

THE SKY IS THE LIMIT: FAA REGULATIONS AND THE FUTURE OF DRONES

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Due to the growing popularity of civilian drone operations and the remarkable potential for utilizing drones commercially, Congress, through the Federal Aviation Administration Modernization and Reform Act of 2012 (FMRA), has tasked the Federal Aviation Administration (FAA) to promulgate rules, implement regulations, and provide general guidance to incorporate drones into the National Airspace System (NAS). Originally, the FAA anticipated publishing formal regulations by September 2015, but the FAA treaded carefully by interpreting FMRA to keep commercial drones grounded—save for a few exemptions—and issued the final rule on June 28, 2016. This note juxtaposes the benefits and drawbacks of commercial drone operations and argues that the economic advantages of commercial drone operations outweigh the trepidations. This note also proposes a slight divergence from the FAA’s final rule on small, unmanned aerial vehicles (UAVs). This note is limited to commercial drones with minimal references to, and discussions of, hobby (i.e. recreational) drones and public (i.e. government) drone operations.

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INTRODUCTION.....	152
I. BACKGROUND.....	155
A. <i>FAA’s Regulation of Drones, 1958 to 2008</i>	155
B. <i>Current FAA Rules, Regulations, and Procedures</i>	157
C. <i>Benefits of Commercial Drone Activity</i>	160
D. <i>Across the Pond: How Have Our International Counterparts Responded to Commercial Drones?</i>	165
1. United Kingdom.....	166
2. New Zealand.....	167
3. France	169
E. <i>Criticisms and Concerns of Commercial Drone Operation</i>	171
1. Safety Concerns.....	172
2. Privacy Concerns.....	174
II. NECESSARY MODIFICATIONS TO FAA’S SMALL UAV NPRM ..	176
A. <i>Visual-Line-Of-Sight Requirement</i>	176
B. <i>Daylight Only Operations Requirement</i>	178
CONCLUSION	179

INTRODUCTION

In 2012, Congress passed the Federal Aviation Administration Modernization and Reform Act of 2012 (FMRA).¹ With the FMRA, Congress simplified and streamlined the FAA’s regulations and procedures. Doing so created a foundation for industries and organizations to incorporate emerging technologies into their respective fields.² Among the many provisions of the FMRA, the safe integration of civilian and commercial drones (also known as sUAS or sUAV)³ into the National Airspace System (NAS) is relegated to six pages—a mere five sections—of the 145 page Act.⁴ The order from Congress lacks true deadlines⁵ and gives the FAA

1. FAA Modernization and Reform Act of 2012, Pub. L. No. 112–95, 126 Stat. 11 [hereinafter FMRA].

2. *Id.* (“An [a]ct [t]o amend title 49, United States Code, to authorize appropriations for the Federal Aviation Administration for fiscal years 2011 through 2014, to streamline programs, create efficiencies, reduce waste, and improve aviation safety and capacity, to provide stable funding for the national aviation system, and for other purposes.”); see also Mike Mitchell, *President Obama Signs the FAA Modernization And Reform Act of 2012 (H.R. 658)*, AVIATION ONLINE MAG. (Feb. 15, 2012), http://avstop.com/news_february_2012/president_obama_signs_the_faa_modernization_and_reform_act_of_2012_hr_658.htm [https://perma.cc/A7MP-9WJ6].

3. Small Unmanned Aerial Systems (sUAS) refers to the drone’s hardware and operator, while Small Unmanned Aerial Vehicles (sUAV) only represents the drone’s hardware.

4. See FMRA, *supra* note 1, §§ 332–336, 126 Stat. at 73–78.

5. Wells C. Bennett, *Unmanned at Any Speed: Bringing Drones into Our National*

broad discretion over the *how* and *when* of regulating drones: the *how* being interpretation of the FMRA⁶ and the *when* being the deadline for final, formalized rules governing commercial drone use, which went into effect on August 29, 2016. Unsurprisingly, the deference afforded to the FAA and delay in implementation led to numerous debates regarding the impact of the delayed finalization of the rules.⁷ The debates naturally (and justifiably) incorporated other issues, namely those of privacy and security.⁸

Prior to the final rule (“107 Rule”),⁹ the FAA chose not to enforce certain aviation requirements (specifically the statutory requirements promulgated and intended for manned aircrafts), and allowed commercial drone operations only on a case-by-case basis. However, the process for obtaining permission to operate commercial drones was time-consuming. It could take up to 10 weeks for the required Section 333 exemption, which provided blanket-coverage for operations that satisfy basic requirements, and up to 60 days for an additional Certificate of Waiver or Authorization (COA). A COA was required if the flight operation went beyond the requirements of the Section 333 exemption.¹⁰ Additionally, the Section 333 exemption required the remote pilot, or Pilot in Command (PIC), to possess the, “appropriate airman certificate as prescribed by 14 C.F.R. 61.”¹¹ The pre-107 Rule regulatory and statutory framework guiding unmanned aircraft operations did not allow the FAA to offer exemptions to operators without the airman certification, thus justifying the need for the expedited issuance of the 107 Rule.¹² However, the newly issued 107 Rule dramatically reduces the burden on those seeking to fly drones

Airspace, ISSUES IN GOVERNANCE STUD., December 2012, at 2; see also Harley Geiger, *Drone Countdown*, CENT. FOR DEMOCRACY & TECH. (Mar. 27, 2012), <https://cdt.org/blog/drone-countdown/> [<https://perma.cc/3V78-8WMB>].

6. See Interpretation of the Special Rule for Model Aircraft, 14 C.F.R. § 91 (2016).

7. Jacob Kastrenakes, *FAA Will Likely Miss 2015 Deadline to Let Companies Fly Drones*, *Report Says*, VERGE (July 1, 2014, 4:55 PM), <http://www.theverge.com/2014/7/1/5862158/faa-will-likely-miss-september-2015-drone-integration-deadline-report> [<https://perma.cc/NRT3-QYBB>]; see Robert Ferris, *Do We Need to Put Drones on a Tighter Leash?*, CNBC (Aug. 6, 2015), <http://www.cnbc.com/2015/08/06/do-we-need-to-put-drones-on-a-tighter-leash.html> [<https://perma.cc/5S9S-CGDJ>].

8. See Andrew Wood, *Are There Enough Drone Laws for the Coming Drone Wars?*, CNBC (May 29, 2015, 11:47 AM), <http://www.cnbc.com/2015/05/29/drones-and-drone-laws-are-starting-to-take-off.html> [<https://perma.cc/H466-YJRN>].

9. Operation and Certification of Small Unmanned Aircraft Systems, 14 C.F.R. § 107 (2016) [hereinafter 107 Rule].

10. See FED. AVIATION ADMIN., PUBLIC GUIDANCE FOR PETITIONS FOR EXEMPTION FILED UNDER SECTION 333 (2014), https://www.faa.gov/uas/beyond_the_basics/section_333/how_to_file_a_petition/media/section333_public_guidance.pdf [<https://perma.cc/D8NT-DT9M>] [hereinafter Sec. 333 Guidance] (stating that petitions take approximately 8–10 weeks just to be posted to the docket); see also FAA, UAS Civil COA, <https://oeaaa.faa.gov/oeaaa/external/uas/portal.jsp> [<https://perma.cc/Z3MS-53YS>].

11. *Id.* at 4.

12. Sec. 333 Guidance, *supra* note 10.

commercially.¹³ Under the new 107 Rule, remote pilots who are at least sixteen years old now receive certification by passing a FAA aeronautical knowledge test at a Knowledge Testing Center, completing FAA Form 8710-13, and vetting by the Transportation Safety Administration.¹⁴ Remote pilots no longer need to seek permission for commercial operations through the tedious Section 333 exemptions and can operate commercial flights so long as they receive remote pilot certification or operate under the direct supervision of a certified remote pilot and abide by the rules set out in the 107 Rule.¹⁵ Additionally, commercial operations that exceed the limitations imposed by the 107 Rule can still seek a COA to waive 107 requirements.¹⁶ This streamlined process should reduce the backlog of individuals seeking Section 333 exemptions and certainly provides better guidance on commercial drone operations. However, there are two significant limitations in the 107 Rule that must be addressed.

The 107 Rule significantly limits commercial drone operations by not allowing operations beyond the operator's visual-line-of-sight¹⁷ or before sunrise or after sunset without a COA. These two limitations unnecessarily restrict and limit an industry that has unlimited potential across a multitude of industries.¹⁸ While the FAA does allow for the waiver of these limiting requirements in special applications, the burden and potential backlog for acquiring the waiver contradicts the "flexibility" that the FAA seeks with the 107 Rule. The limitations should be modified to ensure the United

13. See *Business Users*, KNOW BEFORE YOU FLY, <http://knowbeforeyoufly.org/for-business-users/> [https://perma.cc/4LQD-JQWP] (last visited Nov. 21, 2016) (defining commercial use as "[a]ny commercial use in connection with a business, including selling photos or videos taken from a UAS, using UAS to provide contract services . . . to provide professional services . . . to monitor the progress of work your company is performing").

14. See *Becoming a Pilot*, FED. AVIATION ADMIN., https://www.faa.gov/uas/getting_started/fly_for_work_business/becoming_a_pilot/ [https://perma.cc/4DLG-QTGA] (last updated Aug. 29, 2016) (providing study materials for the test and list of basic requirements).

15. See FED. AVIATION ADMIN., SUMMARY OF SMALL UNMANNED AIRCRAFT RULE (PART 107) (June 21, 2016), https://www.faa.gov/uas/media/Part_107_Summary.pdf [https://perma.cc/BA4Z-Z8PN] (providing the most current rules, operating limitations, and other requirements of commercial drone operation).

16. To seek a COA, remote pilots must submit a waiver application online, see *Request a Waiver/Airspace Authorization*, FED. AVIATION ADMIN. (last updated Sept. 1, 2016) https://www.faa.gov/uas/request_waiver/ [https://perma.cc/59SX-9RJV].

17. See, e.g., Thomas Lee, *Drawn by Clear Skies and Fewer Rules, Drone Makers Test Overseas*, SAN. FRAN. CHRONICLE (May 13, 2016, 6:28 PM), <http://www.sfchronicle.com/business/article/Drawn-by-clear-skies-and-fewer-rules-drone-7467994.php> [https://perma.cc/786Z-TJ9L] ("Poland has emerged as the de facto global center for drones. According to PricewaterhouseCoopers, Poland ranks first among the 15 countries where drone use is most common. Its liberal regulations are a draw. The country already provides licenses for drones operated from a remote location, without requiring that the pilot be able to see the aircraft.")

18. See *infra* Part I, Sec. C.

States remains competitive in the global drone economy.¹⁹ If not, the rules governing commercial small drone operations will obstruct a variety of industries from improving overall safety and efficiency.

