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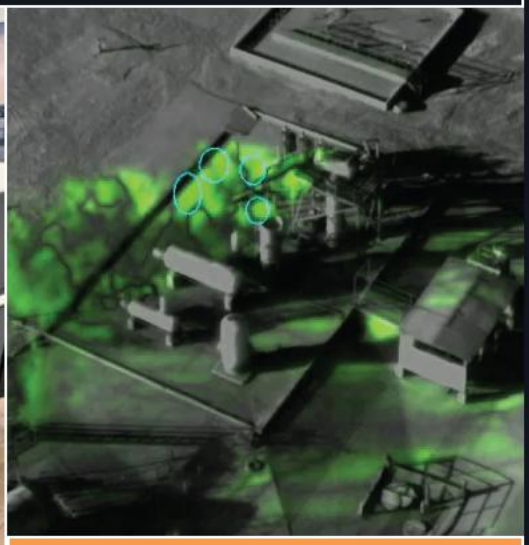
The Playbook for Scaling Dock Drone Operations



Oil and Gas Edition

Published by **FlytBase Research | 2025**

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The Shift in Energy Operations

From scheduled inspections to continuous visibility

For decades, oil and gas inspection followed a fixed routine: periodic checks, manual climbs, and delayed reporting. Crews scheduled access to flare stacks, tanks, and pipelines weeks in advance, often coordinating around safety clearances and production schedules. Each inspection came with downtime, human exposure, and incomplete data.

Today, this rhythm has changed. Autonomous docked drones, operating directly from site perimeters or control centers, perform continuous monitoring across facilities. AI-driven models schedule flights automatically, trigger launches when sensor anomalies appear, and feed verified visuals directly into maintenance and safety systems.

Instead of snapshots captured quarterly, operators now see live condition trends across every asset. The result is a connected network of eyes in the sky, an autonomous visual layer over every critical operation that enables earlier interventions, shorter outages, and safer decisions.

> *"Autonomy isn't replacing inspectors; it's giving them continuous vision."*

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The Pilot Trap

Why most energy drone programs stall

Across the oil and gas sector, hundreds of pilot programs have demonstrated the potential of drones for inspections. Yet fewer than 25% scale beyond proof-of-concept. The barriers are not technological, they're operational. Drones succeed when embedded into workflows, not when added beside them.

The 5 common pitfalls

Manual Dispatch

Most deployments rely on human pilots or scheduled operators. Drones sit idle after hours or during critical alerts when no one is available to launch.

Fragmented systems

Inspection imagery, alarm data, and CMMS logs often exist on separate platforms. Without unified data flow, findings stay isolated.

Compliance overload

Every flight generates logs, media, and safety documentation. Without automation, reporting alone limits daily flight volume.

Hardware without infrastructure

Teams purchase docks before building software integration or maintenance workflows, leading to underused assets.

Lack of operational visibility

Supervisors have no single dashboard showing inspection readiness, fleet status, or anomaly trends.

> *Programs that scale treat drones as infrastructure, not projects. Success depends on aligning autonomy with maintenance systems, not just flight operations.*

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The Oil and Gas Operations Cycle

Turning inspections into continuous intelligence

Every oil and gas facility runs on cycles: inspection, detection, verification, maintenance, and compliance. Docked drones automate these steps, creating a feedback loop that strengthens reliability over time.

The five phases of autonomous response

1. Inspection

Scheduled or event-triggered drone missions capture repeatable visual and thermal data across flare stacks, tanks, and pipeline corridors.

2. Detection

AI models identify early signs of corrosion, heat anomalies, or leaks and generate flagged observations within minutes.

3. Verification

Engineers validate issues remotely through side-by-side comparisons with previous captures, reducing field exposure.

4. Maintenance & Documentation

Verified anomalies are logged directly into CMMS or digital twins, ensuring traceability and compliance with standards like API 653 and PHMSA.

5. Continuous Readiness

Each mission enhances predictive models, optimizing flight frequency and refining asset risk profiles.

Asset-wise Applications of Autonomous Drones

Storage Tanks and Wellheads

Tank farms and storage terminals depend on reliable, repeatable inspections to maintain integrity and compliance.

FlytBase docked drones capture structural, thermal, and environmental data autonomously, ensuring early fault detection and complete SPCC documentation.

Integrated workflows link inspection results directly to maintenance and compliance systems.

