End-to-End Testing & Validation Plan

Drinks Sustainability Tool

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1. Objective

The objective of this test plan is to perform a comprehensive, end-to-end validation of the 'Drinks Sustainability Tool' MVP. This script will simulate a complete user journey, from company registration to final LCA report generation, to ensure all backend and frontend components are functioning correctly and are properly integrated.

2. Test Environment

- **Platform:** The live Replit development environment.
- **Database:** A clean, seeded PostgreSQL database.
- **Services:** All services (Flask Backend, React Frontend, Celery Workers, OpenLCA Server) must be running.

3. Test Case 1: Full Lifecycle for a Self-Producing Spirits Brand

This test case simulates a new, self-producing spirits brand signing up and creating an LCA for their product. It will use data inspired by the "Avallen LCA" document to test the system with realistic inputs.

Phase 1: Company & Product Setup

1. **Action:** Create a new user account using Replit Auth.
2. **Action:** Complete the initial company onboarding.
    - **Company Name:** "Orchard Spirits Co."
    - **Location:** "Normandy, France" (ensure this is geocoded correctly).
3. **Action:** Create a new product SKU.
    - **Product Name:** "Heritage Apple Brandy"
    - **Product Type:** "Spirit"
4. **Expected Result:** A new company and product are created in the database. The user is directed to the LCA data collection questionnaire.

Phase 2: Supplier & Product Data Setup (Admin Workflow)

This phase tests the internal admin's ability to pre-populate the supplier network.

1. **Action (as Admin):** Navigate to the /app/suppliers dashboard. Use the **"Add New**

Verified Supplier" form to create the following suppliers and products.

2. **Supplier 1: Agricultural Input**
    - **Supplier Name:** "Normandy Apple Orchards"
    - **Category:** "Agricultural Inputs"
    - **Location:** "Bayeux, France"
    - **Product:**
        - **Name:** "Traditional Cider Apples"
        - **Crop Type:** "Apples"
        - **Yield (ton/ha):** 31.5
3. **Supplier 2: Bottle Producer**
    - **Supplier Name:** "Saverglass"
    - **Category:** "Bottle/Can Producers"
    - **Location:** "Feuquières, France"
    - **Product:**
        - **Name:** "700ml White Glass Bottle"
        - **Material:** "Glass"
        - **Weight (g):** 540
        - **Recycled Content (%):** 80
4. **Supplier 3: Stopper Producer**
    - **Supplier Name:** "Amorim Cork"
    - **Category:** "Stopper/Closure Producers"
    - **Location:** "Porto, Portugal"
    - **Product:**
        - **Name:** "Natural Agglomerated Cork"
        - **Material:** "Natural Cork"
        - **Weight (g):** 7.2
5. **Supplier 4: Secondary Packaging**
    - **Supplier Name:** "Smurfit Kappa"
    - **Category:** "Secondary Packaging Producers"
    - **Location:** "Saint-Malo, France"
    - **Product:**
        - **Name:** "6-Bottle Corrugated Box"
        - **Material:** "Corrugated Cardboard"
        - **Weight (g):** 229
6. **Expected Result:** All four suppliers and their respective products are created in the verified_suppliers and supplier_products tables with a 'verified' status. Their locations are correctly geocoded.

Phase 3: LCA Data Collection & Supplier Linking (Client Workflow)

1. **Action (as Orchard Spirits Co.):** Begin the detailed LCA questionnaire for the "Heritage Apple Brandy".
2. **Agriculture Tab:**
    - Select "Normandy Apple Orchards" and their "Traditional Cider Apples" from the supplier network.
    - Manually enter diesel_l_per_hectare: 15.
3. **Inbound Transport Tab:**
    - **Action:** The system should automatically calculate the distance from "Bayeux, France" (supplier) to "Normandy, France" (client).
    - Manually select mode: "Lorry >32t".
4. **Processing Tab:**
    - Enter the following data:
        - water_m3_per_ton_crop: 0.056
        - electricity_kwh_per_ton_crop: 10.21
        - lpg_kg_per_l_alcohol: 0.16
        - net_water_use_l_per_bottle: 1.23
5. **Packaging Tab:**
    - For the **Bottle**, select "Saverglass" and their "700ml White Glass Bottle".
    - For the **Stopper**, select "Amorim Cork" and their "Natural Agglomerated Cork".
    - For **Secondary Packaging**, select "Smurfit Kappa" and their "6-Bottle Corrugated Box".
6. **Action:** Submit the completed questionnaire.
7. **Expected Result:**
    - An lca_questionnaires entry is created with the correct structured data.
    - The product_inputs table is correctly populated, with links to the supplier_product_id for all selected components.
    - The LCA calculation is triggered as an asynchronous background job.

Phase 4: Validation

1. **Action:** Wait for the "Report Ready" notification.
2. **Action:** Navigate to the dashboard and view the results for "Heritage Apple Brandy".
3. **Verification:**
    - Check that the dashboard displays non-zero values for Carbon, Water, and Waste.
    - Check that the reports table in the database has a new entry with status: 'draft' and contains the calculated data in the report_data_json field.
    - Request an expert review and confirm the status changes to pending_review.

    - As an admin, approve the report and confirm the status changes to approved.
    - As the client, confirm the "Download PDF" button is now active.
4. **Expected Result:** The entire end-to-end process completes successfully, data flows correctly between all tables, and the final report is generated and validated.