Part I of this note briefly tracks the development of aviation law and policy, starting from early government regulations regarding large commercial aircraft; to the development of the FAA; and ending with a more thorough coverage of movement from FAA guidance and procedures to the notice of proposed rulemaking (NPRM) and the 107 Rule. The current and forecasted market, economic benefits, and industry specific uses for commercial drones are also addressed in Part I, along with concerns surrounding commercial drones; specifically, the security and privacy concerns and states' reactions to prolific drone use; the commercial drone technology; and general logistical issues.

Part II addresses two major concerns raised by industry professionals. Other components of the regulatory scheme such as the national registry system for all drones²⁰ and additional technical requirements for drones²¹ will not be discussed.

I. BACKGROUND

A. *FAA's Regulation of Drones, 1958 to 2008*

Laws concerning aviation were virtually non-existent prior to 1925.²² This lack of oversight, coupled with rudimentary aircraft technology, resulted in hazardous—and often fatal—flying operations.²³ United States mail carriers and military operators conducted the only flights at that time. The first major piece of

19. Jack Nicas, *Regulation Clips Wings of U.S. Drone Makers*, WALL ST. J. (Oct. 5, 2014, 6:07 PM), <http://www.wsj.com/articles/regulation-clips-wings-of-u-s-drone-makers-1412546849> [<https://perma.cc/CNE4-ZNKQ>] (stating that the drone industry is getting left behind in the U.S. and article states that accommodating polices outside the US have fueled the commercial drone market); see Press Release, Market Watch, Commercial Drone Market to Reach \$2.07 Billion by 2022: Grand View Research, Inc. (Aug. 13, 2015), <http://www.marketwatch.com/story/commercial-drone-market-to-reach-207-billion-by-2022-grand-view-research-inc-2015-08-13> [<https://perma.cc/KJ7D-4LAS>] (“The regulatory scenario is [sic] Europe is more conducive to market growth as opposed to the U.S., which is expected to play a pivotal role in high penetration of commercial drones in Europe.”).

20. Press Release, FED. AVIATION ADMIN., U.S. Transportation Secretary Anthony Foxx Announces Unmanned Aircraft Registration Requirement (Oct. 19, 2015), http://www.faa.gov/news/press_releases/news_story.cfm?newsId=19594 [<https://perma.cc/6725-WTRN>] (FAA announced the creation of a task force comprised of government officials and industry representatives to develop a national drone registry before November 20, to be in place for the 2015 holiday season). The drone registry was finalized and instituted in late December 2015. Registration and Marking Requirements for Small Unmanned Aircraft, 14 C.F.R. § 48 (2016).

21. 107 Rule, *supra*, note 9, at 42, 110–14.

22. *A Brief History of the FAA*, FED. AVIATION ADMIN. (last updated Feb. 19, 2015) https://www.faa.gov/about/history/brief_history/ [<https://perma.cc/MXS4-XMAS>].

23. *Id.*

aviation legislation did not address safety concerns. Rather, the Contract Air Mail Act (“Kelley Act”) authorized the United States government to award airmail delivery contracts to private carriers.²⁴ The Kelley Act is credited with igniting the commercial aviation industry and clearing subsequent regulations for takeoff.²⁵ The Federal Aviation Administration (then known as the Federal Aviation Agency)²⁶ began operations 33 years later on December 31, 1958.

The FAA initially assumed responsibility for aircraft pollution and noise regulations, airport safety certifications, and new airline certification along with its general oversight of the NAS.²⁷ In 1981, the FAA took its first action to address unmanned aircrafts by implementing “model aircraft operating standards” in the issuance of Advisory Circular 91-57 (“AC 91-57”).²⁸ According to the FAA, AC 91-57 was issued to distinguish model aircraft operations from manned aircraft operations, which face cumbersome statutory requirements that would be too burdensome for model aircrafts.²⁹ While the drafters of AC 91-57 could not have contemplated the advanced technology that exists today, many of the guidelines listed are strikingly similar to the standards enumerated in section 336 of the FMRA (the model aircraft section).³⁰ The FAA’s focus on unmanned aircrafts waned until the early 2000’s when the rapid advancement of drone technology prompted the FAA’s Aviation Safety Unmanned Program Office to issue AFS-400 UAS POLICY 05-01 (“Policy 05-01”).³¹

Policy 05-01 responded to the increased drone use by

24. *The Air Mail Act of 1925 (Kelly Act)*, AVIATION ONLINE MAG., <http://avstop.com/history/needregulations/act1925.htm> [https://perma.cc/4X9Y-JB6G] (last visited Nov. 21, 2016); See PAUL B. LARSEN ET AL., AVIATION LAW: CASES, LAWS AND RELATED SOURCES 8 (2nd ed. 2012).

25. *A Brief History of the FAA*, *supra* note 22; LARSEN, *supra* note 24 at 11.

26. *Request a Waiver/Airspace Authorization*, *supra* note 16 (In 1966 Congress authorized the creation of the Department of Transportation and changed the Federal Aviation Agency to the Federal Aviation Administration under the Department of Transportation.).

27. *Id.*

28. FED. AVIATION ADMIN., ADVISORY CIRCULAR 91-57, MODEL AIRCRAFT OPERATING STANDARDS (1981) (model aircrafts are considered hobby aircrafts used for recreational purposes only). Note, AC 91-57 was updated September 2, 2015 with Advisory Circular 91-57A. The updated AC is much more detailed but contains generally the same guidelines as the original.

29. Operation and Certification of Small Unmanned Aircraft Systems, 80 Fed. Reg. 9543, 9549–9550 (proposed Feb. 23, 2015) (discussing generally the FAA’s history of regulating sUAS, specifically the AC 91-57) [hereinafter sUAS NPRM].

30. *See id.*

31. FAA, AFS-400 POLICY MEMO 05-01, UNMANNED AIRCRAFT SYSTEMS OPERATIONS IN THE U.S. NATIONAL AIRSPACE SYSTEM – INTERIM OPERATIONAL APPROVAL GUIDANCE (2005) [hereinafter POLICY 05-01]. This policy memorandum was updated in 2008, *see* FED. AVIATION ADMIN., INTERIM OPERATIONAL APPROVAL GUIDANCE 08-01, UNMANNED AIRCRAFT SYSTEMS OPERATIONS IN THE U. S. NATIONAL AIRSPACE SYSTEM.

establishing guidelines for when FAA personnel issues a Certificate of Waiver or Authorization (COA).³² Specifically, Policy 05-01 requires COA applicants to clearly indicate the safety precautions they have in place to operate drones in the NAS, such that interference or collisions with other aircraft is “extremely improbable” and to establish airworthiness to comply with 14 C.F.R. § 91³³ that did not address unmanned aircrafts due to the “see and avoid” provision.³⁴ Additionally, Policy 05-01 explicitly rejects COA applications for commercial drones and applied the “Model Aircraft” exemption as described in AC 91-57 to allow hobbyists to fly model planes without needing a COA.³⁵ Essentially, Policy 05-01 allowed limited drone operations for research purposes to exceed the boundaries of recreational flying.

In 2007, the FAA further clarified its policy concerning the operation of drones, stating that “[r]egulatory standards need to be developed to enable current technology for unmanned aircraft to comply with Title 14 Code of Federal Regulations.”³⁶ In doing so, the FAA listed three types of UAS (Unmanned Aircraft Systems) to be regulated³⁷, which include “Civil” (commercial operation requiring COA), “Public” (government operations), and “Model Airplanes” (drones used for recreation or sport).³⁸ Finally, further proliferation of drone use prompted the FAA to update the 2005 Policy 05-01 memorandum in 2008 by adding more detailed guidelines for personnel issuing COAs.³⁹ These detailed guidelines provided greater understanding of the COA procedure, benefitting the agency and individual requestors alike.

B. Current FAA Rules, Regulations, and Procedures

The passage of Public Law 112-95, commonly referred to as the FMRA, finally addressed the patchwork of FAA rules, policy statements, and guidance.⁴⁰ This congressional attempt to provide clarity for the FAA proved to be a turning point for drone enthusiasts and the industries vying to incorporate the emerging technology. Detailed in sections 332 and 333, the FMRA directs the Secretary of Transportation to establish formal standards, rules, and regulations to safely incorporate small drones into the NAS under a timetable. This timetable proved to be more of a suggestion

32. POLICY 05-01, *supra* note 31.

33. 14 C.F.R. § 91.113 (FAA Right-of-way Rule).

34. POLICY 05-01, *supra* note 31.

35. *Id.* at 4, 6 (Policy 05-01 refers to commercial drones as “Civil” COA Applications).

36. *Id.* at 2.

37. UAS includes the drone, pilot, and any other equipment associated with the drone operation while UAV is simply referring to the drone itself.

38. Unmanned Aircraft Operations in the National Airspace System, 72 Fed. Reg. 6689 (Feb. 13, 2007).

39. POLICY 05-01, *supra* note 31.

40. FMRA, *supra* note 1.

than a list of actual deadlines.⁴¹ Nonetheless, the FMRA prompted a thorough review of drone technology and its possible implications when fully integrated into the NAS by slowly issuing COAs for commercial operations on a limited basis. Additionally, the FAA established drone test sites to research drone technology and methods for safe operations in the NAS.⁴²

The most notable accomplishment for the FAA came from the ruling in *Huerta v. Pirker*,⁴³ which affirmed the FAA's authority to enforce and prosecute issues pertaining to drone operations. The respondent challenged a fine issued by the FAA for "reckless operation" of his drone and received a favorable ruling from the administrative law judge, who held that drones are not "aircraft" under 49 U.S.C. § 40102(a) and 14 C.F.R §1.1 but rather model aircrafts, a distinct category according to the FAA and not applicable to enforcement under the aforementioned statutes.⁴⁴ The central issue in *Pirker* was whether the FAA's interpretation of 'aircraft' according to 49 U.S.C. § 40102(a) and 14 C.F.R §1.1 included unmanned aerial vehicles.⁴⁵ The National Transportation Safety Board (NTSB) concluded the FAA's interpretation of the definition (i.e. an "aircraft" is any "device" "used for flight in the air") was proper in light of the plain language and purpose of both statutes.⁴⁶ In broadly interpreting the definition of 'aircraft' to include drones, the NTSB affirmed the FAA's authority in the matter and remanded the case back to the administrative law judge.⁴⁷ The FAA eventually settled with Pirker, but the case nonetheless confirmed the FAA's enforcement authority over commercial drone operations.

