ASSESSMENT REPORT ON AVIODING GREENHOUSE GAS EMISSIONS BY KEEPING FOOD IN THE HUMAN SUPPLY CHAIN

Document Prepared by Earthood Services Private Limited

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Summary

Verra has contracted Earthood Services Private Limited (ESPL), a VVB, to conduct the validation assessment, for the proposed methodology titled “Avoiding greenhouse gas emissions by keeping food in the human supply chain”. The proposed methodology would outline how to quantify the net greenhouse gas (GHG) emission reductions from keeping food (edible and/ or inedible parts) in the human food chain. The methodology aims to reduce the amount of food that would otherwise have been discarded, therefore leaving the human food chain.

The proposed Methodology Element belongs to sectoral scope 13 (Waste handling and disposal).

The purpose of validation was to conduct an independent assessment of the proposed methodology titled " Avoiding greenhouse gas emissions by keeping food in the human supply chain" in order to determine whether it complied with the Verra's requirements/21/22/, including the appropriateness of the Verra claims and the plans design for their monitoring. The validation's scope included an assessment of the impacts and subjects within project boundary, their contribution to the UN SDGs, and the advantages to people, prosperity, and the environment that they entail.

Validation was performed using a combination of document review, and interactions with relevant parties. The proposed methodology was evaluated in accordance with the Verra's requirements.

01 clarification requests (CLs) and 05 corrective action requests (CARs) were raised as findings throughout the validation process. The Earthood Services Private Limited audit team's conclusions from the validation process have been closed.

There were no uncertainties identified during the assessment of methodology.

A team composed of technical experts and methodology experts carried out the assessment and referred to the Verra's requirements/21/22/ for the assessment, along with the use of standard auditing techniques, methodological development requirements, tools, guidelines, etc. wherever applicable.

The VVB can confirm that:

- the proposed methodology complies with the Verra's requirements/21/22/;
- the methodology form for its applicable version has been appropriately filled for all relevant sections;
- the application of tools, guidelines, and other applicable document/3-9/ (as mentioned in the methodology) is not altered

all relevant information has been consistently applied within the applicable sections in the methodology document.

CONTENTS

1 INTRODUCTION

1.1 Objective

Verra contracted Earthood Services Private Limited to conduct an independent assessment of the proposed methodology "Avoiding greenhouse gas emissions by keeping food in the human supply chain" to determine its compliance with the requirements of the Verified Carbon Standard (VCS).

1.2 Summary Description of the Methodology

The ne methodology assessed contains procedure to quantify the net GHG emission reductions from keeping food (edible and/ or inedible parts) in the human food chain. The methodology applies to those project activities which reduce the amount of Food loss, that will eventually leave the human supply chain. Hence, the project activities may prevent this Food loss or waste of food products at different stages of the food chain like at the farm level, food processing facility, food services/ hospitality, or residential. The methodology falls within sectoral scope 13: waste handling and disposal of the VCS Program.

The globally applicable methodology includes project activities that are diverting food away from the FLW destination. The FLW destinations refers to the where the food is diverted from the human supply chain. Examples of the FLW designation are Animal Feed, Bio-based Materials/ Biochemical Processing, Codigestion/ anaerobic digestion, composing/ aerobic processes, controlled combustion, land applications, landfill, not harvested/ plowed-in, refuse/ discards/ litter, sewer/ wastewater treatment. All the definitions of FLW designations are taken from FLW Standard (FLW Protocol, 2016)/11/, and are defined in appendix 1 of the methodology. The definitions as per FLW standard has been assessed and found to be properly defined.

The typical baseline scenario for the project activity applying this methodology would be the continuation of pre-project food diversion practices (i.e., sending food to an FLW destination). As described above, the methodology is applicable to all the situations where food is diverted away from an FLW destination, including destinations with valorisation. However, in those situations estimated emission reductions are likely to be small.

2 ASSESSMENT APPROACH

2.1 Method and Criteria

The methodology Validation, from Contract Review to Assessment Report, was conducted using VVB's internal procedures. The proposed methodology was checked against the requirements of the VCS Program/21/22/.

The methodology Validation process is conducted as per Earthood Services Private Limited's internal CDM Quality Manual and in accordance with criteria laid down by Verra. It includes the following steps:

- contract with methodology developer for the scope and appointment of validation team and technical review team;
- completeness check of Verra methodology form;
- desk review of methodology in accordance with the tools & requirements and mentioned references/stattistics wherever applicable;
- reporting and closure of findings (CARs/CLs/FARs) and preparation of draft validation report;
- independent technical review of the draft report and final/revised documentation (e.g., VCS methodology form and VCS validation assessment report);
- issuance of the final assessment report to contracted methodology developer (or authorized representatives).

No sampling was required during the methodology validation.

2.2 Document Review

The proposed methodology assessment is performed primarily as a document review of the documents submitted at various stages of assessments. The review is performed by assessment team using dedicated protocols. The assessment team cross checks the information provided in the documents (filled-in methodology form) and information from sources other than those used, if available, and also conducts independent background investigations. VVB has conducted a desk review as under;

- A review of the data and information presented to verify their completeness;
- A review of the revisions made to the methodology, including referenced tool(s), referenced sources and, where applicable, the quality assurance and quality control procedures;

An evaluation of revisions made in terms of their influence on the quantification of time savings calculations.

2.3 Interviews

No site visit was conducted for this assessment.

2.4 Assessment Team

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)
1	Team Leader	IR	Garg	Shreya	Central Office
2	Technical Expert	IR	Singh	Kaviraj	Central Office
3	Trainee Validator	IR	Varshney	Divij	Central Office
4	Technical reviewer	IR	Gautam	Ashok K.	Central Office
5	Technical Expert to Technical Reviewer	IR	Gautam	Ashok K.	Central Office

2.5 Resolution of Findings

As an outcome of the validation & verification process, the team can raise different types of findings:

A Clarification Request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable VCS requirements have been met

Where a non-conformance arises the team leader shall raise a Corrective Action Request (CAR). A CAR is issued, where:

- The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions.
- The VCS requirements have not been met.
- There is a risk that emission reductions cannot be monitored or calculated.

The validation process may be halted until this information has been made available to the team leader's satisfaction. Failure to address a CL may result in a CAR. Information or clarifications provided as a result of a CL may also lead to a CAR.

During the validation and verification process, total 05 CARs and 01 CL were raised and resolved satisfactorily. The list of CARs/CLs/FARs raised and the response provided, the mean of validation, reasons for their closure and references to correction in the relevant documents are provided in Appendix 4 of this report.

