



Deliverable report 10

AI and IAGEN Application Use Case

Methane Leak Detection in Vaca Muerta, Neuquén, Argentina

Executive Summary – IAGEN Application for Methane Leak Detection in Dead Cow.

This executive summary presents an innovative application of artificial intelligence generative (IAGEN) in the energy sector, focused on leak detection Methane in the Vaca Muerta formation, Neuquén, Argentina. This is a strategic opportunity to strengthen sustainability, operational efficiency, and compliance. regulatory in one of the main reserves of unconventional hydrocarbons in the world.

Use case classification:

The report classifies this IAGEN application based on four axes:

1. By main resource: Gas (main), Oil (secondary).
2. By activity: Energy efficiency and sustainability.
3. By technology: Generative AI models, computer vision (CNN, semantic segmentation) and machine learning algorithms.
4. By strategic impact: AI for sustainability and impact reduction environmental.

1. Opportunities for using AI and IAGEN in the sector.

The identified opportunities focus on the automated, real-time detection of methane emissions through intelligent analysis of images and videos.

captured by drones, fixed cameras, or satellites. AI allows patterns to be identified visually associated with leaks, even in adverse conditions, integrating with environmental sensors and operating systems for immediate response. This approach opens up possibilities for continuous monitoring, predictive maintenance and effective mitigation of environmental risks.

2. Expected benefits.

The application of these technologies offers multiple benefits: it improves security operational by enabling early leak detection, reduces costs through reduction of manual inspections and optimizes decision-making. Furthermore, boosts the competitiveness of the sector through the fulfillment of commitments climatic and regulatory.

3. Application of AI.

The technical proposal is based on a workflow that includes data capture visuals, their preprocessing, analysis using computer vision models (CNN, semantic segmentation), generation of automatic alerts and activation of operational responses. Artificial intelligence operates in an integrated manner with systems centrally managed, facilitating continuous monitoring and corrective actions in real time.

4. Proposed AI Agent

The report proposes an agentic system made up of different modules: agents of capture, preprocessing, analysis, alerting, and feedback. The analytics agent, at the heart of the IAGEN system, employs generative AI to identify anomalous patterns in images that suggest the presence of methane. Its main function is to automate the leak detection, issuing risk alerts and facilitating immediate intervention. This agent improves diagnostic accuracy, reduces human intervention and enables continuous improvement through adaptive learning.

5. Conclusion

The implementation of IAGEN in Vaca Muerta represents an innovation Transformative in the environmental and operational management of the energy sector. The combination of computer vision, artificial intelligence, and an agentic system coordinated allows us to move towards a proactive, efficient and monitoring strategy aligned with current climate challenges. This technological solution contributes to a more responsible exploitation of resources, positioning Vaca Muerta as a benchmark in energy sustainability.