SUSTAINABLE HERBS INITIATIVE

Supplier Guidance for Tracking Emissions in the Cultivation and Processing of Herbs – V1.0 – August 2026

Honoring People, Plants & Place
From Source to Finished Product



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How to use this guide

Document aim:	To help primary processing companies track data for mapping emissions for herbal products.
Context:	This guide is part of the SHI Scope 3 Emissions initiative which is building a database for emissions of botanicals along with a standardized, scalable model to calculate these using supplier data.
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1. About

1. About this Guidance

This document outlines steps and best practices to collect farm and processing level data to support suppliers and buyers in tracking and entering accurate data.
Use this document as you are filling out the survey for more clarity on what you should be entering.

This guidance does not provide an evaluation of which cultivation practices or processing methods are more sustainable or cause fewer emissions.

2. Guidance for Entering Farm Data

2. Guidance for Entering Data: Farm-level

Section	Data needed	Good	Better	Best
Cultivation (area, system, yields)	Cultivated area Fresh yield Final product amount	Provide cultivated area and final (meaning final at farm-gate) product amount based on farm records and **estimated fresh** yield.	Provide fresh yield AND final (e.g. pre-dried) product amount along with assumed loss-rates (e.g. drying, sorting etc.) in note field.	Measure loss-rates (e.g. for fresh-to-dry ratios through weighing samples from fresh and final products) and record them for use to enter fresh and final product amounts.
	Names of co-products Value share (%) of co-products	List all co-products and estimate their value share.	Track co-product quantities and calculate value shares based on average market prices.	Maintain detailed records of co-product volumes and values based on sales records per season.

2. Guidance for Entering Data: Farm-level

Section	Data needed	Good	Better	Best
Crop Residues	Dry matter amount of crop residues remaining after harvest (stems, stubble, leaves, roots, branches). Management method: left on field, composted, burned etc. **Note for perennial crops:** consider only the crop residues (if any) remaining after harvest during the assessed year. **Note for wild collection:** Only include residues resulting from the wild harvest activities.	Track what you do with crop residues (burn, compost, turn into field, leave on field) and estimate dry matter amount of crop residue based on visuals and/or via comparing with crop yield amount.	**One-time exercise:** After harvest, collect all residues from 1-3 small specified areas of the assessed crop fields (e.g. 1 m^2 or 10 sq. ft.) to dry fully and weigh, then extrapolate (e.g. by multiplying the average per m^2 amount with 10,000 to obtain a per ha amount).	**Regularly:** collect, dry and weigh all residues from 3-5 specified areas (e.g. 1 m^2 or 10 sq. ft.) from different parts of the field(s) of the assessed crop. Describe crop attributes/ activities relevant to the residue generation in the note field (e.g. every how many years/on what share of the area that year are residues generated for perennial crop cycles, pruning cycles, reasons if no or very high or low amounts of residues are provided etc.).

2. Guidance for Entering Data: Farm-level

Section	Data needed	Good	Better	Best
Organic Fertilizers	Type of organic fertilizer (compost, manure, etc.), incl. source (on-site or purchased Quantity applied per acre For compost: How compost is managed (balance aerobic/ anaerobic, turning frequency) If trucked in: distance from origin to farm	Track how much compost/fertilizer is used, source (made on-site or trucked in), composition, (and turning frequency/level of aeration for compost).	Estimate how much nitrogen is applied via manure, slurry or compost and enter equivalent amount of organic fertilizer that matches most closely the fertilizer you applied.	Determine N (and ideally P and K) content of your organic fertilizers/ compost regularly via lab analysis and quantify applied fertilizer amounts (e.g. via sample-based weighing, recording volumes by noting load capacity of equipment etc.) to obtain precise N-application rate per acre/ ha.
Mineral Fertilizers	Type of mineral fertilizer (and N, P, K content) Amount applied per acre or ha Production region/ country of fertilizer	Track type and total quantity of mineral fertilizers purchased per year, assign share to assessed crop and divide by acreage/ area.	Retain purchase records of fertilizer types with N, P, K values of fertilizers to provide precise N-application rates per acre/ ha.	Maintain per-crop, per-season records of mineral fertilizer application with full composition data for precise N, P, K and product amounts. Identify fertilizer production origins via label or enquiry at seller.

