Which States Are Prepared for the Drone Industry? A 50-State Report Card, Release 2.0

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ABSTRACT

Worldwide, commercial drone services are being tested and permitted. Progress in the United States has been slow, in part because of a lack of clarity about the federal and state roles over drones and airspace management. To jump-start the drone industry, states can create *drone highways*—aerial corridors directly above public roads. We score and rank the 50 states based on their laws and drone industry data that indicate their preparedness for drones and drone highways. Many states have laws that allow cities to lease the air rights above public roads, vest air rights with property owners, and establish avigation easements. With these laws, states can facilitate future drone operations in low-altitude airspace while Congress and the Federal Aviation Administration develop national drone policies. Creating a clear and coherent framework at the state and local level, such as a system of drone highways, will make parcel delivery faster, improve distribution of medical supplies, and create technology and logistics jobs.

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Worldwide, hundreds of drone companies are testing and creating new drone services. Commercial drone companies have operated for years in China, Japan, Rwanda, and Switzerland for agricultural uses, deliveries in rural areas, and medical deliveries. In the United States, UPS, Amazon, USPS, and others also want to gain a sliver of the $30 billion home-delivery market. The Federal Aviation Administration (FAA) authorized several drone pilot projects, including some for public safety and medical uses, but widespread deployment of commercial drones is years away in the United States.

Progress has been slow in part because of a lack of clarity about the federal and state roles over drones and airspace management. For instance, in 2019, the North Dakota legislature authorized $28 million for a statewide drone traffic management system while negotiating with the FAA over the state's role in traffic management.[1] Ohio's drone task force director says a statewide drone traffic management system is expected in the next few years, but leadership is uncertain how to proceed given the regulatory issues.[2] Some members of Congress would like to codify state and local authority over drone flight management, but the technology is moving faster than federal legislation.[3]

1. Patrick Groves, "North Dakota Plans Statewide Drone Air Traffic Control," *GovTech*, June 10, 2019.
2. Brian Garrett-Glaser, "At Ohio Air Taxi Symposium, Policy Seen as Far behind Technology," *Aviation Today*, March 3, 2020. The director notes there are "many questions remaining on what kind of authority and oversight the FAA will have over locally-operated infrastructure."
3. There are a few bills in Congress that would codify state authority over low-altitude airspace, generally up to 200 feet above the ground. *See* Drone Integration and Zoning Act of 2019, S. 2607, 116th Cong. (2019); Drone Federalism Act of 2017, S. 1272, 115th Cong. (2017); Drone Innovation Act, H.R. 2930, 115th Cong. (2017).

CREATING DRONE HIGHWAYS

The Government Accountability Office (GAO) pointed out in a report to Congress in September 2020 that it is unclear how federal and state governments will share authority over low-altitude airspace, and this uncertainty slows technological progress.[4] State authorities should prepare to have more involvement in drone operations than they historically had in aviation. States and cities have police powers over land use and zoning, and low-altitude airspace—where many drones will fly—is inseparable from the land beneath it.[5] Further, courts look to state law when determining whether approved flight paths amount to an unconstitutional taking of property.[6] For practical and legal reasons, then, state and city authorities will play a key role in demarcating drone highways as well as in creating time, place, and manner restrictions such as time-of-day rules, noise maximums, and privacy protections.

To jump-start this new industry and bring new drone services to residents, state and local leaders should coordinate with the FAA to create "drone highways"—aerial corridors above public rights-of-way—that operators could use for parcel delivery, inspections, search-and-rescue, and other drone services. By demarcating drone highways above roadways, regulators can avoid nuisance, trespass, and takings lawsuits from landowners.[7]

Leasing the aerial corridors above public roads would allow state and local authorities to manage drone highways for safe and efficient drone services. Exercising this power would also allow many authorities to receive passive income, through leasing or auction, from a currently unused public resource—the public right-of-way between 50 feet and 200 feet above the ground.

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4. US GAO, "Unmanned Aircraft Systems: Current Jurisdictional, Property, and Privacy Legal Issues regarding the Commercial and Recreational Use of Drones," *B-330570 Current Drone Legal Issues*, September 16, 2020. The GAO report notes that "the legal uncertainty surrounding these [drone federalism] issues is presenting challenges to integration of UAS [unmanned aircraft systems] into the national airspace system."