Three months later, on February 15, 2015, President Obama issued a public memorandum titled *Promoting Economic Competitiveness While Safeguarding Privacy, Civil Rights, and Civil Liberties in Domestic Use of Unmanned Aircraft Systems*.⁴⁸ In

41. Bennett, *supra* note 5.

42. See Press Release, FED. AVIATION ADMIN., FAA Announces Virginia Tech UAS Test Site Now Operational (Aug. 13, 2014), https://www.faa.gov/news/press_releases/news_story.cfm?newsId=16875 [<https://perma.cc/6E22-ZXT5>]; Press Release, FED. AVIATION ADMIN., FAA Approves First Commercial UAS Flights over Land (June 10, 2014), https://www.faa.gov/news/press_releases/news_story.cfm?newsId=16354 [<https://perma.cc/C22F-TZMF>]; Press Release, FED. AVIATION ADMIN., FAA Grants Five More Commercial UAS Exemptions (Dec. 10, 2014), https://www.faa.gov/news/press_releases/news_story.cfm?newsId=17934 [<https://perma.cc/6LRZ-H3AQ>].

43. *Huerta v. Pirker*, No. CP-217, 2014 WL 8095629, at *11 (N.T.S.B. Nov. 17, 2014).

44. *Id.* at *1-2.

45. *Id.* at *2.

46. *Id.* at *3.

47. *Id.* at *5.

48. *Administration of Barack Obama, 2015 Memorandum on Promoting Economic*

the memorandum, the executive branch asserted its dedication to ensuring that the FAA account for privacy, security, and transparency while integrating drones into the NAS. While the memorandum did not carry the force of law, it certainly complemented the FMRA requirements pertaining to oversight and assessment of the FAA's forthcoming rules.⁴⁹ Hours after the presidential memorandum was released, the FAA released their NPRM for small, unmanned aircraft systems.⁵⁰

The NPRM was met with some reservations along with positive reactions by industry representatives. In an article with *Popular Science* magazine, many industry representatives expressed *generally* favorable opinions of the NPRM.⁵¹ David Dvorak of Field of View, LLC claimed that, “[t]hese new rules give us a bit more certainty in a new and rapidly evolving industry.”⁵² On the other hand, Mr. Dvorak echoed the concerns of other industry participants about the line-of-sight requirement, stating, “[a] strict interpretation of the FAA’s definition of visual line of sight in the proposed rules could be prohibitive to businesses, such as those in the precision agriculture industry, that are looking to cover or image large land areas.”⁵³ Henry Schneider, a film and video producer at Open Window Productions stated similarly that, “there needs to be some restrictions . . . but [the FAA] needs to recognize the economic benefits, [and not implement rules] which are beneficial to one industry over another. If they made rules with [the] same restrictions from field to farm, it wouldn’t work.”⁵⁴ While no rules proposed by a federal agency are likely to please everyone, the FAA’s small UAV NPRM was generally seen as a positive development and, with some slight modifications, will be embraced as a necessary step forward.

One month after the NPRM, the FAA streamlined the COA process to allow for more operators, by fast-tracking requests that are similar to previously approved requests and not requiring multiple, per-flight authorizations. In other words, once an operator received a Section 333 exemption there is no need to seek another

Competitiveness While Safeguarding Privacy, Civil Rights, and Civil Liberties in Domestic Use of Unmanned Aircraft Systems, Daily Comp. Pres. Docs. 1, 5.

49. *Id.*

50. Press Release, FED. AVIATION ADMIN., DOT and FAA Propose New Rules for Small Unmanned Aircraft Systems (Feb. 15, 2015), https://www.faa.gov/news/press_releases/news_story.cfm?newsId=18295 [<https://perma.cc/QVD5-C7SX>].

51. Kelsey D. Atherton, *What Does the Drone Industry Think of the FAA’s New Rules? The Good, the Bad, and the Glacially Slow*, POPULAR SCIENCE (Feb. 19, 2015), <http://www.popsci.com/what-does-drone-industry-think-faas-new-rules> [<https://perma.cc/T5RQ-UVFD>].

52. *Id.*

53. *Id.*

54. Comments gleamed from personal conversation with Henry Schneider.

COA for flights below 200-feet.⁵⁵

Finally, on June 28, 2016, the FAA issued the 107 Rule, which superseded the Section 333 exemption process and clarified the patchwork of guidelines and policy statements. While the 107 Rule is a significant step-forward in allowing the commercial drone industry to flourish by providing clear guidance and predictability on commercial drone operations, there are still many unanswered questions. The FAA, under the guise of safety, is intentionally taking an “incremental approach” to the regulation of commercial drones.⁵⁶ Industry representatives, however, argue that such an approach contradicts the flexibility required to keep pace with this emerging technology.⁵⁷ For the United States to compete with—or surpass—other countries in the commercial drone market, the 107 Rule must be modified as it pertains to the line-of-sight and daylight operation requirements. Doing so would allow operators to fully embrace the infinite applications of this emerging technology and forgo seeking an exemption to fly their drones beyond the line-of-sight or outside of daylight hours. To fully appreciate the necessity of removing/modifying those requirements, it is crucial to understand the benefits associated with commercial drone operations and how other countries have addressed commercial drone regulations.

C. *Benefits of Commercial Drone Activity*

The benefits and applications of commercial drones are limitless—and the market demand has already been realized across a variety of industries.⁵⁸ Drones not only have the potential to

55. Clay Dillow, *The FAA Issues Blanket Approval for Commercial Drone Use Below 200 Feet*, FORTUNE (Mar. 24, 2015, 6:09 PM), <http://fortune.com/2015/03/24/faa-commercial-drone-approval/> [<https://perma.cc/L3FE-29RW>]; Press Release, FED. AVIATION ADMIN., FAA Streamlines UAS COAs for Section 333 (Mar. 24, 2015), http://www.faa.gov/news/updates/?newsId=82245&omniRss=news_updatesAoc&cid=101_N_U [<https://perma.cc/Rf7Q-6XV8>].

56. 107 Rule, *supra* note 9, at 42, 70–73 (“[B]ecause higher-risk UAS operations pose additional safety issues that require more time to resolve, the FAA proposed to limit this rulemaking to small UAS operations posing the least amount of risk so that the agency could move to quickly issue a final rule integrating those operations into the NAS. . . the FAA has decided to proceed with an incremental approach in this final rule but has added waiver authority to the regulatory text in order to accommodate new technologies and unique operational circumstances.”).

57. *Id.* at 70–73 (“Amazon.com, Inc., the American Farm Bureau Federation, and several state farm bureaus, raised concerns about the proposed incremental approach. These and other commenters, such as the U.S. Small Business Administration (SBA) Office of Advocacy and the George Washington University Regulatory Studies Center, argued that more flexibility is necessary in the final rule to keep pace with new and emerging technologies. In addition, the commenters asserted that by delaying the integration of certain operations, such as beyond-visual-line of-sight operations, until a future rulemaking, the FAA would also delay the benefits associated with those operations until the pertinent future rulemaking is complete.”).

58. Clay Dillow, *State vs. State: FAA Breaks Down Winners, Losers in Growing*

revolutionize how certain industries operate, but the market size is truly astounding and has been estimated to exceed \$127 billion globally.⁵⁹ Unmanned aircrafts are unique in three ways: accessibility, affordability, and ease of operation. Those three qualities contribute to the growing popularity and cross-industry application of drones.

With regard to accessibility, most drones available for purchase are technologically advanced and come in a range of prices for every budget,⁶⁰ yet the drones are relatively easy to operate.⁶¹ The drone technology provides users with the ability to attach enhanced cameras or sensors (if not already pre-equipped), add larger batteries for extra flight time, and even choose between lighting options.⁶² Customizability appeals to recreational users and industry operators alike. In commercial applications, farmers use custom drones to quickly and efficiently monitor their crops,⁶³ journalists capture news footage (provided they have a COA),⁶⁴ and gas and oil pipeline inspectors take advantage of the extra battery life by inspecting thousands of miles of pipe in one flight⁶⁵—the list is endless. It is clear that the accessibility of drones makes them useful tools for a wide range of industries, but this is trivial if the cost does not justify the utility.

While a high-end professional drone can cost up to \$50,000,⁶⁶

Drone Market, FORTUNE (Sept. 20, 2015, 11:05 AM), <http://fortune.com/2015/09/20/faa-drone-operators/> [https://perma.cc/U5MY-WG7T].

59. *Global Market for Commercial Applications of Drone Technology Value at Over \$127bn*, PWC (May 9, 2016, 10:19AM), http://pwc.blogs.com/press_room/2016/05/global-market-for-commercial-applications-of-drone-technology-valued-at-over-127bn.html [https://perma.cc/2SCG-EJY5].

60. An Internet search engine query for “Drones” provides online shopping options for drones ranging from \$18 to \$4,500.

61. Fintan Corrigan, *How to Fly a Quadcopter—5 Best Drones Provide the Answer*, DRONEZON (Feb. 13, 2015), <http://www.dronezon.com/learn-about-drones-quadcopters/how-to-fly-a-quadcopter-5-best-drones-with-video-tutorials/> [https://perma.cc/8SRL-22PD].

62. Mike Gortolev, *7 Must-Have Quadcopter Accessories for Every Drone Enthusiast*, DRONEBLY (Aug. 9, 2014), <http://dronebly.com/7-must-have-quadcopter-accessories-for-every-drone-enthusiast> [https://perma.cc/HB4H-H3CR].

63. See *Ag Drones for Crop Surveillance*, PRECISION DRONE, <http://www.precisiondrone.com/agricultural/> [https://perma.cc/NE4L-N3MS]; Tom Dudek, *Drones or Unmanned Aerial Systems for Use in Commercial Agriculture*, MICH. STATE UNIV. EXT. (June 2, 2016), http://msue.anr.msu.edu/news/drones_or_unmanned_aerial_systems_for_use_in_commercial_agriculture [https://perma.cc/MUX4-CAUV].

64. Clemens Kochinke, *It's Official: Using Drone-Captured News*, DRONE LAW (May 6, 2015, 9:23 PM), <http://dronelaw.net/post/118327385407/its-official-using-drone-captured-news> [https://perma.cc/8HLL-SS2Y]; FED. AVIATION ADMIN., MEMORANDUM ON MEDIA USE OF UAS (2015), [https://www.faa.gov/about/office_org/headquarters_offices/agc/pol_adjudication/agc200/interpretations/data/interps/2015/williams-afs-80%20-%20\(2015\)%20legal%20interpretation.pdf](https://www.faa.gov/about/office_org/headquarters_offices/agc/pol_adjudication/agc200/interpretations/data/interps/2015/williams-afs-80%20-%20(2015)%20legal%20interpretation.pdf) [https://perma.cc/JC6E-DRVG].

65. See Kent Harrington, *Taking a Drone on an Oil Pipeline Inspection Test Drive*, AICHE: CHENECTED (Dec. 20, 2012), <http://www.aiche.org/chenected/2012/12/taking-drone-on-oil-pipeline-inspection-test-drive> [https://perma.cc/XKD4-KJUJ].