2. Guidance for Entering Data: Farm-level

Section	Data needed	Good	Better	Best
Liming	Type and amount of liming material applied across crop rotation (see next slide for clarification)	Per type of liming material: determine average amount of lime applied per ha (or acre) per year by adding up all lime applied over e.g. 10 or 20 years and dividing by number of years and the total crop area of your farm.	Distribute the lime applied during one liming instance to all crops grown until the next liming instance.	Maintain multi-year liming records and distribute cumulative amounts among crop rotation elements appropriately, e.g. dividing total applied over full crop rotation by number of years (or months with cash crop coverage) of crop rotation (including crops planned for future years when assessing crop towards beginning or middle of crop rotation cycle).
Crop Protection	(Product) amounts of herbicides, insecticides, fungicides, and other pesticides applied (lbs, kg).	Estimate amount of product applied per category (herbicide, insecticide etc.)	Document application rates per pesticide type, crop and season.	Maintain per-crop application records incl. product names and respective application rates, note composition (active ingredient), and source in note field.

Entering liming data correctly: best*

Step 1: Define crop rotation cycle or alternative period**

Crop	Start (approx.)	End (approx.)	Duration (months)
Winter Barley (preceding crop, prior cycle)	Oct. 1st half 2021	July 1st half 2022	9.3
Fallow	*July 1st half 2022*	*Aug. 2nd half 2022*	*1.2*
Winter Oilseed Rape	Aug. 2nd half 2022	July 2nd half 2023	11.3
Fallow	*July 2nd half 2023*	*Oct. 1st half 2023*	*2.4*
Winter Wheat	Oct. 1st half 2023	Aug. 1st half 2024	9.9
Fallow	*Aug. 1st half 2024*	*Aug. 1st half 2024*	*0.3*
Cover crop (nematode-resistant yellow mustard)	*Aug. 1st half 2024*	*Feb. 2nd half 2025*	*6.4*
Fallow	*Feb. 2nd half 2025*	*March 2nd half 2025*	*1.1*
Sugar Beet	March 2nd half 2025	Oct. 2nd half 2025	6.9
Fallow	*Oct. 2nd half 2025*	*Oct. 2nd half 2025*	*0.2*
Winter Wheat	Oct. 2nd half 2025	Aug. 1st half 2026	9.2
Fallow	*Aug. 1st half 2026*	*Oct. 1st half 2026*	*2*
Winter Barley	Oct. 1st half 2026	July 1st half 2027	9.3
Fallow	*July 1st half 2027*	*Aug. 2nd half 2027*	*1.2*
Winter Oilseed Rape (following crop, next cycle)	Aug. 2nd half 2027	July 2nd half 2028	11.3
Total (core rotation, excl. preceding/following cycles)			**59**

If e.g. sugar beet is the assessed crop, enter either of these values into farmpact)

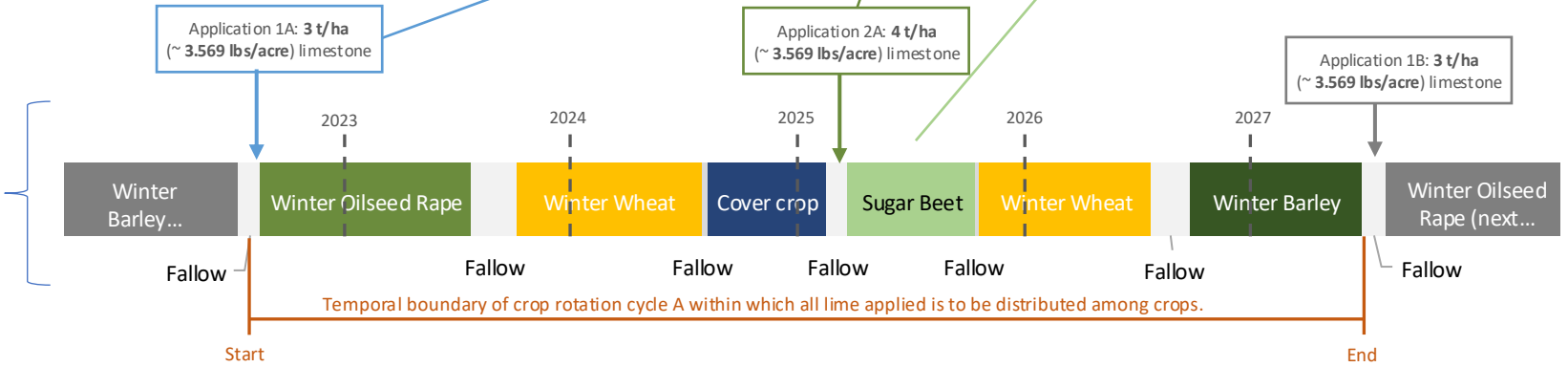
Step 2: adding up all liming instances over one crop rotation cycle

