficiency and safety of flyways and corridors,[284] the FAA should reevaluate airspace in urban areas and incorporate additional flyways and corridors for eVTOL aircraft to use. When designing these sectors of airspace, the FAA should require eVTOL aircraft to use existing navigation and traffic avoidance technology to further enhance safety and to increase the volumes of aircraft that can use the airspace at once.

272. Bill Cox, *Flying the Corridors*, PLANE & PILOT, https://www.planeandpilotmag.com/article/flying-the-corridors/ (Feb. 6, 2016) [https://perma.cc/9XLL-YSFJ].

273. *Id.*

274. *See* AIM, *supra* note 271, at 3-5-5–5-7.

275. *See id.*

276. Cox, *supra* note 272.

277. *See id.*

278. *Id.*

279. *See* NASA, URBAN AIR MOBILITY (UAM) MARKET STUDY 11–12 (Crown Consulting, Inc. et al. eds., 2018), https://www.nasa.gov/sites/default/files/atoms/files/uam-market-study-executive-summary-v2.pdf [https://perma.cc/3KT7-G8FD] [hereinafter URBAN AIR MOBILITY (UAM) MARKET STUDY].

280. *See* AIM, *supra* note 271, at 3-5-7.

281. Cox, *supra* note 272.

282. *Id.*

283. *Id.*

284. *See id.*

Aircraft regularly use a Global Positioning System ("GPS") to navigate more safely and efficiently.[285] This space-based radio navigation system uses signals from satellites to provide aircraft with accurate information on its position and velocity.[286] Aircraft use GPS to fly from waypoint to waypoint,[287] which are specified geographical locations marked on aeronautical navigation charts.[288] Use of a Wide Area Augmentation System ("WAAS"), an extremely accurate GPS navigational system that can provide both horizontal and vertical navigation,[289] has also become increasingly popular.[290] Aircraft equipped with WAAS can fly within a precisely contained flight path[291] with vertical and horizontal accuracies of better than three meters,[292] thus allowing for a greater margin of safety when navigating.[293]

The FAA could create new flyways and corridors in busy urban airspace by establishing new waypoints so that eVTOL aircraft equipped with GPS and WAAS can safely and accurately navigate between the waypoints and through the flyway or corridor. Given the ultraaccuracy of WAAS,[294] and the ability of autopilots to vertically and horizontally navigate the aircraft along the programmed flight path,[295] these flyways and corridors could have a relatively small horizontal and vertical footprint[296] and thus be minimally invasive into the surrounding controlled airspace.

Since eVTOL aircraft operating in flyways and corridors will not be communicating with air traffic control,[297] the FAA will need to devise special rules and regulations to ensure safety and adequate aircraft separation to support a large volume of eVTOL operations. As with the Hudson River Flyway and Los

285. *Aviation*, GPS.GOV, https://www.gps.gov/applications/aviation/ (Feb. 10, 2022) [https://perma.cc/UVV9-U9CR].

286. *Satellite Navigation—Global Positioning System (GPS)*, FED. AVIATION ADMIN., https://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/navservices/gnss/gps (last visited Nov. 1, 2022) [https://perma.cc/QPW9-5MTV].

287. *Aviation*, *supra* note 285.

288. *Waypoint*, SKYBRARY, https://skybrary.aero/articles/waypoint (last visited Oct. 29, 2022) [https://perma.cc/A4CU-BL5B].

289. *Satellite Navigation-Wide Area Augmentation System (WAAS)*, FED. AVIATION ADMIN., https://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/navservices/gnss/waas (last visited Nov. 1, 2022) [https://perma.cc/UZH9-QNUH].

290. *See WAAS - Benefits*, FED. AVIATION ADMIN., https://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/navservices/gnss/waas/benefits (Oct. 4, 2022) [https://perma.cc/8XQ5-5MUA].

291. *Id.*

292. *What is WAAS?*, GARMIN, https://www8.garmin.com/aboutGPS/waas.html (last visited Oct. 29, 2022) [https://perma.cc/UKR7-M4AA].

293. *WAAS - Benefits*, *supra* note 290.

294. *See What is WAAS?*, *supra* note 292; *see also WAAS - Benefits*, *supra* note 290.

