HUB TECH IA

AI and IAGEN Application Use Case

Analysis of Geological and Seismic Data for Area Identification with Shale Gas in Vaca Muerta

Executive Summary – Application of IAGEN in Shale Gas Exploration in Vaca Dead.

This executive summary presents a strategic application of generative artificial intelligence (IAGEN) in the energy sector, specifically in data analysis.

geological and seismic for the identification of areas with production potential

Shale gas in the Vaca Muerta formation. This initiative represents an opportunity

Transformer to optimize natural gas exploration and reduce risks

environmental and strengthen Argentina's energy competitiveness in the market international.

Use case classification

The report classifies this IAGEN application based on the following axes:

1. By main resource: gas (main), oil (secondary).
2. By activity: information management and decision-making.
3. By technology: generative AI models (GANs, Transformers, Models of Diffusion, machine learning, computer vision systems.
4. By strategic impact: strategic decision-making and data analysis.

1. Opportunities for using AI and IAGEN in the sector

IAGEN allows the automation of the analysis and interpretation of large volumes of

seismic and geological data. Its main opportunities include: generation of

synthetic subsurface models, automatic identification of geological traps,

prediction of shale gas presence, suggestion of optimal drilling locations, integration with

geostatistical analysis and numerical modeling of

deposits. In addition, it allows simulating environmental scenarios to make decisions

preventive.

2. Expected benefits

The application of these technologies in shale gas exploration generates benefits

specific ones such as:

- Greater precision in identifying areas with gas.
- Reduction of costs and unnecessary drilling.
- Optimization of operational and human resources.
- Minimizing environmental impact through more precise intervention.
- Reduction of the time between prospecting and extraction.
- Generation of qualified employment and development of local capacities.

3. Application of AI

The proposed approach articulates a structured workflow that goes from the

data collection and preprocessing to prediction and validation of results,

integrating techniques such as GANs, Transformers and geostatistical analysis. This

architecture allows to generate three-dimensional representations of the subsoil, predict

reservoir evolution and make informed decisions in real time.

4. Proposed artificial intelligence agent

The report proposes the development of an intelligent agent based on IAGEN that

automates the analysis of geological and seismic data to identify areas with

shale gas potential in Vaca Muerta. This agent combines generative models

(GANs, Transformers and diffusion models) with deep learning algorithms and computer vision, allowing to generate simulations of the subsurface, detect traps geological and suggest optimal locations for drilling with greater precision.

Its main function is to assist in strategic decision making, reducing analysis times, minimizing human errors and avoiding perforations unnecessary. Integrated into workflows with real-world validation, this agent provides scalability, operational efficiency and environmental sustainability, also facilitating use by multidisciplinary teams, even without advanced technical training.

5. Conclusion

The implementation of IAGEN in Vaca Muerta is presented as an innovation disruptive for the energy sector. Its incorporation allows us to evolve from a traditional logic towards a proactive, data-driven, and customer-oriented strategy sustainability. This approach not only optimizes profitability and operational efficiency, but also reinforces environmental commitment and technological development. Argentina, consolidating Vaca Muerta as a strategic engine for growth national.