		t/ha	lbs/acre
Beginning of cycle: maintenance liming	Liming instance 1A	3	2,677
Main liming before sugar beet	Liming instance 2A	4	3,569
	Sum Cycle A	**7**	**6,246**
Next-cycle maintenance liming	Liming instance 1B	3	2,677

Step 3: Distribute sum of entire liming amount among crops in cycle based on time crop is grown (excl. fallow periods)

Crop	Duration (months)	Area-time-share	Amount of lime allocated t/ha	Amount of lime allocated lbs/acre
Winter Barley (prior cycle)	9.3	13%	0.9	789
Winter Oilseed Rape	11.3	15%	1.1	959
Winter Wheat	9.9	13%	0.9	840
Cover crop	6.4	9%	0.6	543
Sugar Beet	6.9	9%	0.7	586
Winter Wheat	9.2	13%	0.9	781
Winter Barley	9.3	13%	0.9	789
Winter Oilseed Rape (following crop, next cycle)	11.3	15%	1.1	959
Total (only cash crops)	**73.6**		**7**	**6,246**

Making sure the entire amount of lime applied is accounted for



*There is not only one correct way to distribute lime application across all crops in a crop rotation, so please consider this as one possible example that you can modify to best suit your context and crop rotation.

** For example, you may instead always distribute the lime applied during one instance to all crops grown until the next liming instance or simply add up all lime applied over a longer period (e.g. 10 or 20 years) and create an annual average

2. Guidance for Entering Data: Farm-level

Section	Data needed	Good	Better	Best
Energy Consumption	Field energy (diesel, petrol, electricity)	Use purchasing records to calculate volume of diesel purchased for the year. Divide by crop acreage for average per acre use across crops.	Track fuel consumption per crop type based on machine types and extent of usage (hours, acres etc.).	Use equipment fuel use display/records to document actual fuel amounts used per crop per season. Provide shares of biodiesel and bioethanol.
	Irrigation (source, amount, method, power source)	Identify water source and provide an estimate of total water used over the season. Note which crops need the most irrigation.	Use annual water usage figures from water utility records/ pump and allocate based on crop demand.	Use **energy** metering with clear records. Provide shares of biodiesel, bioethanol, renewable electricity (purchased or self-generated).
	On-farm processing / drying (fuel source, amount)* **Main challenge is to break down total energy consumption to kg of product. Good, better and best practices focus on different approaches to do so.*	Track total annual consumption of electricity, propane, and other fuels for drying. Divide total fuel used by total dry weight of all products to get an average fuel ratio per kg. Apply this ratio to each crop.	For each crop, record fresh weight, drying time, drying temperature, and final dry weight. Track total annual energy use. Allocate energy to each crop based on its drying time to receive crop-specific energy consumption ratio per kg.	Install a separate energy meter on the dryer to measure electricity or fuel consumption directly. Use the meter data to calculate actual energy use per crop per drying batch amount or for season.

