Introductory Webinar on VM0046 *Methodology for Reducing Food Loss and Waste, v1.0*

Karina Bautista, Senior Program Officer, Food System Innovation, Verra

Liz Guinessey, Manager, Food and Blue Carbon Innovation, Verra

Kai Robertson, Independent Consultant

Koldo Saez de Bikuña, Sustainability Consultant, Quantis

4 October 2023

Photo by Bale Mountain REDD Project

Housekeeping

- Please put questions in the Q/A box. “Like” the questions that you would like to be answered live.
- We will have time at the end to respond to questions. In the event that we run out of time to address all questions, please include your name when entering your question for follow-up.
- Follow-up questions can also be sent to:
  - Liz Guinessey, eguinessey@verra.org
  - Karina Bautista, kbautista@verra.org

Agenda

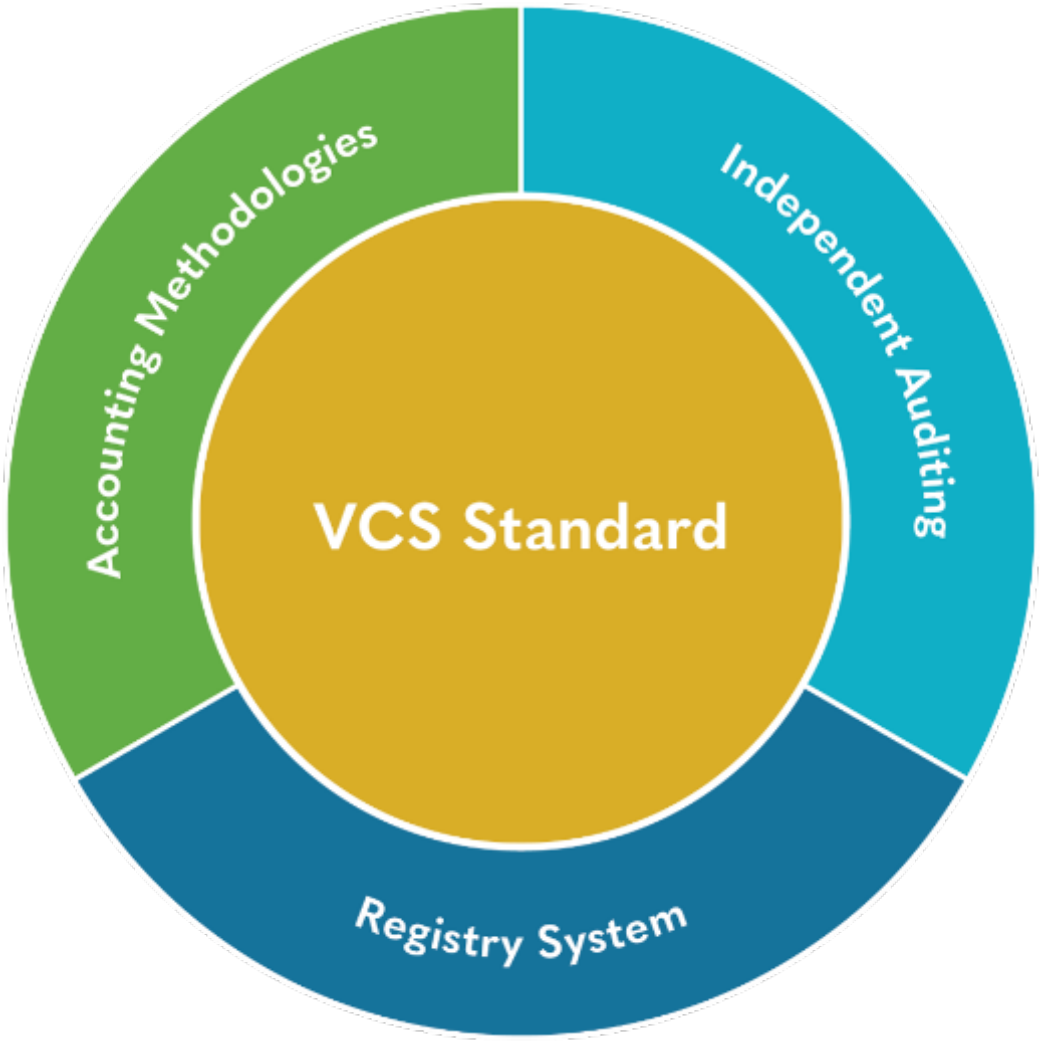

Photo by FUNDAECO / REDD Conservation Coast Project

1. VCS Program overview
2. VM0046 overview
3. Q&A

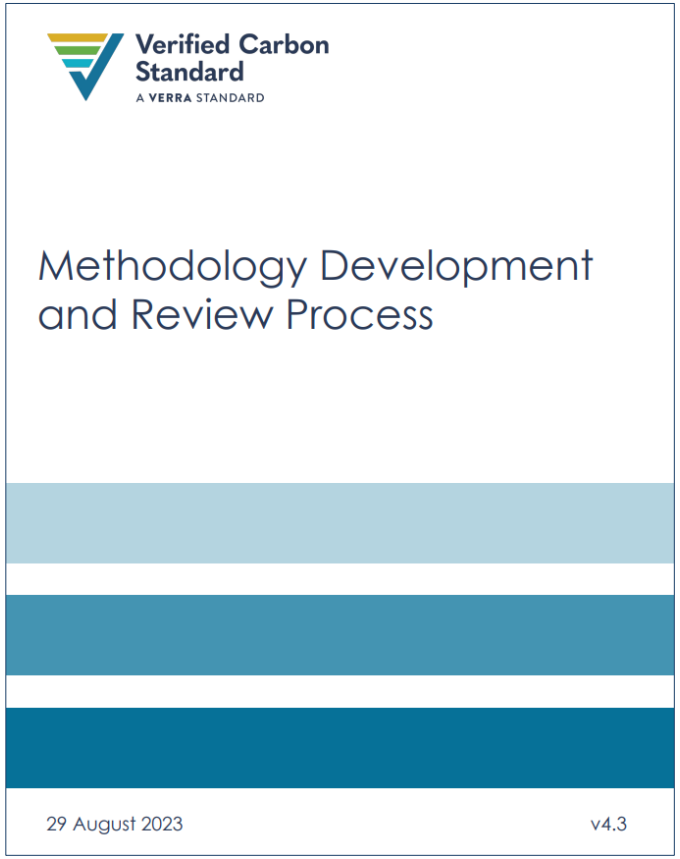
Verified Carbon Standard (VCS) Program Overview