66. Robert Anthony, *These Are The High-Tech Drones That You Can Actually Buy*,

most are relatively inexpensive, ranging anywhere from 20 dollars to a few thousand dollars. The type of drone needed will depend on the industry, but even the more expensive drones can be cost-effective solutions. For example, a farmer surveying his crops for disease or other crop issues with a rugged mid-range drone saves money by not surveying the property by plane or automobile.⁶⁷ Considering the amount of time saved in these scenarios, drone use also increases the cost-efficiency.

Other industries benefit as well. The oil and gas industry experienced immensely positive results from utilizing drones “for inspecting and monitoring offshore rigs, pipelines, storage tanks, flare stacks and other infrastructure.”⁶⁸ According to Chris Blackford, co-founder and chief operation officer at Sky Futures,⁶⁹ “It’s far safer, quicker and more cost-effective . . . The inspection data [collected by drones] in five days takes rope-access technicians about eight weeks.”⁷⁰ This cost saving is realized in the actual money saved by utilizing drones as well as the risk mitigation. A drone damaged or destroyed while inspecting a dangerous portion of an oilrig is far less expensive than an employee sustaining injuries from the same task. Overall, a drone’s affordability comes from the nominal cost of the drone, the cost it replaces, the time it saves, and the mitigated risk.

The final quality that contributes to a drone’s unique position for commercial applications is its relative ease of operation and short learning curve for inexperienced operators. A drone can complete many tasks that would normally require a manned aircraft but accomplish the same without a pilot. While the FAA seeks a minimal level of sophistication to operate drones commercially with a COA or under the 107 Rule, it is nowhere near the level of expertise that flying a full size aircraft requires. Employers who find a valuable use for drones can save time and money by training their employees to operate drones rather than hire new employees with a certain professional skill set; these employees can then obtain a 107 Rule remote pilot certification.

ELITE DAILY (May 2, 2013, 9:15 AM), <http://elitedaily.com/envision/these-are-the-high-tech-drones-that-you-can-actually-buy/> [https://perma.cc/VME3-44MN].

67. See, e.g., *Smart Farmers Using Drones*, AIR DRONE CRAZE, <http://www.airdronecraze.com/smart-farmers-using-drones/> [https://perma.cc/8K4C-B3AD] (last visited Nov. 16, 2016); Alan Perlman, *Drone Technology Helps Florida Farmers Cut Costs*, UAV COACH (June 28, 2015), <http://uavcoach.com/drone-technology-helps-florida-farmers-cut-costs/> [https://perma.cc/S82G-P3K5].

68. Anjli Raval, *Inspection Drones Take Off as Flying Robots Replace Rigworkers*, FINANCIAL TIMES (Sept. 7, 2015), <https://www.ft.com/content/74418aac-3a06-11e5-bbd1-b37bc06f590c> [https://perma.cc/5CUQ-3DXD].

69. Sky Futures is a drone inspection company headquartered in London that specializes in the oil and gas industry. BP and Royal Dutch Shell are two clients (*see id.*).

70. Raval, *supra* note 68.

James Benham, president of JBKnowledge,⁷¹ said, “[f]or years, contractors have employed helicopter pilots to take photos or create videos of construction progress or completed projects, which typically is very expensive, [u]sing drones could be a much less costly alternative.”⁷² Having general contractors or sight supervisors take the little time it requires to learn how to operate a drone would save an incredible amount of overhead.⁷³

While the accessibility, affordability, and ease of operation makes drones a viable tool for many different industries, perhaps the most well-known proposed applications for drones come from industry giants such as Facebook, Amazon, and even Walmart.⁷⁴ Facebook is currently developing a program that would provide Internet access to rural areas via drones that are capable of sustaining steady flight for three months at a higher altitude than commercial airlines.⁷⁵ Amazon—the most outspoken advocate for commercial drones—on the other hand, is nearing completion of its drone delivery service.⁷⁶ In fact, it was Amazon’s drone delivery service announcement in December of 2013 that sparked the public’s interest in the commercial drone industry.⁷⁷ While Amazon has grand intentions for drone delivery, the 107 Rule will keep drone delivery in specified testing areas, away from the public.

71. JBKnowledge is a company based out of Texas providing technology solutions for the construction and insurance industries.

72. Katie Kuehner-Hebert, *Flying High: Why the Industry Needs Drones to Get Off the Ground*, CONSTRUCTOR MAGAZINE (Apr. 30, 2015), <http://www.constructormagazine.com/flying-high-why-the-industry-needs-drones-to-get-off-the-ground/#.ViYNfBCrRTY> [<https://perma.cc/3Q2T-CDCN>].

73. Steven Cvitanovic et al., *Drones: Maximizing Efficiency and Productivity with a Dash of Big Brother Thrown in*, JD SUPRA (Dec. 22, 2015), <http://www.jdsupra.com/legalnews/drones-maximizing-efficiency-and-81760/> [<https://perma.cc/B4MA-UUFX>]; see also Kim Slowey, *NAHB: Drone use taking off among larger homebuilders*, CONSTRUCTIONDIVE (May 26, 2016), <http://www.constructiondive.com/news/nahb-drone-use-taking-off-among-larger-homebuilders/419871/> [<https://perma.cc/Q4UG-X58V>].

74. Greg Nichols, *Walmart’s Drone Ambitions Are Real, and Smarter than Amazon’s*, ZDNET (June 6, 2016, 3:27 PM), <http://www.zdnet.com/article/walmarts-drone-ambitions-are-real-and-smarter-than-amazons/> [<https://perma.cc/DLG3-458W>]; Jonathan Vanian, *Behind the Scenes with Facebook’s New Solar-Powered Internet Drone and Laser Technology*, FORTUNE (July 30, 2015, 6:13 PM), http://for.tn/1gricQ7?xid=for_tw_sh [<https://perma.cc/LDB7-KZB9>].

75. Vanian, *supra* note 74; see Josh Constine, *Facebook Will Deliver Internet Via Drones with “Connectivity Lab” Project Powered by Acquires from Ascenta*, TECH CRUNCH (Mar. 27, 2014), <http://techcrunch.com/2014/03/27/facebook-drones/> [<https://perma.cc/A6JT-XJJU>]; see also Victor Luckerson, *Facebook Reportedly Wants to Buy a Drone Company*, TIME (Mar. 4, 2014), <http://time.com/12395/facebook-drones-titan-aerospace/> [<https://perma.cc/KZ6F-7P7D>].

76. AMAZON PRIMEAIR, <http://www.amazon.com/b?node=8037720011> [<https://perma.cc/B25Z-FGTS>] (last visited on Nov. 11, 2016); see Keith Wagstaff, *Amazon Unveils Flight Plan for Its Prime Air Delivery Drones*, NBC NEWS (July 28, 2015, 1:55 PM), <http://www.nbcnews.com/tech/innovation/amazon-drones-n399771> [<https://perma.cc/W8NK-TU7J>].

77. Search for *Drones*, GOOGLE TRENDS, <https://www.google.com/trends/explore#q=drones> [<https://perma.cc/A59Y-P5SU>] (last visited Nov. 13, 2016) (showing the internet search interest in commercial drones over the last 10 years).

However, not to be outdone or “out-teched,” Google also unveiled programs utilizing drones for delivery.⁷⁸ The enthusiasm on display by these industry goliaths is indicative of the potential for commercial drone use.

While the FAA has been slow to make commercial drones a viable option for mass utilization (specifically in terms of delivery), it has agreed to allow COA exemptions for experimentation for companies such as Amazon, who have shown a true interest in developing a feasible plan to implement commercial drones. Other corporations such as Fox Sports have also received a COA to use drones for coverage of the U.S. Open⁷⁹ and the National Football League, which received a COA to film *empty* stadiums (to avoid flights over individuals that are not directly participating in the flight, per 107 Rule) with drones.⁸⁰

Thus far, the majority of commercial operators utilize drones for aerial data gathering. 85% of companies holding COA are small businesses that operate in highly technical fields such as aerial data gathering.⁸¹ While it is extremely positive to see small businesses utilizing drones to further their practice, there is a troubling lack of large corporations with exemptions (save for the aforementioned three). According to Brian Wynn, President and CEO of the Association for Unmanned Vehicle Systems International (AUVSI), “[i]n many cases, large companies are testing [drones] in countries with more established risk-based, technology-neutral regulations, such as Canada and Australia. Larger businesses are mainly focused on more complex operations than are currently allowed by the exemption process.”⁸² Mr. Wynn continues by saying:

companies like Google and Amazon will continue to develop their drone technology elsewhere . . . in order to continue reaping the economic benefits that [drones] offer, we need to

78. Mark Harris, *Google is Testing Drones in US Airspace by Piggybacking on NASA Exemption*, GUARDIAN (Aug. 12, 2015, 12:26 PM), <http://www.theguardian.com/technology/2015/aug/12/google-testing-drones-us-airspace-nasa-deal-private-land> [https://perma.cc/T3M2-YQK8]; Eric Limer, *This is Google's Delivery Drone in Action*, POPULAR MECHANICS (Oct. 19, 2015), <http://www.popularmechanics.com/flight/drones/news/a17842/googles-delivery-drone-in-action/> [https://perma.cc/44L7-RVVU].

79. Taylor Soper, *How FOX Sports Will Use Drones at the U.S. Open, and Why the FAA is Watching*, GEEKWIRE (June 6, 2015, 3:00 PM), <http://www.geekwire.com/2015/here-are-the-drones-fox-sports-is-using-for-its-u-s-open-coverage/> [https://perma.cc/CAT2-UAV4].

80. Jamieson Cox, *The NFL is the First Major American Sports League Allowed to Fly Drones*, VERGE (Sept. 24, 2015, 12:39 PM), <http://www.theverge.com/2015/9/24/9392497/nfl-films-commercial-drone-exemption-faa> [https://perma.cc/P338-NQCV]. See also 107 Rule, *supra* note 9, at 42,202.

81. Dillow, *supra* note 55.

82. *Id.*

do all we can to support the growth and development of this industry . . . [b]ut the longer we take, the more our nation risks losing its innovation edge along with the billions of dollars of economic impact.⁸³

The versatility of drones across an assortment of unique industries makes this an exceptional technology. For many companies, drones are not an entertaining experiment, but an incredible solution to mitigate risks while increasing efficiency. More businesses would be able to utilize drone technology for infrastructure inspection, crop monitoring, data gathering, or delivery if a legal framework existed to *support* and *encourage* their ventures. Many innovating companies in the drone industry are hesitant to focus their resources in the United States due to a problematic and over-complicated regulatory structure. These companies look overseas instead, where some countries offer more intuitive and innovation-friendly regulations.