3 ASSESSMENT FINDINGS

3.1 Relationship to Approved or Pending Methodologies

Following List of similar methodology has been identified:

Methodology	Title	GHG Program	Comments
VM0018	Energy efficiency and solid waste diversion activities within a sustainable community	VCS	This methodology provides a procedure to determine the net CO_2, N_2O and CH_4 emissions reductions associated with grouped projects that focus on energy efficiency and solid waste diversion activities for an assortment of facilities within a set territory.
[under development]	Methodology for the avoidance of greenhouse gas emissions through composting of food waste using insects	VCS	The methodology applies to food waste that is diverted from a landfill. The proposed methodology demonstrates the accounting procedure for the reduction in methane emissions from landfills by diverting food waste to a composting facility that uses compositing by an insect-based process to produce a usable compost for other applications such as fertilizer for local gardens and landscaping. Composting using an insect-based process is more efficient than traditional composting

			processes using windrows. The insect-based process takes less time to convert food waste to compost, using less area for the process, and can be operated indoors on a year-round basis.
AM0083	Avoidance of landfill gas emissions by in-situ aeration of landfills – version 1.0.1	CDM	This methodology comprises measures to avoid the emissions of methane to the atmosphere from biomass or other organic matter that would have otherwise been left to decay anaerobically in a landfill. In the project activity, ambient air is sucked into the landfilled waste. Limited to sites with waste depth lower than 10m.
AMS-III.AO	Methane recovery through controlled anaerobic digestion – Version 1.0	CDM	This methodology comprises measures to avoid the emissions of methane to the atmosphere from biomass or other organic matter that would have otherwise been left to decay anaerobically in a solid waste disposal site (SWDS), or in an animal waste management system (AWMS), or in a wastewater treatment system (WWTS). In the project activity, controlled biological treatment of biomass or other organic matters is introduced through anaerobic digestion in closed reactors equipped with biogas recovery and combustion/flaring system
AMS-III.F	Avoidance of methane emissions through composting	CDM	This methodology comprises measures to avoid the emissions of methane to the atmosphere from biomass or other organic matter that would have otherwise been left to decay anaerobically in a solid waste disposal site (SWDS), or in an

			animal waste management system (AWMS), or in a wastewater treatment system (WWTS). In the project activity, controlled aerobic treatment by composting of biomass is introduced.
AMS-III.G	Landfill methane recovery – version 10.0	CDM	This methodology comprises measures to avoid methane emissions through capture and combustion from landfills used for disposal of residues from municipal, industrial and other solid wastes containing biodegradable organic matter.
-	Organic Waste Composting Project Protocol - Version 1.1	CAR	The Reserve Organic Waste Composting Project Protocol provides guidance to account for, report, and verify GHG emission reductions associated with the diversion of eligible organic wastes away from anaerobic landfill disposal systems and to composting operations where the material degrades in a controlled aerobic process.
-	U.S. Landfill project protocol - Version 5.0	CAR	The installation of a system for capturing and destroying methane gas emitted from a landfill. The installation must exceed any regulatory requirement. Expansion of an existing project may be eligible as a new project as long as the gas cannot migrate between projects. The protocol accepts a wide range of technologies, including: (i) Methane destruction onsite (enclosed flare, open flare, electricity generation, thermal energy production), (ii) Methane transported offsite for destruction

			(direct-use or pipeline injection), (iii) Methane used as vehicle fuel (onsite or offsite).

The VVB has checked the following registries on similar methodologies:

Registry
Climate Action Reserve /24/
UNFCCC Clean Development mechanism/25/
Gold Standard for Global Goals (GS4GG) /26/
Global Carbon Council (GCC) /27/
Verified Carbon Standard (VCS) /28/

AM0083/4/ and AMS-III.G/7/ refers to the avoidance of methane from the landfill waste site. Hence, not applicable for revision to consider the type and nature of typical projects as per newly proposed methodology.

AMS-III.AO/5/ refers to the avoidance of methane from the solid waste disposal site (SWDS), animal waste management system (AWMS), wastewater treatment system (WWTS) through controlled biological treatment of biomass or other organic matters. Hence, not applicable for revision to consider the type and nature of typical projects as per newly proposed methodology.

AMS-III.F/6/ refers to the avoidance of methane from the solid waste disposal site (SWDS), animal waste management system (AWMS), wastewater treatment system (WWTS) through controlled aerobic treatment by composting of biomass. Hence, not applicable for revision to consider the type and nature of typical projects as per newly proposed methodology.

As per VVB's assessment, no further similar methodologies have been identified and the list of all similar methodologies as per provided new methodology is considered complete and no further similar methodology could have been reasonably revised to meet the objective of the current Methodology, and thus, the current Methodology is justified.

3.2 Stakeholder Comments

The project has been published by Verra for public commenting from 08 March 2022 to 24 April, 2022. 83 comments were received from the public stakeholder consultation to the methodology/10/. Very detailed and specific comments have been provided by the stakeholders. Based on the comments received the methodology has been updated as applicable. All comments have been listed in appendix 1 and all comments have been considered and provided

with a response. During the assessment of methodology, all the comments were checked, and unsatisfactory responses are further added as findings in the assessment.

Overall, all comments have been considered and due account has been taken. Hence, the stakeholder comments have been adequately considered or addressed.

3.3 Structure and Clarity of Methodology

The methodology is drafted with clear, concise and logical approach, bearing all the relevant sections applicable as per the methodology form template/23/. It was assessed that:

- The methodology template instructions/23/ have been adhered to, and methodology form also fulfils requirements and criteria laid in the appropriate sections within the form.
- The terminologies used in the methodology follow Verra program requirements and GHG accounting generally.
- The applicable keywords have been used appropriately and consistently, denoting requirements, recommendations and permissible or allowable options, wherever applicable.
- The criteria and procedures are drafted in an easy to understand manner and can be applied readily and consistently by project proponents.
- The revisions do not introduce any ambiguity which may lead to lack of clarity in undertaking audits by the project activity(ies).

The clarity of content, its applicability and continuity in terms of use with other similar tools is observed in the methodology. The structure of methodology is well defined, maintaining consistency with the methodology form.

3.4 Definitions

Some of the definitions used in the proposed methodology revisions are mentioned below;

Biogenic CO_2: CO_2 emissions deriving from the respiration of organic matter by bacteria (biological processes) or its oxidation through physico-chemical processes (e.g., combustion or pyrolysis). Fast-cycling biogenic CO_2 emissions are considered climate neutral.

Food: This methodology uses the term “food” to refer broadly to all parts of plants, fungi, and animals —whether processed, semi-processed, or raw— that could be eventually consumed by humans.

Food Loss and Waste (FLW): For this methodology specifically, “food loss and waste” and the acronym FLW refer to food (and any associated inedible parts) that goes to any FLW destination.

FLW Destination: Refers to where food goes when removed from the human food supply chain (see Appendix 1 for possible FLW destination options and details on each of them) (FLW Standard).

Inedible Parts: Components associated with a food that, in a particular food supply chain, are not intended to be consumed by humans. Examples of inedible parts associated with food could include bones, rinds, and pits/stones (FLW Standard).

