FGI Webinar: Remote Sensing for Cover Integrity & Methane Emissions

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Date: May 9, 2024

Introduction & Background

This webinar introduced automated drone-based surface emission monitoring (SEM) for landfills and biogas containment facilities. SNIFER Robotics' technology replaces labor-intensive, hazardous manual methods, providing U.S. EPA-approved compliance monitoring (OTM 51, ALT-150). The presentation emphasized the environmental and economic importance of accurately detecting methane leaks, which contribute significantly to greenhouse gas emissions and represent lost renewable natural gas (RNG) revenue.

The Methane Challenge and Industry Pressure

- Regulatory requirements are tightening, with lower action thresholds and mandatory inspections.
- Satellite and aerial monitoring detect "super emitters" but lack resolution for actionable repair.
- Landfills emit ~80 million metric tons CO_2-equivalent annually; many emissions are underreported.
- Accurate monitoring and capture technology can transform compliance costs into RNG revenue opportunities.

Limitations of Existing Monitoring Technologies

- *Satellites/Aerial*: Measure plume volumes over large areas; cannot locate specific leaks.

- *Manual SEM*: Laborious, hazardous, and limited to accessible areas; involves walking 20-mile serpentine paths with FID detectors, sampling 2–4 inches from the ground.

The SNIFER Drone Solution: Automated SEM

- Hexacopter drone with methane detector, laser altimetry, and weighted hose/nozzle maintains ground contact.

- Flies pre-programmed paths at 7 mph, 6 m above ground, minimizing prop wash effects.

- Provides 1 ppm–100% concentration detection, locating leaks within 30 ft with >90% accuracy.

- Captures actionable, point-source data for rapid remediation.

Data Transformation and Value-Added Analytics

- Heat maps and analytics guide gas collection optimization, identifying low-level and intermittent sources to maximize RNG capture.

- Estimates fugitive emissions (kg/hr) with uncertainty considerations.

- Supports pre-feasibility studies for RNG facility investments.

- Validates geosynthetic cover performance, comparing installed covers to temporary soil covers.

Application to Geosynthetic Cover Systems

- Identifies high-concentration methane leaks at seams, anchor trenches, penetrations, and tears.
- Essential for floating biogas lagoon covers, locating leaks undetectable by other means.
- Data informs repair planning, fugitive emissions estimation, and maintenance prioritization.
- Emphasized caution during repair due to explosion risk.

Additional Drone Applications and Industry Recommendations

Complementary sensors: aerial topography, NIR vegetation analysis, thermal imaging for subsurface anomalies.

Recommendations:

- Promote exposed geomembranes with drone validation.
- Offer proactive maintenance contracts.
- Address emissions around soil cover penetrations.
- Incorporate leak detection as a final QA step.
- Exercise extreme caution during field repairs.

Conclusions and Advantages

- Enhanced safety (≥50% reduction in foot traffic).
- Superior accuracy and precision with comprehensive coverage.

- Automated reporting at costs comparable to manual methods at scale.

- Provides actionable insights for regulatory compliance, operational efficiency, and RNG revenue capture.