HUB TECH IA

Deliverable report 29

AI and IAGEN Application Use Case

Optimization of Logistics Management in the Energy Sector of Vaca Muerta, Neuquén, Argentina

I. Introduction

Vaca Muerta, one of the largest shale formations in the world, has significantly boosted oil and gas production in Argentina, positioning the country as a key player in the energy market.

Logistics management presents challenges. Furthermore, rising logistics costs in Argentina, driven by factors such as rising security, communications, and fuel prices, add another layer of complexity.

In this context, IAGEN emerges as a key tool for optimizing logistics, offering innovative solutions to improve the efficiency, safety, and sustainability of operations, and contributing to cost reduction.

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.

II. IAGEN Applications in Logistics Management of the Energy Sector

IAGEN can transform logistics management in the energy sector in several ways, optimizing processes and improving decision-making.

1. **Data Analysis and Prediction**

- Data monitoring and analysis: With its ability to process large volumes of data generated by sensors and tracking systems, IAGEN can identify patterns and trends that optimize routes, predict transportation demand, and improve energy efficiency.
- Prediction and forecasting: IAGEN's algorithms predict energy demand more accurately, facilitating the planning of energy production, storage, and transportation, which in turn optimizes resource management and reduces costs.

2. **Operations Optimization**

- Predictive Maintenance: IAGEN analyzes data from equipment and machinery to predict potential failures and schedule preventive maintenance, minimizing downtime and optimizing asset lifespan.
- Route Optimization: By analyzing variables such as traffic, weather conditions, and vehicle availability, IAGEN generates optimal routes for transporting materials and supplies, reducing delivery times and transportation costs.
- Inventory Management: IAGEN predicts material demand, optimizes inventory levels, minimizes storage costs, and prevents stockouts, ensuring a continuous flow in the supply chain.

3. **Risk Management and Automation**

- Risk Management: IAGEN identifies and assesses logistics risks, such as accidents, delays, or supply chain disruptions, and generates strategies to mitigate them. By analyzing data and predicting potential problems, IAGEN enables companies to make proactive decisions to strengthen supply chain resilience and ensure operational continuity.
- Process Automation: IAGEN automates repetitive logistics tasks, such as generating transport orders, scheduling shipments, and managing documentation, freeing up staff to focus on more strategic tasks.

III. IAGEN Applications in Logistics Management

Application	Description
Data monitoring and analysis	Processing large volumes of data to identify patterns and trends that allow for route optimization, predicting transportation demand, and improving energy efficiency.
Prediction and forecast	Predicting energy demand to facilitate planning of energy production, storage, and transportation.
Predictive maintenance	Analysis of equipment and machinery data to predict potential failures and schedule preventive maintenance.
Route optimization	Generation of optimal transportation routes, considering variables such as traffic, weather conditions, and vehicle availability.
Inventory management	Predicting material demand and optimizing inventory levels.
Risk management	Identification and evaluation of logistical risks and generation of

	strategies to mitigate them.
Process automation	Automation of repetitive logistics tasks, such as generating transport orders and managing documentation.

IV. Application of agents driven by IAGEN in the activity

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. **Agentic Flow Design Proposal for Implementation**

- Data Capture: Sensors installed in vehicles constantly record operating, weather, and route conditions.
- Processing and Analysis (Analytic Agent): A generative model receives and analyzes this data in real time to detect patterns of anomalies or operational deviations.
- Route Generation (Generative Agent): A specialized GPT agent dynamically generates optimal routes considering multiple operational variables.
- Recommendations and Alerts (Proactive Agent): This agent generates immediate

alerts and corrective action recommendations directly to operators and logistics managers.

- Feedback (Adaptive Agent): Adjusts the model with each new data, constantly improving its accuracy and effectiveness.

V. Benefits of IAGEN Implementation in Logistics Management

The implementation of IAGEN in logistics management in the energy sector offers a wide range of benefits:

- Cost Reduction and Efficiency Improvement: IAGEN reduces costs by optimizing the efficiency of logistics operations. Route optimization, inventory management, and predictive maintenance, among other applications, contribute to reducing operating costs, minimizing waste, and improving profitability.
- Increased safety: IAGEN can help prevent accidents, improve workplace safety, and reduce operational risks.
- Improved decision-making: IAGEN provides accurate, real-time information for strategic decision-making.
- Competitive advantage: Adopting IAGEN positions companies as leaders in innovation and efficiency.

VI. Challenges of IAGEN Implementation in Logistics Management

Despite the benefits, the implementation of IAGEN also presents challenges that must be considered:

- Initial investment: Implementing IAGEN requires an investment in technology, infrastructure, and training.
- 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.

- Systems Integration: IAGEN must integrate with the company's existing systems, which may require adaptations and upgrades.
- Data Availability: IAGEN requires accurate and reliable data to operate, which can be a challenge in some cases.
- Resistance to change: Implementing AI can generate resistance from staff, who may perceive it as a threat to their jobs. To mitigate this challenge, it is crucial to implement training programs that develop the skills necessary for adapting to new technologies, such as analytical skills, effective communication, and teamwork. It is important to note that AI, while automating tasks, also creates new job opportunities that require specific skills in technology management.
- Regulatory framework: The lack of a clear regulatory framework for IAGEN in the energy sector can create uncertainty and hinder its adoption.

VII. Regulations and Standards relevant to IAGEN in Argentina

In Argentina, the regulatory framework for the IAGEN in the energy sector is under development. The Argentine government, through the Ministry of Energy, is working on defining policies that promote innovation and energy efficiency in the sector. An example of this initiative is Resolution 79/2025 of the National Electricity Regulatory Entity (ENRE), which establishes public hearings to discuss energy-related issues, including the incorporation of new technologies. This resolution demonstrates the government's openness to citizen participation and its pursuit of a regulatory framework that fosters the modernization of the energy sector.

Furthermore, there are regulations that promote energy efficiency and the incorporation of renewable energy, such as Law 27,191, which establishes ambitious goals for energy generation from renewable sources. Argentina's Ministry of Energy seeks an energy matrix that, in addition to being inclusive, stable, sovereign, dynamic, and federal, is also

sustainable, driving the transition toward a cleaner and more efficient energy model.

It is crucial that energy sector companies stay up-to-date on the regulations and standards relevant to the implementation of IAGEN and actively participate in the debate surrounding its development.

VIII. Conclusions

The IAGEN has the potential to revolutionize logistics management in the Vaca Muerta energy sector, offering innovative solutions to improve efficiency, safety, and sustainability. While implementing the IAGEN presents challenges, the benefits far outweigh the costs. Companies that adopt this technology will be better positioned to compete in an increasingly demanding market and contribute to a cleaner and more efficient energy future.

In the context of Vaca Muerta, the IAGEN can be a key factor in the development of the region and the achievement of Argentina's energy goals. By optimizing the production, transportation, and distribution of oil and gas, the IAGEN can contribute to the country's energy independence and boost exports. Furthermore, the IAGEN can help reduce the environmental impact of operations in Vaca Muerta, promoting sustainable and responsible development.

It is essential that energy companies in Vaca Muerta remain at the forefront of AIGEN adoption, invest in staff training, and collaborate with experts in the field to take full advantage of the opportunities this technology offers. AIGEN is not only a tool for optimizing logistics, but also a strategic investment for the future of the energy sector in Argentina.

Note: In developing this report, the structure of use case reports has been considered, which generally include a "base case" describing the current situation and an "extended case" presenting the proposed improvements or changes.

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