Recovered Food: Food that has been kept in the human food chain because of the project activity; includes activities that focus on "prevention" (stopping food from being discarded in the first place) as well as "rescue" (redistributing to people food at risk of being discarded).

The methodology applies all the generic terms and definitions. Most of the definitions have been refereeing from the FLW standard/11/.

The definitions were found to be consistently included in the methodology text, along with the reference. The definitions are concise and would aid in providing context of the methodology and enhance the readability.

3.5 Applicability Conditions

During the methodology assessment process, the assessment team ensured the applicability conditions were appropriate for the activities targeted by the methodology. Quantification procedures required by the methodology adequately target the relevant applicability conditions. The applicability conditions appropriately specify relevant requirements to individual projects. The assessment determined the applicability conditions contained within the methodology are appropriate, adequate and in compliance with the VCS standards and rules.

Further, the assessment team determined the applicability conditions provide sufficient clarity to projects determining if their activities are or are not eligible under the methodology. The applicability conditions address environmental integrity and practical considerations, where relevant.

The following summarizes applicability conditions as written, changes made during the revision of the methodology, and the final evaluation of those changes during the assessment:

S.No.	Applicability Criteria	Assessment
1.	The project activity must reduce the amount of food discarded compared to the baseline scenario. This must be demonstrated by evidence that, in the absence of the project, food would have been discarded and gone out of the human food chain. If the FLW destination for the proposed project activity	The criteria defines the project activities that can be applicable under the methodology. The applicability condition is written in clear and concise manner to ensure the project activity must reduce the amount of

	is animal feed, which would be used to feed animals intended for human consumption, the project proponent must provide evidence that the animals consuming this feed stay in the human food chain	food discarded as compared to baseline.
2.	All recovered food must adhere to relevant food health and safety legislation	The condition is written to ensure that all the relevant food health and safety legislature as per the region/ state/ country should be followed while implementing the project activity.
3.	A project activity that shifts food from one FLW destination to another destination (e.g., from landfill to composting) does not reduce the amount of food leaving the human food chain and thereby would not qualify to use this methodology. This focus on "food waste avoidance" is in line with the priority of other FLW reduction targets and programs such as the U.S. EPA's Food Recovery Hierarchy and the United Nations' SDG 12.3	The applicability condition is written in clear and concise manner to ensure that the project activities that shifts food from one FLW destination to another destination will not be an applicable project activity.
4.	Project activities must introduce or implement one or more changes that reduce the amount of food discarded at any stage of the food's life cycle, including farms and agricultural cooperatives; retailers and warehouses; restaurants, canteens, food vendors and other business-to-consumer and food stakeholders directly selling or serving food to end-users; and private households. Appendix 2 includes examples of the types of projects that reduce the amount of food discarded	The applicability condition is established to ensure that project activity must introduce or implement one or more changes that reduce the amount of food discarded at any stage of the food's life cycle.
5.	Project proponents must sufficiently quantify the emissions in the baseline and project scenarios. This will require information on the following: ● The characteristics of the treatment technology at the FLW destination where food would otherwise have gone in the baseline scenario. This must be	The applicability condition is established to ensure that project activity must sufficiently establish the type of FLW destination, mode of transport etc. to quantify the baseline and project emissions appropriately and conservatively. The applicability

	quantifiable to estimate baseline emissions based on accepted default factors (e.g., for landfill with flaring, emission factors may be available through regulatory data sources). ● The transport modes (e.g., by car, bike, truck) and distances within the baseline and project scenarios (e.g., from the facility where food is discarded to the FLW destination) must be known or otherwise inferred from available information and reasonable but conservative assumptions. ● The project activity must be able to provide sufficient data on the mass of the food that would have been sent to an FLW destination in the baseline scenario, as well as its characteristics, and on the mass of food that has been eventually recovered. Project proponents must be able to account for and report on the amount of FLW in line with the requirements of the FLW Standard. The following data considerations should be taken into account: ▪ At a minimum, the food should be classified at a product category level (e.g., meat). Where possible, classifying food at an ingredient level (e.g., beef) will enable the use of more accurate emission factors. This data needs to be specific to the project boundary and related to the activities covered. ▪ Due to the variability in what is considered "inedible", project proponents are not required to distinguish between what would be considered an edible or inedible part of food, and instead must simply report on the mass of food	condition is written in clear and concise manner

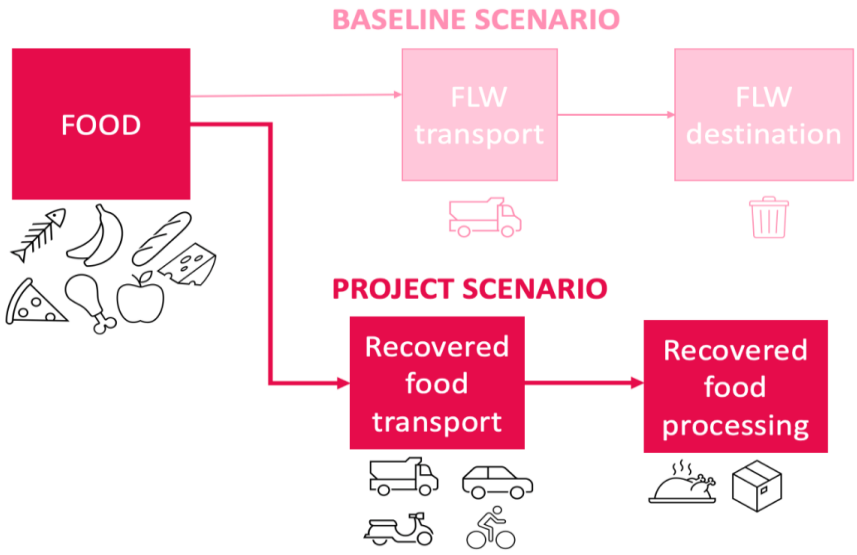
	that is eventually recovered (i.e. accounting for eventual discards after processing and distribution activities). ▪ The data may be based on any quantification method but should strive to minimize the degree of uncertainty and project proponent must provide a qualitative description and/or quantitative assessment of the uncertainty around FLW inventory results. (see guidance in Chapter 9 of the FLW Standard) ▪ The data may be from direct measurements, inferred from surveys, or indirectly calculated from existing food records (e.g., food purchased minus food served) (see the FLW Standard for additional guidance on possible quantification methods and the tradeoffs). In most situations, a representative sampling with direct measurements will result in a quantification of FLW that is more accurate than an estimate based on an indirect calculation; and both are typically - although not always - more accurate than FLW estimated from surveys. Project proponents may use Mass Flow Analysis software and tools to monitor, calculate and depict FLW flows during the project period. Guidance on representative sampling methods can be found in Appendix X. ▪ Credible evidence such as contractual agreements, or waste management records (in-house, or	