5. The FAA, for instance, acknowledges the "police powers" of local authorities in five areas: land use, zoning, privacy, trespass, and law enforcement operations. Operation and Certification of Small Unmanned Aircraft Systems, 81 Fed. Reg. 42064, 42194 (June 28, 2016) (codified at 14 C.F.R. pts. 21, 43, 61, 91, 101, 107, et al.).

6. United States v. Causby, 328 U.S. 256, 266 (1946).

7. See Brent Skorup, "Drone Technology, Airspace Design, and Aerial Law in States and Cities," (Mercatus Center at George Mason University, Working Paper December 2020), https://www.mercatus.org/system/files/skorup_drone-technology_mercatus-wp_v1.pdf. For a discussion of the imprecise nature of landowners' air rights and interaction with aerial nuisance laws, *see* Lindsey P. Gustafson, "Arkansas Airspace Ownership and the Challenge of Drones," *University of Arkansas at Little Rock Law Review* 39, no. 2 (2017): 245, 258–77.

ASSESSING STATE POLICY

State laws need to accommodate drone flights from large and small operators and clarify who—whether state, local, or federal officials—can make low-altitude airspace available to operators. This report card scores all 50 states and Puerto Rico based on their existing laws and policies. (See table 1 at the end of this section for scores and rankings.) The report identifies which states have laws and policies that show promise in creating drone highways and a statewide drone industry.

METHODOLOGY

We score states based on five factors that signal a state's readiness for commercial drone services. Given the legal obstacles to creating drone highways above private property, we give the most weight to the two factors that make drone highways over public roads feasible—an airspace lease law and an avigation easement law. That said, the other factors are economically important and weighted accordingly. There is necessarily some subjectivity in how to weight these factors. Other relevant legal issues, such as state-based insurance and liability rules, will also affect the drone industry; in our estimation, however, the following five factors should be the top state priorities.

1. Airspace Lease Law (30 points)

To have a widespread and safe drone delivery economy, drones will in most places need "drone highways" demarcated by regulators and safely separated from airports, homes, schools, and other sensitive locations. Leasing airspace above public property would accelerate drone services because creating flight paths over backyards and private lands raises difficult questions about the taking of private property.[8]

Over one-third of states currently allow state or local authorities to lease airspace above public roads and public property. There are many variations of these road airspace-leasing provisions, but Oregon's law is a good, clear example:

> Any political subdivision holding the easement or fee title to a street or highway may lease the space above or below that street or highway for private purposes.[9]

8. United States v. Causby, 32 U.S. 256, 265 (1946) (holding that landowners have "a claim to [low-altitude airspace] and that invasions of it are in the same category as invasions of the surface").
9. Ore. Rev. Stat. § 271.430 (2017).

Although these laws were passed decades ago with real estate development in mind, they allow the creation of statewide or citywide drone delivery networks.

A state law allowing authorities to lease airspace above state *and* local roads receives a full 30 points. Only seven states authorize airspace leasing above both state and local roads.[10] A state law allowing authorities to lease airspace above state roads but not local roads, or vice versa, receives 10 points. Sixteen states fall into this category. The remaining states that are silent on the matter receive zero points.

2. Law Vesting Air Rights with Landowners (10 points)

Air rights laws serve a few purposes. First, they clarify that the state is exercising its police powers and defining property rights within the state. Second, where state or local authorities own public rights-of-way, air rights laws recognize their property interest in the aerial corridors above public roads. Third, these laws put drone operators and residents on notice about the extent of homeowners' property rights, which reduces litigation risk for operators and homeowners alike.

In 1922, the influential Uniform Law Commission approved a model law known as the Uniform Aeronautics Act.[11] One provision recognized that landowners own the low-altitude airspace above their land:

> The ownership of the space above the lands and waters of this State is declared to be vested in the several owners of the surface beneath, subject to the right of flight.[12]

Nearly half of states have adopted some version of this model law; these states receive 10 points. States that are silent on the matter of air rights ownership receive zero points.

10. These seven states are Arkansas, New Hampshire, Oklahoma, Oregon, Texas, Virginia, and Washington.
11. The American Bar Association established the Uniform Law Commission in the late 1800s. Today, the Uniform Law Commissioners are lawyers, judges, law professors, and legislators appointed by their states to draft model laws that state legislatures are encouraged to enact.
12. Uniform Law Commission § 3, Uniform Aeronautics Act (1922).

