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**Rule Title: Normalizing Unmanned Aircraft Systems Beyond Visual Line of Sight Operations  
Executive Order 12866 Meeting, White House Office of Information and Regulatory Affairs  
Critical Infrastructure/Utilities/Energy Sector  
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## Introduction:

Critical infrastructure and utility providers are increasingly adopting Uncrewed Aircraft Systems (UAS or drones) to enhance their operational capabilities by employing drones to support inspections, maintenance operations, and security. This document provides examples of the economic benefits of beyond visual line-of-sight (BVLOS) UAS operations in the sector and the need for this rule to proceed to the Notice of Proposed Rulemaking (NPRM) stage of the rulemaking process. A failure to do so would be catastrophic for the commercial drone industry and severely hinder the ability for critical infrastructure and utility providers to adequately scale their UAS operations to maximize the usage of this technology.

## Overview of Drone Usage in the Utilities and Critical Infrastructure Sector:

Drones are set to play an increasingly vital role in the utilities and critical infrastructure sectors, particularly through their support for routine and supplemental inspections. This application of drones has emerged as one of the earliest adopters and most widely deployed areas for BVLOS operations, encompassing essential structures such as bridges, railways, power lines, pipelines, and power plants. For instance, a notable collaboration between ConocoPhillips, Insitu (Boeing), and the FAA in 2014/2015 marked the beginning of infrastructure analysis on Alaska's North Slope. This initiative paved the way for the first commercial deployment of BVLOS systems in "the lower 48," specifically when BNSF Railway began utilizing these technologies for inspecting 150-mile segments of railway track in New Mexico by late 2015. Both operations were designed to enhance safety by supplementing traditional inspection methods. Since then, various rule waivers and exemptions have allowed early adopter BVLOS operations to expand significantly, enabling inspections and analyses on a larger scale. Beyond routine inspections, BVLOS drones have proven invaluable for emergency assessments in unsafe or inaccessible areas following natural disasters. Moreover, companies have leveraged drone technology for detailed surveying and mapping across both public and private sectors. As BVLOS operations continue to evolve, they will transform how utilities and critical infrastructure are inspected and maintained, resulting in lower maintenance costs for service providers while minimizing service interruptions. Additionally, an important environmental benefit is realized through reduced carbon emissions since drones can replace traditional aviation platforms like helicopters during infrastructure inspections.

## Specific Examples of BVLOS UAS Operations in the Utilities and Critical Infrastructure Sector:

Below are a few examples of how BVLOS UAS operations will revolutionize how critical infrastructure and energy providers serve Americans and the significant economic benefits of these operations.

### Highways and Bridges

State Departments of Transportation (DOTs) stand to benefit significantly from the integration of UAS into their operations, with potential **annual savings estimated at around \$560 million** on bridge inspections alone.<sup>1</sup> A recent survey conducted by the American Association of State Highway and Transportation Officials (AASHTO) highlighted this trend, revealing that in 2019, 72% of state DOTs were utilizing UAS for day-to-day operations. This number surged to 93% by 2023, a remarkable increase considering that, when AASHTO first surveyed state DOTs in 2016, not a single agency reported using drones.<sup>2</sup> The survey further indicated that all state DOTs have adopted UAS for surveying purposes, while 84% employ them for bridge inspections and construction and maintenance tasks.<sup>3</sup> Additionally, 64% use drones for pavement inspections, and 20% use them for rail line inspections.<sup>4</sup> **Despite these advancements, state DOTs have cited the challenges associated with BVLOS operations as the primary obstacle hindering broader UAS implementation.** In terms of return on investment, agencies reported significant savings related to equipment costs, labor efficiency, enhanced worker safety, and reduced insurance expenses, with some respondents noting savings of up to \$2 million

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<sup>1</sup> Levitate Capital White Paper, Enterprise Market 2020, at 8.

<sup>2</sup> American Association of State Highway and Transportation Officials, *2024 AASHTO Quick Snapshot UAS Survey*, at 2.

<sup>3</sup> *Id.* at 3.