	ideally externally verified) must be provided to show that the food recovered by the project activity was previously sent to the FLW destinations used for the baseline scenario. ▪ Credible evidence such as contractual agreements, receipts of sale of food, and waste management records must be provided to show that the food was retained for sale (or use) and not sent to any FLW destination. This evidence must support the calculation of the GHG emissions savings to align with the amount of food that was retained for sale (or use).	
6.	Project proponents must provide data to estimate the proportion of food that has been effectively consumed due to the project activity and/or eventually discarded by the implemented project activities (i.e., to quantify the leakage). If no data are available, conservative default leakage factors must be applied to adjust for the risk of eventual discards	The applicability condition is established to ensure the leakage emissions as described in section 8.3 of methodology are taken into account while implementing the project activities.
7.	There may be minimal downstream GHG emission reductions possible from project activities that recover food from baseline scenarios where the FLW is valorized by the facility that receives it (e.g., is converted into a soil amendment, produces biomethane). Nonetheless, if a project activity reduces the amount of food available as a feedstock for an FLW destination facility where valorization takes place, conservative leakage factors must be used (see section 8.3.2)	The applicability condition is established to ensure the leakage emissions as described in section 8.3 of methodology are taken into account while implementing the project activities.

3.6 Project Boundary

The methodology defines the project boundary as the spatial extent of the project boundary encompasses the region(s) or state(s) where food ends up (the FLW destination) under the baseline scenario, as well as the region(s) or state(s) where the recovered food is used or consumed as a result of the project activities (if different from that of baseline scenario).

This is illustrated in the methodology as per following figure:



Further the methodology provides a table of corresponding GHG sources, sinks and reservoirs, whether they are included or not and a corresponding justification:

Source		Gas	Included?	Justification/Explanation
Baseline	FLW transport	CO_2	Optional	Not a major emission source and excluding it from the baseline is conservative.
		CH_4	Optional	Not a major emission source and excluding it from the baseline is conservative.
		N_2O	Optional	Not a major emission source and excluding it from the baseline is conservative.
	Food decomposition at FLW destination	CO_2	No	Biogenic CO_2 emissions from food decay are assumed to be climate-neutral and are therefore excluded.

		CH_4	Yes	Biogenic CH_4 emissions are a major source of emissions in the baseline scenario.
		N_2O	Yes	N_2O emissions may arise from landfill, combustion, and digestate application.
Project	Recovered food transport	CO_2	Yes	CO_2 emitted from the combustion of fossil fuels to transport recovered food must be included.
		CH_4	No	De minimis, therefore excluded.
		N_2O	No	De minimis, therefore excluded.
	Recovered food processing (electricity consumption)	CO_2	Yes	CO_2 may be emitted from electricity generation during processing of recovered food.
		CH_4	No	De minimis, therefore excluded.
		N_2O	No	De minimis, therefore excluded.
	Recovered food processing (fossil fuel consumption)	CO_2	Yes	CO_2 may be emitted from combustion of fossil fuels during processing of recovered food.
		CH_4	No	De minimis, therefore excluded.
		N_2O	No	De minimis, therefore excluded.

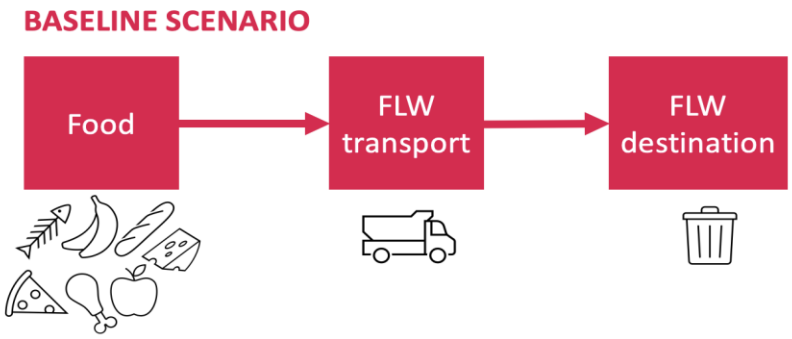
The project boundary has been assessed as adequate in the context of the considered typical project activities. All relevant GHG emission sources have been identified, assessed and corresponding justification for inclusion or exclusion has been provided.

The provided figure is a clear and correct as well as appropriate delineation of typical project activities under the methodology.

3.7 Baseline Scenario

The baseline scenario is where in the absence of project activity the food is ultimately not consumed and ends up in the Food Loss and Waste (FLW) destination. Hence, the baseline emissions are the GHG emissions related to the diversion of food in pre-project conditions, which have been avoided by the project activity as illustrated in the Figure below. One year time period has been considered for calculating the food diverted from a FLW destination. In the absence of

sufficient data for a year period, or in case of an anomalous year (e.g., because of serious disruptions due to a natural disaster or a pandemic like COVID), a 3-year average may be considered.



The methodology further requires providing credible evidence of the baseline scenario of FLW destination and also provides examples of those such as annual government records, records of a waste disposal facility, records of production facility among others.

The baseline scenario is hence predefined and any project activity has to provide evidence complying with the baseline scenario. A related applicability criterion is established in section 4 of the methodology. This ensures that project activities that are not applicable to the related cannot apply the methodology.

3.8 Additionality

The Methodology uses the project method to establish a procedure for the demonstration of additionality. As per section 3.5 of the Methodology requirements/22/, the project proponent must apply the following steps to demonstrate additionality:

Step 1: Demonstrate Regulatory Surplus

The project proponent must demonstrate regulatory surplus in accordance with the rules and requirements regarding regulatory surplus set out in the latest version of the VCS Standard and VCS Methodology Requirements/21/22/.

Step 2: Implementation Barriers

The project proponent must identifies barriers that would prevent the implementation of the project activity. The methodology has also describes some of the barriers that can be faced based on three types: Investment Barriers, Institutional Barriers etc. the description was found to be in line with the VCS standard requirement and Methodology requirement and hence foynd to be appropriately described.

The identified barriers must be demonstrated with the documentary evidence sourced from an independent third party. The types of evidences that may include has been identified in section 7 of the methodology/1/.

Step 3: Common Practices

The project proponent must determine the project is not a common practice based on the requirements set out in VCS Standard and Methodology requirements/21/22/. The methodology clearly sets out the procedure to demonstrate the project activity is not a common practice. The steps has been assessed and found to be appropriately outlined.

The Assessment team reviewed the procedure for providing additionality and issued findings, as necessary. The final methodology document/1/ contained an additionality procedure appropriate for the project activities, and the assessment team concludes the criteria for determining additionality is complete and in line with the VCS requirements and Methodology requirements.