Key autonomous applications for storage tanks:

Structural Inspection

Perform API 653 inspections of roof, shell, and annular plates for corrosion or deformation.

Leak Detection

Detect oil, gas, or VOC leaks early to prevent escalation.

Thermal Imaging

Identify pooling, roof vent blockages, or abnormal heat signatures.

Environmental Monitoring

Validate berm containment and spill-prevention readiness per EPA SPCC standards.

Security Surveillance

Automate perimeter patrols and intrusion monitoring.

Emergency Response

Provide real-time visuals during fire or spill incidents.

Offshore Platforms

Offshore platforms operate in isolated, high-risk conditions where safety and uptime are critical.

FlytBase docked drones deliver autonomous inspections, thermal checks, and environmental monitoring without human deployment.

Redundant connectivity ensures continuous operations and real-time decision support from onshore command centers.

Key autonomous applications for offshore platforms:

Structural Inspection

Assess decks, topsides, and supporting structures for corrosion or fatigue.

Leak Detection

Detect fluid leaks and gas emissions across manifolds and piping networks.

Thermal Imaging

Identify overheating machinery or electrical components before failure.

Environmental Monitoring

Track emissions, discharge, and compliance metrics for offshore regulations.

Security Surveillance

Conduct automated deck and perimeter patrols.

Emergency Response

Respond within seconds to safety alerts, fire, or impact events.

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Success Story

Thermal Power Plant Inspection and Security

Pampa Energía, Argentina's largest independent energy company, specializes in the electricity, oil, and gas value chains. Headquartered in Buenos Aires, it engages in intense oil and gas exploration and production activities. It has a presence in 13 production areas and 5 exploration areas in the most significant basins of the nation.

As part of its Digital Transformation strategy, Pampa Energía sought to optimize the inspection routes at the Genelba power plant. Rather than hiring additional employees and drone pilots, they decided to explore the use of autonomous drones to simultaneously carry out maintenance planning, inspections and security operations.

Pampa energía

"We decided to employ the FlytBase powered autonomous drone-in-a-box solution due to its superior unattended flight technology and affordable price."

Marcelo Lopez, Project Manager,
Pampa Energia

Flare Stacks

Flare stacks are high-risk, compliance-driven assets that demand precise, repeatable inspections.

FlytBase enables autonomous visual and thermal monitoring through docked drones that operate on schedule or respond instantly to alarms.

The result is faster insight into combustion health, reduced human exposure, and complete compliance documentation.

Key autonomous applications for flare stacks:

Structural Inspection

Detect corrosion, surface wear, and deformation following API 537 and SSPC VIS 1/2 standards.

Thermal Imaging

Measure combustion efficiency, temperature balance, and heat damage using visible and infrared analytics.

Environmental Monitoring

Capture emissions data and produce audit-ready compliance reports.

Emergency Response

Provide immediate aerial visibility during flare outages or thermal anomalies.

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Pipelines

Pipeline networks extend across wide, often remote terrain.

FlytBase automates aerial patrols that detect corrosion, leaks, and encroachment while maintaining a complete visual record for compliance.

Integration with acoustic systems and GIS platforms creates a seamless, always-on monitoring layer.

Key autonomous applications for pipelines:

Structural Inspection

Monitor joints, coatings, and support structures for degradation.

Leak Detection

Identify gas or fluid leaks through optical and thermal sensors.

Thermal Imaging

Detect flow or pressure anomalies through temperature variance.

Environmental Monitoring

Track vegetation, soil stability, and right-of-way encroachment.

Security Surveillance

Conduct automated patrols and trespass detection along corridors.

Emergency Response

Verify leaks and assess damage immediately after alarms.

Stations and Substations

Stations and substations connect production, transmission, and processing systems.

FlytBase automates inspections across mechanical, electrical, and environmental domains, reducing manual rounds and providing continuous oversight.

Each docked drone acts as a shared resource for operations, maintenance, and security teams.

Key autonomous applications for stations and substations:

Structural Inspection

Inspect transformers, compressors, and switchgear for damage or wear.

Thermal Imaging

Detect overheating equipment and load imbalances.

Environmental Monitoring

Audit containment, drainage, and emission areas for compliance.

Security Surveillance

Execute routine patrols and access checks across facilities.

Emergency Response

Capture live visuals during electrical or process incidents.