<sup>4</sup> *Id.*

annually.<sup>5</sup> On average, each respondent indicated that drone operations allowed them to save approximately 2,783.33 staff hours per year, demonstrating not only the operational efficiency gained through UAS adoption but also its substantial economic impact on state transportation agencies.<sup>6</sup>

### Power Providers

The integration of drones into utility inspections has the potential to yield substantial economic benefits for the U.S. economy, with **projected annual savings of up to \$920 million.**<sup>7</sup> BVLOS operations significantly reduce maintenance costs for utility providers while also minimizing service outage times, which currently result in economic losses estimated at approximately \$18 billion annually.<sup>8</sup> Traditional methods, such as using helicopters equipped with lidar for power line inspections, can be prohibitively expensive per mile. UAS BVLOS operations present a more cost-effective solution by enabling rapid coverage of vast areas. This dramatic improvement in efficiency not only enhances grid resiliency but also lowers operating costs that ultimately benefit consumers.

A prime example of the effectiveness of BVLOS drone operations can be seen in the aftermath of Hurricane Milton in Florida, where Florida Power and Light (FPL) deployed large drones to assess damage before manned aircraft could take to the skies. This swift action allowed ground crews to restore power much faster by facilitating more accurate resource allocation following storm activity.<sup>9</sup> In rural and forested areas, electrical utilities can leverage BVLOS drones to increase the frequency of inspections, thereby enhancing fire prevention measures and ensuring greater power reliability. For example, Georgia Power implemented a pilot program utilizing drones for comprehensive aerial inspections instead of traditional helicopter methods, resulting in improved fault detection and overall reliability.

Moreover, BVLOS operations enable companies to conduct thorough inspections at lower costs while reducing reliance on manned flights in wired environments. Drones also provide significant environmental advantages because they are capable of spanning long distances across transmission corridors that often traverse inaccessible regions. In such cases, traditional inspection crews must use heavy equipment—such as boats or marsh masters—that leave a considerable ecological footprint. In contrast, drones offer a safer, more efficient, and cost-effective alternative for accessing these challenging areas while minimizing environmental impact.

### Railroads

Since 2015, BVLOS drones have been deployed on one of the nation's largest railroads, BNSF, demonstrating their potential to enhance safety and efficiency in railroad inspections.<sup>10</sup> Railroads of all sizes, from short lines to Class One railroads, can now increase the frequency of inspections without requiring human presence on the tracks or in potentially hazardous environments. In addition to BNSF's pioneering efforts, Union Pacific has also led the way by utilizing automated BVLOS drones for inspecting tunnels, culverts, and other confined spaces. The result is a safer transportation infrastructure and economic benefits for railroads, customers, and consumers.

The railroad industry has proven its capability to operate nationally scaled BVLOS operations, with flight durations exceeding six hours and covering approximately 700 miles per flight—all remotely managed from command centers located over 1,000 miles away. To date, BNSF has successfully flown well over 60,000 miles using this innovative technology. A significant advantage for railroads is that they own and control their right-of-way and assets. This ownership facilitated BNSF's early success as an FAA Pathfinder and research partner. As a result, BNSF has been able to address a

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<sup>5</sup> *Id.* at 5.

<sup>6</sup> *Id.*

<sup>7</sup> Levitate Capital White Paper, Enterprise Market 2020, at 9.

<sup>8</sup> *Id.*

<sup>9</sup> The White House, *Remarks by President Biden on the Initial Impacts of Hurricane Milton and the Federal Government's Ongoing Support to State and Local Officials* (Oct. 10, 2024), <https://www.whitehouse.gov/briefing-room/speeches-remarks/2024/10/10/remarks-by-president-biden-on-the-initial-impacts-of-hurricane-milton-and-the-federal-governments-ongoing-support-to-state-and-local-officials/>.