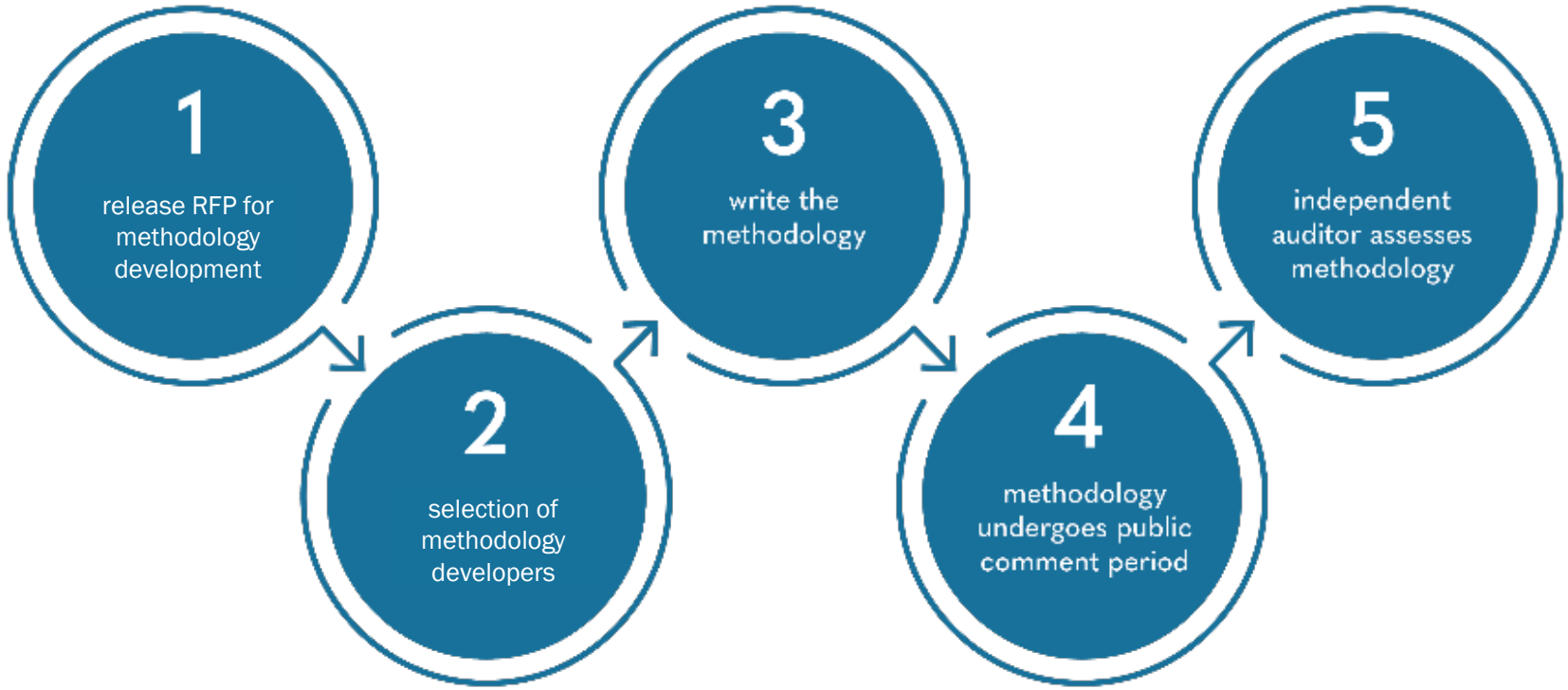
VCS Program Overview

- VCS Standard
  - Rules and requirements that all projects must follow in order to be registered and issue Verified Carbon Units (VCUs)
- Accounting Methodologies
  - Quantify Greenhouse Gas (GHG) emission reduction and removals (ERRs) specific to each project type
- Independent Auditing
  - Third-party Validation/Verification Bodies (VVBs) approved by Verra
- Registry System
  - Central storehouse of data on all registered projects and VCU issuances

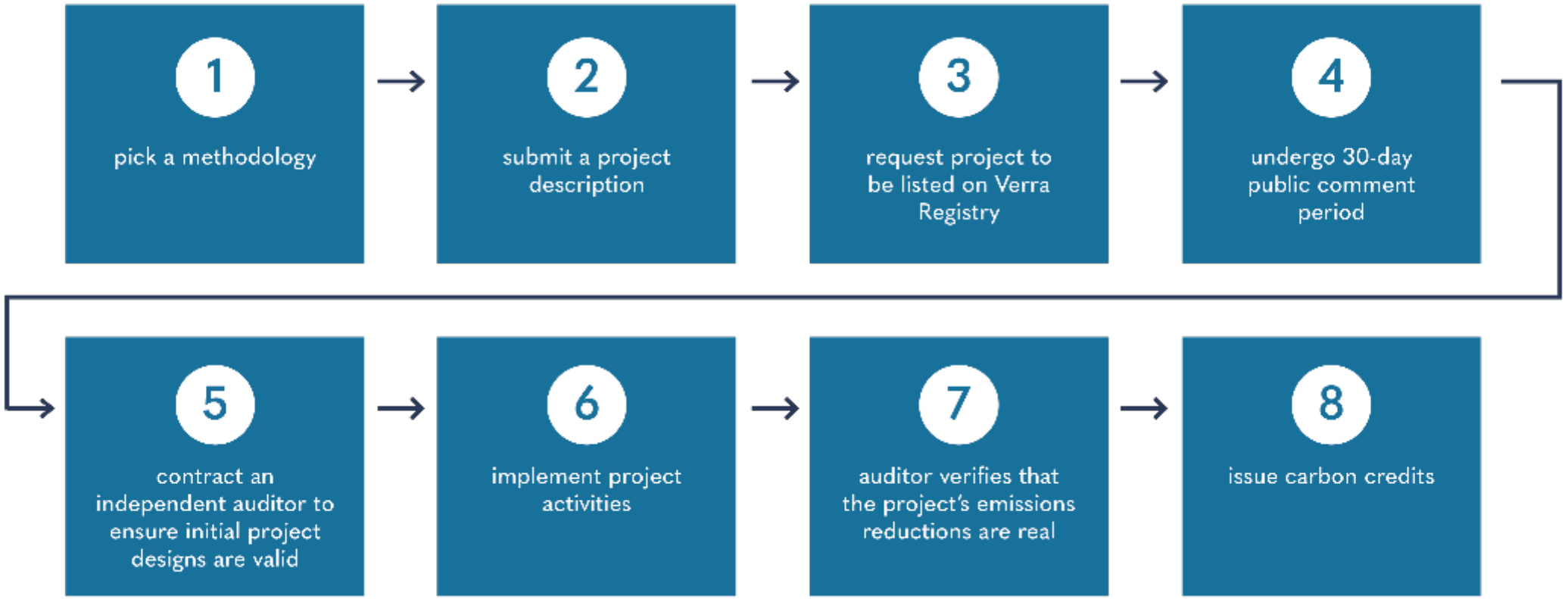


Methodology Development and Review Process



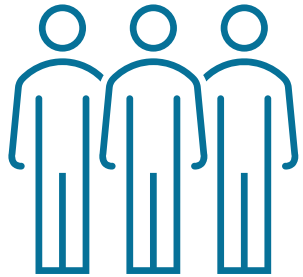


How to Develop a VCS Project



What Are Carbon Credits?

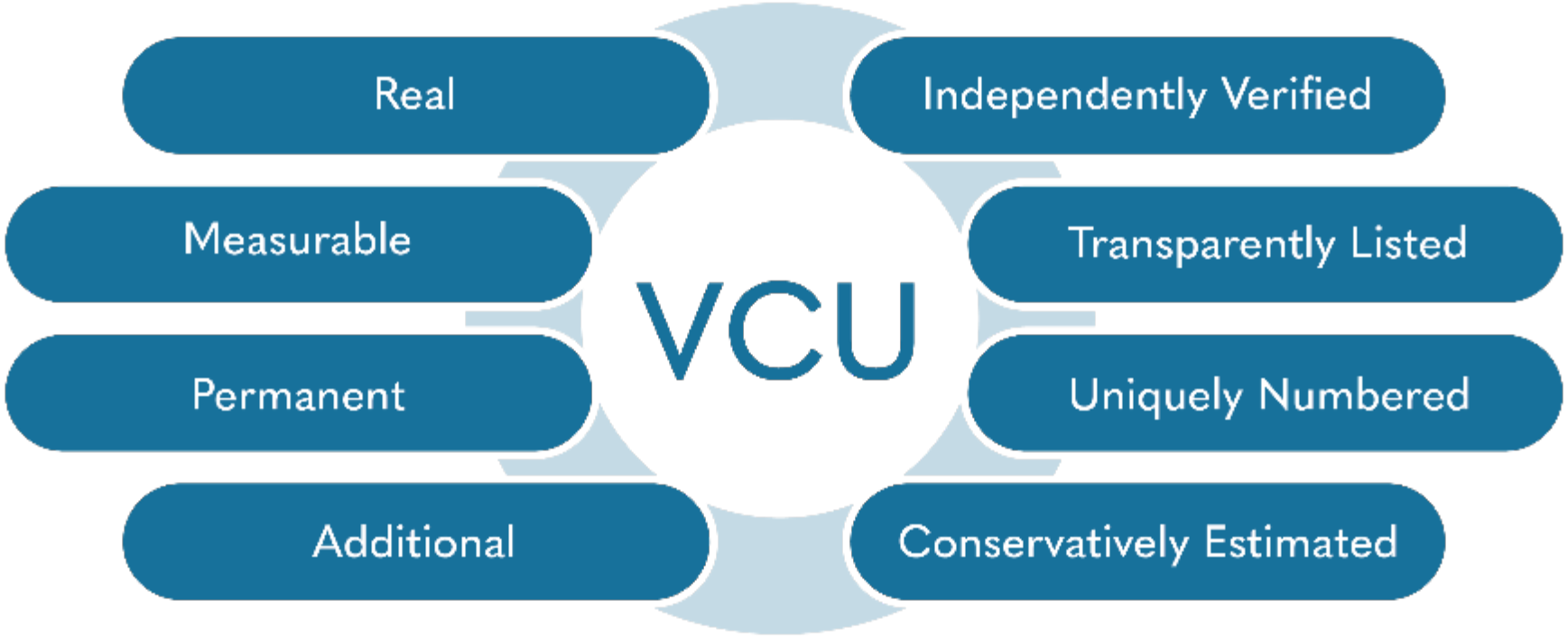
Represents a reduction or removal of one metric tonne of carbon dioxide (CO_2) or equivalent in another greenhouse gas (CO_2e)



Can have benefits to communities, biodiversity, sustainable development, and more

Recorded and retired on a registry

What Makes a Good Carbon Credit?