3.9 Quantification of GHG Emission Reductions and Removals

3.9.1 Baseline Emissions

The methodology identifies that the continuation of pre-project activities and the food that is not consumed, ends up in the FLW destination as a baseline scenario. To quantify the baseline, the methodology has defined some of the steps to help the project proponent. The steps defined for calculating baseline emissions and removals has been assessed and found to be appropriate.

The formulas, algorithms and equations used in the methodology are found to be appropriately identified. The emission factors taken aggregated GHG emission value per FLW quantity with the metric of kilograms of carbon dioxide equivalent (kg CO2e) per kilogram of food (kg food).

Two options has been identified to apply the GHG emission factors to characterize the baseline emissions for the relevant destination.

- Option 1 will use default emission factor if the FLW destination is not landfill. Also, in addition, if the information about the fraction of CH_4 captured at the facility is not available at the landfill site this option can be applied.
- Option 2 will be used if the FLW destination is landfill and all the detailed information are available about the fraction of CH_4 captured at the landfill site.

If option 1 is opted by the project proponent, default emission factors for various FLW destination can be chosen. The default factors are adopted from Documentation for Greenhouse Gas Emission and Energy Factors Used in the Waste Reduction Model (WARM): Organic Materials Chapters (November 2020) (U.S. Environmental Protection Agency (EPA), 2020)/18/19/. The documents has been reviewed and the emission factors are found to be appropriately added. The project proponent should use country specific emission factors, if available.

$BE_y = \sum_{i,j} M_{FLW,i,j,y} * EF_{i,j,y}$

Where:

BE_y =Baseline emissions in year y (tCO_2e)

$M_{FLW,i,j,y}$ =Mass of recovered food streams pertaining to food category i going to treatment technology j for year y (e.g., tonnes)

$EF_{i,,j,y}$ =Emission factor of food category i and FLW destination treatment technology j, plus the related collection/transportation emission factor, for year y

If option 2 can be chosen by the project proponent if the FLW destination is landfill site and more detailed information is known about the fraction of CH_4 captured at the landfill.

$$BE_y = BE_{CH4,y} + BE_{Trans,y}$$

Where:

$BE_{CH4,y}$ =Baseline CH_4 emissions from food decomposition in year y

$BE_{Trans,y}$ =Baseline GHG emissions from collection and transport of FLW to destination facility in year y

To calculate $BE_{CH4,y}$, CDM tool *Emissions from solid waste disposal sites is referred which is found to be appropriate.*

$$BE_{CH4\_y} = 0.225*(1 - f)* GWP_{CH4} *MCF*\sum_{x=1}^{y}(M_{FLW,y} * \frac{DM}{2} * e^{-k(y-x)} * (1 - e^{-k})) \quad (3)$$

Where:

f =Fraction of CH4 captured, flared, combusted or recovered (nil value for conventional landfills) at the destination landfill facility in year y

GWP_{CH4} =Global warming potential of methane (100 years)

MCF =Methane correction factor applied to the destination landfill facility (variable according to the climatic conditions where the landfill is located)

DM =Average dry matter fraction of all the recovered food streams

$M_{FLW,y}$ =Mass of the recovered food by the project activities in year y

k =Decay rate of food in different climatic conditions

x =cumulated years of the period in which FLW is prevented from being disposed of in the landfill, starting from x = 1 to crediting year y.

$BE_{Trans,y}$, Baseline GHG emissions from collection and transport of FLW to destination facility, if distances to destination are known is calculated by;

$$BE_{Trans\_y} = \Sigma i\ D_{i,y} * M_{FLW,i,y} * EF_{trans.mode,\ i,\ y}$$

Where:

$D_{i,y}$ =Distance travelled with transport mode i for the collection of recovered food (km) during year y

$M_{FLW,i,y}$ =Mass of the recovered food transported in mode i during year y (e.g., tonnes)

$EF_{trans.mode,\ i,\ y}$ =Emission factor of the transportation mode *i* in year y, e.g., in kg CO_2e/t-km

3.9.2 Project Emissions

The project emissions are related to the new project activities taking place to recover food and avoid FLW i.e. keeping food in the human supply chain. To quantify the project emissions, the project proponent can use equation 5 of the methodology/1/, which has been assessed and found to be appropriately identified.

$$PE_y = PE_{Trans\_y} + PE_{Proc\_y}$$

Where:

PE_y =Project emissions in year y (tCO_2e)

PE_{Trans_y} =Project emissions from transportation to collect and deliver the recovered food in year y (tCO_2e). This factor must consider all trips for the different transportation stages (e.g., collection, distribution, delivery) and means required for the completion of the project activities covered in the Project Boundary

PE_{Proc_y} =Project emissions from electricity consumption or other energy and/or material use for additional processing, storage, etc. in year y (tCO_2e), if considered additional for the recovery of food

Project emission from transportation ($PE_{trans,y}$) has been derived from the CDM Tool 12 and the emission factors can be taken from GHG emission factor GHG emission factors hub (EPA, 2021)/19/, DEFRA/29/ or CDM Tool 12/20/. The equation to identify the project emission from transportation is as follows:

$PE_{Trans\_y} = D_{i,y} * M_{FLW,y} * EF_{trans.mode,\ i,\ y}$

Where:

$D_{i,y}$ =Distance travelled by transport mode i for the collection of recovered food (km) during year y

$M_{FLW,y}$ =Mass of the recovered food during year y (e.g., in tonnes)

$EF_{trans.mode,\ i,\ y}$ =Emission factor of transportation mode *i* in year y, e.g., in kg CO_2e/tonne-km

Project emissions from electricity consumption or other energy and/or material use for additional processing, storage can be calculated as follows;

$PE_{Process\_y} = Elec\_cons_{,y} * EF_{electricity} + FC_{i,y} * EF_{fuel} + OE_{,y}$

Where:

$Elec\_cons_{,y}$ =Electricity consumption (e.g. in kWh) in year y

$EF_{electricity}$ =Emission factor of the region- or state-specific grid-mix (e.g., in kg CO_2e/kWh)

$FC_{,i,y}$ =Consumption of fuel *i* in year y, e.g. in gallons

$EF_{fuel,y}$ =Emission factor for fuel *i* in year y, e.g. in kg CO_2e/gallon

$OE_{,y}$ =Other emissions from the consumption of additional materials needed for the processing and delivering the new food product, e.g. packaging, preservatives, etc.

The formulas, algorithms and equations used in the methodology are found to be appropriately identified. The reference to the emission factors has been appropriately identified in the methodology. The procedures for estimating the parameters related to the quantification of project emissions and removals are found to be appropriate.

3.9.3 Leakage

Additional GHG emission reduction occurring outside the project boundary due to the implementation and operation of a related GHG reduction project activity under the methodology is considered leakage and has to be considered. Is this proposed new methodology applied by a typical related project activity, leakage emissions are primarily attributed to eventual discards and recovering food from FLW destinations with valorization.