<sup>10</sup> *Keeping Pace with Innovation – Update on the Safe Integration of UAS into the Airspace Before the Subcomm. on Aviation Operations, Safety, and Sec. of the S. Comm. on Com., Sci., and Transp.*, 115th Cong. (2018) (Testimony of Todd Graetz, Director of Technology Services, BNSF Railway Company).

variety of needs including routine supplemental inspections, derailment responses, natural disaster assessments, and even dock-based drone operations for intermodal yard inspections.<sup>11</sup>

These initiatives have laid the groundwork for demonstrating a return on investment through enhanced safety—allowing for additional inspections without putting personnel in close proximity to potentially dangerous assets—and have led to further infrastructure approvals for utilities such as power lines and pipelines. According to the Association of American Railroads, more than 61,000 Class I bridges in the U.S. undergo manual inspections each year for defects and structural integrity,<sup>12</sup> while inspectors cover roughly 140,000 miles of rail network.<sup>13</sup> Daily drone operations on some railroads not only improve efficiency and accuracy but also enhance overall safety.<sup>14</sup>

Despite these advancements in drone technology within the railroad sector, **broader adoption remains limited due to the high costs and complexities associated with scaling BVLOS operations.** As rule-based operations become normalized and economically feasible, it is anticipated that further expansion of drone use across the industry will follow suit.

## Oil and Gas

Drones are increasingly being deployed in the oil and gas industry to enhance safety, efficiency, and regulatory compliance across various operations. One of their key applications is monitoring extensive pipeline networks for issues such as vegetation encroachment, spill detection, gas emissions tracking, and flare stack inspections.<sup>15</sup> In particular, drones equipped with advanced thermal imaging, LiDAR, and other sensors can detect anomalies in older pipelines located in rural areas more effectively and frequently.

Drones are also utilized for inspecting refineries and oil rigs. These aerial vehicles can be operated from coastal-based operations centers and are easily deployed for routine asset inspections and environmental monitoring. For instance, a study conducted at a U.S. oil refinery revealed that the use of drones led to a **remarkable 90% reduction in time spent on on-site inspections, resulting in annual savings of \$530,000 in observation and monitoring costs alongside a \$1.97 million increase in productivity.**<sup>16</sup>

Moreover, drones play a crucial role in security surveillance within the industry. Similar to safety inspections, they can be employed to inspect fixed-site facilities for security purposes. The innovative ‘drone-in-a-box’ technology enables automated and regular fence line surveys to ensure safe environments while detecting any abnormalities. This approach not only decreases the hours required by safety personnel but also minimizes their exposure to potential threats; however, waivers are currently necessary for this service at large facilities.

In emergency situations—such as natural disasters or industrial incidents—drones provide instant response capabilities and damage assessments. The “drone-in-a-box” technology allows for rapid deployment of drones that can assess hazards in real-time, thereby protecting workers from exposure to dangerous conditions. This capability is particularly advantageous in remote locations or challenging terrains where traditional emergency response may face significant obstacles.

Overall, the integration of drone technology into the oil and gas sector is proving to be transformative by improving operational efficiencies while enhancing safety measures across various applications. Unlocking standardized BVLOS

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<sup>11</sup> Jenn Player, *Breaking Regulatory Barriers for Remote Operations*, Skydio (Jun. 24, 2021), <https://www.skydio.com/blog/BVLOS-for-remote-drone-operations/>.

<sup>12</sup> *Freight Rail Infrastructure & Equipment Safety*, Association of American Railroads, <https://www.aar.org/issue/freight-rail-infrastructure-equipment-safety/>.

<sup>13</sup> *Freight Rail Safety Inspections*, Association of American Railroads, <https://www.aar.org/issue/freight-rail-safety-inspections/>.

<sup>14</sup> Nastassia Putz, *Drones are shaping the future of railroading* (Aug. 12, 2024), <https://www.trains.com/trn/train-basics/abcs-of-railroading/drones-are-shaping-the-future-of-railroading/>.

<sup>15</sup> Levitate Capital, *The Future of the Drone Economy: A Comprehensive Analysis of the Economic Potential, Market Opportunities, and Strategic Considerations in the Drone Economy* 70 (Dec. 2020), <https://levitatecap.com/levitate/wp-content/uploads/2020/12/Levitate-Capital-White-Paper.pdf>.

<sup>16</sup> Consortiq, *The Importance of Drones in the Oil and Gas Industry*, <https://consortiq.com/uas-resources/the-importance-of-drones-in-the-oil-and-gas-industry>.

operations will only increase the ability for providers to employ drones to maintain their infrastructure safely and efficiently.