295. *See Air Traffic Services Brief—Wide Area Augmentation System (WAAS)*, AIRCRAFT OWNERS & PILOTS ASS'N, https://www.aopa.org/advocacy/advocacy-briefs/air-traffic-services-brief-wide-area-augmentation-system-waas (Feb. 8, 2017) [https://perma.cc/WRB8-Y77H] ("[M]any autopilots are able to couple to the pseudo glideslope and give [pilots] lateral and vertical guidance . . . .").

296. *See* FED. AVIATION ADMIN., WAAS: WIDE AREA AUGMENTATION SYSTEM 2 (2021), https://www.faa.gov/sites/faa.gov/files/2021-12/WAAS_quick_facts.pdf [https://perma.cc/GW63-8K36] [hereinafter WAAS: WIDE AREA AUGMENTATION SYSTEM] (explaining that WAAS enables a "smaller . . . [flight path] footprint").

297. *See* AIM, *supra* note 271, at 3-5-5–3-5-7.

Angeles Corridor, the FAA could enforce speed restrictions to provide pilots more time to see and avoid other aircraft and to avoid overtaking.[298] Also, the FAA could require eVTOL aircraft to be equipped with a Traffic Alert and Collision Avoidance System ("TCAS") as certain aircraft operating under Part 135 are required to have.[299] TCAS increases pilot awareness of nearby aircraft and serves as a defense to midair collisions.[300]

Additionally, the FAA should design flyways and corridors with the expectation that autonomous eVTOL aircraft will eventually use the airspace. The UAM industry is developing autonomous eVTOL aircraft to improve safety and to achieve mass adoption through lower costs.[301] Autonomous eVTOL aircraft will likely operate under the concept of "free flight" where aircraft will maintain their own separation from each other and resolve potential conflicts using GPS, TCAS, and other enabling technologies[302] including cameras and sensors.[303] These technologies will serve as additional safety features for eVTOL aircraft flying in narrow corridors and flyways as small as one to three miles wide.[304]

Lastly, cities will need to work closely with the FAA as the corridors and flyways are designed. Cities and the FAA must jointly ensure that the corridors and flyways do not exasperate inequities by favoring one community over another or negatively impact certain communities.[305] Additionally, this airspace should be well-connected with ground transit systems to maximize the benefits of this new form of transportation.[306] Cities should become involved in the early stages of airspace design before federal airspace regulations preempt their ability to promote equitable access.[307]

298. Airspeed must not exceed 140 knots in the Hudson River Flyway and Los Angeles Corridor. *See* FED. AVIATION ADMIN., NEW YORK CLASS B AIRSPACE HUDSON RIVER AND EAST RIVER EXCLUSION SPECIAL FLIGHT RULES AREA (SFRA) (2009), https://www.faasafety.gov/files/gslac/courses/content/79/775/kneeboard.pdf [https://perma.cc/L3B8-54WF] [hereinafter NEW YORK CLASS B AIRSPACE SFRA]; *see also* Cox, *supra* note 272.

299. *See* 14 C.F.R. § 135.180 (1994); *see also Traffic Alert and Collision Avoidance System (TCAS)*, NAT'L BUS. AVIATION ASS'N, https://nbaa.org/aircraft-operations/communications-navigation-surveillance-cns/tcas/ (last visited Nov. 1, 2022) [https://perma.cc/H6VL-MC7J].

300. *Traffic Alert and Collision Avoidance System (TCAS)*, *supra* note 299.

301. Manfred Hader & Stephan Baur, *Urban Air Mobility: Targeting Autonomous Flight Operations from the Beginning*, ROLAND BERGER (Aug. 25, 2021), https://www.rolandberger.com/en/Insights/Publications/Urban-Air-Mobility-Targeting-autonomous-flight-operations-from-the-beginning.html [https://perma.cc/L8F7-N6XM].

302. *See* Joshua R. Bertram, Xuxi Yang, Marc W. Brittain & Peng Wei, *Online Flight Planner with Dynamic Obstacles for Urban Air Mobility*, AIAA AVIATION 2019 F., June 2019, at 1.