D. Across the Pond: How Have Our International Counterparts Responded to Commercial Drones?

The global market for commercial drones is growing exponentially and is estimated to exceed \$197 billion.⁸⁴ As with any disruptive technology,⁸⁵ the United States must act appropriately to remain competitive and claim its potential share of the market. The question then, is: how does the United States balance privacy and security concerns with business interests? To address this

83. *Id.*; see also Geoff Murray et al., *Can The U.S. Catch Up in The Race for Drones?*, FORBES (Sept. 15, 2015, 3:59 PM), <http://www.forbes.com/sites/oliverwyman/2015/09/15/can-the-u-s-catch-up-in-the-race-for-drones/> [https://perma.cc/42FF-2VRT] (Oliver Wyman Consulting firm data showing that the U.S. trails in commercial drone registration at just over 1000 in mid-2015, behind France, and Japan at over 2,500. While the U.S. has significantly increased the commercial drones registered, it is still not the global leader and therefore fails to take advantage of the “first-movers” business theory.); Kristen Wyatt, *Even Watered-Down Drone Limits Fail In Colorado*, CBS DENVER (Jan. 26, 2016, 5:42 PM), <http://denver.cbslocal.com/2016/01/26/even-watered-down-drone-limits-fail-in-colorado-legislature/> [https://perma.cc/XF9Z-8RBR] (Colorado Legislature failed to pass laws due to the hamper it would be on commercial operations.); Miriam McNabb, *Intel Warns FAA: Drone Regs May Drive Them Overseas*, DRONELIFE (Nov. 20, 2015), <http://dronelife.com/2015/11/20/intel-warns-faa-drone-regs-may-drive-them-overseas/> [https://perma.cc/AJ3S-VAPX] (Intel warns FAA that drone regulations may drive them overseas.).

84. PwC, *supra* note 59.

85. See Matthew Jenkin, *Delivering the goods: could SMEs benefit from the drone industry?*, THE GUARDIAN (July 24, 2015, 2:15 PM), <http://www.theguardian.com/small-business-network/2015/jul/24/delivering-goods-smes-drone-industry> [https://perma.cc/KAH9-UHJL] (CEO of Bizzy, a UK app company, defining “Disruptive Tech” and stating “[d]rones could disrupt so many industries and provide a range of services consumers would both love and need . . . [a]s consumers living in a ‘now’ economy, with low attention spans and the expectation that we need everything at the touch of a button, drones could provide this across a range of industries from manufacturing, security and software to hardware and consumer-based services.”).

question, this note closely analyzes the laws and regulations abroad to understand the realized benefits compared with the consequences. A comparative look at foreign governments such as the United Kingdom, New Zealand, and France reveals that there is a wide spectrum of governance over commercial drones. Some governments such as the United Kingdom have crafted regulations similar to those currently in place in the United States; others such as New Zealand and France have tailored their laws to promote safe and effective commercial drone operations.

1. United Kingdom

The United Kingdom has similar regulations governing the operation of commercial drones. According to the Air Navigation Order 2009 Articles 166 and 167,⁸⁶ drone operation requires permission from the Civil Aviation Authority (“CAA”) when the operation is for commercial purposes (i.e. a service that operators charge for, such as field surveillance).⁸⁷ Otherwise, drones under the 20kg weight limit and “being flown within direct unaided line of sight and away from people, property and congested areas” are not required to obtain permission.⁸⁸ The CAA’s requirements are also nearly identical to those of the United States: both require the operators applying for permission/exemption to demonstrate an understanding of the safety implications, and take necessary steps for addressing those safety concerns.⁸⁹ Finally, Article 138 of the Air Navigation Order 2009 requires both manned and unmanned aerial flights to operate in a manner that is not reckless or negligent, a general requirement also contained in the FAA’s 107 Rule.⁹⁰

There are only two noticeable differences between the United States’ current drone regulatory scheme and the United Kingdom’s. First, the United States’ regulations come in the form of a rule and general guidance, the latter not having the force of law. The United Kingdom regulations are wholly enforceable. Second, the CAA’s regulations do not differentiate between governmental or recreational drone users to the same extent as the FAA. These differences, however, do not substantially differentiate the current

86. Air Navigation Order 2009 is comparable in breadth and scope to the US’s FMRA 2012. Air Navigation Order 2009, SI 2009/3015 (Eng.), http://www.legislation.gov.uk/uksi/2009/3015/pdfs/uksi_20093015_en.pdf [<https://perma.cc/7529-5ZW4>].

87. See *Unmanned Aircraft: Requirements for operating in airspace*, CIVIL AVIATION AUTHORITY, <https://www.caa.co.uk/unmannedaircraft/> [<https://perma.cc/PK3W-VXD9>].

88. *Id.*

89. *Id.*; see also FAA, *supra* note 15.

90. Air Navigation Order 2009, *supra* note **Error! Bookmark not defined.**; see also *Operation and Certification of Small Unmanned Aircraft Systems*, *supra* note 9, at 42066.

drone use in each location.

Save for its partnership with Amazon,⁹¹ the United Kingdom does not seem to be making great strides in capturing market share. With the United States' and United Kingdom's regulatory schemes being almost identical, it would seem that the first to clear commercial drones for take-off, beyond limitations currently imposed, would stand to make substantial gain in this industry.

2. New Zealand

In contrast to the United States and United Kingdom, New Zealand implemented simple and straightforward regulations pertaining to drones known as Remotely Piloted Aircraft Systems ("RPAS"). New Zealand's CAA consolidated its aviation rules into the appropriately titled Civil Aviation Rules,⁹² which is organized by Parts, and detailed in accompanying Advisory Circulars.⁹³ Parts 101 and 102 address the operations of drones—Part 101 pertaining specifically to recreationally operations, while laying out the general safety guidelines, and Part 102 describing operations that require permission.⁹⁴ New Zealand's CAA does not make an explicit distinction between recreational and commercial operations and, therefore, permits commercial drones without permission if the requirements of Part 101 are met. In general, drones under 25kg ("small unmanned aircraft") need to be operated safely, below four hundred feet and away from persons and property, unless the operator obtains consent.⁹⁵ Additionally, New Zealand allows drones to be operated through monitors and other visual aid devices,⁹⁶ while the United States currently has an express ban on such, requiring an unassisted direct line of sight.⁹⁷

Drones over 25kg ("medium" and "large" unmanned aircraft), and operations which cannot meet the requirements of Part 101, need approval from the CAA. Part 102 lists the basic requirements

91. Nicky Woolf and Samuel Gibbs, *Amazon to test drone delivery in partnership with UK government*, THE GUARDIAN (July 25, 2016, 7:00 PM), <https://www.theguardian.com/technology/2016/jul/25/amazon-to-test-drone-delivery-uk-government> [<https://perma.cc/K4X4-U5TN>].

92. *RPAS, UAV, UAS, Drones and Model Aircraft*, CIVIL AVIATION AUTH. OF NEW ZEALAND, <http://www.caa.govt.nz/rpas/> [<https://perma.cc/FU3E-3WLB>].

93. CIVIL AVIATION AUTH. OF NEW ZEALAND, ADVISORY CIRCULAR 101-1, REMOTELY PILOTED AIRCRAFT SYSTEMS (RPAS) UNDER 25 KILOGRAMS – OPERATING IN COMPLIANCE WITH PART 101 RULES (2015), https://www.caa.govt.nz/Advisory_Circulars/AC101-1.pdf [<https://perma.cc/YVU5-5FXJ>] [hereinafter AC101-1]; CIVIL AVIATION AUTH. OF NEW ZEALAND, ADVISORY CIRCULAR 102-1, UNMANNED AIRCRAFT – OPERATOR CERTIFICATION (2015), https://www.caa.govt.nz/Advisory_Circulars/AC102-1.pdf [<https://perma.cc/GYZ6-DSK5>] [hereinafter AC102-1].

94. AC101-1 & AC102-1, *supra* note 93.

95. *Compare* AC101-1, *supra* note 93, *with* FAA, ADVISORY CIRCULAR 91-57, MODEL AIRCRAFT OPERATING STANDARDS (1981).

96. AC102-1, *supra* note 93.

97. 107 Rule, *supra* note 9, at 42,092.

for approval from the Civil Action Authority such as a demonstrated understanding of safety concerns, and a detailed statement of what the drone is used for and how it will be done safely—strikingly similar to what is required for FAA-COAs and United Kingdom’s CAA permission.⁹⁸ Importantly, New Zealand does not expressly prohibit drones operating under Part 102 from operating beyond the operator’s direct line of sight.⁹⁹

This drone-favorable regulation allowed Fastway Couriers,¹⁰⁰ in partnership with United States-based Flirtey,¹⁰¹ to complete a successful delivery of automotive parts in Auckland, New Zealand via drone.¹⁰² Further emphasizing the efficiency of drone delivery, the delivery took place in under five minutes, while a traditional driver delivery would have taken approximately twenty minutes, depending on traffic.¹⁰³ While Flirtey has made progress in the United States in terms of drone courier services,¹⁰⁴ it currently favors working in less-stringent regulatory countries such as Australia and New Zealand.

Under these less burdensome regulations, why aren’t more drones being utilized for delivery? First, commercial drone delivery technology is still in its infant stage.¹⁰⁵ It has enjoyed a significant amount of press coverage, but that does not necessarily translate to wide-scale acceptance; drone delivery is still a niche.¹⁰⁶ In New Zealand, the red tape may be *comparatively* easier to deal with, but small business owners (outside of technical industries) are still reluctant to dedicate a significant amount of time or money towards applying for the necessary permissions and setting up a workable business model. The takeaway from New Zealand’s system, however, is that laws governing commercial drones make a

98. *Id.*

99. *Id.*

100. Fastway Couriers is a global courier service. See FASTWAY COURIERS, <http://www.fastway.com.au/why-fastway/about-fastway> [https://perma.cc/QW3R-JNWG] (last visited Nov. 13, 2016).

101. Flirtey is an Australian start-up, headquartered in Reno, Nevada, that develops drone-centered delivery systems. FLIRTEY, <http://flirtey.com/> [https://perma.cc/7LQ9-KEPR] (last visited Nov. 13, 2016); see also Zoe Daniel, *Drone delivery start-up Flirtey taking on Google, Amazon in race to satisfy regulators* ABC AU (May 16, 2016, 2:31 PM), <http://www.abc.net.au/news/2016-05-17/australian-startup-flirtey-takes-on-google-in-drone-race/7416004> [https://perma.cc/2Q79-PHAN].

102. Matthew Theunissen, *Parcel delivery by drone*, NZ HERALD (June 21, 2015, 5:00 AM), http://www.nzherald.co.nz/business/news/article.cfm?c_id=3&objectid=11468563 [https://perma.cc/Z5TV-PEVT].