2. Guidance for Entering Data: Farm-level

Section	Data needed	Good	Better	Best
Land Management	For **all** land management practices: Changes within past 20 years, years of change, share of crop rotation area, dominating practice before respective change	Compare current practice with dominant practice ~10 years ago.	Compare current practice with dominant practice ~5, ~10 and ~15 years ago.	Keep records for practices for each field/crop and year to precisely determine dominant practices and changes.
	Dominating **tillage** practice in crop rotation (No-till, Reduced, full tillage) *(Next page has additional guidance)*	Determine whether reduced or full tillage based on equipment used		Record depth and frequency of soil disturbance to determine full or reduced tillage practices.
	Crop Residues: Whether crop residues are primarily left on field			Record for each crop whether crop residues left on field
	Organic Inputs: whether at least 20% of crop rotation's nitrogen demand is covered by organic fertilization	Perform estimate based on organic fertilizer amount	Assess based on annual records of total organic nitrogen input across crop rotation	Assess based on annual records and measured N-content the share of organic nitrogen input across crop rotation
	Cover Crops: Whether substantial biomass from catch crops, undersown crops, green manure is introduced into soil (at least every 3 years)	Estimate cover crop frequency in crop rotation	Record cover crop frequency and growth duration	Annual qualitative assessment of cover crop development

Entering the Correct Tillage Method

	Full (conventional)	Reduced	No-Till
Explanation	The soil is deeply and completely turned over and inverted — often multiple times within a single growing season. At planting time, less than 30% of the soil surface is covered by crop residues, soil is largely bare.	The soil is cultivated, but less intensively than with full tillage. There is no complete soil inversion. Tillage is typically shallow. At planting time, crop residues cover more than 30% of the surface, partial soil protection provided.	There is **no soil tillage** before seeding. Seeds are placed directly into undisturbed soil. Only the immediate seeding zone is minimally disturbed. Weed control is mostly managed with herbicides.
Typical Equipment	• Moldboard plow – fully inverts and turns the soil • Subsoiler / deep ripper – loosens the soil to significant depths • Disc harrow – cuts and incorporates crop residues • Rotary tiller / power tiller – intensively breaks up and mixes the soil • Seedbed combination / power harrow – prepares the seedbed after plowing	• Shallow cultivator / field cultivator – loosens the soil without inverting it • Disc harrow – shallowly incorporates residues • Mulch seeder – sows directly into mulched residues • Tine rotor / rotary harrow – light surface seedbed preparation • Strip-till implement – only works narrow strips; the rest remains undisturbed (transitional to No-till)	• No-till drill / direct seeder – cuts a narrow slot into the soil and places the seed without disturbing the rest • Disc coulter seeder – designed for hard, undisturbed soils • Precision planter with no-till setup – for maize, soy, etc. • (Herbicide sprayer for weed control) • Roller crimper – rolls down cover crops and crimps stems, leaves mulch layer on the soil surface

2. Guidance for Entering Data: Farm-level

Section	Data needed	Good	Better	Best
Land Use	Current land use type (e.g. cultivated, perennial etc.). Any land use change within past 20 years: land use before change and year of change (e.g. forest-to-arable conversion).	Document land use history with dates of any conversions.		Maintain documented land use records with satellite/remote sensing verification. Track all conversions with dates and areas.
Transport (if included in farm-level survey)	One-way transport distances by mode: road (km), rail (km), sea (km). Country and postcode of destination.	Estimate transport distances by mode to buyer.	Use map tools (e.g. google maps, searates.com) to enter routes from origin to buyer, including intermediate steps (e.g. ports, train stations etc.)	Maintain documented transport records with verified distances, modes, and carrier information.

