HUB TECH IA

Deliverable report 54

AI and IAGEN Application Use Case

AI for optimizing water use in hydraulic fracturing in Dead Cow

Executive Summary: Application of AI and IAGEN for Water Use Optimization in Hydraulic Fracturing in Vaca Muerta

This executive summary presents a strategic application of artificial intelligence (AI) and generative artificial intelligence (IAGEN) in the energy sector, specifically aimed at optimizing water use in production processes.
Hydraulic fracturing in the Vaca Muerta formation. This is an opportunity concrete to improve the sustainability and efficiency of one of the main unconventional developments in the country.

Use case classification

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

1. By main resource: Water + Energy.
2. By activity: Energy efficiency and sustainability.
3. By AI technology used: Machine learning, generative AI, natural language processing, data integration platforms and intelligent agents.
4. By strategic impact: Sustainability and reduction of environmental impact.

1. Opportunities for using AI and IAGEN in the sector

Opportunities identified include: accurate prediction of water volume required per fracture stage, dynamic adjustment of operating parameters during injection, optimization of fracture design through scenario simulation, automation of regulatory reports and continuous improvement in water efficiency each well. AI enables the integration of geological, operational, and production data to make decisions in real time, maximizing hydrocarbon recovery with less use of fresh water.

2. Expected benefits

Among the operational and strategic benefits are: reduction in consumption Total water per well, reduction in logistics and environmental costs associated with the transportation and treatment of the resource, increasing productivity per liter of water used, simplification of post-fracturing logistics, and greater competitiveness of shale projects thanks to a smaller water footprint and greater overall efficiency.

3. Application of AI

The proposed approach is based on an ecosystem of AI technologies that combine machine learning, real-time sensors, data integration platforms and generative AI systems. These allow monitoring conditions during the fracture, adjust parameters in real time, generate automatic recommendations for operators, simulate multiple operating configurations and automate environmental reporting. AI acts as a decision support system, shortening planning times, reducing the margin of error and increasing accuracy operational.

4. Proposed AI Agent

The report proposes the design of an intelligent agent powered by IAGEN, which aims to assist operators and engineers in intelligent water management. during hydraulic fracturing. This agent combines language models,

Machine learning and conversational flows, with the ability to interact
with existing sensors, databases and systems.

Its key functions include: prediction of the optimal water volume per stage, dynamic pumping adjustment, simulation of fracture designs with
lower water impact, automation of regulatory reports, analysis of
water efficiency per well and monitoring of operational and environmental KPIs.
Implementation would allow the operation to be digitally transformed with tools
accessible and scalable, even for non-technical staff, enabling more informed, faster and sustainable decision-making.

5. Conclusion

The implementation of AI and IAGEN for water use optimization in Vaca
Muerta represents a disruptive transformation with high strategic value.
combination of predictive models, monitoring platforms and autonomous agents allows to
reduce environmental impact, improve operational efficiency and
ensure more sustainable management of water resources. This initiative positions
local industry at the forefront of technology and lays the foundations for a model of
exploitation more competitive, resilient and aligned with the environmental challenges of the 21st century.