103. *Id.*

104. Nick Lavars, *Flirtey cleared for take-off in first FAA-approved drone delivery service*, GIZMAG (July 15, 2015), <http://www.gizmag.com/flirtey-drones-deliver-medicine-in-us-first/38102/> [https://perma.cc/3SWK-S3BZ].

105. See BOB HAZEL & GEORGES AOUDE, *IN COMMERCIAL DRONES, THE RACE IS ON 5* (Oliver Wyman ed., 2015).

106. *But see* Kieron Monks and Earl Nurse, *Life-saving drones take flight in Rwanda*, CNN (Aug. 10, 2016, 6:21 AM), <http://www.cnn.com/2016/08/10/africa/blood-drones-rwanda-mpa/> [https://perma.cc/3S8S-7KAB].

considerable impact on where new companies are willing to test their commercial drone systems; and once commercial drones become more mainstream, these companies will be established in the areas that gave them the green-light early on. Thus, once the technology becomes more advanced and business models can be adapted for smaller businesses, countries that were hard-pressed to allow drone operations in the early stages could be fighting an uphill battle to capture market share. As more successful trial runs are completed, more companies will take advantage of commercial drones in a multitude of sectors. The more time the FAA spends on limiting commercial drones to testing or experimental flights, the more market share will be seized by foreign competition.

3. France¹⁰⁷

Of all the nations that have addressed commercial drone operations, none are as advanced and accepting of commercial drones as France. In 2012, France began regulating commercial drones through a decree issued by the Directorate General for Civil Aviation (“DGAC”).¹⁰⁸ In the regulations, France created seven unique categories that represent a variety of drones (based on weight and capabilities), and established safety guidelines with respect to people and property that are observed in regulations across the globe.¹⁰⁹ In addition to the categories, France also established a process for certain commercial drones to seek permission. However, the process in France was much more user-friendly compared to the pre-107 Rule process in the United States, and allowed a greater number of drone operators to seek permission for specific commercial purposes. Since then, France has taken the lead in crafting its regulations in a manner that adapts to the industry, while also addressing general concerns of privacy and security. According to news source, *France24*:

Unlike the US, France has laid the groundwork for the use of drones for private enterprise, with operators required to apply for official certification. Businesses can fly drones within a pilot’s line of sight and beyond that line of sight (with the help of a video camera) over a distance of up to 15 kilometres. Civil commercial operators can also request

107. At the time of this writing, France—and many other countries—where victims of horrible terror attacks; this author pauses to remember those who lost their lives and recognize solidarity with France and every suffering nation.

108. Loi 2012-1207595A du 11 avril 2012 relatif à l’utilisation de l’espace aérien par les aéronefs qui circulent sans personne à bord, [Law 2012-1207595A of April 11, 2012 on the use of airspace by aircraft circulating no one on board], JOURNAL OFFICIEL DE LA RÉPUBLIQUE FRANÇAISE [J.O.] [OFFICIAL GAZETTE OF FRANCE], May 10, 2012.

109. *Regulatory News*, CIVIC DRONE, <http://www.civicdrone.com/news/regulatory-news-about-uav-in-france-c10027.html> [https://perma.cc/62QU-2AXH] (last visited Nov. 21, 2016).

special permission from police to fly over populated areas.

This freedom has allowed firms in France to use drones in sophisticated and groundbreaking ways, including helping build or repair roadways, power lines, pipelines, and other economically vital infrastructure. The large majority of certification applications so far have come from media companies, but the heavy industry and agricultural sectors have also started exploring drone use.¹¹⁰

With so much emphasis being placed on drone delivery, it is easy to overlook the other applications of commercial drones—such as in the agriculture industry, or operations related to infrastructure. Through its regulations, France has supported a myriad of industries, accepting over 1,600 registered commercial drone operators by March of 2015, significantly more than the United States, which had less than 600 (most of which are for research or testing purposes) around the same time. While the FAA drastically improved and streamlined its COA process, and the 107 Rule has made it easier to fly commercial drones through the remote pilot certification (and not needing a Section 333 exemption), the visual-line-of-sight and daylight operation requirements are still points of contention for commercial drone operators. France, on the other hand, has capitalized on this emerging market by allowing the technology to be easily applied commercially, without requiring visual-line-of-sight, and most noticeably with farmers.¹¹¹ As noted in Part C, the applications of drones to help farmers is limitless. Paris-based company Airinov¹¹² estimates that it will secure approximately 20,000 commercial drone flights over farms.¹¹³ The technology utilized by Airinov can survey farms, identify problem areas by detecting weeds, and ultimately lower agricultural costs.¹¹⁴

We can learn from the legal framework of other states by comparing those frameworks to our own. Initially, countries where the framework favors commercial drone operations have not

110. Joseph Bamat, *What France can teach Obama about civilian drones*, FRANCE 24 (Jan. 29, 2015), <http://www.france24.com/en/20150129-france-civilian-drone-legislation-lessons-usa-obama> [https://perma.cc/3N5R-YR8T].

111. Rudy Ruitenberg, *What the French Know About Drones That Americans Don't*, BLOOMBERG (Mar. 16, 2015, 6:00 AM), <http://www.bloomberg.com/news/articles/2015-03-16/what-the-french-know-about-drones-that-americans-don-t> [https://perma.cc/CV7P-H4RK].

112. Airinov is a French company founded in 2010 that provides innovative UAV-based solutions for agriculture applications. AIRINOV, <http://www.airinov.fr/en/company/about/> (last visited Nov. 13, 2016) [https://perma.cc/3EZS-ZKSN].

113. Ruitenberg, *supra* note 111.

114. *Id.*

suffered any more accidents than countries with stringent or stalled regulations. According to NYDatabases.com, there have been 50 domestic drone accidents reported as of December 31, 2015.¹¹⁵ While data regarding drone accidents in France is not readily available, the press has covered significantly less drone crashes (with more emphasis on drones flying over restricted areas). A general estimate provided by Muriel Preux, program manager of DGAC's Remotely Piloted Aircraft Systems (RPAS) division, suggests that there have been no reports of drone accidents that jeopardized public safety and only approximately 100 reported crashes since April 2012.¹¹⁶

E. Criticisms and Concerns of Commercial Drone Operation

As with any emerging technology, the unique opportunities do not please everyone. The justifiable concerns regarding safety and privacy, have been a significant part of the discussion. With regard to safety, the main issues with drones (commercial or recreational) are operation with a high-degree of anonymity, modification with little technical experience, and operation with even less experience. This is a dangerous combination, but not insurmountable. Additionally, operators who fail to recognize established safety procedures for flying drones run the risk of interfering with manned aircrafts¹¹⁷ and persons¹¹⁸ or intruding on private, secure locations.¹¹⁹ Regarding privacy, Fourth Amendment concerns flourish in light of government actors adopting advanced surveillance technology,¹²⁰ in addition to the risk of "peeping toms."

115. Democrat and Chronicle, *Domestic Drone Accidents*, NY DATABASES, <http://rochester.nydatabases.com/map/domestic-drone-accidents>; *but see* Arthur H. Michel and Dan Gettinger, *Analysis of New Drone Incident Reports*, CENTER FOR THE STUDY OF THE DRONE (Mar. 28, 2016), <http://dronecenter.bard.edu/analysis-3-25-faa-accidents/> [<https://perma.cc/FM2E-SEQD>] (analyzing FAA report indicating there has been 528 *close encounters* and *sightings* between 2014–15) (emphasis added).

116. E-mail from Muriel Preux, Program Manager of DGAC's Remotely Piloted Aircraft Systems ("RPAS") Division, to author (Jan. 15, 2016) (on file with author).

117. Joseph Serna, *Lufthansa Jet and Drone Nearly Collide Near LAX*, L.A. TIMES (Mar. 19, 2016, 8:57 AM), <http://www.latimes.com/local/lanow/la-me-ln-drone-near-miss-lax-20160318-story.html> [<https://perma.cc/L9DW-YLR7>].

118. Matias Grez, *Drone Crashes onto Piste, Misses Champion Skier by Inches*, CNN (Dec. 23, 2015, 3:58 PM), <http://edition.cnn.com/2015/12/23/sport/marcel-hirscher-drone-crash/> [<https://perma.cc/6DLV-8FQ8>].

119. Bart Jansen, *Small Drone Crashes Near White House Despite Ban Against Flights in D.C.*, USA TODAY (Oct. 9, 2015, 5:12 PM), <http://www.usatoday.com/story/news/2015/10/09/drone-crash-white-house-ellipse-us-park-police-federal-aviation-administration/73641812/> [<https://perma.cc/JDU5-YMBW>]; Dan Bilefsky, *France Arrests 3 With Drones by Power Plant*, N.Y. TIMES (Nov. 6, 2014), <http://nyti.ms/1wzAjqU> [<https://perma.cc/EM5L-7GH8>]; Martin Robinson, *Man Accused of Sending a Drone Over High-Profile Landmarks Including Houses Parliament, Buckingham Palace and Anfield*, DAILY MAIL (Mar. 18, 2015, 9:27 AM), <http://dailymail.com/1x0iVOX> [<https://perma.cc/UA5F-DS7Q>].

120. *Surveillance Drones*, EFF, <https://www.eff.org/issues/surveillance-drones> [<https://perma.cc/MQ4R-FKWZ>]; David Kravets, *FBI Admits it Surveils U.S. with Drones*, WIRED (June 19, 2013, 12:04 PM), <http://www.wired.com/2013/06/fbi-drones/>

1. Safety Concerns

Safety is the first and foremost consideration of any regulatory framework and accordingly, section 333 of the FMRA states that the “Secretary of Transportation, in consultation with representatives of the aviation industry, Federal agencies . . . and the unmanned aircraft systems industry, shall develop a comprehensive plan to safely accelerate the integration of civil unmanned aircraft systems into the national airspace system.”¹²¹ According to the FAA, the key determinations are: “(1) the operation must not create a hazard to users of the national airspace system or the public; and (2) the operation must not pose a threat to national security.”¹²² Furthermore, the FAA decided to approach this objective incrementally, to allow low risk operations sooner and address higher risk operations in subsequent rules, rather than a single omnibus rulemaking.¹²³

Opponents of wide-scale drone operations are quick to call attention to the media headlines of drones wreaking havoc or coming into close proximity with manned aircrafts.¹²⁴ An even more terrifying possibility is presented in a video posted online to YouTube showing a homemade drone equipped with a handgun, fully operational from the user’s remote control.¹²⁵ The issue is that the majority of drones in the media are:

Operated by hobbyists . . . the public and to some extent the non-technology news media [do not] know the difference. To them, a drone is a drone regardless of whether it’s being used by some moron thrill seeker or by [a] company to inspect a radio tower or a bridge.¹²⁶

The fact of the matter is that limiting drone operations, without distinguishing between commercial and recreational operations, does not directly address the safety concerns and only hinders a market by making it more difficult for companies to utilize drones legally. To reduce malfeasant operations, more

[<https://perma.cc/WN6W-YJE8>]; see also *Domestic Drones*, ACLU (last visited Nov. 13, 2016), <https://www.aclu.org/issues/privacy-technology/surveillance-technologies/domestic-drones> [<https://perma.cc/PD2M-L767>].