Quantification of leakage emissions are as follows:

$LE_y = LE_{discards\_y} + LE_{valorization,y}$

Where,

$LE_{discards\_y}$ = leakage emissions from eventual discards

$LE_{valorization,y}$ = leakage emissions from reducing food from FLW destinations with valorization

Emissions related to leakage from eventual discards ($LE_{discards\_y}$)

For the purpose of this methodology, eventual discards defined as a project that avoids FLW at a certain point in the supply chain may still result in FLW later in the supply chain. The procedure for calculating the leakage emission has been described appropriately in the methodology. The project proponent must use the specific leakage data to calculate the leakage factors. Project proponents are suggested to use FAO's/30/ FLW database if national data are missing. The default factors has been reviewed and found to be appropriately defined in the methodology.

$LE_{discards\_y} = \sum BE_{i,j,y} * LF_{i,j}$

Where:

$LE_{discards\_y}$ = Leakage due to eventual discards of the recovered food in year y (tCO_2e)

$BE_{i,j,y}$ = Baseline emissions of the recovered food in food supply stage j pertaining to food group category i in year y (tCO_2e)

$LF_{i,j}$ = Leakage factor of food group category i in food supply stage j (%, see default factors in Tables 4, 5).

Emissions related to leakage from reducing food from FLW destinations with valorization ($LE_{valorization,y}$)

While assessing the leakage, It is also important to take into account that the operating conditions of some of the plants may change dur to the implementation of project activity due to the less amount of food waste from previous going to the anaerobic digestor which results in reduction in its biomethane output or it may require additional organic matter be imported from elsewhere to compensate for the imbalance created by reducing the amount of food available as feedstock for the digestor. The leakage emission must be considered in such cases. The procedure for calculating the leakage emission has been described appropriately in the methodology. The project proponent must use the specific leakage data to calculate the leakage factors. The default factors has been reviewed and found to be appropriately defined in the methodology.

3.9.4 Net GHG Emission Reductions and Removals

As per methodology, the net GHG emission reductions and removals are calculated as:

$ER_y = BE_y - PE_y - LE_y$

Where:

ER_Y = Net GHG emissions reductions and removals in year y (tCO_2e)

BE_Y = Baseline emissions in year y (tCO_2e)

PE_y = Project emissions in year y (tCO_2e)

LE_y = Leakage in year y (tCO_2e)

Based on the documents checked as well as based on related VCS regulations the VVB confirms that the procedures for calculating net GHG emission reductions and removals are appropriate for the project activities covered by the methodology, and provide an overall conclusion regarding procedures for calculating net GHG emission reductions and removals.

Hence, the VVB confirms that:

- All algorithms, equations and formulas used are appropriate and without error.
- Any uncertainties associated with the quantification of net GHG emission reductions and removals are addressed appropriately.

3.10 Monitoring

The methodology has described data and parameters available at validation that are fixed for the duration of the project crediting period and data and parameters monitored that must be monitored during the project crediting period for each verification.

All parameters which have been defined in the corresponding baseline, project and leakage emission calculation sections have been considered either as a parameter available at validation or as a monitoring parameter or is given as a default value.

Data and parameters available at validation:

Parameter	Definition	Justification
GWP_{CH4}	Global warming potential of methane, t $CO_2e/t\ CH_4$	The source is the IPCC latest Assessment Report (100-year GWP), unless otherwise allowed by VCS. This datum will be used for calculation of baseline and project emissions in line with VCS rules.
k	Decay rate of recovered food, Years-1	The source is the IPCC 2006: Guidelines for National GHG inventories. The applied values has been stated in the methodology and found to be appropriate. The datum will be used for calculation of baseline and project emissions in line with VCS rules.

MCF	Methane correction factor	The source is the IPCC 2006: Guidelines for National GHG inventories. The applied values unde certain conditions has been stated in the methodology and found to be appropriate. The datum will be used for calculation of baseline and project emissions in line with VCS rules.

Data and parameters Monitored:

Parameter	Definition	Justification
M_{FLW}	Mass of the recovered food, Tonnes	The parameter is appropriately calculated for the mass of recovered food from the direct measurements or can be inferred from survey or from the publicly available records on the annual basis. The purpose of data is for the calculation of baseline and project emissions, and the QA/QC and calculation methods are appropriate for the datum.
f	fraction of CH_4 captured at the destination (waste treatment) facility, flared, combusted or recovered in year y (zero for conventional facilities)	The parameter is appropriately defined for the fraction of CH_4 captured, which can be selected from the maximum value out of the following: contract or regulation requirements specifying the amount of methane that must be destroyed/ used, and historic data on the amount captured for once in the crediting period. The purpose of data is for the calculation of project emissions, and the QA/QC and calculation methods are appropriate for the datum.
$D_{y,i}$	The distance travelled for the collection of recovered food during year y by transport mode I, Km or miles	The parameter is appropriately calculated for the distance travelled for the collection of recovered food from the logistic logbook, trip records, or indirectly calculated from location data on the annual basis. The purpose of data is for the calculation of project emissions, and the QA/QC and calculation methods are appropriate for the datum.
$Elec\_cons_{,y}$	Electricity consumption in year y for processing the recovered food (if applicable), kWh	The parameter is appropriately calculated for the electricity consumption that will happen due to the processing of the recovered food, which can be obtained from the electricity purchase bills on the annual basis. The purpose of data is for the

		calculation of project emissions, and the QA/QC and calculation methods are appropriate for the datum.
$FC_{i,y}$	The consumption of fuel i in year y for processing the recovered food (if applicable), Liters or gallons	The parameter is appropriately calculated for the fuel consumption that will happen due to the processing of the recovered food, which can be obtained from the fuel purchase bills on the annual basis. The purpose of data is for the calculation of project emissions, and the QA/QC and calculation methods are appropriate for the datum.

Findings were raised for the parameters, and a thorough assessment of the parameters and the monitoring & alternate choices available against each was conducted. The parameters selected and depict a valid project activity scenario and for the quantification of GHG emissions from keeping food (edible and/ or inedible) in the human supply chain.

The calculations and equations used for each parameter are well defined, and are in conformity with the Verra's rules and requirements.

4 ASSESSMENT CONCLUSION

The VVB, Earthood Services Private Limited (Earthood) has performed a validation of the proposed methodology "Avoiding greenhouse gas emissions by keeping food in the human supply chain" /1/. The validation was performed on the basis of rules and requirements defined by Verra Standard /21/22/.

The methodology is falling within Sectoral Scope 13 – Waste handling and disposal.

Earthood Services Private Limited has informed the methodology developers of the validation outcome through the draft validation report and final validation report. The final validation report contains the information with regard to fulfilment of the requirements for validation, as appropriate.