303. FUTUREFLIGHT, SOLVING THE AVIONICS PIECE OF THE UAM PUZZLE 3 (2020), https://cdn.cncms.aero/sites/default/files/uploads/fst_report/field_frp_pdf/2020/04/2020-FF-Avionics.pdf [https://perma.cc/6Z5N-X7U5].

304. *See id.* at 5.

305. L.A. DEP'T TRANSP., URBAN AIR MOBILITY: POLICY FRAMEWORK CONSIDERATIONS 27 (2021), https://ladot.lacity.org/sites/default/files/documents/ladot-uam-policy-framework-considerations.pdf [https://perma.cc/H8NJ-2HJE].

306. *See id.*

307. *See* Mark Zannoni, *Cities Must Develop Regulations Now for Urban Air Mobility*, MEDIUM (Mar. 5, 2020), https://medium.com/@MarkZannoni/cities-must-develop-regulations-for-urban-air-mobility-today-d73aafd559d1 [https://perma.cc/5VC6-43SS].

Given the availability of highly accurate navigational technologies and development of autonomous technologies, the FAA should create additional uncontrolled flyways and corridors in urban areas that would safely support high volumes of eVTOL aircraft and help reduce cost. Lower costs will help promote UAM as a more equitable form of transportation.[308]

C. Vertiport Regulations

Since the FAA does not regulate private facilities like vertiports,[309] state and local governments need to be prepared to regulate vertiports with the goal of promoting an equitable transportation system. While eVTOL flights are several years away, states and cities must begin preparing for the growth of UAM now.[310] Only through careful infrastructure planning will cities see a high adoption rate of UAM[311] and more inclusive access.[312]

1. Uniform State Legislation

The Uniform Law Commission ("ULC") should develop legislation for states to adopt as they prepare to regulate vertiports. If states develop legislation independently, eVTOL operators will be faced with different regulations and enforcement policies when building and operating vertiports.[313] As a result, eVTOL operators will likely need to adopt multiple business model variations, which will ultimately drive up operating costs.[314] Enlisting the ULC to devise a standardized governance framework will simplify the construction and operation of the vertiport network while reducing cost[315] and therefore promote more inclusive access.[316]

The ULC provides states with legislation that brings "clarity and stability to critical areas of state statutory law."[317] When many states expect to adopt legislation on a subject, and uniformity among all jurisdictions is a primary objective, the ULC can devise a "uniform" act for all states to adopt[318] by drawing on the expertise of lawyers, judges, state legislators, and subject-matter experts.[319]

308. *See The Seven UAM Principles*, *supra* note 94.

309. NAT'L AIR TRANSP. ASS'N, *supra* note 212, at 12–13.

310. *6 Steps Towards the Future of Urban Air Mobility*, AEROSPACE INDUS. ASS'N (Feb. 27, 2019), https://www.aia-aerospace.org/6-steps-uam/ [https://perma.cc/R56C-96D2].

311. *See* TRAVIS MASON & EMILIEN MARCHAND, URBAN AIR MOBILITY POLICY RECOMMENDATIONS FOR THE NEXT 5 YEARS 35 (Headway ed., 2020), https://www.oier.pro/ic-orig/LdDmrXrEQIMl/Inhalte/AB-20102-Headway-Whitepaper-3-31-20.pdf [https://perma.cc/M2TQ-GT7Y].

312. *See The Seven UAM Principles*, *supra* note 94.

313. Zoldi, *supra* note 221.

314. *Id.*

315. *Id.*

316. *See The Seven UAM Principles*, *supra* note 94.

317. *ULC: About Us*, UNIF. L. COMM'N, https://www.uniformlaws.org/aboutulc/overview (last visited Nov. 1, 2022) [https://perma.cc/26YY-SNUJ].

318. *What is a Uniform Act?*, UNIF. L. COMM'N, https://www.uniformlaws.org/acts/overview/uniformacts (last visited Nov. 1, 2022) [https://perma.cc/R8DR-PDX3].

319. *ULC: About Us*, *supra* note 317.