Verra Projects issue unique carbon credits known as Verified Carbon Units or VCUs

VM0046 Overview

VM0046 Development History

June 2021: RFP released and methodology development consultants selected by Verra

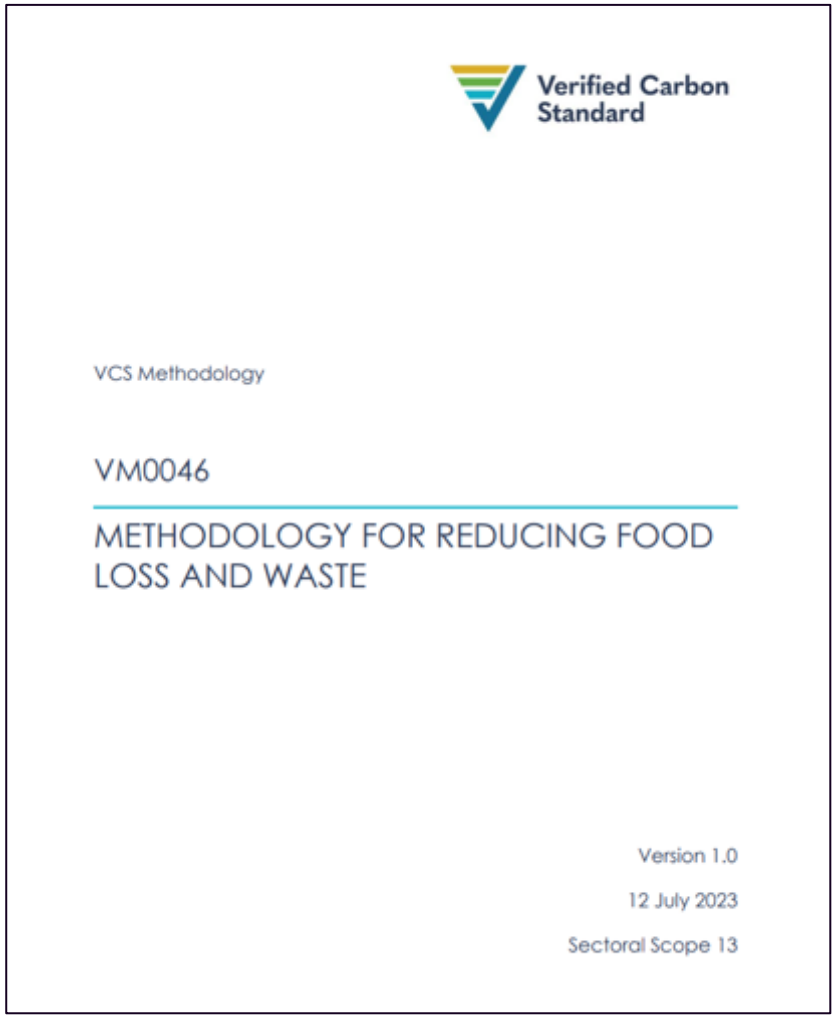
March-April 2022: 45-day public consultation

Q3 2022: VVB assessment

July 12, 2023: Final approval by Verra

Quantis

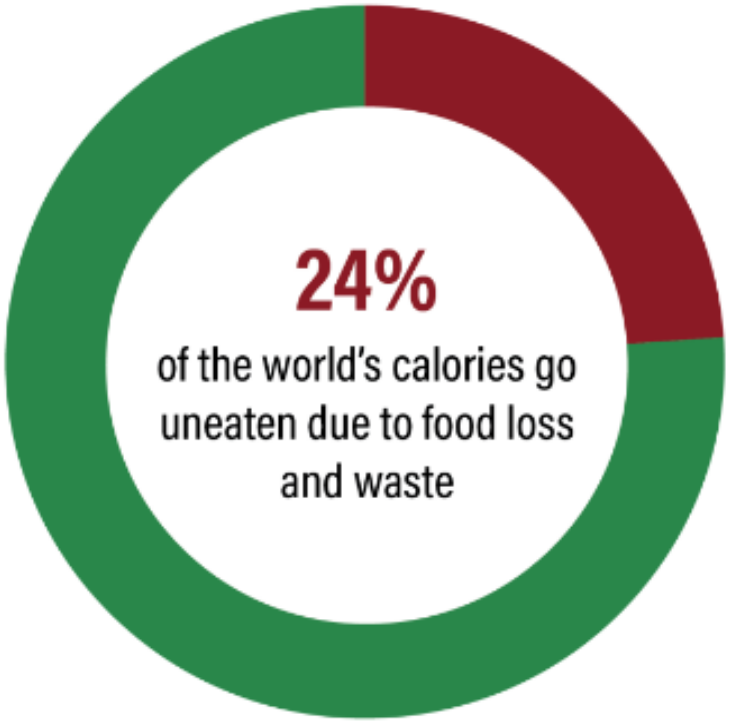
wrap



Why Reduce FLW?

Global Scale

Over **1 billion tonnes** of food is lost or wasted each year



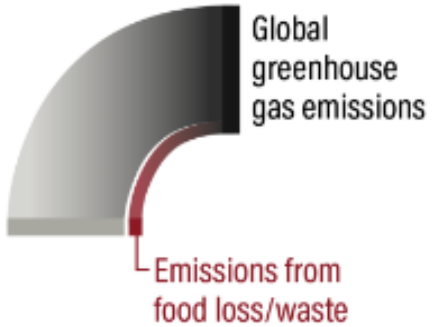
Global Impact

Wastes **1/4 of fresh water** used in agriculture

Wastes **1/4 of all fertilizer** used in agriculture

Uses an amount of land greater than the **area of China**

Drives **8-10%** of global **greenhouse gas emissions**



Source: WRI, Explainer, April 20th 2023.

Overview of FLW Standard

Purpose: Describe and report data on food loss / waste consistently and transparently

Provides:

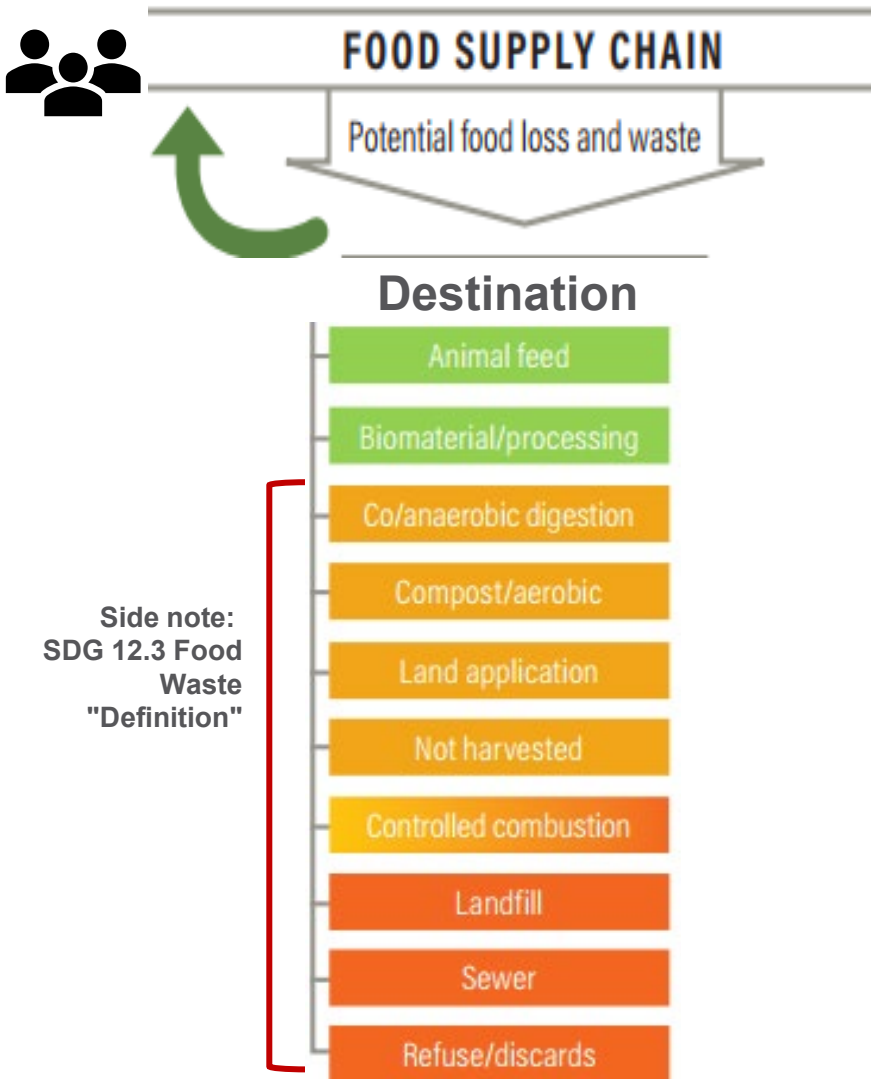
1. Common language
2. Standardized way to summarize data (FLW inventory)
3. Practical guidance