Earthood Services Private Limited applied the following validation process and methodology using a competent validation team;

- the publication of draft version on VERRA for global stakeholder consultation process
- the desk review of documents and evidences submitted by the methodology developers in context of the reference Verra's guidelines issued,
- reporting audit findings with respect to clarifications and non-conformities and the closure of the findings, as appropriate and
- preparing a draft validation opinion based on the auditing findings and conclusions
- technical review of the draft validation opinion along with other documents as appropriate by an independent competent technical review team

- finalization of the validation opinion (this report)

The review of the methodology report and, supporting documentation have provided Earthood Services Private Limited with sufficient evidence to determine the fulfilment of stated criteria.

Earthood Services Private Limited is of the opinion that the proposed methodology "Avoiding greenhouse gas emissions by keeping food in the human supply chain", does meet the stated criteria of Verra's, requirements. Therefore, the proposed methodology is being recommended to VERRA Board for request for registration and approval.

5 EVIDENCE OF FULFILMENT OF VVB ELIGIBILITY REQUIREMENTS

Earthood Services Private Limited is accredited by Executive Board (EB) of Clean Development Mechanism (CDM) as a Designated Operational Entity (DOE). The accreditation has been granted for 11 different sectoral scopes including sectoral scope 13 i.e. Waste handling and disposal. The information about Earthood Services Private Limited's accreditation and sectoral scope is available at the following UNFCCC interface https://cdm.unfccc.int/DOE/list/DOE.html?entityCode=E-0066/ .

The personal worked on the methodology has sufficient knowledge and experience of working on the projects in sectoral scope 3 including cookstove projects. The short resume of team members is provided below.

6 SIGNATURE

Signed for and on behalf of:

Name of entity: _____

Signature: _____

Name of signatory: _____

Date: _____

APPENDIX 1: LIST OF STAKEHOLDER COMMENTS

All the comments raised during the public stakeholder comments period was reviewed by the VVB. The responses to all the comments was found to be satisfactory and where, applicable the necessary changes as per the public comments raised has been made in the methodology. The changes made has been reviewed and found to be appropriate.

Comment No.	Methodology Section	Comment	Response to commenter (public)	Summary of change made (internal)	Response & document change status
1	2	Missing stages of the food chain	All downstream stages are already included and referred to as "downstream emissions". For upstream emissions, we anticipate creating a VCS module to quantify upstream impacts of an FLW intervention in the future.	No change needed	
2	4	Missing stages of the food chain	Transport and storage included in the food stage examples given in first paragraph (section 4)	Minor change added	"e.g., at the farm level, during transport, storage,..."
3	4	Would FAO/WORLD BANK/LOCAL AGRI MINISTRY stats/studies be acceptable?	General statistics like FAO or national stats may be used for the Baseline emissions only (if more relevant or udpated than the default factors provided). General statistics cannot be used to calculate Project emissions	No change needed	
4	4	Is a project achieving prevention of spoilage without any diversion subject to leakage?	Within this methodology, leakage is a possible side-effect of FLW avoidance projects and thus a concern. Leakage should always be addressed. Please refer to section 8.3 for guidance.	No change needed	

5	5	Can we envisage regional spatial boundaries such as ECOWAS/CARIBBEAN, where practices are broadly similar?	Per the VCS Program, a project proponent can group project instances, whereby a single project has one or more clearly defined geographic areas where project activity instances are developed (see *VCS Standard v4.2*, Section 3.5.8-3.5.13). Thus, it could be possible to have a project with multiple instances across a region, so long as the grouped project requirements as defined by the Standard are met.	No change needed	
6	5	I understand the exclusion of upstream production related GHG emissions. However, in the case of reduced spoilage in transportation, could one seek to include the fuel savings from reduced tonne-miles of transportation?	Inclusion of fuel savings from reduced transportation is out of the scope of the methodology. However, other methodologies that cover this project activity could potentially be stacked with the food loss and waste methodology. Please refer to VCS Standard, v4.2 Section 3.5.1-3.5.3 for more information on using more than one methodology.	No change needed	
7	7	What is the position where there are regulations on paper, which are totally ignored in practice?	Under the VCS Program, any project activity must demonstrate regulatory surplus, i.e., the project shall not be mandated by any law, statute or other regulatory framework, or for UNFCCC non-Annex I countries, any systematically enforced law, statute or other regulatory framework. Even if loosely enforced, should a mandate exist in a specific geography, a project would be ineligible in this area.	No change needed	
8	General	A new form of revenue through the form of carbon credits would be of significant help to small food waste reduction businesses like Throw No More.	Thank you for this valuable feedback.	No change needed	

9	General	To fully ascertain the full scope of our impact, it is pivotal to include the appropriate upstream emissions as >70% of the GHG emissions we divert happen upstream. Hence, we would appreciate this forward-thinking methodology to be a true reflection of our activities.	We are aware that most of the food's life cycle impacts fall within the agricultural production stage, as recognized in the note in page 10: "A significant amount of GHG emissions is embodied in the production of food. Using and consuming a higher proportion of available food would therefore, in aggregate, generate reductions in production-related GHG emissions" However, reductions in upstream GHG emissions directly associated with food recovery (or FLW reduction) are difficult to prove as having taken place (i.e. with actual data). We will allow for the inclusion of avoided upstream emissions in very specific cases, in a VCS module (still to be developed) where guidance to calculate and incorporate those benefits will be provided.	No change needed	no change
10	General	The report indicates that the methodology applies to project activities that "reduce the amount of food that would otherwise have been discarded, therefore leaving the human food chain…" it was not clear to me if the food that used to go to the landfill and now diverted for animal/insect feed is considered within the scope that it remains in the human food chain and thus can be considered for carbon credits.	Animal feed does fall within the scope of the methodology. An extension module to calculate and include avoided upstream emissions associated with animal feed will be added at a later stage.	No change	

11		On the same topic, from my reading the food that is redirected for industrial purposes where it is manufactured as food product qualifies for carbon credits, however, food that is diverted from going to landfills to non-food industrial development or for composting is not considered for carbon credits. I find this strange as if the project focuses on diverting food going to landfill for industrial processing or composting (both of which have lower GHG as is evident from Table 3 by a simple comparison of emission l landfill versus composting). This can encourage the big generators of food waste that cannot be rescued (e.g. hospitality industry consumer waste) to make extra effort to divert it for composting which is lower carbon footprint. Is there any opportunity to pass this to the developers of the methodology (at least to consider calculation that difference between landfill and composting as in table 3?	The avoidance of such emissions is outside the scope of this methodology (see Applicability condition 2). Please, refer to Waste methodologies for that purpose, e.g. VM0018 (https://verra.org/methodology/vm0018-energy-efficiency-and-solid-waste-diversion-activities-within-a-sustainable-community-v1-0/)	No change	No change needed
12	1	WRAP runs various whole chain food waste reduction projects with retailers / customers, suppliers and growers; and shared case studies on these on their website. Connecting with WRAP's specific team here could provide insight into: how they used current methodologies and protocols to build these programmes; how to build a methodology for commercial contexts; how to leverage historical financial and supplier data for food waste/ loss measurements; how to map out material flows; how to co-define specific supply chain definitions on food waste and loss which connect to the FLW Protocol; and how to set governance processes around monitoring.	Thank you for your feedback. Verra worked closely with WRAP to develop this methodology	No change needed	

