HUB TECH IA

Deliverable report 30

AI and IAGEN Application Use Case

Automatic Queries - Immediate access to operational information in the Energy Sector in Vaca Muerta

I. Introduction

This report addresses an innovative proposal for the application of generative artificial intelligence (IAGEN) in the Vaca Muerta energy sector, focusing on query automation and immediate access to key operational information. In an environment characterized by high technical complexity, the need for agile responses, and constant regulatory updates, having intelligent systems capable of interpreting, integrating, and responding in real time has become a strategic priority.

In this context, the incorporation of intelligent agents powered by IAGEN represents a concrete opportunity to transform consultation, decision-making, and knowledge management processes in the energy industry. The report details the design and implementation phases of a composite agent, its technical capabilities, expected benefits, and key recommendations to ensure effective and sustainable adoption aligned with the sector's current challenges.

II. IAGEN in Vaca Muerta: Answering Frequently Asked Questions

Generative Artificial Intelligence (GENI) is a branch of artificial intelligence that focuses on creating new content, such as models, images, code, or text, from existing data. This technology uses advanced algorithms to analyze large amounts of information, identify patterns, and generate new and original content that is often indistinguishable from

human-created content.

The IAGEN can be a valuable tool for energy companies in Vaca Muerta, allowing them to respond to frequently asked questions efficiently and accurately. Some specific examples include:

- Production Queries: IAGEN can analyze historical and real-time production data to answer questions about extraction volumes, well performance, and production projections. IAGEN's ability to analyze large volumes of data and detect patterns can help companies optimize their production strategies, identify areas for improvement, and make more informed decisions.
- Infrastructure Queries: IAGEN can access information on infrastructure projects, such as oil and gas pipelines, to answer questions about transportation capacity, construction costs, and completion times. Additionally, IAGEN can be used to create simulations and models to help visualize and plan the development of new infrastructure.
- Regulatory Consultations: IAGEN can analyze the energy sector's regulatory framework, including laws, decrees, and resolutions, to answer questions about permits, licenses, and environmental requirements. This can help companies ensure regulatory compliance and avoid potential penalties.
- Market Consultations: IAGEN can access information on international oil and gas prices, global demand, and market trends to answer questions about Vaca Muerta's competitiveness and export opportunities. IAGEN can generate market reports and analyses to help companies understand market conditions and make strategic decisions.
- Sustainability Consultations: IAGEN can analyze environmental data, such as greenhouse gas emissions and water consumption, to answer questions about the environmental impact of Vaca Muerta operations and mitigation strategies. Additionally, IAGEN can access information on best practices in water management, such as the implementation of the ISO 14001 standard, which has enabled Vaca Muerta companies to reduce their water consumption.

IAGEN can also be used to create marketing and communications content, such as articles, social media posts, and promotional materials, that help companies communicate their sustainability strategies and build trust in local communities. Furthermore, IAGEN can automate customer service, answering frequently asked questions through chatbots and virtual assistants, improving efficiency and customer satisfaction.

III. IAGen Implementation Composite Agent

Today, it is possible to combine automation through AI agents with Generative AI-based models to further optimize activities .

1. IAGEN Agents Concept

In recent years, generative artificial intelligence (GAI) has revolutionized the way we interact with technology, enabling the development of systems capable of generating content, answering complex questions, and assisting with highly demanding cognitive tasks. From this capability, a new technological architecture has emerged: GAI-powered agents. These agents are not simple conversational interfaces, but autonomous systems that can interpret instructions, make decisions, execute tasks, and learn from their interactions with the environment.

An IAGen agent combines large language models with additional components such as external tools, memory, planning, and autonomous execution. This allows them to operate in complex environments, with the ability to break down objectives into steps, coordinate multiple actions, interact with digital systems (such as databases, APIs, or documents), and adapt to context changes in real time. These qualities distinguish them from traditional chatbots and open up a range of more sophisticated and customizable applications.

At the organizational level, these agents are being used to automate processes, generate data analysis, assist in decision-making, and improve the user experience, both internally and externally. For example, they can take on human resources, legal,

financial, or logistics tasks, and even tasks linked to the technical areas of production processes, acting as intelligent assistants that collaborate with human teams. This ability to integrate knowledge and execute tasks autonomously transforms the way organizations can scale their operations without losing quality or control.

Furthermore, agentic workflows—structures where multiple agents collaborate to solve complex problems—allow responsibilities to be distributed among different agent profiles, each with specific functions. This creates hybrid work environments where humans and agents coexist, optimizing time, costs, and results. The ability to connect agents with tools such as Google Drive, CRMs, or document management platforms further expands their capabilities.

The development of IAGen-powered agents represents a crucial step toward a new era of intelligent automation.

Among the benefits of authentic workflows powered by generative AI models is the ability to automate entire production processes, end-to-end, and even add value by leveraging the capabilities of language models based on these technologies.