Resources available @ https://flwprotocol.org/

What Emissions are Covered by the Methodology?

Upstream (Value Chain) *Food Production*	Downstream (End-of-life) *FLW Destinations*
NO Not included at this time due to difficulty demonstrating that agricultural production, or other relevant upstream emissions, have been reduced	**YES** Downstream emissions avoided due to food being consumed rather than going to an FLW destination (e.g., landfill)

Applicability Conditions (FLW Destinations)



Side note: SDG 12.3 Food Waste "Definition"

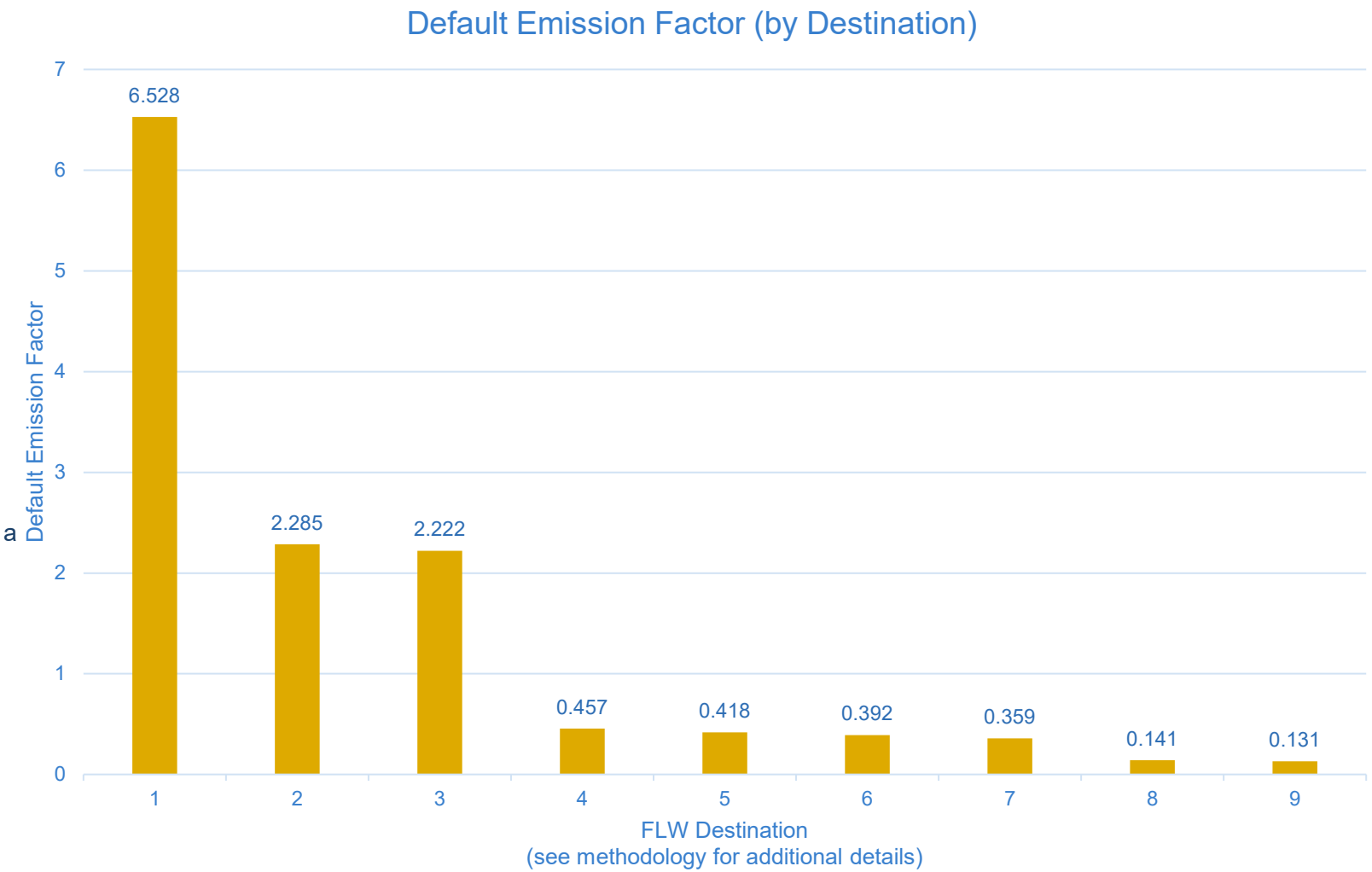
- The methodology applies to activities that avoid FLW from being generated by keeping food in the human consumption chain
- The project must divert food away from one of the following FLW destinations:
  - Anaerobic digestion
  - Composting
  - Controlled combustion, incineration
  - Landfill
  - Open burning, open dump
  - Sewer/wastewater
- The methodology does **NOT** apply to activities that shift FLW from one destination to another

Default emission factors for FLW destinations that are applicable for VM0046

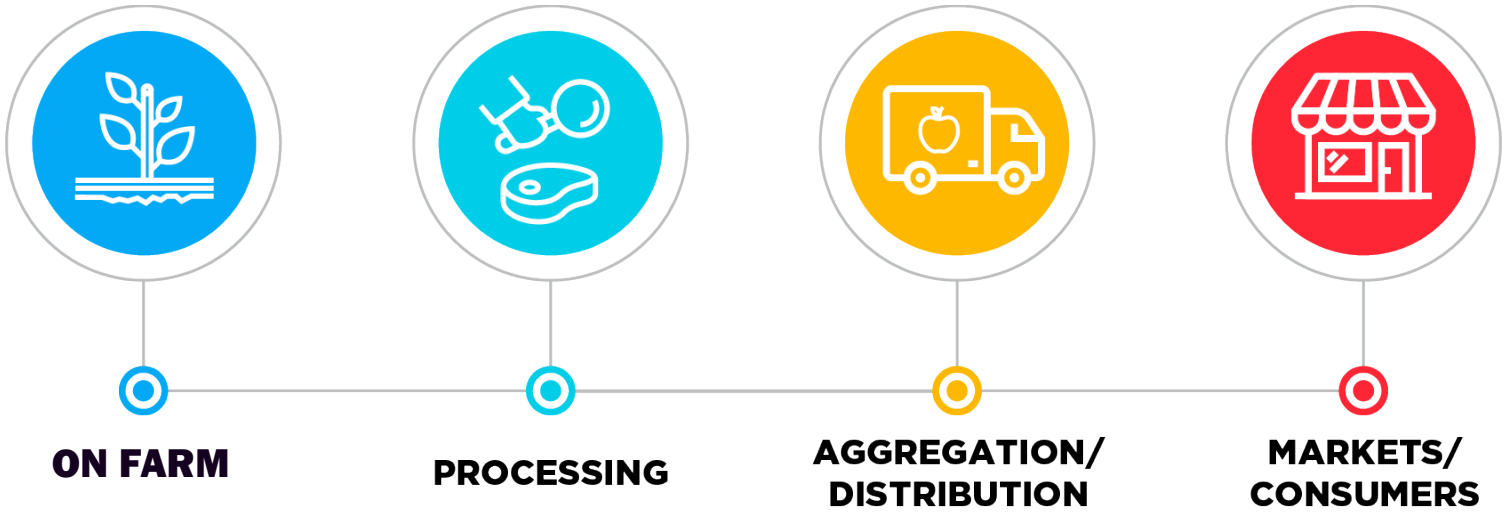
LEGEND

1. Landfill without flaring [b]
2. Open dump [b]
3. Landfill with flaring [b]
4. Anaerobic digestion (dry) [a]
5. Sewer / wastewater [d]
6. Composting [a]
7. Anaerobic digestion (wet) [a]
8. Open burning [c]
9. Controlled combustion, incineration [a]

