HUB TECH IA

AI and IAGEN Application Use Case

Oil and Gas Well Monitoring - Pressure Analysis, temperature and flow to minimize failures

Executive Summary – Application of AI and IAGEN for Real-Time Monitoring Real de Pozos in Vaca Muerta

This executive summary presents a strategic application of artificial intelligence (AI) and generative artificial intelligence (IAGEN) in the energy sector, specifically in the real-time monitoring of oil and gas wells.
This is a concrete opportunity for Vaca Muerta, as it allows for the optimization of processes, prevent failures and improve operational integrity at one of the reserves most important conventional in the world.

Use case classification

The report classifies this application of AI based on the following axes:

1. By main resource: oil and gas.
2. By activity: optimization of production processes.
3. By technology: generative models, machine learning (RNN, LSTM, GRU), artificial vision, big data and integration with IoT.
4. By strategic impact: optimization of production and infrastructure.

1. Opportunities for using AI and IAGEN in the sector

Specific opportunities include: continuous data acquisition and analysis real-time, predictive maintenance of critical equipment, early detection of anomalies that compromise well integrity and dynamic optimization of extraction parameters. These solutions allow you to address the complexity

Vaca Muerta's operation, particularly in contexts of limited connectivity and challenging geological formations.

2. Expected benefits

The application of AI and IAGEN in well monitoring allows:

- Prevent critical failures through early warnings.
- Reduce downtime and improve operational efficiency.
- Optimize maintenance and extend equipment life.
- Increase operational safety and reduce environmental impact.
- Increase extraction productivity through more efficient decisions informed and automated.

3. Application of AI

The implementation is based on the deployment of IoT sensors that capture key parameters (pressure, temperature, flow rate, vibrations), which are processed in real time by AI models trained to identify patterns.
anomalies and adjust operational variables. The architecture includes algorithms for time series, autoencoders, CNN, RUL and reinforcement learning, all integrated into a scalable, multimodal intelligent monitoring platform.

4. Proposed AI Agent

The report proposes a real-time intelligent agent for oil wells and gas, composed of modules that integrate IoT sensors, anomaly detection (LSTM, transformers), predictive maintenance (RUL, Random Forest), structural integrity assessment, production optimization with AI and communication automated using natural language.

Its main function is to anticipate failures and adjust operating parameters accordingly. autonomous. The agent integrates with existing systems, learns with use and allows Scaling monitoring from a single well to an entire network, improving efficiency, safety, and operational continuity in Vaca Muerta.

5. Conclusion

The incorporation of solutions based on AI and IAGEN represents a

A key transformation for the energy industry. Its application in Vaca Muerta allows you to move from a reactive logic to a proactive, data-centric strategy, automated intelligence and operational sustainability. This evolution not only strengthens the sector's competitiveness, but also lays the foundation for a more efficient and resilient exploitation of the country's energy resources.