3. Guidance for Entering Processing Data

3. Guidance for Entering Data: Processing

Section	Data needed	Good	Better	Best
Product Ingredients & Composition	Input amount per declared unit (kg), incl. loss rate at goods receipt (%), whether transport is refrigerated	Provide documented input amounts based on production records. Include loss rates at goods receipt		
	Sourcing origins (up to 3) with share of supply (%). Transport distances by mode	State country of origin and estimate transport distances by mode.		Provide share of supply per origin and transport distances per mode.
	Output Balance: Co-products output (kg per kg main product), water loss (e.g. through drying, kg per kg main product), waste output (kg per kg main product). Co-product names and revenue share (%). Waste disposal method.	Estimate co-product, water loss, and waste amounts. If co-products are produced: list co-products and their approximate revenue share from the total revenue of products and co-products produced from the same raw material(s). Co-product output amount is most relevant, the remaining output amount can be distributed between waste and water loss based on estimates since precise amounts for waste and water loss are not available in many cases. Water loss estimates with 15% residual moisture: • Roots: 60% (drying ratio: 2:1) • Leaves: 75% (drying ratio: 3,4:1) • Fruits: 80% (drying ratio: 4,3:1)		Document output balance based on production records, weighing co-product amounts (if they exist), (sample-based) weighing of waste amounts per 1 kg main product, weighing raw materials before drying (if drying takes place). Track main and co-product revenues annually.

3. Guidance for Entering Data: Processing

Section	Data needed	Good	Better	Best
Product Ingredients & Composition	List of processing aids used during production (e.g. refrigerants, cleaning agents, etc.). Type and quantity per 1 kg product produced.	List processing aids used and estimate quantities.	Document processing aid types and quantities based on purchase records.	Maintain per-product records of all processing aids with quantities and usage (or replacement) logs.

3. Guidance for Entering Data: Processing

Section	Data needed	Good	Better	Best
Energy	•Description of all processing and storage steps (e.g. washing, drying, cooling, freezing etc.).	List all processing steps.		List all processing steps in order.
	Consumption per declared unit of energy source	Estimate total annual fuel consumption at processing plant. Allocate to product based on production logs – using the "help me calculate this" tool.	Track total fuel consumption per energy source at processing plant using purchase records. Allocate to product based on production logs – using the "help me calculate this" tool.	Meter fuel consumption per process step. Maintain per-product energy records with per-kg consumption figures.
	Electricity consumption, purchased heat/steam, Electricity source	Estimate total electricity use and divide by volume (using allocation tool). State if you use a green electricity tariff.	Use annual electricity bills and calculate per-kg consumption using allocation tool. Document electricity source and any renewable tariff.	Set up sub-metering for processing equipment. Document electricity source with renewable tariff certificate. Track self-generated renewable energy share.

3. Guidance for Entering Data: Processing

Section	Data needed	Good	Better	Best
Waste	Amounts per declared unit (kg) for: municipal waste, cardboard/paper, plastic, organic waste, glass, …. Management method and recycling share (%) per stream.	Estimate total waste volumes by category and likely disposal method.	Track waste volumes by category using disposal records. Document management method (or enquire local waste disposal service provider) and recycling share per stream.	Maintain per-product waste tracking with verified volumes, ideally average densities (or sample weights) management methods, and recycling shares per waste stream.
Water & Wastewater	Amount of water used (litres per kg main product). Amount of wastewater generated (litres per kg main product).	Estimate total water use and wastewater volumes.	Use water utility records for annual consumption. Estimate wastewater volumes based on process knowledge.	Meter water consumption per process step. Track wastewater volumes with treatment/disposal documentation.
Packaging	Product physical state (e.g. solid/dry, liquid). Packaging variant(s): type (e.g. bag, box, drum), size, amount (kg), number of (re)uses, secondary packaging.	List main packaging type(s) and sizes used. State product physical state.	Document packaging variants with material weights and reuse counts. Note whether secondary packaging is used.	Maintain detailed packaging specifications per variant: material type, weight, dimensions, reuse count, secondary packaging details.