Representatives from each of the fifty-three member jurisdictions (*i.e.*, all fifty states, District of Columbia, Puerto Rico, and United States Virgin Islands)[320] are consulted during the drafting process so that the uniform act is representative of each of the jurisdictions' needs.[321] The result is a reduced compliance burden for businesses and stakeholders who conduct business in multiple states.[322]

Uniform acts generally follow the same path from conception to final adoption: proposal, study, drafting, style, reading for comment, and final reading.[323] Anyone who identifies a need for uniformity in state law can submit a proposal to the ULC.[324] Proposals that are expected to be well-received by most states will be assigned to a committee who will conduct an extensive examination of the subject, which includes consultations with stakeholders and other interested parties.[325] The ULC will then appoint a drafting committee to prepare a draft of the uniform act, which state representatives will later review, debate, and amend.[326] Each state representative votes on a proposed uniform act that has been presented for final reading, and if it receives a majority vote, each representative is expected to introduce and enact the uniform act in their state.[327]

The ULC has tackled some of the nation's major legal-tech problems[328] and therefore should be well-equipped to offer legislation for regulating vertiports. For example, the Uniform Automated Operation of Vehicles Act addresses various legal and policy issues raised by automated driving by reconciling automated driving with state motor vehicle codes so that autonomous vehicles can be subject to consistent regulations throughout the United States.[329] Additionally, the ULC has begun drafting a uniform law addressing tort liability and defenses related to the use of aerial drones.[330]

States expecting a demand for eVTOL aircraft should likewise collaborate with each other and the ULC to create a regulatory framework for vertiports. Doing so will lessen the burden on eVTOL operators as they build their vertiport

320. Michael J. Wilkins, *The Uniform Law Commission: What You Know Can Help Us*, 30 UTAH BAR J. 48, 48 (2017).

321. *ULC: About Us*, *supra* note 317.

322. *Id.*

323. Wilkins, *supra* note 320, at 48.

324. *Id.* at 49.

325. *Id.*

326. *Id.*

327. *Id.* at 49–50.

328. *See, e.g.*, *Technology Committee,* UNIF. L. COMM'N, https://www.uniformlaws.org/committees/community-home?communitykey=c63debda-e05e-4cc7-91b2-56aac3e68cbc (last visited Nov. 1, 2022) [https://perma.cc/Y9NK-XNDK] ("The Committee on Technology was formed to study and monitor developments in technology, particularly as new technologies impact current ULC Acts."); *infra* notes 329–30 and accompanying text.

329. *See Automated Operation of Vehicles Act*, UNIF. L. COMM'N, https://www.uniformlaws.org/committees/community-home?CommunityKey=4e70cf8e-a3f4-4c55-9d27-fb3e2ab241d6 (last visited Nov. 1, 2022) [https://perma.cc/YNZ3-2YGS].

330. *See generally* UNIF. L. COMM'N, TORT LAW RELATING TO DRONES ACT: DRAFT (2018), https://www.uniformlaws.org/HigherLogic/System/DownloadDocumentFile.ashx?DocumentFileKey=33acb2b0-79d5-13c0-888e-4813125798d2 [https://perma.cc/27HL-HDSL].

networks and will ultimately reduce operating costs[331] and promote equity in transportation.[332]

2. City Legislation and Promotions

City and local governments will need to update their infrastructure plans to support UAM and to promote this new transportation option as an equitable one. Additionally, local governments should offer incentives that will help lower the cost of UAM and increase the volumes of flights.

Since zoning requirements define the characteristics of city districts[333] and the location of housing, jobs, and services vary significantly by city,[334] local government leaders will need to consult with communities and advocacy groups to determine where vertiports should be constructed and ultimately whether residents want UAM to be part of their transportation network.[335] Zoning will require an assessment of how well a potential vertiport location is connected with ground transportation systems, whether the land use would generate or benefit from demand for UAM, and the effects of the vertiport's positive and negative externalities.[336] Cities and local governments should begin this zoning assessment now so that the UAM industry can begin to build its network of vertiports as eVTOL aircraft become certified. Consulting with communities will also reduce procedural inequities as public stakeholders from all socioeconomic statuses are included in decisions about how the benefits and burdens of this new transportation system are distributed.[337]

Cities today offer incentives to private transportation and mobility companies to provide lower fees and increased availability of services in lower-income and excluded neighborhoods. [338] For example, the vehicle-sharing industry has waived application and membership fees for individuals with lower incomes and discounted trips originating from certain communities.[339] In return, local governments have offered various benefits to ridesharing companies such as permitting them to use conveniently located city-owned parking spaces.[340] Cities could

331. *See* Zoldi, *supra* note 221.

