Deliverable report 52

AI and IAGEN Application Use Case

Real-time monitoring of water sources in Vaca Muerta

Executive Summary – IAGEN Application for Water Source Monitoring in Vaca Muerta

This executive summary presents a strategic application of artificial intelligence (AI) and generative artificial intelligence (IAGEN) in the environmental management sector, specifically focused on real-time monitoring of water quality in the Vaca Muerta region. This is a key opportunity to promote the environmental sustainability, strengthen the social license to operate and optimize the use of water resource in one of the most important areas of hydrocarbon exploitation of the country.

Use case classification

The report classifies this application of AI and IAGEN based on four axes:

1. By main resource: water and energy.
2. By activity within Vaca Muerta: energy efficiency and sustainability.
3. By technology: machine learning, computer vision, agents smart and data integration platforms.
4. By strategic impact: sustainability and reduction of environmental impact.

1. Opportunities for using AI and IAGEN in the sector

The report identifies concrete opportunities to apply AI in monitoring environmental, such as early detection of anomalies in water bodies, correlation of environmental data with industrial operations, predictive analysis of water quality, and predictive maintenance of critical infrastructure. The inclusion of satellite images and drone data, combined with IoT sensors, power continuous and accurate monitoring. IAGEN also enables automation of the generation of reports, recommendations and contextualized analysis in real time real.

2. Expected benefits

Among the expected benefits are the improvement in response capacity In the event of environmental incidents, optimizing water use through reuse efficient, reducing the risk of pollution, strengthening the Transparency towards citizens and authorities, and the minimization of operating costs due to failures or inefficiencies in the water management system.

3. Application of AI

AI is applied through an ecosystem that integrates distributed sensors in field, real-time analysis of water quality data (pH, turbidity, salinity, among others), machine learning algorithms trained to identify deviations, and visualization and alert platforms that enable a response Agile. Computer vision extracts patterns from satellite or drone images, expanding the scope of monitoring in remote areas. This entire system transforms traditional reactive logic into a predictive and proactive approach.

4. Proposed AI Agent

The IAGEN-powered intelligent agent proposed in the report represents a significant evolution compared to traditional monitoring systems. Its architecture combines advanced language models with data analysis modules, computer vision, and IoT sensor connectivity. This allows you to perform complex tasks such as detecting anomalies in real time, analyzing images satellite or drones to identify possible polluting events, and issue

automatic alerts to key stakeholders (operators, regulators, communities).
In addition, the agent can generate periodic reports and operational recommendations.
contextualized, thus contributing to evidence-based decision-making and
risk anticipation.

A distinctive feature of this agent is its integration into workflows
automated or “agent workflows”, where different modules collaborate to
cover the entire monitoring cycle: from data capture to issuance
diagnoses and suggestions for action. It also includes a legal module that
assesses regulatory compliance and a transparency-oriented component,
with the possibility of publishing open data that reinforces public trust.
Thanks to its scalability, the system can be adapted to multiple points of
distributed monitoring in Vaca Muerta, making environmental surveillance viable
powerful smart with controlled costs and capacity for continuous improvement.

5. Conclusion

The implementation of AI and IAGEN for water monitoring in Vaca Muerta
constitutes a key tool to reconcile energy development with the
environmental protection. The combined use of advanced technologies allows
anticipate risks, improve water use efficiency, and strengthen confidence
public. This initiative positions Vaca Muerta as a benchmark in innovation
technology applied to sustainability, promoting more efficient exploitation
responsible, efficient and aligned with the environmental demands of the 21st century.