APPENDIX

4. Introducing the Sustainable Herbs Initiative Scope 3 Emissions Working Group



The SHI Scope 3 Working Group brings together companies that want to better **understand climate impacts of their botanical supply chains**



The goal is to build a clearer picture of **what causes emissions**, and support **joint action to reduce them**



Through **collaboration, shared learning, standardized methods and practical tools** that help companies collect and use relevant data

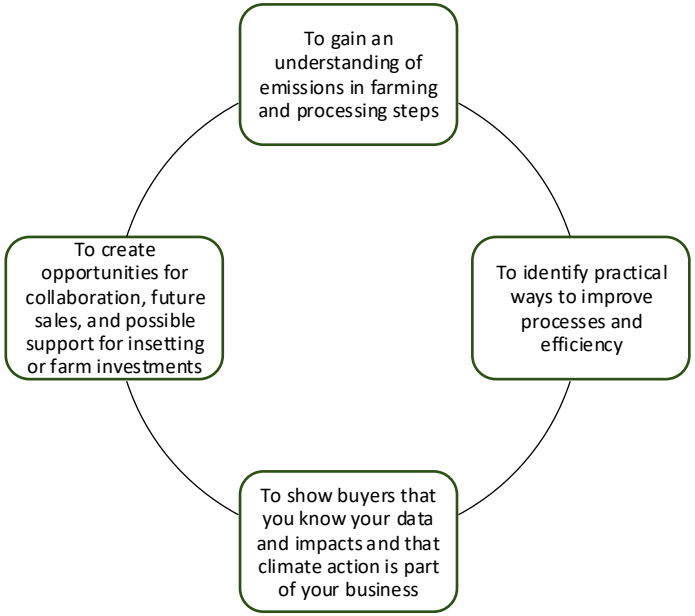
5. Activity Data and Product Carbon Footprints Offer Great Value to Brands and Suppliers

Society
Needs to limit climate change and adapt to its impacts to protect people, ecosystems, and supply chains from growing risks and damage.

Brands
Need to take responsibility for the climate impacts of their business models, including their value chains.

Primary Processors
Need to understand their own impacts, identify ways to improve, and show buyers that they are prepared for future challenges.

Benefits that come from this project:



6. Process to Collect Data and Calculate Product Carbon Footprints

1. Primary processor **receives and fills out online survey** via **farmpact** (⬇)
2. **PCF results** are calculated in farmpact
3. SHI company **validates** survey data and PCF results
4. SHI company might contact primary processor for **clarification**
5. Primary processor potentially **adjusts data**
6. Results are jointly declared as **final** (data entry form is locked by SHI company)

What is farmpact?

farmpact is a web app to **collect data along value chains** for products originating from **agriculture or wild harvesting** to determine **emissions** and identify climate **mitigation measures**, including their costs and feasibility. The SHI Scope 3 working group is using farmpact as **a tool to support their objectives** through facilitating **high quality data** input as well as **interpreting**, **working with** and **sharing** emissions data.

Click here to find out more about farmpact!

ude this info farmpact?

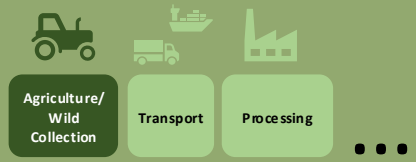
Please note

- There are **separate surveys** to collect data at **farm-/wild collection-level** vs. the **processing-level**
- Data can be provided for:
  - **individual farms**
  - **a group of farms**
  - **as an average dataset** reflecting regional production/ harvesting practices in a specific supply chain
- Each processing step within a product's supply chain that takes place at a **separate facility** is to be covered by a separate data entry form

7. Understanding Key Methods

System Boundaries

The **calculation covers** the supply chain **from crop production or wild harvesting** over **transportation** to **processing, for a specific year.**



Please note: Make sure to provide data separately for the different stages, e.g. the amount of product at **farm gate** is just that and **not the amount after processing**. Data is to be provided as actuals for the specific assessed year, i.e. for several harvest cycles per year: sum all inputs and outputs over that year.

Declared Unit

Emissions are calculated **per 1 kg of product** at the different stages.

per **1 kg harvested botanical**
(the way it is exiting the farm/wild collection boundary, e.g. after on-farm sun-drying)

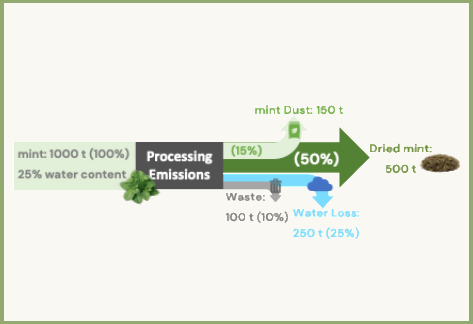
per **1 kg processed product**
(the way it is exiting the factory gate, i.e. after processing and incl. packaging)

Please note: Pay attention to the reference amount data is asked for.

