CCC Product Image Generator Technical Architecture & Cost Estimate

1. Tool Purpose

The Product Image Generator is a product-fidelity–preserving image orchestration system designed to transform real WooCommerce product images into ad-ready marketing visuals. It is not a text-to-image tool, but a controlled image-to-image and composition pipeline optimized for commercial use.

2. System Overview

The system ingests WooCommerce product data, isolates the product, generates controlled lifestyle or studio backgrounds, recomposes the original product image, prepares ad-safe layouts, creates structured variations, validates quality, and stores assets in the CCC Creative Library.

3. Required APIs

WooCommerce REST API: product images, variants, metadata.

Google Vertex AI Imagen: background generation and image-to-image recomposition.

Google Vision API / Vertex Vision: product segmentation and alpha masking.

CCC Internal Services: Brand DNA, Campaign Context, Rules Engine, Creative Library.

4. AI Pipeline & Background Prompts

Step 1 – Product Isolation (Vision API)
Instruction: Identify the primary product object. Remove background completely. Preserve edges, labels, text, proportions, and lighting. Return accurate alpha mask.

Step 2 – Scene Planning (Logic Layer)
Instruction: Select a commercial lifestyle or studio environment aligned with persona, funnel stage, and campaign angle. Avoid distractions. Prioritize ad usability.

Step 3 – Background Generation (Imagen)
Prompt: Generate a realistic commercial background scene only. No products. No text. Scene type, mood, lighting, and color harmony must align with brand palette and campaign context.

Step 4 – Product Recomposition (Imagen Image-to-Image)
Prompt: Place the provided product image into the scene. Preserve exact appearance. Maintain realistic shadows and scale. Do not alter packaging, text, or logo.

Step 5 – Ad-Safe Layout Preparation
Instruction: Crop to platform ratios. Maintain negative space. Ensure visual balance and ad compliance.

Step 6 – Controlled Variations
Prompt: Generate variations by modifying background, lighting, or crop only. Never modify product appearance. Maintain brand consistency.

Step 7 – Quality Validation
Checks: product fidelity vs original, no hallucinated text, brand color compliance, ad-safe composition. Regenerate on failure.

5. Metadata & Storage

Each image is tagged with product ID, variant ID, campaign ID, persona, angle, funnel stage, platform, image type, and variation type. Stored in CCC Creative Library.

6. Cost Estimate for 1,000 Images (Google-First Stack)

Assumptions (Estimated):
- Vision API segmentation: ~$0.002 per image
- Vertex AI Imagen background generation: ~$0.03 per image
- Vertex AI Imagen recomposition: ~$0.03 per image
- Average 1 segmentation + 2 Imagen calls per final image

Per-Image Cost Breakdown:
- Vision API: $0.002
- Imagen (2 calls): $0.06
- Total per image: ~$0.062

Total Estimated Cost for 1,000 Images:
≈ $62 USD (excluding storage, compute orchestration, and bandwidth)

Notes:
- Costs scale linearly
- Batch processing and caching can reduce costs
- Pricing is estimate-based and should be validated against current Google Cloud pricing

7. Success Metrics

High usability rate without manual edits, reduced creative production time, increased testing velocity, and consistent brand-safe outputs.

8. Final Statement

This system is a commercial product visualization pipeline. Its value comes from orchestration, constraints, and context-aware generation—not raw AI creativity.