HUB TECH IA

AI and IAGEN Application Use Case

Energy Optimization in Vaca Muerta through Digital Twins and Generative Artificial Intelligence (IAGEN)

Executive Summary: Application of Generative Artificial Intelligence in Optimization Vaca Muerta Energy

This executive summary presents an innovative technological application in the sector of oil and gas, specifically focused on energy optimization in Vaca Muerta.
The report details a strategic opportunity for the region through the integrated use of Digital Twins and Generative Artificial Intelligence (GENA) models, addressing efficiency improvements, sustainability, and environmental impact reduction.

The document classifies this initiative according to different dimensions:

1) By main resource: oil (main) and gas (secondary).
2) By activity: energy efficiency and sustainability.
3) By technology used: generative AI and intelligent agents.
4) By strategic impact: sustainability and reduction of environmental impact.

1. Opportunities for using AI and IAGEN in the sector:

The report identifies key opportunities to apply Artificial Intelligence and Generative Artificial Intelligence in Vaca Muerta, aimed at improving efficiency energy. These include real-time prediction and optimization of

energy consumption, process reengineering to reduce waste,
Predictive maintenance to anticipate failures and detect energy leaks
invisible and the generation of automatic strategies to reduce the carbon footprint.
These applications allow you to optimize complex operations and move towards a
more efficient and sustainable production.

2. Benefits:

The proposed solutions allow:

- Optimize productivity and asset performance.
- Reduce operating and maintenance costs.
- Anticipate failures and operational risks.
- Improve data-driven decision-making.
- Contribute to environmental and regulatory objectives.

3. Application of AI: IAGEN analyzes large volumes of operational data and generates predictive models that optimize energy operations. Through generative algorithms and time series, proposes optimal configurations of operation that are validated by the Digital Twins before being
implemented in the physical environment.

4. Proposed Artificial Intelligence Agent:

The report proposes the implementation of an intelligent agent designed to operate as the decisional nucleus of the plants in Vaca Muerta. This agent acts on the real-time database, monitoring critical variables such as pressure, flow rate and energy consumption. Based on the analysis of historical information, it is able to Identify patterns of behavior and predict future scenarios. Use models generative to design different operational configurations, which then validates

through simulations in the virtual environment of the digital twin. In this way,
selects and applies—or suggests to the human operator—the most efficient alternative.
In addition, it incorporates a continuous learning mechanism that allows it to adjust its models
based on the results obtained and new system conditions.
Together, this agent functions as the “operational brain” of the energy system,
articulating data, simulations and real-time decisions to maximize the
performance and sustainability of operations.

5. Conclusion.

The integration between Digital Twins and Generative Artificial Intelligence represents
a transformative opportunity for Vaca Muerta, allowing for more efficient operations
efficient, sustainable, and adaptive. Despite challenges such as infrastructure
technological or local regulation, the potential to generate economic, environmental and
Strategically, it is remarkable. The synergy between these technologies positions Vaca Muerta
as an ideal setting for smart energy innovation.