Generative Artificial Intelligence

Design and Planning of Projects and Operations in the Gas Industry, Oil and Water in Vaca Muerta, Neuquén

Executive Summary – Application of IAGEN in Project Design and Planning and Operations in Vaca Muerta.

This executive summary presents a strategic application of artificial intelligence generative (IAGEN) in the energy sector, focused on the design and planning of Projects and operations in the gas, oil, and water industry in the Vaca Muerta formation. This represents a significant opportunity to modernize and optimize processes. complexes in one of the world's leading unconventional reserves.

Use case classification

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

1. By main resource: gas and oil as main ones, water in a role complementary.
2. By activity: information management and decision-making.
3. By technology: generative AI models (GANs, LLMs), machine learning, Big data and integration platforms, and 3D visual simulation.
4. By strategic impact: support for strategic decisions through analysis predictive and automated planning.

1. Opportunities for using AI and IAGEN in the sector

IAGEN is applied to the automatic generation of infrastructure models and operations, scenario simulation, design optimization according to conditions geological and regulatory, and automation of technical documentation. Highlights also digital twins to test designs before their actual implementation. These capabilities allow you to plan and redesign projects dynamically and contextualized.

2. Expected benefits

The use of IAGEN facilitates the reduction of planning times and lowers costs. operational, improves efficiency in resource allocation and reduces risks operational through predictive models. In addition, it promotes fluid collaboration in multidisciplinary teams, enhances innovation in design and facilitates automated project documentation.

3. Application of AI

AI is integrated into a workflow that includes operational data entry and geological, model generation, scenario simulation, technical validation and monitoring through digital twins. These tools allow you to iterate designs infrastructure and operations with greater speed and precision, adjusting dynamically to changing variables.

4. Proposed IAGEN Agent

The report proposes an agentic system made up of four main agents that operate in an integrated manner. The 3D Model Generator uses geological data, topographic and regulatory to develop virtual prototypes of wells, pipelines, treatment plants and pumping stations, optimizing each design accordingly operational efficiency, safety, and costs. These models allow for exploring variants construction before its physical execution, significantly speeding up the stages

preliminary projects.

Additionally, the Operational Scenario Simulator analyzes the infrastructure behavior under different conditions, anticipating risks technical and environmental. The Resource Optimizer dynamically adjusts the use of materials, energy and personnel, while the Documentation Generator Assistant Technique automatically produces key project reports and documents. This agentic structure not only improves decision making, but also enables Precise, fast and scalable planning, adaptable to changing conditions from Vaca Muerta.

5. Conclusion

The incorporation of IAGEN in the planning and design of energy projects in Vaca Muerta represents a paradigm shift towards a proactive, efficient and sustainable. Its adoption allows the national energy industry to face challenges technical and environmental issues with greater agility, raising innovation standards, security and productivity in a key context for the country's economic development.