121. FMRA, *supra* note 1, at 73.

122. 107 Rule, *supra* note 9, at 42,065.

123. 107 Rule, *supra* note 9, at 42,086.

124. See Serna, *supra* note 117.

125. Hogwit, *Flying Gun*, YOUTUBE (July 10, 2015), <https://www.youtube.com/watch?v=xqHrTtvFFIs> [<https://perma.cc/LA39-NLSR>]; see also FPSRussia, *Prototype Quadrotor with Machine Gun!*, YOUTUBE (Apr. 23, 2012), <https://www.youtube.com/watch?v=SNPJMk2fgJU> [<https://perma.cc/D6RN-8T5L>].

126. Wayne Rash, *2016 Dawning as Year of the Drone in the Business Sector*, EWEEK (Dec. 27, 2015), <http://www.eweek.com/mobile/2016-dawning-as-year-of-the-drone-in-the-business-sector-2.html> [<https://perma.cc/A8D3-X7Y5>].

stringent requirements need to be imposed on drones sold for recreational purposes (i.e. those not built and intended for specific commercial purposes).

For the most part, states have been proactive in enacting legislation addressing public safety and privacy issues surrounding drone operations. According to the National Conference of State Legislatures (“NCSL”), 26 states have adopted legislation since 2013.¹²⁷ Of those states, Nevada has arguably the most comprehensive law which covers the “weaponization” of drones.¹²⁸ This data shows that states are capable and willing to address safety and privacy concerns in a more efficient and tailored manner than the FAA.¹²⁹ Additionally, to supplement the state legislation, there are companies dedicated to developing technology to protect individuals and businesses from intrusive drones, proving that drones are not presenting dangers that cannot be addressed in both the private and public sector.¹³⁰ Once again, comparing our regulations to those in France, there can be a healthy balance between safety and lenient regulations. In a report issued by the French Government on the civilian use of drones, the General Secretariat for Defense and National Security noted:

127. *State Unmanned Aircraft Systems (UAS)*, NCSL (Sept/ 30, 2016), <http://www.ncsl.org/research/transportation/state-unmanned-aircraft-systems-uas-2015-legislation.aspx> [<https://perma.cc/EM45-JEDD>] (“In 2015, 45 states considered 168 bills related to drones. Twenty states—Arkansas, California, Florida, Hawaii, Illinois, Louisiana, Maine, Maryland, Michigan, Mississippi, Nevada, New Hampshire, North Carolina, North Dakota, Oregon, Tennessee, Texas, Utah, Virginia and West Virginia—passed 26 pieces of legislation. Five other states—Alaska, Georgia, New Mexico, Pennsylvania and Rhode Island—adopted resolutions related to drones. Georgia’s resolution established a House study committee on the use of drones and New Mexico adopted memorials in the house and senate requiring a study on protecting wildlife from drones. Pennsylvania’s resolution directs the Joint State Government Commission to conduct a study on the use of UAS by state and local agencies and Rhode Island’s resolution created a legislative commission to study and review regulation of UAS. Additionally, Virginia’s governor signed an executive order establishing a commission on unmanned systems. Florida and Kentucky have prefiled [sic] bills for the 2016 legislative session.”); *but see* Michael J. Bologna, *Aviation Lawyers Doubt State Laws Restricting Drones*, BLOOMBERG BNA (Feb. 4, 2016), <http://www.bna.com/aviation-lawyers-doubt-n57982066999/> [<https://perma.cc/GXA4-LRBC>] (claiming that the coverage of these state laws are likely preempted by federal authority).

128. NCSL, *supra* note 127.

129. 107 Rule, *supra* note 9, at 42,190–92.

130. Carl Franzen, *The Anti-Drone Business is About to Take Off*, POPULAR MECHANICS (May 1, 2015), <http://www.popularmechanics.com/flight/drones/a15328/dronesshield-anti-drone-business/> [<https://perma.cc/4YDM-6PFM>] (discussing DroneShield); Damien Gayle, *The Drone Catcher: Flying Net is Designed to Stop Terrorist from Flying Bomb-Laden Gadgets into Nuclear Power Stations*, DAILY MAIL (Feb. 10, 2015, 5:15 PM), <http://www.dailymail.co.uk/news/article-2948062/The-drone-catcher-France-reveals-flying-net-stop-terrorists-flying-bomb-laden-gadgets-nuclear-power-stations-following-spate-sightings.html> [<https://perma.cc/BVH2-W4Z5>] (discussing drone net); David Szondy, *Battelle’s DroneDefender Anti-Drone Beam Gun Grounds UAVs*, GIZMAG (Oct. 16, 2015), <http://www.gizmag.com/battelless-dronedefender-beam-gun-uavs/39885/> [<https://perma.cc/FE75-ZEKP>] (presenting an anti-drone rifle).

This legal framework, even when renovated, will not prevent possible malicious use of drones. However, through its educational merits based on making users accountable, it will contribute to considerably reducing the difficulties caused by ignorance of applicable rules by leisure users and will allow the public authorities to more quickly distinguish a malicious drone from an ordinary drone and therefore to act more effectively against it.¹³¹

While most people are less likely to instinctively associate domestic drone operations with the military drone strikes overseas, the public is still frightful of what drones can be used for. Certainly, these fears are somewhat justified, but every technology can be utilized to instigate chaos. There are other means to address safety concerns without hampering an entire industry.

2. Privacy Concerns

Privacy has become a pressing issue in a variety of fields in this digital age. As privacy pertains to drones, states and localities have taken it upon themselves to promulgate laws in their jurisdiction in the absence of federal laws.¹³² In fact, opponents claim privacy protections are lackluster at the federal level and the Electronic Privacy Information Center (EPIC) filed suit against the FAA for lack of privacy considerations in the NPRM.¹³³ Tony Romm of *Politico* describes the Obama Administration's actions as "not so much new rules as they are general, broad suggestions for companies to be on their best behavior — with little in the way of penalties."¹³⁴ The D.C. Circuit Court of Appeals dismissed the EPIC lawsuit.¹³⁵ While not the thrust of this note, the case highlights

131. GEN. SECRETARIAT FOR DEF. AND NAT'L SEC., THE DEVELOPING USE OF CIVIL DRONES IN FRANCE: ISSUES AND POSSIBLE STATE RESPONSES 27 (pdf on hand with author).

132. NCSL, *supra* note 127.

133. *Epic v. FAA*, EPIC.ORG (last visited Nov. 13, 2016), <https://epic.org/privacy/litigation/apa/faa/drones/> [<https://perma.cc/LGC3-DWFD>] (EPIC "sued the Federal Aviation Administration for failing to establish privacy rules for commercial drones as mandated by Congress. . . . In 2012, over 100 organizations, experts, and advocates joined EPIC in petitioning the FAA to establish privacy protections prior to the deployment of commercial drones in the United States. In 2014, the FAA responded to EPIC's petition, claiming that drone privacy implications 'did not raise an immediate safety concern.' The FAA further stated, 'We will consider your comments and arguments as part of that project.' But in 2015 when the FAA announced a rulemaking on commercial drones, the agency purposefully ignored privacy concerns, stating that privacy 'issues are beyond the scope of this rulemaking.'"); *see also* Michael Frank, *Drone Privacy: Is Anyone in Charge?*, CONSUMER REPORTS (Feb. 10, 2016), <http://www.consumerreports.org/electronics/drone-privacy-is-anyone-in-charge> [<https://perma.cc/9R4X-F9S5>].

134. Tony Romm, *Drone Privacy Push Could Stall Out*, POLITICO (Jan. 3, 2016, 7:30 AM), <http://www.politico.com/story/2016/01/drone-privacy-amazon-google-217257> [<https://perma.cc/4AP8-QAZA>].

135. Elec. Privacy Info. Center v. FAA, No. 15-1075, at 2 (D.C. Cir. 2016),

government use of drones have been questioned as Fourth Amendment violations. The FAA took a positive step forward in addressing privacy concerns when they required all drones under 55lbs and over 0.5lbs to be registered on a national registry with the user's name and address. This requirement, unfortunately, also cuts both ways; many recreational users are hesitant about making personal information public for a "toy."

As stated earlier, privacy has been addressed at the state and local level. While these privacy laws are not uniform across the nation, they are more carefully considered and tailored to the specific regions and arguably accomplish more in the realm of privacy than the federal government. For example, Wyoming, a largely unpopulated and agricultural state has lenient privacy laws regarding drones, while New York, which has a high concentration of people, is more concerned with the privacy implications of drone use.¹³⁶ While the FAA is responsible for the implementation of commercial drones in the NAS and it may seem that it is better positioned to address privacy concerns, the FAA's General Counsel issued a statement clarifying the areas of law that the states are responsible for in terms of unmanned aircraft—and privacy is included.¹³⁷ Understanding that the states have been relatively proactive in enacting safety and privacy laws, and having faith in the states to do such, is necessary so the FAA can focus on administering the 107 Rule and future rules that benefit the industry and public alike. The EPIC lawsuit meant well but was ultimately frivolous—privacy concerns are outside the scope of the FAA's task of integrating drones into the NAS.¹³⁸ Finally, the industry itself has recognized the privacy implications surrounding drones and, in conjunction with the National Telecommunications and Information Administration, issued a "voluntary best practices" for drone use.¹³⁹

[https://www.cadc.uscourts.gov/internet/opinions.nsf/41DFCFD566803A1185257FAF004DF912/\\$file/15-1075-1612391.pdf](https://www.cadc.uscourts.gov/internet/opinions.nsf/41DFCFD566803A1185257FAF004DF912/$file/15-1075-1612391.pdf) [<https://perma.cc/HCP5-Y7RP>].

136. An Internet search for Wyoming and New York drone laws show that laws passed in Wyoming curtail law enforcement's use of drones for data gathering and use by hunters while New York seems to be more proactive in establishing comprehensive regulation aimed at all drone operations. *Compare Drone Flying Laws in Wyoming, DRONE PILOT SMARTS*, <http://dronepilotsmarts.com/drone-flying-laws-in-wyoming/> [<https://perma.cc/WA8L-T9ZC>], with Cecilia Kang, *F.A.A. Drone Laws Start to Clash With Stricter Local Rules*, N.Y. TIMES (Dec. 27, 2015), <http://nyti.ms/1mdhI2O> [<https://perma.cc/33XJ-9SJ8>].