332. *See The Seven UAM Principles*, *supra* note 94.

333. Vivek Sarma, *The Impact of Zoning on Design*, WDG PERSP. (Jan. 19, 2016), https://www.wdgarch.com/perspectives/2016/01/19/the-impact-of-zoning-and-design/ [https://perma.cc/M7K5-8N3V].

334. MICHAEL KODRANSKY & GABRIEL LEWENSTEIN, CONNECTING LOW-INCOME PEOPLE TO OPPORTUNITY WITH SHARED MOBILITY 4 (Living Cities et al. eds., 2014), https://livingcities.org/wp-content/uploads/2021/03/Can-Shared-Mobility-Help-Low-Income-People-Access-Opportunity_.pdf [https://perma.cc/2P65-JKYY].

335. L.A. DEP'T TRANSP., *supra* note 305, at 19.

336. *Id.* at 27.

337. Bullard, *supra* note 4, at 1188.

338. SHARED-USE MOBILITY CTR., EQUITY AND SHARED MOBILITY SERVICES: WORKING WITH THE PRIVATE SECTOR TO MEET EQUITY OBJECTIVES 18 (Leslie Gray ed., 2019), https://sharedusemobilitycenter.org/wp-content/uploads/2019/12/EquitySharedMobilityServices-FINAL.pdf [https://perma.cc/QM5V-KN8E].

339. *Id.*

340. *See* KODRANSKY & LEWENSTEIN, *supra* note 334, at 14.

offer similar incentives for eVTOL operators including permitting vertiports to be built on top of government-owned buildings or land in prime locations.

These incentives have not always proved to be successful, however.[341] Opponents will point out that, despite mobility companies' initial efforts to offer new forms of mobility in low-income and excluded communities when given incentives, demand has still been too low for these companies to justify continuing to offer services in some communities.[342] One possible solution includes directly incorporating equity objectives into the regulations and competitive annual permitting processes, which local governments have done with the bike, scooter, and car-sharing industries.[343] Cities should plan to do the same with the UAM industry and require that eVTOL operators support vertiports in certain communities as part of the requirement to operate them citywide. Another possible solution is to offer direct subsidies as has historically been done with other mobility options.[344] Cities could subsidize reduced fares from vertiports in certain communities or support the operating costs of vertiports to keep them open in certain areas during times when public transit is not offered.

Now is the time for city and local governments to begin updating their infrastructure plans as vertiport planning commences and developing incentives that will help promote UAM as an equitable form of transportation.

V. CONCLUSION

The rise in mobility options that cities across the United States have seen, including car sharing, ridesharing, and micromobility (*e.g.*, bikes, scooters), has worsened the nation's already inequitable transportation system.[345] An equitable transportation system provides affordable, reliable, and convenient transportation options[346] while sharing the benefits and costs across the communities that are impacted by it.[347] Decades of policy decisions and demographic shifts have caused the nation's transportation systems not to meet this definition.[348] Theoretically, greater transportation options should decrease inequities in transportation,[349] but new mobility options are often located in major or wealthier parts of a city, thus contributing to inequities in the transportation system.[350]

Cities across the United States will soon see the introduction of a new form of transportation called Urban Air Mobility ("UAM"),[351] where private companies will offer on-demand flights in eVTOL aircraft to transport people between

341. *See id.* at 19.
342. *See id.* at 20.
343. SHARED-USE MOBILITY CTR., *supra* note 338, at 40.
344. *See* KODRANSKY & LEWENSTEIN, *supra* note 334, at 21.
345. FEDOROWICZ ET AL., *supra* note 2, at 6–8.
346. INVESTING IN PLACE, *supra* note 27, at 1.
347. *See* LITMAN, *supra* note 5, at 56.
348. FEDOROWICZ ET AL., *supra* note 2, at 3.
349. *See* COHEN & CABANSAGAN, *supra* note 10, at 6.
350. FEDOROWICZ ET AL., *supra* note 2, at 7.
351. Ravich, *supra* note 14, at 657.