Emissions factors expressed as tCO2e/tDM

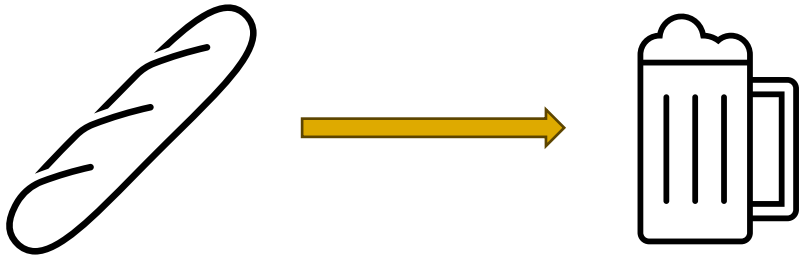


Eligible Project Activities



Source: EPA.

Illustrative Example of Project Activity



1. A project developer uses surplus bread (that was going to landfill) to replace 25% of the malted barley in its beer

2. Project developer brews beer

3. Beer is consumed. Bread remains in the human food chain / not wasted

Project Start Date

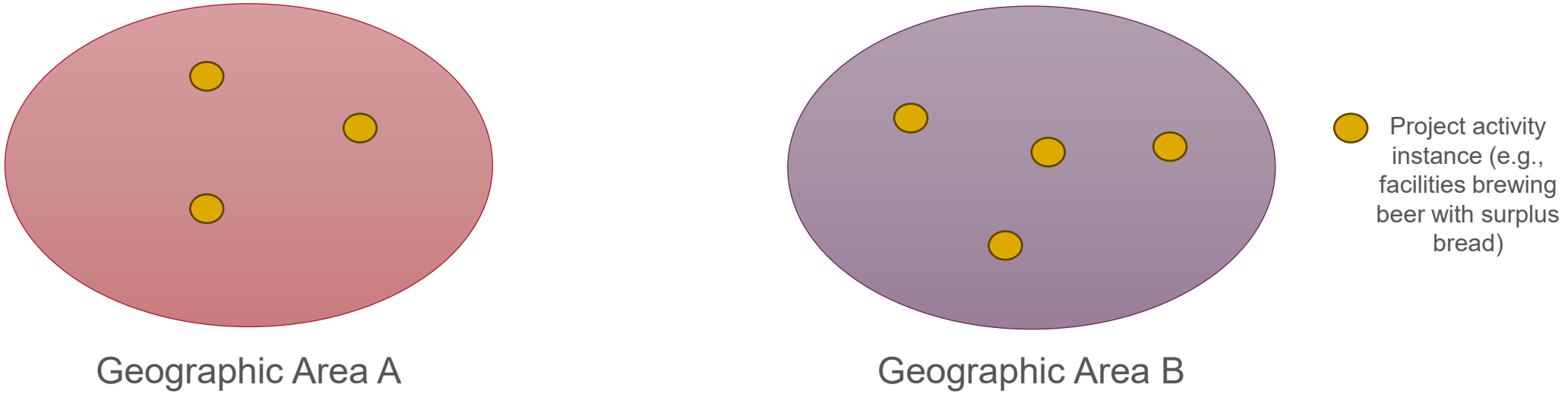
- "The project start date of a non-AFOLU project is the date on which the project began generating GHG emission reductions or carbon dioxide removals."
  - Section 3.8 of the *VCS Standard, v4.5*

- Under the VCS, non-AFOLU projects shall complete validation within two years of the project start date. Additional time is granted for non-AFOLU projects to complete validation where they are applying a new VCS methodology. **Projects using a new VCS methodology and completing validation within two years of the approval of the methodology by Verra may complete validation within four years of the project start date.**
  - Section 3.8.1 of the *VCS Standard, v4.5*

Grouped Project Activities

- Under the VCS, it is possible to develop grouped projects, or projects with multiple project activity instances

- A grouped project is defined as “a project to which additional instances of the project activity, which meet pre-established eligibility criteria, may be added subsequent to project validation”
  - *VCS Program Definitions, v4.4*



Key methodological components

Project Boundary

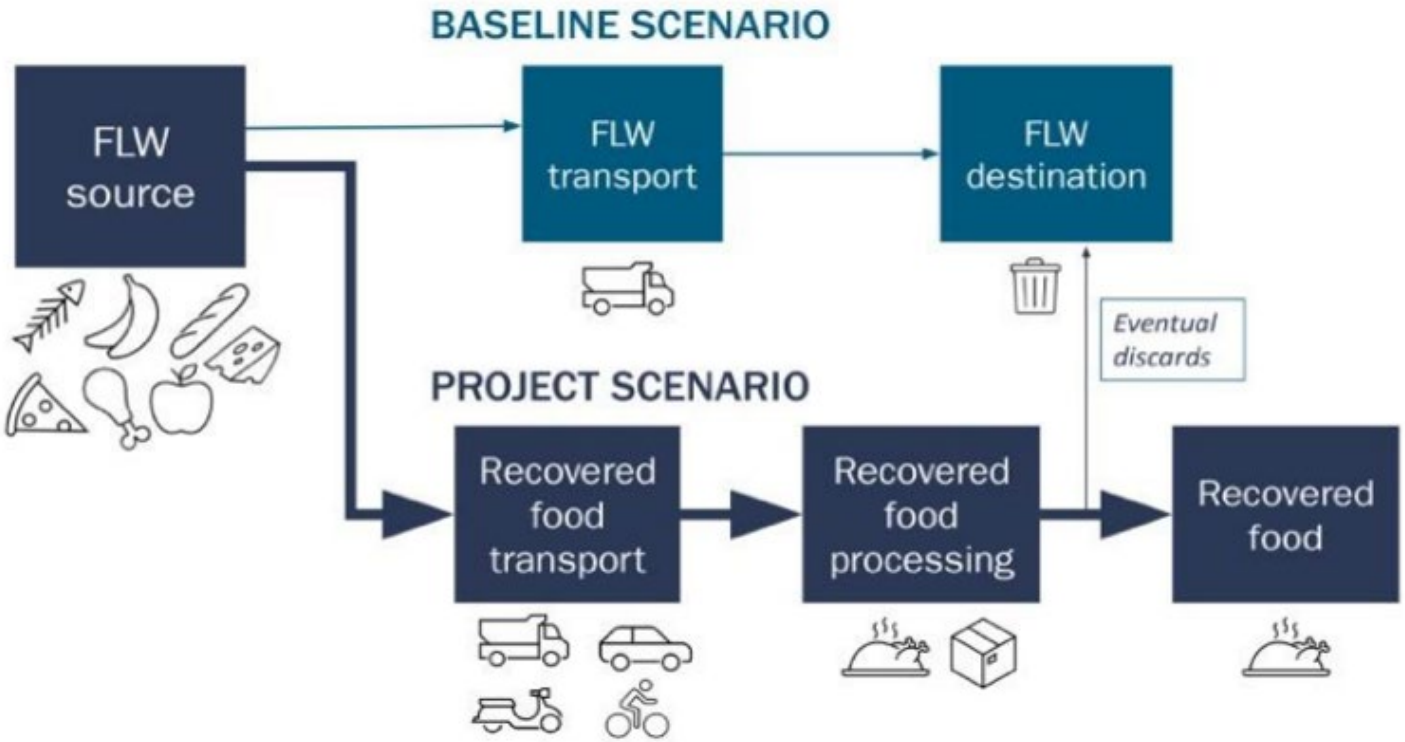
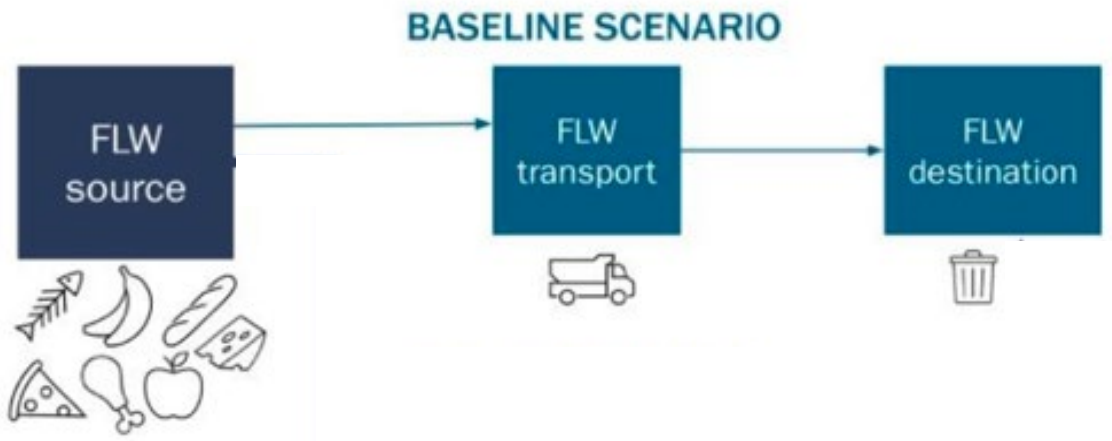


