

Flying Cars and Drones Pose Policy Challenges for Managing and Regulating Low-Altitude Airspace

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For more than half a century, "flying car" concepts have graced the covers of *Popular Science* magazine, have been featured in futuristic Hollywood sci-fi movies, and, of course, have hauled that famous space-age cartoon family, the Jetsons. Until recently, though, small hovercraft and drone-like air taxis existed only as prototype concepts and amateur-built curios. Recent advances in aerospace design and propulsion, as well as in computer control and autonomous systems, are raising the prospect that flying cars may soon become a reality. Development and marketing efforts are bringing to the fore new policy and regulatory challenges regarding the control of low-altitude airspace, safety, noise, privacy, and landowner rights. They also are raising new questions about the appropriate roles of federal, state, and local authorities in regulating and managing these operations.

While Massachusetts-based [Terrafugia](#) has been working for more than a decade to develop a street-legal car that can transition to a flying machine, Chinese drone manufacturer [EHang](#) has developed a prototype autonomous single-seat quadcopter that looks similar to a scaled-up version of smaller personal drones that the company sells. Similarly, German manufacturer [Velocopter](#) has developed a prototype two-seat multicopter that was field-tested over Dubai in September 2017 in what was reported as a first-ever autonomous air taxi demonstration in an urban setting. [KittyHawk](#), a California-based startup with financial ties to [Alphabet](#) (the parent company of Google), is testing prototypes of a single-seat personal hovercraft and a fixed-wing vertical-takeoff and landing craft. In total, it has been [reported](#) that more than 50 flying car concepts are in the works.

While most efforts to date to launch personal aircraft and small air taxi vehicles have come out of startup companies, over the past year larger aerospace conglomerates, including [Airbus](#), Boeing subsidiary [Aurora Flight Sciences](#), [Embraer](#), [Bell Helicopters](#), and [Rolls-Royce](#), have launched programs to develop passenger-carrying urban air transports.

Many of these concepts are powered by electric motors, and their designs more closely resemble small drones than traditional aircraft. They are being designed specifically to transport people relatively short distances (roughly 5 to 25 miles) in urban areas with highly congested roadways. Ride-sharing giant [Uber](#), for example, is partnering with multiple aerospace companies and cities in hopes of launching demonstration air taxi flights within the next five years.

Managing Low-Altitude Air Traffic

Future urban air taxis, along with small drones, will largely operate in low-altitude airspace. Small unmanned aircraft, including delivery drones, will mostly be limited to airspace below 500 feet above the ground. Flying cars and urban air taxis may be allowed to use slightly higher altitudes, but will likely remain below 2,000 feet most of the time. Operations at these lower altitudes, which until now have been mostly off limits for fixed-wing aircraft, pose unique challenges for controlling and managing air traffic and maintaining safe separation. Traditional radar and two-way radio communications are probably not viable methods of tracking and controlling low-flying aircraft in dense urban settings, and in any event, autonomous air vehicles will lack human pilots to follow instructions from air traffic controllers.

The National Aeronautics and Space Administration (NASA) has been charged with research and development of a concept called Unmanned Aircraft System Traffic Management ([UTM](#)) to handle drones and other low-flying air traffic, and private firms, including Amazon and Google, are [reportedly](#) working to develop a private system for controlling low-altitude airspace. However, additional development and testing are needed to field reliable technologies for handling potentially large volumes of low-flying aircraft with varying degrees of autonomy.

Safety, Privacy, Noise, and Landowner Concerns

The Federal Aviation Administration (FAA) largely restricts small unmanned aircraft flights to altitudes below 500 feet with no specific minimum altitudes, although [flights directly over people](#) require [special permission](#). Urban air transport flights carrying people, using aircraft larger and heavier than most drones, raise new concerns about the safety of occupants as well as people and structures below. Liability for injury and damage to people and property on the ground, as well as passengers, is yet to be addressed.

It is unclear whether delivery drones and urban air taxis will be allowed to fly where their operators wish, or will be restricted to specific routes in the same way that automobiles are limited to traveling on public roads. Also unresolved is the potential conflict between the rights of operators of low-flying aircraft and those of landowners regarding undue nuisance and noise from low-flying aircraft: Will landowners have any specific rights to prevent or curtail unwanted overflights? Will community associations, private organizations that set rules governing many housing developments, be able to restrict autonomous flying cars and delivery drones from taking off and landing within their communities? Similarly, will municipalities be able to decide when and where urban air transports can pick up and drop off passengers and set curfews for drone delivery services?

Delineating Federal, and State, and Local Roles

While airspace and flight operations generally fall under federal purview and FAA regulatory control, states and local governments will likely play an increasingly important role in determining permissible takeoff and landing sites for drones and urban air transports. A number of state and local governments have already enacted [laws and ordinances](#) restricting the use of public lands, such as parks, for launching, operating, or recovering drones. The Drone Federalism Act ([S. 1272](#)) proposes to give state, local, and tribal governments additional authority to regulate drone flights below 200 feet in order to preserve local interests regarding public safety, personal privacy, property rights, land use management, and mitigating nuisances and noise pollution. Municipalities may play an increasingly important role in setting zoning guidelines for the use of private lands for urban air transportation. While federal regulation of airspace promotes uniformity across the national airspace system, future air mobility concepts may lend themselves to additional local oversight to address unique regional transportation needs and challenges.