However, its implementation also poses technical, ethical, and legal challenges, ranging from responsible design to human oversight. Therefore, understanding its architecture, operational logic, and potential impacts is critical for its effective and safe adoption in diverse professional contexts.

2. **IAGEN-driven agent design proposal for the activity**

Objective : Implement a generative artificial intelligence (IAGen) system tailored to internal documentation, ensuring accuracy, operational utility and scalability.

Phase 1: Identification and Collection

a. **Intelligent Collector Agent**

Function : Detects, accesses and organizes all relevant internal documentation to be

used as a training corpus.

Key capabilities :

- Semantic exploration of document databases (files, PDFs, SharePoint, Google Drive).
- Classification by document type (manuals, resolutions, reports, policies).
- Detection of duplicate or obsolete documents.
- Automatic indexing and metadata.

b. **Collaboration with human team** :

- Request validation of the collected documentation.
- Tag documents with "pass", "review", "exclude".

Phase 2: Model Training

a. **Specialized Training Agent**

Function : Trains a model or fine-tuning (RAG) on validated documents, adapting it to the specific context of the organization.

Key capabilities :

- Generation of embeddings and vectorization of documents.
- Training with representative examples (prompts + answers).
- Performance evaluation in comprehension, response and context.

Collaboration with human team :

- Review of outputs in controlled tests.
- Tuning hyperparameters and confidence thresholds.
- Iterative correction of errors or hallucinations.

Phase 3: Technical Implementation

a. **Operational Integration Agent**

Function : Connects the trained IAGen model to the organization's existing interfaces.

Key capabilities :

- Integration with platforms such as Microsoft Teams, Intranet, Slack, or internal systems.
- Embedded in virtual assistants or smart forms.
- Support for multiple languages and privacy levels.

Complementary actions :

- Execution of pilot tests with selected users.
- Gathering preliminary metrics (understanding, usefulness, confidence).

Phase 4: Launch and Monitoring

a. **Performance and Continuous Improvement Monitor Agent**

Function : Constantly evaluates the functioning of the system and coordinates improvement actions.

Key capabilities :

- Real-time metrics: response accuracy, latency, user satisfaction, topic coverage.
- Record of unsolved cases or uncertain answers.
- Automatic generation of progress and performance reports.

Post-launch actions :

- Application of direct user feedback (surveys or interface).
- Dynamic adjustment of the model, prompts and RAG.
- Activation of retraining cycles according to documentary or regulatory changes.

Additional Agent Considerations

Privacy and confidentiality management : access control to certain documents or responses based on the user's profile.

Audit and traceability : complete record of each interaction for review and quality control.

Scalability : Modular architecture that allows expansion to new domains or departments.

IV. IAGEN Cost-Benefit Analysis

Implementing IAGEN in the Vaca Muerta energy sector requires an initial investment. However, the potential benefits may outweigh the [costs] .

Costs	Benefits
Acquisition of IAGEN software	Greater efficiency
Investment in technological infrastructure (servers, storage, etc.)	Error reduction
Staff training in the use of IAGEN	Improved decision-making
System maintenance and upgrade costs	Greater customer satisfaction

V. Recommendations for the Implementation of IAGEN

Technicians:

- Short-term investment in AI agent implementation teams in technology and

training: Investment is required in proofs of concept and pilot testing. The focus here must be on developing the talent needed to implement these solutions, as there is a trend toward cost reduction in systems that enable "no-code" and "low-code" automation. For the first stage, it is also recommended to recruit teams with experience in AI agent design and implementation. Finally, it is key to form an in-house team to support and foster an agentic culture that redefines human-machine interaction.

- Select the IAGEN technology that best meets your company's specific needs.
- Ensure the quality and availability of data for training IAGEN models.
- Integrate IAGEN with existing enterprise systems for efficient information flow.
- Implement security measures to protect data and ensure privacy.

Organizational:

- Define a clear strategy for adopting IAGEN, with objectives, deadlines, and responsibilities.
- Train staff in the use of IAGEN and in change management.
- Foster a culture of innovation and collaboration to maximize IAGEN's potential.
- Establish monitoring and evaluation mechanisms to measure the impact of IAGEN on the organization.
- Consider using IAGEN in training programs for energy sector personnel.

VI. Conclusions

IAGEN has the potential to transform the energy sector in Vaca Muerta, improving efficiency, decision-making, and sustainability. While implementing this technology requires an initial investment, the potential benefits are significant. By following the technical and organizational recommendations, energy sector companies can take full advantage of IAGEN's capabilities to answer frequently asked questions, optimize their operations, and contribute to the responsible development of Vaca Muerta.

The adoption of IAGEN in Vaca Muerta can not only improve companies' efficiency and profitability but also contribute to a more sustainable and competitive energy industry in Argentina. IAGEN can help optimize production, reduce environmental impact, manage risks, and attract new investment, consolidating Vaca Muerta as an engine of economic growth and an example of responsible development in the energy sector.

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