**Optimizing Cement Operations with Generative AI**

Create a Generative AI–driven platform for autonomous cement plant operations that optimizes energy use, quality, and sustainability across processes.

**Challenge**

Cement plants are among the most energy-intensive industries in India, with complex, interlinked processes that demand constant balancing. Variability in raw material, grinding inefficiencies, high-temperature clinkerization, and siloed control systems often lead to wasted energy, inconsistent product quality, and higher environmental impact. Meanwhile, the industry faces urgent pressure to integrate alternative fuels, improve thermal substitution rates, and operate sustainably at scale.

**Objective**

Build a Generative AI–powered platform for autonomous plant operations and cross-process optimization. The solution should reduce energy consumption, improve product quality, stabilize production, and accelerate sustainability through intelligent control and decision-making.

**Solution Capabilities:**

* **Optimize Raw Materials & Grinding:**Ingest real-time feed data to predict variability, fine-tune grinding efficiency, and minimize energy losses.
* **Balance Clinkerization Parameters:**Continuously monitor high-temperature operations, adjusting controls to lower energy demand while reducing environmental impact.
* **Ensure Quality Consistency:**Use Generative AI to detect fluctuations in inputs and provide proactive quality corrections.
* **Maximize Alternative Fuel Use:**Model diverse fuel combinations, optimize thermal substitution rates, and reduce reliance on fossil fuels.
* **Enable Strategic Cross-Process Optimization:**Fuse siloed data streams (raw material → clinker → utilities) into a unified AI layer for holistic decision-making.
* **Enhance Plant Utilities & Material Handling:**Predict and minimize energy consumption in utilities and optimize internal logistics flows.

**Tech Stack:**Use of Google AI technologies (Gemini, Vertex AI, Cloud Vision, BigQuery, Firebase, Agent Builder).