ad hoc locations within a city or between a city and the suburbs.[352] These eVTOL aircraft will seat between two to nine passengers and will have the ability to take off and land vertically.[353] The concern is that, without proper planning by legislators, UAM has the potential to worsen transportation inequity as other new mobility options have historically done.[354]

UAM commercial flights could begin as early as 2024,[355] and more than 150 UAM developers are racing towards certification.[356] The UAM industry aspires to offer eVTOL aircraft flights to the masses[357] with prices at or below those of automobile ridesharing services.[358] While meeting this goal will be a challenge,[359] high volumes of aircraft and increased demand for flights will drive cost down, thus making UAM more affordable[360] and consequentially more equitable.[361]

Existing federal aviation regulations and state and local laws will challenge the UAM industry's ability to reach its goal of offering eVTOL flights at lower costs from convenient locations. The result will be a worsening of inequity in cities' transportation systems. Three major categories of legislation will pose as barriers to UAM achieving high volumes of flights at affordable prices: certification of aircraft and regulation of commercial air taxi services, airspace, and vertiport regulations.

Obtaining FAA certification for eVTOL aircraft will prove to be a challenge under the existing regulatory framework.[362] The unique designs of eVTOL aircraft are unlike those found on traditional airplanes and rotorcrafts, so there will be a lot of trial and error under the existing FAA certification process, which will increase cost.[363] Each potential pathway to certification has its advantages and disadvantages,[364] but without clear certification standards, UAM manufactures are bound to face a higher burden of compliance[365] and higher costs.[366] Additionally, challenges with Part 135 Certification, a requirement that eVTOL operators must fulfill before offering revenue flights, exist.[367] The FAA has yet to provide guidance on how Part 135 Certification can be streamlined for eVTOL

352. *Id.* at 658–61.

353. Ravich, *supra* note 14, at 658.

354. FEDOROWICZ ET AL., *supra* note 2, at 7 ("[N]ew mobility technologies have the potential to reduce existing transportation inequities. But without proper planning, they could reinforce existing inequities . . . .").

355. *Is Joby Aviation Wall Street's New Darling of eVTOL?*, *supra* note 57; *see also* Ravich, *supra* note 14, at 659.

356. Patterson, *supra* note 58; *Is Joby Aviation Wall Street's New Darling of eVTOL?*, *supra* note 57.

357. *See, e.g.*, *Roadmap to Sustainable Air Mobility*, *supra* note 54.

358. *Id.* at 34.

359. *See* UBER ELEVATE, *supra* note 18, at 4.

360. *Id.*

361. *See The Seven UAM Principles*, *supra* note 94.

362. COUDERT ET AL., *supra* note 111, at 5.

363. *Id.*

364. *See* Graydon et al., *supra* note 120, at 2.

365. *See* COUDERT ET AL., *supra* note 111, at 2.

366. *See* UBER ELEVATE, *supra* note 18, at 4.

367. *14 CFR Part 135 Air Carrier and Operator Certification: General Information*, *supra* note 107; *see* Larsen, *supra* note 108.

operators,[368] including assessing risk levels necessary to define limitations in the Ops Specs.[369] As a result, Part 135 Certification may unnecessarily add to the cost of UAM operations, thus yielding further inequities in transportation.[370]

The complexities of the national airspace system will limit the volumes of eVTOL flights,[371] resulting in increased flight costs[372] and further inequities in transportation.[373] Urban areas, where eVTOL aircraft will be operating, are often located underneath complex, busy airspace.[374] High volumes of eVTOL flights will overwhelm air traffic control as it is managed now[375] as eVTOL aircraft will conduct flights between numerous departure and arrival points within a city.[376] Without the possibility of establishing charted arrival and departure procedures, demand for air traffic control will quickly exceed its capacity.[377]

No comprehensive regulatory guidance governing vertiport operations exists.[378] As a result, the UAM industry will need to adopt multiple business models to comply with differing state and local government policies,[379] thus increasing the cost of eVTOL flights.[380] Additionally, community acceptance of vertiports will prove to be a challenge,[381] which will prevent high volumes of flights from convenient locations.[382]

Regulators should introduce new legislation and regulations that will help the UAM industry to offer high volumes of eVTOL flights at lower costs while promoting transportation equity. Opportunities exist in the same three categories of legislation mentioned above.