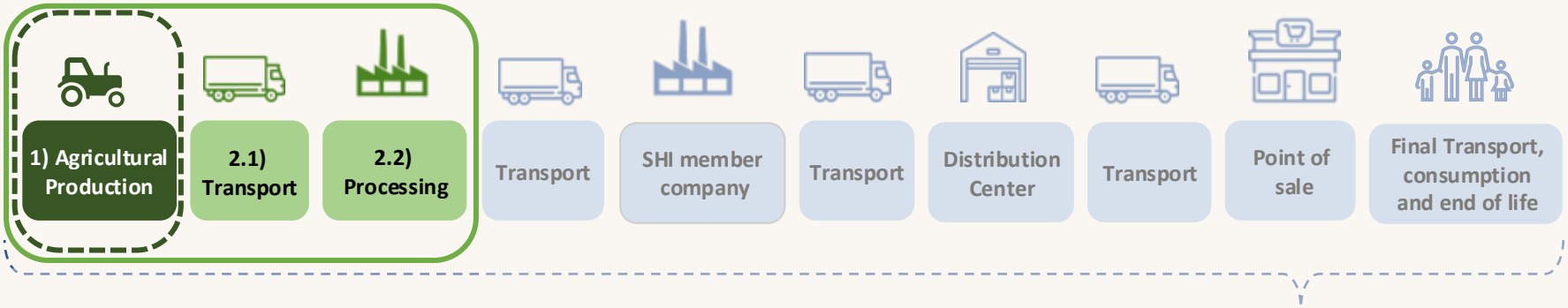
Mass Balance & Allocation

What goes into the process must equal what comes out:

Input Raw Material (100%) = Main Product Processed (%) + Co-products (%) + Water Loss (%) + Waste (%)



7. Understanding Key Methods – System Boundaries for Your Assessments



"Cradle-to-farm gate"

- Boundary covers the 1) agricultural production/wild collection
- Includes on-farm processing

➔ **farmpact survey farm-level, guidance for data entry: Ch. 6**

- Calculated for a raw material directly after harvest (e.g. fresh mint)
- If further processing takes place, cradle-to-factory gate boundary is required

"Cradle-to-factory gate"

- Boundary additionally covers 2.1) transport to processing site and 2.2) processing of a product

➔ farmpact survey processing-level, guidance for data entry: Ch. 7

- Calculated for an intermediate product (e.g. dried mint)
- SHI company that buys intermediate product can use this emission factor to calculate its supply chain emissions

"Cradle to grave"

- Covers the entire lifecycle of a final product from the production to end-of-life
- Used to compare different final products and to identify emission hotspots along the different life cycle stages
- Calculated for final products (e.g. mint tea) and may include indirect use phase emissions (i.e. boiling of tea water)

7. Time and Space Boundary

Temporal boundary for including data

- **Specified harvest year (e.g. 2025)** (if multiple cuttings were harvested, include all data for that year)
- Include **all processes** that took place **since previous year's or crop's harvest until this year's harvest**, such as: soil preparation, seeding/planting, irrigation, fertilization, weeding, crop protection/ pesticide application, harvest etc.
- Include processes for cover crop cultivation if used as **green manure** (not harvested and sold), such as diesel consumption in tractor etc., ideally allocated between the different crops in the rotation that benefit from this
- Please also provide data on what happens with crop residues, unmarketable products etc.

Area boundary for including data

- <u>Only</u> **fields on which specified product is grown**
- In case of intercropping/multiple crops on same area at the same time with same fertilizer, pesticide and energy inputs: include entire intercropping area
- For certain activities, such as land use change, management practices and liming, the entire area of the crop rotation of which the assessed product is part may have to be covered