Figure 1: Simplified schematic diagram of the project boundary

Baseline Scenario

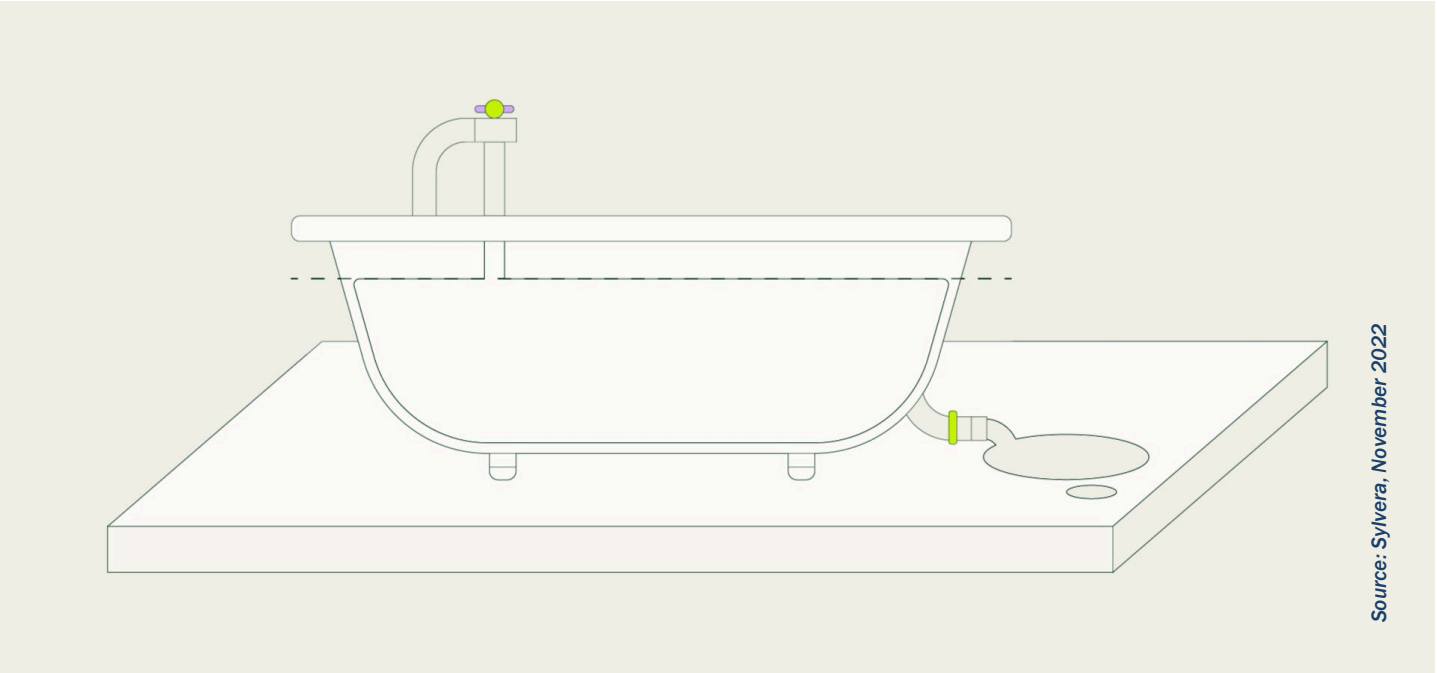
Business as Usual (BAU) scenario where food is not consumed by humans and sent to FLW destination (waste facility)



Additionality

Additional: Emission Reduction/Removals (ERRs) that would ***NOT*** have occurred ***without*** the revenue from carbon finance

Additionality = beyond BAU



Non-additional projects neither help to drain nor turn off the tap

Demonstrating Additionality

Step 1: Regulatory surplus

a) *"Project activities shall not be mandated by any law or other regulatory framework"* *

Step 2: Identify barriers that would prevent implementation of a practice that keeps food from leaving the human supply chain

a) Investment barriers

b) Institutional barriers

c) Cultural and social barriers

Step 3: Demonstrate project activities are not common practice

a) Defined as greater than 20% adoption rate in the applicable geographic area (amount of food being recovered relative to the quantity wasted)

b) Common practice analysis

***Section 3.14 of the** VCS Standard v.4.5*

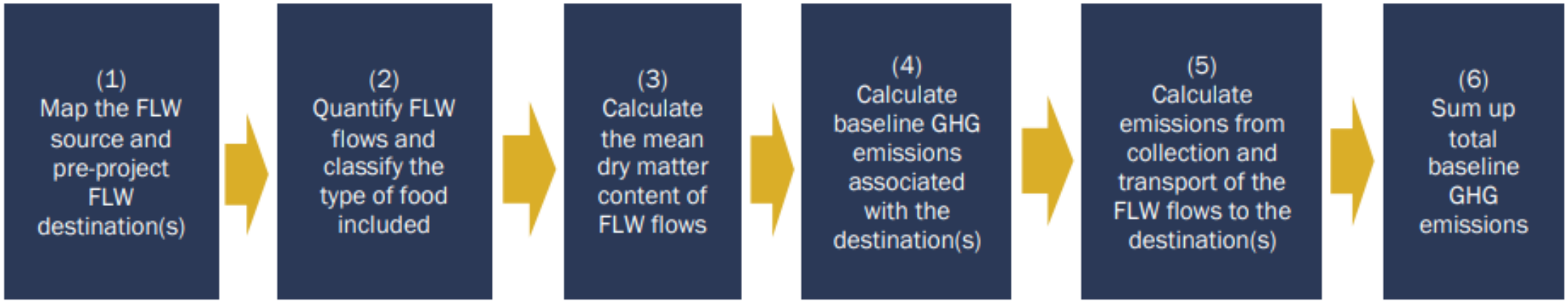
Quantification of GHG Emission Reductions

Quantification of GHG Emission Reductions: Baseline Emissions

$$BE_y = \sum_j BE_{j,y} + BE_{Trans_{j,y}}$$

Where:

BE_y	Total baseline emissions in year *y* (tCO_2e)
$BE_{j,y}$	Baseline emissions from the FLW destination *j* in year *y* (tCO_2e)
$BE_{Trans_{j,y}}$	Baseline GHG emissions from collection and transport of FLW flows to destination *j* in year *y* (tCO_2e)