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Success Story

Power Grid Transmission Line Inspection and Monitoring

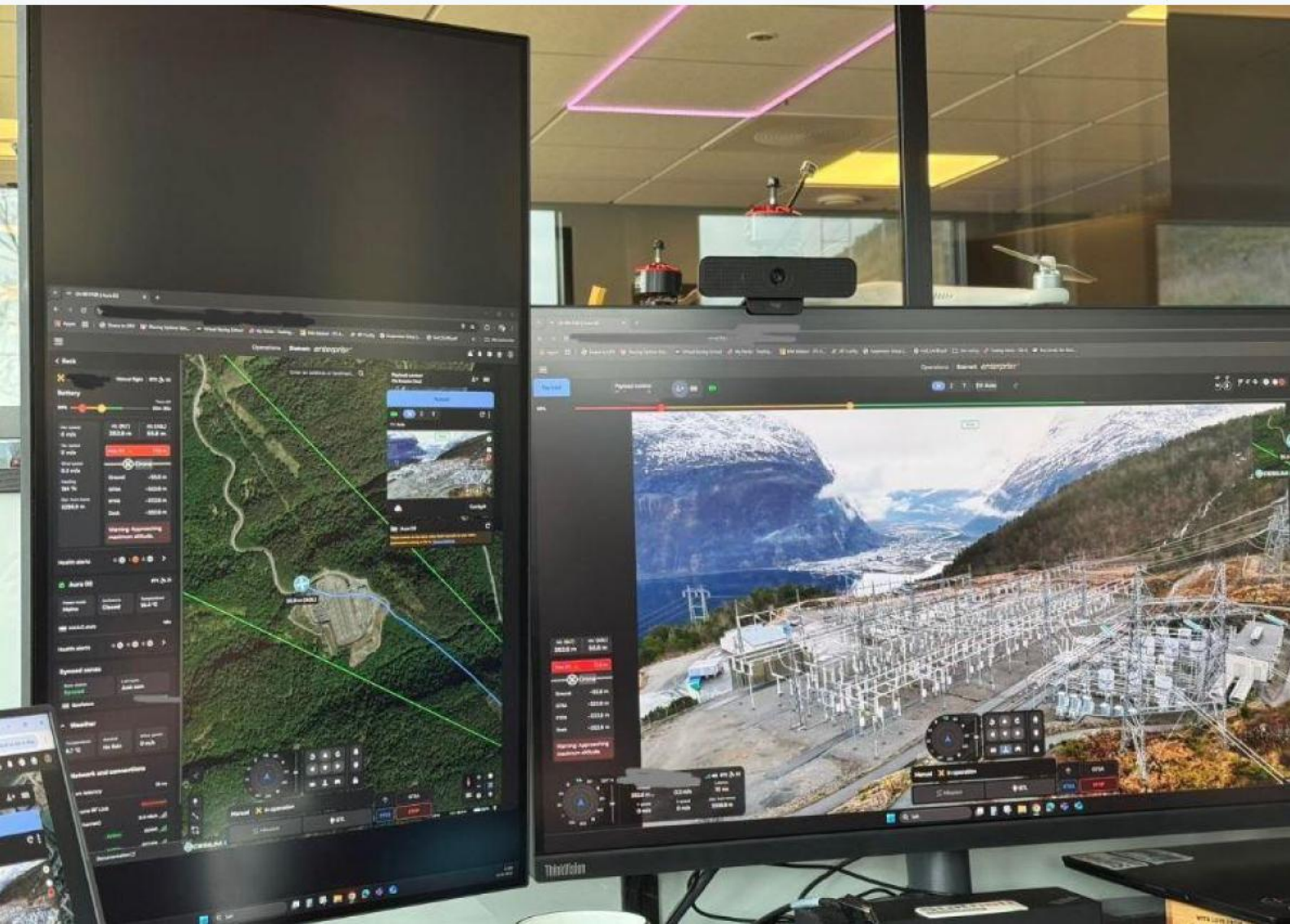
Statnett, Norway's transmission system operator, manages the country's power grid infrastructure across challenging mountainous terrain. Headquartered in Oslo, it operates thousands of kilometers of transmission lines in harsh Nordic conditions.

As part of its Digital Transformation strategy, Statnett established a dedicated Drone Center to optimize transmission line inspection routes. Instead of deploying additional field personnel for manual inspections, they implemented autonomous drone technology to carry out maintenance planning, asset monitoring, and grid resilience operations simultaneously.

