Automated Agricultural Footprint Guide

For the Replit Development Agent

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1. Objective

This document provides a detailed technical guide for the Replit Agent to upgrade the platform's LCA calculation method for agricultural inputs. The current manual data entry for agricultural metrics (e.g., yield per hectare) will be replaced with a more accurate, user-friendly, and automated workflow. This new method will leverage the pre-calculated, scientifically validated processes within the licensed ecoinvent database via the OpenLCA API.

2. Part 1: Frontend Changes (Simplified Data Collection)

The user-facing data collection form for agricultural inputs must be simplified to reflect the new, automated backend logic.

- **Location:** The "Agriculture & Ingredients" tab of the **Enhanced LCA Data Collection Form**.
- **Action:** The existing fields (main_crop_type, yield_ton_per_hectare, diesel_l_per_hectare, sequestration_ton_co2_per_ton_crop) must be **removed**.
- **New Interface:** The tab will be replaced with a single, clear, repeatable form section titled **"Agricultural Ingredients"**.
    - **UI:** An "Add Ingredient" button that, when clicked, adds a new row with the following fields:
        1. **Ingredient**: A searchable dropdown menu. This is the most critical field. It will be populated with the material_name values from our internal lca_process_mapping table where the category is 'Agriculture'.
        2. **Amount**: A numeric input field for the quantity of the ingredient used per functional unit (e.g., per bottle).
        3. **Unit**: A dropdown for the unit of measurement (e.g., kg, Litres).
- **Guidance:** A prominent tooltip on this section will explain: "Please add each agricultural ingredient that goes into your product. Simply select an ingredient from our database and enter the amount used. Our tool will automatically calculate the full upstream environmental footprint—including water use, land use, and carbon emissions—using the globally recognized ecoinvent database."

3. Part 2: Backend Enhancements

3.1. Database Update (lca_process_mapping table)

- **Requirement:** This table is the "translation dictionary" that connects our user-friendly ingredient names to the precise process IDs in the ecoinvent database. It must be populated with the most common agricultural ingredients.
- **Action (Admin Task):** The Avallen Solutions team must populate this table with entries for agricultural products.
- Example Rows:
material_name	ecoinvent_process_uuid	database_version
"Molasses, from sugarcane"	uuid-for-molasses-production	"3.8"
"Apples, at farm"	uuid-for-apple-production	"3.8"
"Barley, at farm"	uuid-for-barley-production	"3.8"

3.2. Update to LCA Calculation Service (Celery Worker)

- **Requirement:** The backend logic for modeling the "Agriculture" stage of the LCA must be completely rewritten.
- **New Logic:**
  1. When the worker processes the agriculture section of a user's lca_data, it will now find a list of ingredients.
  2. The worker will iterate through this list. For each ingredient, it will:
     a. Take the user-selected Ingredient name.
     b. Perform a lookup in our lca_process_mapping table to retrieve the exact ecoinvent_process_uuid.
     c. In the OpenLCA product system, create a new process using this specific UUID.
     d. Set the quantitative reference (the "flow amount") for this process to the Amount and Unit provided by the user.
     e. Link the output of this new agricultural process as an input to the "Inbound Transport" process.
  3. This method completely removes the need for the backend to calculate anything for the agricultural stage itself; it simply instructs OpenLCA to use the pre-existing, scientifically validated process from the ecoinvent database, scaled to the user's specified amount.