3. Avigation Easement Law (25 points)

Though many states recognize landowners' property rights in the air, they often condition those rights and allow drone (and airplane) flights over land, as long as flights do not invade the land and people on the ground are not disturbed. Like the airspace ownership provision, many states have adopted a version of avigation easement provision from the Uniform Aeronautics Act:

> Flight in aircraft over the lands and waters of this State is lawful, unless at such a low altitude as to interfere with the then existing use to which the land or water, or the space over the land or water, is put by the owner, or unless so conducted as to be imminently dangerous to persons or property lawfully on the land or water beneath.[13]

These avigation easement laws mean that drone operators can fly, as long as they are high enough not to bother landowners and passersby. These laws also mean that if the state or municipality does not own the aerial corridors above public roads, drones would still generally be able to access the aerial easements if state officials demarcated drone highways above public roads.

Nearly half of states have avigation easement laws and receive 25 points. The states that are silent on the matter receive zero points.

4. Drone Task Force or Program Office (20 points)

Widespread commercial drone services will raise novel issues for state and local authorities related to zoning rules, noise limits, time-of-day restrictions, job training and education, insurance, and privacy for residents within drone camera-shot range. Most of these issues require evaluation and discussion by regulators, residents, researchers, and operators. States that have a drone program office within their Department of Transportation (DOT) or a statewide task force will be ahead of the curve and can anticipate future issues before they become problems for industry and residents.[14]

13. Uniform Law Commission § 4, Uniform Aeronautics Act (1922).
14. In Release 1.0 of this report we called this factor "Aviation Advisory Committee." We've changed the factor name here and throughout the report to more closely resemble what the states are doing and the terminology that has developed.

States that have an active statewide task force or a program office dedicated to commercial drone services within the state receive 20 points. Eleven states fulfill this criterion.[15]

States that created a task force that was temporary (or appears to have lapsed) will receive 10 points. Further, states that have a legislative body that produced a drone report will receive 10 points, as it indicates growing lawmaker knowledge and prioritization of drone issues. The remaining states that have no task force, program office, or policy reports receive zero points.

5. Drone Jobs Estimate (15 points)

The final factor that contributes to a state's score is the estimated number of drone jobs listed in the state in 2019. We rank states based on the number of drone jobs per 100,000 residents so that populous states are not unduly favored. We grant one point (maximum of 15) for every two drone-related jobs per 100,000 residents. The number of drone jobs serves as a proxy for soft factors that benefit a state, such as a university or community college system with drone programs or workers in the aerospace industry. These soft factors can position states for future jobs and services growth, much like the automotive supplies industry revolving around Detroit and the information technology industry revolving around Silicon Valley.

NOTE ON CHANGES FROM RELEASE 1.0

In this report, Release 2.0, we have kept the five factors and their weighting the same as in the first release.[16] However, there have been some changes in scoring and state ranks. First, in some cases state laws and policies have changed or we unintentionally omitted relevant factors in the first release (in Release 1.0 we omitted that Maryland law *does* vest air rights with landowners, for instance). Second, we have clarified that a state will receive full points for having an active, statewide drone task for, or a program office within, a transportation agency. This category was more ambiguous (and easier to fulfill) in the first release. Finally, we

15. Kansas, Michigan, and Texas have active, statewide task forces examining drone issues. Nevada, New Jersey, North Carolina, North Dakota, Ohio, and Utah have drone program offices within or overseen by their respective Department of Transportation or governor's office. Oklahoma and Virginia have both an active drone task force and a statewide program office.
16. Release 1.0 is available on the Mercatus Center website. Brent Skorup and Connor Haaland, "Which States Are Prepared for the Drone Industry? A Fifty-State Report Card" (Mercatus Center at George Mason University, Arlington, VA, March 19, 2020).