The FAA should certify eVTOL aircraft under the same regulatory framework as the EASA plans to do. The EASA devised its own airworthiness standards designed specifically for eVTOL aircraft[383] because the existing certification process for airplanes and rotorcrafts would be too cumbersome to adapt to the novel features of eVTOL aircraft.[384] Under the EASA's standard, the UAM industry can expect clear standards,[385] and this predictability in the regulatory environment ultimately reduces costs.[386] The FAA should also require eVTOL

368. *See* Larsen, *supra* note 108.
369. *See* LENGEL *supra* note 154, at 288; Graydon et al., *supra* note 120, at 3.
370. *See The Seven UAM Principles*, *supra* note 94.
371. *See* Bauranov & Rakas, *supra* note 176, at 2.
372. *See* UBER ELEVATE, *supra* note 18, at 3–4.
373. *See The Seven UAM Principles*, *supra* note 94.
374. *See* Bauranov & Rakas, *supra* note 176, at 2.
375. *See id.*
376. *See* UBER ELEVATE, *supra* note 18.
377. *See* INSTRUMENT PROCEDURES, *supra* note 204, at 1–26.
378. NAT'L AIR TRANSP. ASS'N, *supra* note 212, at 9.
379. Zoldi, *supra* note 221.
380. *See id.*
381. Rothfeld et al., *supra* note 232, at 268.
382. *See* COMPONENTS OF PUBLIC ACCEPTANCE, *supra* note 66, at 3.
383. SPECIAL CONDITION FOR SMALL-CATEGORY VTOL AIRCRAFT, *supra* note 241, at 1.
384. Cowan, *supra* note 240.
385. *See EASA Publishes Vertical Takeoff and Landing Certification Special Condition*, *supra* note 242.
386. *See* Lynch, *supra* note 128.

operators to implement a Safety Management System ("SMS") as this will help streamline Part 135 Certification.[387]

The FAA should create more flyways and corridors in the national airspace system for eVTOL aircraft to use. The eVTOL aircraft would be able to safely transition through busy urban airspace without needing to contact air traffic control.[388] Existing navigation (*e.g.*, GPS, WAAS)[389] and traffic avoidance technologies (*e.g.*, TCAS)[390] would enhance safety and support high volumes of aircraft. Additionally, the FAA should design airspace with the expectation that autonomous eVTOL aircraft will eventually use it, as autonomous technologies will help improve safety and allow mass adoption through lower costs.[391] Cities should also work with the FAA to ensure that flyways and corridors serve all communities within a city and are well-connected with other ground transportation systems.[392]

The ULC should develop legislation for states to adopt as they prepare to regulate vertiports. The ULC's ability to devise a standardized governance framework for vertiports across all states will simplify vertiport operations[393] and therefore promote more inclusive access.[394] Cities should also begin to consult with their communities to determine where vertiports should be located and update their zoning requirements accordingly. Incentives, as have been provided to other mobility companies to offer lower fees and increased availability of services in lower-income and excluded neighborhoods,[395] will help to promote inclusivity. Directly incorporating equity objectives into regulations and annual permitting processes will also prove to be beneficial.[396]

With proper planning and the right regulatory framework, UAM has the potential to promote equity in the transportation system. The UAM industry aspires to offer eVTOL flights to everyone.[397] The FAA and state and local governments should be onboard, too.

387. *See generally* INTRODUCTION TO SAFETY MANAGEMENT SYSTEMS FOR AIR OPERATORS, *supra* note 264.

388. *See* AIM, *supra* note 271, at 3-2-3, 3-2-4.

389. *See Aviation*, *supra* note 285.

390. *Traffic Alert and Collision Avoidance System (TCAS)*, *supra* note 299.

391. *See* Hader & Baur, *supra* note 301.

392. *See* L.A. DEP'T TRANSP., *supra* note 305, at 27.

393. Zoldi, *supra* note 221.

394. *See The Seven UAM Principles*, *supra* note 94.

395. SHARED-USE MOBILITY CTR., *supra* note 338, at 3.

396. *Id.* at 40.

397. *See, e.g.*, *Roadmap to Sustainable Air Mobility*, *supra* note 54.