HUB TECH IA

AI and IAGEN Application Use Case

Exploration: Reserve Prediction for Accurate Estimation of Volume of Recoverable Gas in Vaca Muerta, Neuquén, Argentina

Executive Summary – Application of AI and IAGEN for Oil Reserve Prediction Gas 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 accurate estimation of the volume of gas technically and economically recoverable in the Vaca Muerta formation. This initiative constitutes a key opportunity to enhance the energy value of the region and attract strategic investments that position Argentina as a relevant player in the global market for unconventional gas.

Use case classification

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

1. By main resource: unconventional natural gas.
2. By activity: information management and decision-making.
3. By technology: generative AI models (GANs), machine learning and data integration and big data platforms.
4. By strategic impact: strategic decision-making and data analysis.

1. Opportunities for using AI and IAGEN in the sector
Applied technologies allow for high-precision prediction of gas volume recoverable through integration of geological, historical and economic data. The Key opportunities include: automation of production curve analysis,

generation and comparison of custom estimation models, evaluation probabilistic Monte Carlo simulation, contextual assistance for strategic decisions, and preparation of clear reports for decision-makers technicians.

2. Expected benefits

The integrated approach of AI and IAGEN provides multiple benefits: substantial improvement in the accuracy of reserve estimates, significant reduction in lead times analysis, ability to adapt to multiple deposits simultaneously, automatic generation of technical and executive reports, and optimization of decisions related to drilling, fracturing and recovery.

3. Application of AI

Deterministic, probabilistic and generative approaches are used, including supervised machine learning, stochastic simulation, and automated decline models. AI acts throughout the entire workflow: from the data collection and validation to scenario simulation and generation automated technical and economic reporting, integrating into environments such as SCADA, Google Drive and visualization platforms.

4. Proposed AI Agent

The report proposes an intelligent agent designed to accurately estimate the The volume of recoverable gas in Vaca Muerta, integrating data on pressure, volume, temperature (PVT), petrophysical properties, decline curves, production history, and economic conditions. This agent uses an automated workflow that includes data cleansing, multi-technique modeling (machine learning, Monte Carlo, decline), and simulation of operating scenarios, generating technical reports with key metrics (P10, P50, P90) and sensitivity graphs as output. and optimization recommendations.

The system is composed of specialized modules: a curve analyzer declination; a probabilistic simulator; an anomaly detector in data input; a predictor based on supervised algorithms such as random forest and neural networks; a technical natural language explainer (LLM) that translates

complex results into understandable reports; and a ready-made report generator for export. This agent allows reducing human intervention, increasing the precision and offer a scalable and continuous tool for decision-making strategic.

5. Conclusion

The incorporation of AI and IAGEN in the estimation of gas reserves in Vaca Muerta represents a high-impact innovation for energy development Argentine. The combination of advanced models with intelligent workflows not only improves decision accuracy and efficiency, but also enables consolidate a strategic vision based on reliable data. This transformation technological contributes to a more sustainable, profitable and aligned exploitation national growth and energy security objectives.