HUB TECH IA

Use Case of AI and IAGEN Application

Optimization of Water and Energy in Hydraulic Fracturing – Vaca Muerta, Neuquén

Deliverable Report Classification 8: IAGEN for the Optimization of Water and Energy in Hydraulic Fracturing – Vaca Muerta, Neuquén

🔹 Classification 1: By Main Resource

- **Selected Option:** 💧 Water + energy (main), 🛢️ Oil (secondary)
- **Justification:**
  The main focus of the report is specifically on optimizing water and energy consumption in hydraulic fracturing processes—both key resources in Vaca Muerta operations. Oil is the ultimate target of these operations, but the report's central and explicit optimization lies in the efficient and sustainable use of water and energy throughout the process.

🔹 Classification 2: By Activity within Vaca Muerta

- **Selected Option:** Energy Efficiency and Sustainability
- **Justification:**
  The primary objective of the report is to achieve greater efficiency in the use of water and energy through the advanced application of Generative Artificial Intelligence (IAGEN). It aims to significantly reduce the consumption of these resources, minimize environmental impact, and enhance the sustainability of hydraulic fracturing operations. This approach is clearly aligned with energy efficiency and environmental sustainability strategies.

🔹 Classification 3: Type of AI Technology Used

- **Main Selected Option:** 1️⃣ Generative AI Models, 2️⃣ Machine Learning Algorithms, and 6️⃣ AI Platforms for Data Integration and Big Data
- **Justification:**
  The report explicitly details the use of Generative AI models (IAGEN) for predictive simulations and the generation of operational scenarios that allow dynamic real-time adjustments. It also clearly mentions the use of advanced machine learning algorithms such as regressions, decision trees, and deep neural networks for predictions and optimization. Furthermore, it describes in

detail the integration with Big Data platforms and IoT sensors for the efficient and real-time management of operational, geological, and environmental data.

🔹 **Classification 4: By Strategic Industry Impact**

- **Selected Option:** AI for Sustainability and Environmental Impact Reduction
- **Justification:**
  The report places special emphasis on the measurable reduction of water and energy consumption, which directly implies a significant decrease in the environmental impact associated with fracturing operations. It also highlights that the adoption of these advanced technologies allows compliance with stricter environmental regulations, improves public image, and consolidates sustainable operational practices aligned with long-term environmental and sustainability goals.