TABLE 1. STATE RANKINGS

Overall rank	State	Overall score	Overall rank	State	Overall score
1	North Dakota	70	26	Hawaii	35
2	Arkansas	69		New Hampshire	35
3	Oklahoma	64	28	Utah	34
4	Nevada	63	29	Michigan	33
5	Virginia	60	30	Ohio	32
6	Georgia	59		Oregon	32
	North Carolina	59	32	Connecticut	28
8	New Jersey	55	33	Kansas	26
9	Delaware	54	34	Alaska	25
	Texas	54		Louisiana	25
11	Minnesota	50		Pennsylvania	25
12	Wisconsin	49	37	Illinois	23
13	Arizona	48	38	Maine	17
	California	48	39	Alabama	16
	Wyoming	48		New York	16
16	Vermont	47	41	West Virginia	15
17	Washington	45	42	Florida	13
18	Montana	42	43	South Carolina	12
19	Idaho	40	44	New Mexico	11
	Massachusetts	40	45	South Dakota	10
	Tennessee	40	46	Nebraska	9
22	Maryland	39		Rhode Island	9
23	Colorado	38	48	Iowa	4
	Missouri	38		Mississippi	4
25	Indiana	37	50	Kentucky	3

Note: Puerto Rico has a profile at the end of the report; however, because our data source does not provide drone jobs numbers for US territories, we have omitted Puerto Rico from the rankings.

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SOURCES AND LEGAL DISCLAIMER

The three relevant airspace laws were found in state codes. The existence of a drone task force or DOT program office was compiled by consulting drone experts, state law databases, and news reports. The authors derived all drone job-listing data from an Axios analysis of drone-related job postings between January 2019 and October 2019.[17]

17. Kaveh Waddell, "Where the Drone Jobs Will Land," Axios, November 9, 2019. The data is from ZipRecruiter job listings. Axios records listings in metropolitan areas, not states, so jobs in metropolitan areas that straddle state lines count for the state in which the majority of the metropolitan area resides (metro New York City drone jobs, for instance, count as New York jobs, which may undercount drone jobs in Connecticut and New Jersey somewhat). Drone jobs in the Washington, DC, metro area are counted as Virginia jobs, given the prevalence of military and aerospace contractors in Virginia.

This report is not legal advice and is intended for informational and educational purposes only. Laws and legal interpretations are subject to change. Operators should consult a licensed local attorney before attempting drone operations.

Trace Mitchell, William Gu, and Patricia Patnode also assisted in this research. To contact the authors about the report analysis or about omissions and updates, please email bskorup@mercatus.gmu.edu.

MICHIGAN

RANK
29

Score: 33/100

- Airspace Lease Law: 10/30
- Law Vesting Air Rights with Landowners: 0/10
- Avigation Easement Law: 0/25
- Drone Task Force or Program Office: 20/20
- Drone Jobs Estimate: 3/15

Factors Helping the State Score

- *Airspace Lease Law*: Michigan law allows local authorities to lease low-altitude airspace above local roads.* Such a law allows authorities to create drone highways above local roadways. However, the state did not receive full points because the law is silent as to whether state officials can lease airspace above state roads and state property.
- *Drone Task Force or Program Office*: Michigan gets full points. The state has an active drone task force overseen by the Michigan Department of Transportation (MDOT), with members from various state governmental agencies.† This 27-member task force was created by the legislature in 2017 and develops statewide policy recommendations on the operation, use, and regulation of drones in Michigan.

Factors Hindering the State Score

- *Law Vesting Air Rights with Landowners*: Michigan law does not expressly provide air rights to landowners, which raises litigation risk for drone operators because landowners do not know the extent of their property rights and may sue to protect their interests.
- *Avigation Easement Law*: Michigan law does not create an avigation easement, which means drone operators may be subject to nuisance and trespass laws, even if their drones do not disturb people on the ground.
- *Drone Jobs Estimate*: Michigan has 5.8 drone-related jobs per 100,000 people, ranking it in the bottom half of states.

These factors make Michigan the 29th most drone-friendly state in the country.

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* Michigan law allows local authorities to control, regulate, and use airspace above local roads. Presumably these permissive laws authorize leasing. *See* Mich. Comp. L. § 117.4h (2020) (cities); Mich. Comp. L. § 78.24 (2020) (villages); Mich. Comp. L. § 42.16 (2020) (townships).

† MDOT Office of Aeronautics, "Unmanned Aircraft Systems Task Force," accessed March 4, 2020, https://www.michigan.gov/aero/0,4533,7-352-79155_79157_84492---,00.html.