### Telecommunications Infrastructure

The telecommunications industry stands to benefit significantly from the integration of drone technology, with **potential annual savings for tower operators estimated at around \$220 million.**<sup>17</sup> Globally, there are over 4.8 million communications towers, with approximately 250,000 located in the United States alone.<sup>18</sup> Currently, about 29,000 tower climbers in the U.S. are utilizing drones for inspections, resulting in a climber-to-drone ratio of 1:4. However, the advent of BVLOS operations presents an opportunity to enhance this dynamic considerably. Strategically positioned drones-in-a-box could be remotely deployed on demand to perform tower inspections—similar to initiatives already underway by a large railroad that has integrated drone inspections into its oversight of 650 major tower sites in the western United States.

This shift towards drone-assisted inspections could lead to significant reductions in tower outage periods and inspection costs while allowing climbers to focus solely on performing necessary repairs, thereby improving safety and operational efficiency.<sup>19</sup> A prime example of this innovation is demonstrated by T-Mobile's pilot test at a stadium in Utrecht, where drones were used to inspect antenna masts. This process took only fifteen minutes compared to the week required using traditional inspection methods.<sup>20</sup> The successful implementation of drones not only streamlines inspection processes but also underscores their transformative potential within the telecommunications sector as operators seek ways to enhance both safety and efficiency while managing their assets more effectively.

### **The Urgent Need to Standardize BVLOS Operations and Move Part 108 Forward:**

Many of the successful applications of drone technology cited above are made possible through case-by-case BVLOS waivers granted by the Federal Aviation Administration. However, this waiver process is time-intensive and lacks the scalability necessary for widespread adoption. To truly maximize the economic impacts and operational efficiency of BVLOS operations, a standardized approach is essential. The drone industry is presently in a volatile state, with several innovative smaller companies eager to provide revolutionary technical solutions facing significant financial challenges. Investment in the drone sector has been declining due to uncertainty regarding when a meaningful return on investment (ROI) can be achieved. **If operations cannot scale through rule-based deployments, only the largest companies will be able to utilize this technology, which would stifle future innovations in aircraft design, software development, and operational support while keeping costs artificially high. This limitation would prevent many infrastructure operators from effectively deploying drones as scalable safety enhancement tools.**

Moreover, the release of a NPRM would contribute to continued funding certainty for these initiatives; funding growth rates have already dropped from an annual increase of approximately 35%—from \$300 million in 2014 to a peak of \$1.6 billion in 2021—to expectations of a 50% reduction over the next three years as we approach the end of 2024. Once standardized BVLOS operations are established, we can anticipate a significant uptick in drone usage for tasks that require such capabilities, including pipeline and power line inspections, remote tower inspections, and highway monitoring.

Widespread adoption of this technology as an added safety mechanism will foster broader implementation since non-waiver-based volume deployment can lead to lower operational costs for operators. Currently, high capital and operating costs associated with deploying BVLOS technology hinder smaller companies—for example equipping approximately 250 miles of railroad right-of-way for BVLOS operations—can exceed \$350,000, an unattainable sum for smaller railroads and utility providers. A failure to move forward with standardized BVLOS operations will thus result in only larger corporations being able to leverage this technology effectively.

This situation threatens future innovations within the industry while also keeping costs elevated and leaving infrastructure operators unable to deploy drones as effective safety enhancement tools. Furthermore, failing to scale these operations

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<sup>17</sup> Levitate Capital White Paper, Enterprise Market 2020, at 10.

<sup>18</sup> Levitate Capital, *The Future of the Drone Economy: A Comprehensive Analysis of the Economic Potential, Market Opportunities, and Strategic Considerations in the Drone Economy*, at 80.

<sup>19</sup> *Id.* at 81.

<sup>20</sup> PwC, *Clarity from above - PwC Global Report On The Commercial Applications Of Drone Technology* (May 2016), <https://www.pwc.com/kz/en/services/drones-technologies/clarity-from-above-eng.pdf>, at 14.

now could compromise both safety and savings for consumers and service providers alike. It also undermines the commercial drone industry's ability to mass-produce drones needed for critical applications—thus exacerbating supply chain issues while limiting profitability potential. **A decision by OIRA not to advance this rule for public comment prior to an administrative transition would consequently delay scaling UAS operations indefinitely, stalling progress at a crucial juncture for drone integration into various sectors.**