137. FAA, STATE AND LOCAL REGULATION OF UNMANNED AIRCRAFT SYSTEMS (UAS) FACT SHEET (2015) https://www.faa.gov/uas/resources/uas_regulations_policy/media/uas_fact_sheet_final.pdf [<https://perma.cc/E2F8-DJU9>] [hereinafter FAA DRONE FACT SHEET].

138. Motion to Dismiss at 4, Elec. Privacy Info. Center v. FAA, No. 15-1075 (D.C. Cir. May 15, 2015), <https://epic.org/privacy/litigation/apa/faa/drones/1552818-Motion-to-Dismiss.pdf>.

139. NAT'L TELECOMM. & INFO. ADMIN., VOLUNTARY BEST PRACTICES FOR UAS PRIVACY, TRANSPARENCY, AND ACCOUNTABILITY (2016), https://www.ntia.doc.gov/files/ntia/publications/uas_privacy_best_practices_6-21-16.pdf

II. NECESSARY MODIFICATIONS TO FAA'S SMALL UAV NPRM

Due to the versatility of drone operations, each business/operator would certainly like to see rules tailored to their needs, but of course this is unmanageable. However, almost every industry operating commercial drones will benefit from two significant modifications: eliminating the visual-line-of-sight (“VLOS”) and the daylight operation requirements. These modifications are primarily based on the success France and New Zealand have seen with similar regulations.

A. *Visual-Line-Of-Sight Requirement*

The VLOS requirement is arguably the most damning element of the 107 Rule. Most, if not all, industries currently operating drones (or those with an identifiable need for drone services) will struggle to maintain an unassisted line of sight on every drone.¹⁴⁰ This means that farmers attempting to scan their crops or workers inspecting oil pipeline need to follow the drone through the entire flight. Businesses seeking safer and more efficient means to conduct their operations will be unable to attain the potential savings associated with drones if they are required to keep an eye on it all times. The National Roofing Contractors Association, Vail Resorts, and the Rocky Mountain Farmers Union suggested that remote pilots should be permitted to extend their VLOS through the use of one or more visual observers who maintain visual-line-of-sight while in constant communication with the remote pilot.¹⁴¹ The FAA responded by noting that

[b]ecause a delay in reaction time may introduce new hazards into the operation, this [107 Rule] will retain the requirement that the remote pilot in command and the person manipulating the flight controls of the small UAS (if that person is not the remote pilot in command) must be able to see the small unmanned aircraft throughout the entire flight. However, as discussed earlier, the visual-line-of-sight requirements of this rule will be waivable.¹⁴²

Although the FAA made the VLOS requirement waivable with a COA, the FAA has only given exemptions to three companies: CNN, BNSF Railway, and the drone data company

[<https://perma.cc/YU4F-K6DG>].

140. See Larry Downes, *What's Wrong with the FAA's New Drone Rules*, HARVARD BUSINESS REVIEW (Mar. 2, 2015), <https://hbr.org/2015/03/whats-wrong-with-the-faas-new-drone-rules#> [<https://perma.cc/FUF2-NDDW>].

141. 107 Rule, *supra* note 9, at 42,097.

142. *Id.*

PrecisionHawk.¹⁴³ France has allowed commercial operations of drones beyond the operator's visual-line-of-sight ("BLOS") since 2012, and industries such as natural gas utilities have greatly benefited without the disastrous consequence contemplated by the FAA.¹⁴⁴

France's BLOS regulations are broken into two categories, or "scenarios."¹⁴⁵ The first scenario not requiring an unassisted line-of-sight, Scenario S2, is an,

Operation taking place beyond direct line of sight, outside a populated zone, in a volume of a maximum horizontal dimension of a radius of one kilometer and a height less than 50 m from the ground and artificial obstacles, without any person on the ground in this zone of movement.¹⁴⁶

The second scenario, Scenario S4, pertains to, "specific activit[ies] (surveys, photographs, observations, and aerial surveillance) beyond direct line-of-sight, outside populated zones and not meeting the criteria of scenario S2."¹⁴⁷ France is not the only country that allows for operations beyond the operator's line-of-sight. New Zealand also allows limited BLOS operations if using first-person view technology and an observer to assist the operator.¹⁴⁸

New Zealand, while more restrictive than France, has also recognized the importance of allowing BLOS flights. According to a report commissioned by Callaghan Innovation,¹⁴⁹ New Zealand businesses could gain up to \$190 million a year from allowing BLOS operations.¹⁵⁰ According to New Zealand's Advisory Circular 102-1:

143. Dave Kolpack, *Drone Operators Seek Permission to Fly Out of Direct Sight*, ASSOCIATED PRESS (Sept. 18, 2016, 12:13 PM), <http://bigstory.ap.org/article/e0985aa409634cd1ba07f21b58e7bde/drone-operators-seek-permission-fly-out-direct-sight> [https://perma.cc/K2D5-TLJ8].

144. Bill Carey, *Natural Gas Utility Starts Drone-Based Surveillance in France*, AINONLINE (July 7, 2015, 1:57 PM), <http://www.ainonline.com/aviation-news/aerospace/2015-07-07/natural-gas-utility-starts-drone-based-surveillance-france> [https://perma.cc/2USW-Z37C].

145. GEN. SECRETARIAT FOR DEF. AND NAT'L SEC., *supra* note 131, at 46–47.

146. *Id.* at 46.

147. *Id.* at 47.

148. AC102-1, *supra* note 93, at 8–9.

149. Callaghan Innovation is a New Zealand government agency supporting hi-tech businesses in New Zealand. See *About us*, CALLAGHAN INNOVATION, <http://www.callaghaninnovation.govt.nz/about-us> [https://perma.cc/A756-YYTE] (last visited Nov. 13, 2016).

150. Fiona Rotherham, *NZ Could Reap \$190M/Year Benefit Becoming First Nation to Allow Beyond-Line-of-Sight Drones*, NAT'L BUS. REVIEW (Mar. 5, 2015), <http://www.nbr.co.nz/article/nz-could-reap-190myear-benefit-becoming-first-nation-allow-beyond-line-sight-drones-bd> [https://perma.cc/EUJ3-K3TP] (The article incorrectly states that New Zealand would be the first nation allowing beyond line of sight drones when there are documented cases of such in France as early as 2012).

While Part 102 does not prohibit BVLOS operations, these types of operation present a number of challenges for operators . . . you will need to present a strong [sic] safety case in your application. Some of the features of a safety case would include—identification of the airspace class to be used and associated requirements and how they will be met; and ability to provide separation from other traffic, such as segregated airspace or a technological solution (e.g. seek, detect and avoid systems [sic]); and mitigate risk to persons, property and terrain. BVLOS operations relying on segregated airspace will need to have successfully obtained approval, for the designation of such airspace before operations would be approved.¹⁵¹

If the FAA, Congress, and the President truly wanted to integrate drones into the NAS and allow commercial operations to flourish, it would be prudent to adopt regulations similar to those found in New Zealand or France. Both recognize the potential liabilities associated with BVLOS flights, yet found that the potential mishaps cannot constrain the economic benefits.

B. Daylight Only Operations Requirement

The drone industry—particularly the companies hoping to implement drone delivery—have opposed the strict requirement that any commercial operation be conducted between the hours of dusk and dawn.¹⁵² This requirement, however, is common in other nations, except New Zealand.¹⁵³ In its Advisory Circular, New Zealand does not seem to condone nighttime flying, but it does not place a ban on it either, allowing companies to receive approval if they can justify their needs in the application.¹⁵⁴ By allowing nighttime drone operations, the United States will distinguish itself from other drone favorable notions (i.e. France) and take a large step towards seizing a larger market share.

This requirement is unfavorable for the drone industry's largest and most profitable sectors: agriculture and entertainment.

151. AC102-1, *supra* note 93, at 9.

152. See Kelsey D. Atherton, *FAA Approves Delivery Drones, as Long as Amazon Changes Everything*, POPULAR SCIENCE (Mar. 20, 2015), <http://www.popsci.com/faa-approves-delivery-drones-if-amazon-changes-everything> [<https://perma.cc/XCV8-Z3X8>]; Melanie Schmitz, *Amazon's Drone Delivery Program Has Been Approved by the FAA, but with Some Major Restrictions*, BUSTLE (Mar. 20, 2015), <http://www.bustle.com/articles/71128-amazons-drone-delivery-program-has-been-approved-by-the-faa-but-with-some-major-restrictions> [<https://perma.cc/WA3V-NGEQ>]; Wayne Grayson, *FAA Expected to Limit Commercial Drone Operation to Licensed Pilots in Daylight Hours Within Sight of the Aircraft*, EQUIPMENT WORLD (Nov. 25, 2014), <https://shar.es/1IzZEf> [<https://perma.cc/3KNF-RY3X>].

153. AC102-1, *supra* note 93 at 8.

154. AC102-1, *supra* note 93 at 8.

With regard to agriculture, farmers tend to monitor crops at night, when the temperature drops, to ensure that the crops are not being damaged by either frost or natural predators. The daylight only operation requirement effectively and unnecessarily prohibits nightly surveys. As to the entertainment industry, this requirement limits the times in which journalists or media producers can obtain footage. Both sectors must resort to costlier or more inconvenient methods to accomplish their goals. A moderate adjustment to this requirement such as the addition of a conclusive list of operators that must comply, would dramatically assist all industries that operate safely.

While these are only two proposed adjustments, the FAA should implement the changes sought by the industry insomuch as they do not seriously neglect privacy and safety concerns, because this emerging technology is unnecessarily hindered when the remote pilots must maintain an un-aided direct line of sight and are limited to daylight only operations.

CONCLUSION

As of this writing, it has been four years since the passage of the FMRA and months since the FAA's issuance of the 107 Rule. The United States has substantially progressed in closing the economic gap, mostly due to the relaxed exemption requirements, but much needs to be accomplished to truly take advantage of this billion-dollar market. If the FAA readdresses the 107 Rule, and allows operations beyond the line of sight and outside of daylight hours, without the need for a waiver, the commercial drone industry will surge, pushing the United States to the forefront of an emerging industry worldwide. To justify these proposals, the FAA can look abroad and see the success experienced by France and New Zealand. As to the privacy and safety concerns, state legislatures have received sufficient FAA guidance¹⁵⁵ to avoid preemption and are best suited to tailor the appropriate safety and privacy laws. It's time the FAA clears commercial drones for takeoff and let this multibillion-dollar industry soar.

155. FAA DRONE FACT SHEET, *supra* note 137.

