HUB TECH IA

Implementation of Generative Artificial Intelligence (IAGEN) for Monitoring Automated Power Plants in Neuquén, Vaca Muerta

Executive Summary – IAGEN Application for Automated Plant Monitoring of Energy in Vaca Muerta.

This executive summary presents a strategic application of generative artificial intelligence (IAGEN) in the energy sector, specifically in the automated monitoring of power plants in the Vaca Muerta region. This initiative constitutes a significant opportunity to optimize operational efficiency, security and sustainability in one of the main productive centers of hydrocarbons of the country.

Use case classification

The report classifies this IAGEN application according to the following axes:

1. By main resource: oil, gas, water and energy (comprehensive approach).
2. By activity: energy efficiency and sustainability.
3. By technology: generative AI models, machine learning, computer vision, natural language processing, and data integration (IoT and big data).

4. By strategic impact: optimization of production and infrastructure energetic.

1. Opportunities for using AI and IAGEN in the sector

The identified opportunities include intelligent real-time monitoring of plants, early fault detection, automated visual inspection

through artificial vision, predictive analysis from historical data and in real-time, and the automation of technical document analysis. These capabilities allow traditional practices to be replaced by a proactive approach, continuous and more precise, with applications in both thermal plants and hydraulic, solar or wind.

2. Expected benefits

The adoption of IAGEN in the energy sector generates concrete benefits such as:

- Improved operational efficiency by automating routine tasks and freeing up staff for strategic functions.
- Reduction of downtime, through predictive detection of faults and preventive maintenance.
- Increased operational safety, thanks to early warnings of anomalies and critical conditions.
- Optimization of the use of natural resources such as water and energy, with direct impact on environmental sustainability.
- More informed decision making, through automated analysis and in real-time big data.
- Reduction of environmental impact by minimizing emissions and waste operatives.
- Strengthening energy sustainability, promoting an operation cleaner, more predictable and scalable.

3. Application of AI

The proposed system integrates machine learning, deep learning, and vision technologies. artificial and natural language processing, all powered by data obtained in real time through IoT sensors. These tools allow build an automated monitoring system that detects anomalies, recommends preventive actions and generates reports for operators and technicians. platform integrates with SCADA, ERPs and technical documentation for a vision

complete operational status.

4. Proposed AI Agent

The report proposes the implementation of the PowerMonitorAI agent, a generative artificial intelligence system designed to monitor, predict failures, generate alerts and automate reports in power plants. The agent operates from five technological modules: data collection (SensorCollector), predictive analysis (PredictiveCore), visual inspection (AnomalyVision), document analysis (ReportNLP), and strategic decision-making (DecisionMaker). Its main benefit lies in its ability to operate continuously, adapt to different energy environments and scale without the need for constant human intervention.

5. Conclusion

The incorporation of IAGEN for automated monitoring represents a strategic transformation for the energy industry in Vaca Muerta. The proposed solution allows for migration from a reactive to a predictive approach, improving the competitiveness compared to other producing regions, and move towards exploitation safer, more efficient, and more sustainable use of resources. This development not only enhances national energy production, but also positions Argentina to the at the forefront of technological innovation in the sector.