Statnett

"The inspection flight was executed using Dock and FlytBase, with full support for remote launch, landing, and charging, integrated into our operations platform."

Espen Blomlie, Drone Center Lead, Statnett



Oil & Gas Autonomous Operations Readiness Checklist

Use this checklist to evaluate whether your oil and gas drone operations are ready for autonomous, continuous inspection across production, midstream, and downstream assets.

Each section represents a core capability proven in scaled, industrial deployments worldwide. The more checks you can tick, the closer your operation is to true autonomous readiness — where uptime, safety, and compliance are maintained automatically.

1. Autonomous Inspection & Triggered Launch

☐ Can your drones auto-launch within 60 seconds of a verified process alarm, temperature spike, or SCADA alert?

☐ Can flight plans adjust mid-mission based on new data such as flare irregularities, gas leaks, or weather changes?

☐ Can a single operator manage and supervise multiple concurrent missions across assets?

☐ Can autonomous missions be triggered directly from inspection schedules or maintenance requests in your CMMS?

☐ Are inspection performance metrics — flight success rate, time-to-visual, and anomaly verification time-tracked automatically?

2. AI & Visual Intelligence

☐ Can AI models detect and classify corrosion, leaks, coating loss, or thermal anomalies directly from live imagery?

☐ Can thermal and visual analytics run locally for air-gapped or offshore environments?

☐ Can the system automatically compare new visuals with historical captures to show degradation trends?

☐ Can detections trigger work orders or follow-up missions automatically?

☐ Are AI detections logged, validated, and retrainable to continuously improve inspection accuracy?

3. Fleet Oversight & Multi-Site Control

☐ Can all docks, aircraft, and mission data be viewed on one centralized dashboard across sites?

☐ Can mission control safely hand off authority between regional operators or contractors?

☐ Can daily and periodic inspections be scheduled, tracked, and scaled across multiple facilities without adding new infrastructure?

☐ Is there continuous health monitoring for docks, batteries, communication links, and sensor payloads?

☐ Can offshore and onshore fleets operate under a unified command center?

4. Integration with Operational Systems

☐ Is the platform integrated with SCADA, PI historians, CMMS (e.g., SAP PM, Maximo), or digital twins (e.g., AVEVA, Hexagon)?

☐ Can alarm triggers or asset conditions automatically generate flight missions?

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4. Integration with Operational Systems

- ☐ Can inspection results and imagery write back to maintenance systems for traceable documentation?
- ☐ Can engineers view thermal overlays, GIS maps, and inspection history in a single workspace?
- ☐ Are inspection logs accessible from within existing compliance or asset management tools?

5. Governance & Compliance

- ☐ Are all inspection missions automatically logged with timestamps, operator inputs, and captured imagery?
- ☐ Is there a verifiable digital chain of custody for each inspection, aligned with API, PHMSA, or ISO 55000 standards?
- ☐ Can the system generate automated compliance reports for API 653, API 537, or SPCC audits?
- ☐ Are retention, access, and deletion policies aligned with corporate data governance and cybersecurity standards?
- ☐ Can inspection and flight data be exported in regulator-approved formats?

6. Safety, Reliability & Redundancy

- ☐ Can operations continue automatically after network or link interruptions (store-and-forward architecture)?
- ☐ Are emergency land, recovery, and fail-safe protocols verified for all weather and site conditions?
- ☐ Does your organization audit drone system readiness as part of HSE routines?

7. Collaboration & Oversight

- ☐ Can live inspection feeds be securely shared with maintenance, HSE, or environmental teams through time-limited access links?
- ☐ Can inspection data be annotated collaboratively and attached to maintenance records?
- ☐ Are departments (Operations, Reliability, HSE, Security) working from a unified visual platform?

8. Training & Standardization

- ☐ Are all operators trained on standardized SOPs embedded directly into the mission platform?
- ☐ Are inspection templates preloaded for API 537, 653, and other regulated standards?
- ☐ Are competency checks, training logs, and operator certifications digitally tracked across sites?

9. Scalability & Sustainability

- ☐ Can a single control room oversee mixed fleets (rotary, fixed-wing, docked, offshore units)?
- ☐ Can your inspection program expand from 1 to 50+ docks without redesigning the infrastructure?
- ☐ Can the system support enterprise-scale asset tagging, alarm ingestion, and report generation?

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Consult our drone autonomy and AI experts to get started with your site operations

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