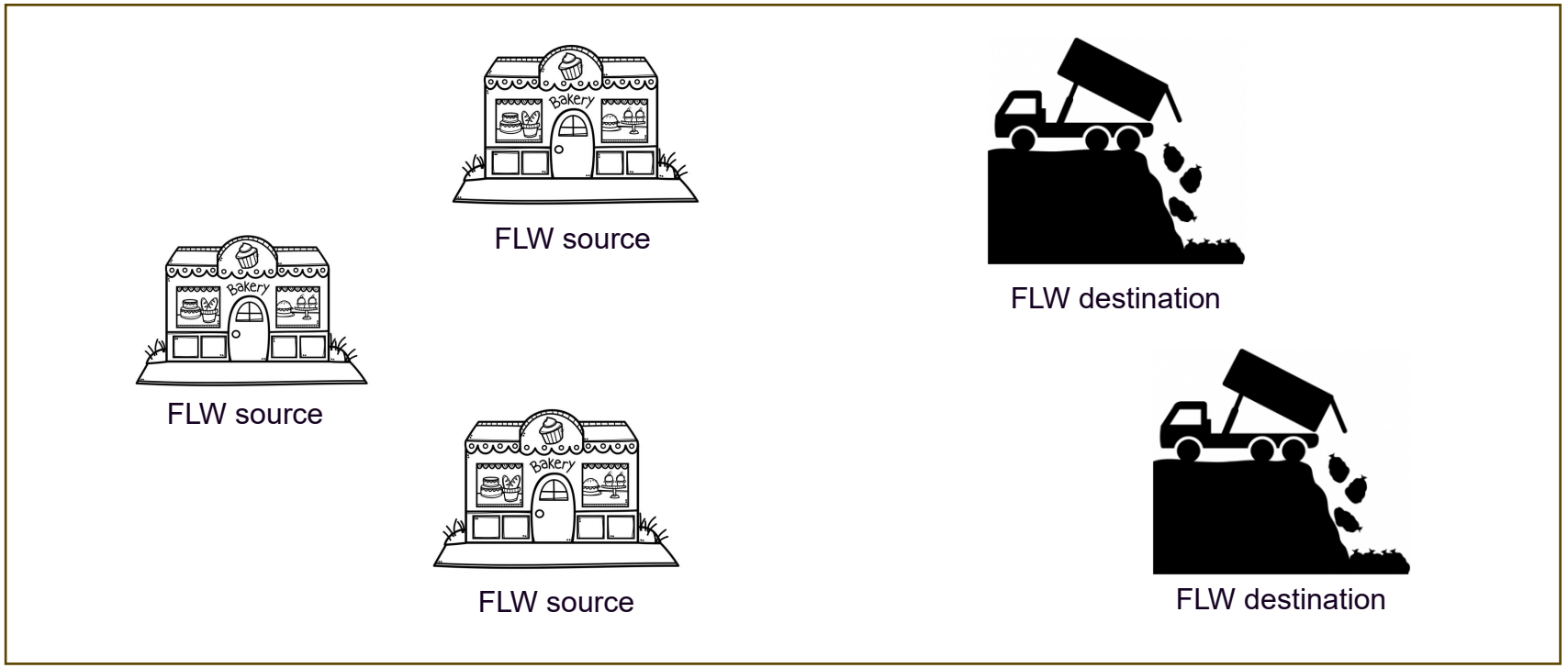
Baseline Emissions – Step 1

(1)
Map the FLW source and pre-project FLW destination(s)

1. Identify all FLW sources and FLW destinations within the project boundary
2. Determine the distance between all sources and destinations

Example:
FLW source = Bakeries with surplus bread

FLW destination = Landfill where bread is discarded



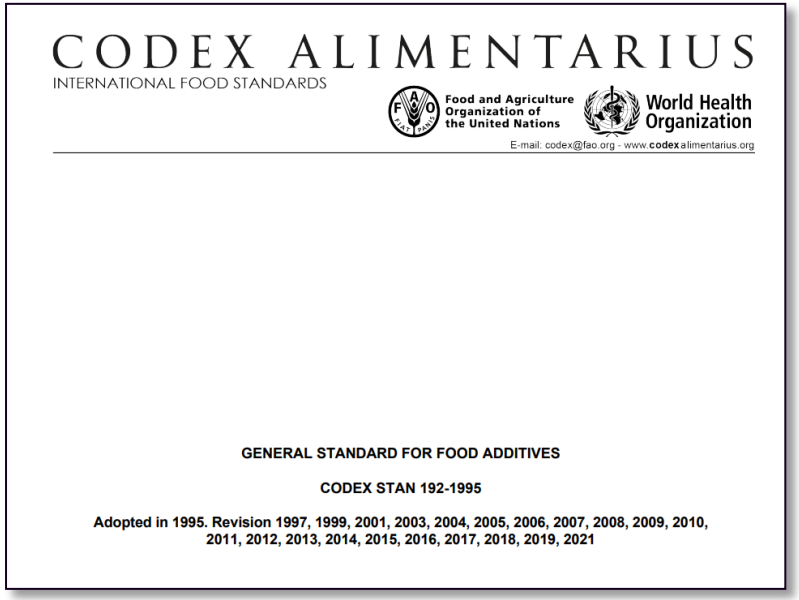
Baseline Emissions – Step 2

(2)
Quantify FLW flows and classify the type of food included

1. Quantify FLW flows

Ex) 300 tonnes bread diverted from landfill

2. Classify flows by food types

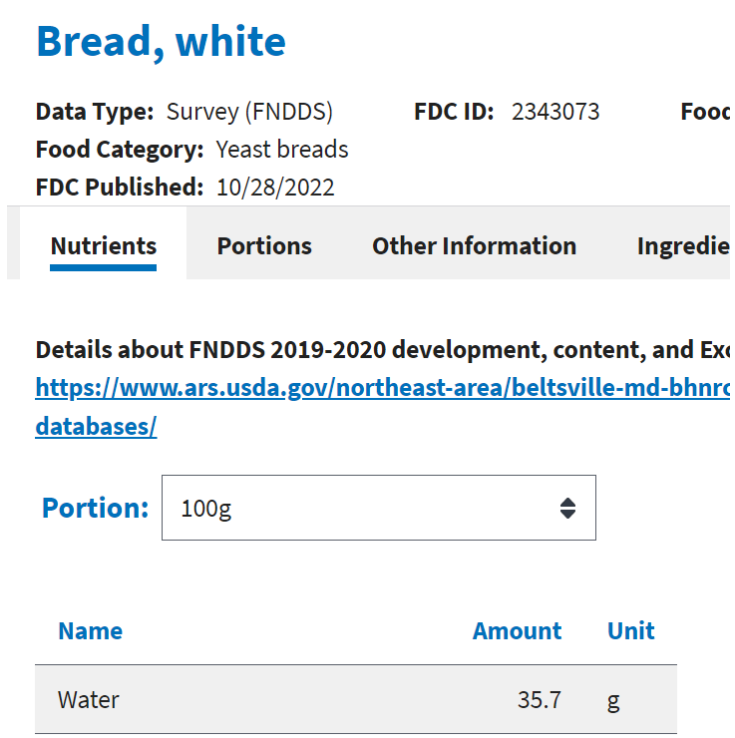


Ex) Yeast-leavened breads = #07.1.1.1

Baseline Emissions – Step 3

(3) Calculate the mean dry matter content of FLW flows

1. Use USDA FoodData Central to find the water content of diverted food



Bread, white

Data Type: Survey (FNDDS) **FDC ID:** 2343073 **Fooc**
Food Category: Yeast breads
FDC Published: 10/28/2022

Nutrients | Portions | Other Information | Ingredie

Details about FNDDS 2019-2020 development, content, and Ex
https://www.ars.usda.gov/northeast-area/beltsville-md-bhnrc databases/

Portion: 100g

Name	Amount	Unit
Water	35.7	g

Water content = $\frac{35.7g}{100g}$

Baseline Emissions – Step 3

(3) Calculate the mean dry matter content of FLW flows

2. Use water content to calculate the dry matter content of FLW flows

$$DM_{j,y} = \sum_{i,j} (1 - WC_{i,j,y}) \times \frac{M_{FLW_{i,j,y}}}{M_{FLW_{j,y}}} \qquad (2)$$

Where:

$DM_{j,y}$	Mean dry matter content of FLW flows going to destination *j* in year *y* (weight fraction)
$WC_{i,j,y}$	Default water content of food ingredient or food category *i* inside the FLW flow going to FLW destination *j* in year *y* (weight fraction)
$M_{FLW_{i,j,y}}$	FLW flow (i.e., mass) pertaining to food ingredient or food category *i* going to FLW destination *j* in year *y* (t)
$M_{FLW_{j,y}}$	Sum of all FLW flows going to FLW destination *j* in year *y* (t)
i	Types of food ingredients or food categories in FLW flows
j	FLW destinations
y	Reporting year

Baseline Emissions – Step 4

(4) Calculate baseline GHG emissions associated with the destination(s)

Option 3) Use default emission factor for relevant FLW destination

Ex) Surplus bread sent to landfill without flaring

$$BE_{j,y} = M_{FLW\,j,y} \times DM_{j,y} \times EF_{default\,j,y}$$

300 tonnes surplus bread

.647 (inverse of water content)

6.528 tCO_2e/t DM

Table 2: Default GHG emission factors (tCO_2e/t DM) for calculating baseline emissions

FLW destination	Emission factor (EF)	Destination with valorization	Note
Anaerobic digestion (wet) [a]	0.359	Yes	Includes fugitive CH_4 and N_2O emissions from the digester and from digestate application on land. Excludes avoided emissions from co-product offsets and transportation.
Anaerobic digestion (dry) [a]	0.457	Yes	
Composting [a]	0.392	Yes	Includes fugitive CH_4 and N_2O emissions from composting. Excludes avoided emissions from co-product offsets and waste transportation.
Controlled combustion, incineration [a]	0.131	Yes	Includes non-CO_2 emissions from the combustion process. Excludes avoided emissions from co-product offsets and transportation
Landfill without flaring [b]	6.528	No	Excludes emissions from transportation
Landfill with flaring [b]	2.222	Yes	Excludes avoided emissions from co-product offsets and transportation
Open burning [c]	0.141	No	Includes non-CO_2 emissions from the combustion process. Excludes emissions from transportation
Open dump [b]	2.285	No	Excludes transportation emissions
Sewer / wastewater [d]	0.418	No	Includes emissions from electricity consumption for wastewater treatment and subsequent anaerobic digestion process

Baseline Emissions – Step 5

(5)
Calculate emissions from collection and transport of the FLW flows to the destination(s)

$$BE_{Trans_{j,y}} = D_{j,y} \times M_{FLW_{j,y}} \times EF_{trans.mode_{m,y}} \times .001$$

- $D_{j,y}$: 185km travelled to landfill
- $M_{FLW_{j,y}}$: 300 tonnes surplus bread going to landfill
- $EF_{trans.mode_{m,y}}$: .00022924 kg CO_2e/t km (EF of diesel truck)
- .001: Correction factor

Baseline Emissions – Step 6

(6)
Sum up total baseline GHG emissions

$$BE_y = \sum_j BE_{j,y} + BE_{Trans_{j,y}}$$

Where:

BE_y	Total baseline emissions in year *y* (tCO_2e)
$BE_{j,y}$	Baseline emissions from the FLW destination *j* in year *y* (tCO_2e)
$BE_{Trans_{j,y}}$	Baseline GHG emissions from collection and transport of FLW flows to destination *j* in year *y* (tCO_2e)

Quantification of GHG Emission Reductions: Project Emissions

Project emissions are any emissions related to project activities taking place to avoid FLW

$$PE_y = PE_{Trans_y} + PE_{Proc_y}$$

Includes:

- Project emissions from **transportation** in the project scenario
- Project emissions from any additional **processing** in the project scenario

Project Emissions

$$PE_{Trans_y} = \sum_{m,x} D_{m,x,y} \times M_{FLW_{m,x,y}} \times EF_{trans.mode_{m,y}} \times .001$$

85 km travelled to collect surplus bread

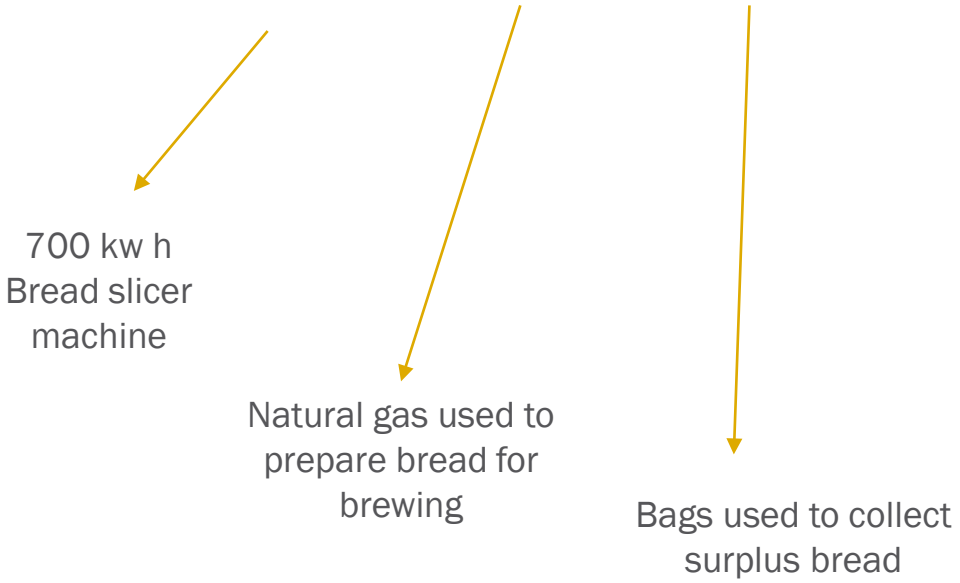
Recovered bread

.00022924 kg CO_2e/t km (EF of diesel truck)

Correction factor

Project Emissions

$$PE_{Proc_y} = PE_{EC_y} + PE_{FC_y} + OE_y$$



Includes:

- Project emissions from electricity consumption due to processing
- Project emissions from fossil fuel consumption due to processing
- Other emissions from additional materials (e.g., packaging)

Quantification of GHG Emission Reductions: Leakage Emissions

$$LE_y = LE_{discards_y} + LE_{valorization_y}$$

Leakage emissions refer to emissions caused outside of the project boundary due to the project activity

The methodology includes two forms of leakage:

1. Leakage from **eventual discards**
    - Referring to diverted food that is eventually discarded
2. Leakage from diversion away from **destinations with valorization**
    - Referring to diverting waste away from a destination that generates energy, for example, an anaerobic digester capturing gases from decomposition for use as biogas energy
    - When waste is diverted additional resources might be needed as feedstock to continue to generate the same level of energy

Leakage Emissions

$$LE_y = LE_{discards_y} + LE_{valorization_y}$$

Bread is diverted from landfills to make beer. However, a percentage of the beer is not consumed and is ultimately wasted

The project identifies a new FLW source from a bakery sending FLW to an incinerator. The incinerator is no longer able to produce as much energy and seeks a new waste stream to meet its energy outputs

Monitoring

- A robust monitoring plan must be in place for the project
- Project proponents must detail the procedures for collecting and reporting all data and parameters listed in Section 9 of the methodology

Thank you to the stakeholders who provided input!

- **Matt Homewood Bidault,** Throw No More
- **Jasmin Schwaegli**, South Pole
- **Thomas Barthuel**, Phenix
- **Louisa Ziane**, Toastale
- **Jim Cabot**, **David Danielson**, Breakthrough Energy Ventures
- **Dr. Jerry Shurson**, University of Minnesota
- **Jan Broeze**, Wageningen University
- **Gilles Dufrasne**, Carbon Market Watch
- **James Kanoff**, Farmlink Project
- **Shai Rilov**, Robin Food
- **Anne Charlotte Mornington**, OLIO
- **Chris McHugh**, Southampton
- **Jessica Vieira**, Apeel Sciences
- **James Persad**, FareShare
- **Manon Ledoux,** Green Spot Technologies

Future Adaptation to Verra's Scope 3 Program

- Verra is developing a Scope 3 Program, which will contain a certification framework for Scope 3 interventions
- Considering adaptation and expansion of procedures to the Scope 3 context

Photo by Nguyen Tong Hai Van for Unsplash.com

Thank You!


Photo by FUNDAECO / REDD Conservation Coast Project

Send follow-up questions to:

- **Liz Guinessey** eguinessey@verra.org
- **Karina Bautista** kbautista@verra.org