13	2	The methodology states “This methodology is applicable in situations where the baseline scenario for the FLW destination has no valorization such as use as soil amendments or energy recovery.” This statement is contradictory to the rest of the methodology (see Section 5 and 8.3).	Thanks for spotting that. The wording of the sentence was indeed not correct. It has now been changed to be consistent with the rest of the methodology	This methodology is also applicable to those situations where food is diverted away from a FLW destination with valorization. In these situations where the FLW received by a facility is being valorized (e.g., energy is recovered), the expected GHG emissions savings (thus the amount of credits generated) for these projects are small.	Agree. Koldo suggested the following "This methodology is also applicable to those situations where food is diverted away from a FLW destination with valorization. Since FLW is being already utilized to produce something valuable to society, the expected GHG emission savings (thus the amount of credits generated) for these projects are small. Examples of FLW destinations with valorization are composting or energy recovery (e.g. biogas plant)."
14	2	First sentence - “The methodology applies to project activities ….the human food chain”. Limiting the project scope to human food chain excludes how a food value chain may serve multiple purposes i.e. growing wheat and soy bean for human and animal feed purposes. And therefore, how these projects focusing on keeping food in the human value chain could cause unintended consequences (see Additional information / propositions below).	Thanks for the suggestion. MFA is indeed a powerful tool that could help project proponents to track or indirectly calculate FLW flows within their project boundaries. We will add a reference to MFA as a possible tool that PP can use to elaborate and report collected FLW data.	Minor change added	Added (Section 4, page 9, first paragraph): "Project proponents may use Mass Flow Analysis software and tools to monitor, calculate and depict FLW flows during the project period.

15	3	There is inconsistency into the rationale presented as to why pet food / animal feed and food chains are excluded from the project. Examples: On page 7, footnote 3 in the methodology explains that FLW excludes animal feed Annex 1 of the methodology includes animal feed as one of the possible FLW destinations. Annex 1 makes it clear that crops specifically grown for animal feed are not included.	The inconsistency has been corrected. Diverting FLW for feed falls within the scope of the methodology, provided that project proponents can prove that the animals are in the human food chain and will be used for human consumption.	Done	We could perhaps create a little more clarity by modifying the footnote to read as follows: There has been consensus emerging around a definition of FLW for the purpose of the UN SDG 12.3 target (i.e., excluding the destinations of animal feed, and bio-based materials/biochemical processing: see Champions 12.3's "Guidance on Interpreting SDG 12.3"). The abbreviation "FLW" is used in this methodology broadly as shorthand for "food loss and waste" and as such does NOT correlate to a particular definition such as the interpretation of the SDG 12.3 tareget by Champions 12.3 or other programs. If food goes to pet food, it falls outside the human food supply chain (even though it may be a valuable use of food - or the inedible parts - suitable for humans).
16	3	Overall, the project definitions could be expanded to inform the reliability of the project methodology and outcomes. E.g. food waste and food loss should be defined separately; there isn't a definition for prevention of food waste and food loss; there is no equivalent definition for recovering food from waste and loss; or a definition for circular food systems and principles for food waste. Currently the definitions don't account for the complexity of the food value chain, drivers / causes of food waste and loss,	The necessary definitions to properly address the goal and scope of the methodology have been set forward in the methodology	No change needed	

		and the variation in food / waste / loss definitions across food types. Furthermore, the terms for “preventing” or “recovering” food waste for the human value chain is confusing and limits the methodology to projects with a linear economy focus - i.e. not circular economy innovations looking to ‘upcycle’ or ‘reuse’ resources.			
17	4	The methodology does not explicitly state any requirements in relation to the adherence to national (or others) health and safety standards governing food production and consumption.	Thanks for the suggestion. A sentence has been added (second eapplicability condition now)	Minor change added	added: "All recovered food must adhere to relevant food health and safety legislation." (section 4, p. 8, 1st condition)
18	4	Evidence has to be presented that, in absence of the project, food would have been discarded and not consumed by humans.	Examples have been provided and are shown in the last two points of condition 4, Section 4, page 9. E.g. "Credible evidence such as contractual agreements, receipts of sale of food, and waste management records can be provided to show that the food was retained for sale (or use) and not sent to any FLW destination"	No change needed	Examples of evidence are defined on page 9 "Credible evidence such as contractual agreements, or waste management records can be provided to show that the food recovered by the project activity was previously sent to the FLW destinations used for the baseline scenario." As noted in row 24 we suggest a change the wording of this and replacing 'can' with 'must'

19	4	The applicability condition 2 states the alignment with the US EPA's Food Recovery Hierarchy and the UN's SDG 12.3. These are indeed key references to use. However, the linear economy framework limits this methodology to focus on projects which prevent and recover food waste - rather than including circularity definitions or economy flows for materials. On the other hand, Annex 1 of the methodology has various definitions which also include circularity definitions - this confuses project users as to what approach is accepted within this project scope; linear economy models or circular economy models or both.	The implicit goal of this methodology is to transit towards Circular food economy models. We believe it will be actually more confusing to introduce new references, definitions and frameworks, other than those already stated in the methodology	No change needed	
20	4	Transport distances have to be included in baseline and project emission calculations where possible.	There is no specific requirement or restrictions regarding transportation. By requiring their inclusion in the calculation of both Baseline and Project emissions, the feasibility will be answered by the outcome of the final amount of savings (if any)	No change needed	
21	4	The methodology says "Credible evidence for the amount of recovered food and the actual use of the recovered food can be provided [...].".		Minor change added	

22	4	The methodology states that “Credible evidence such as contractual agreements, receipts of sale of food, and waste management records can be provided to show that the food was retained for sale (or use) and not sent to any FLW destination.”.	We have revised the methodology to include examples of evidence forms to show the food was consumed in the project scenario	For notes specific to the inedible/food point, see row 37	I agree we should consider an adaptation but don't think this is the right spot to do so. We'd need to then add a similar bullet about what's required if only addressing the 'inedible parts.' See proposed edit however to this condition in row 24 (but the change is independent of the food/inedible parts question).
23	4	“Credible evidence such as contractual agreements…was previously sent to FLW destinations used for the baseline scenario.”	We have revised the methodology to include contractual agreements as one of the forms of credible evidence to demonstrate where food was sent in the baseline scenario.	Change made	

24	5	The current methodology suggests to include transport emissions in the baseline and project scenario if possible. It is unclear what the priority on this is and how project proponents should proceed if not enough data is available and/or if data is available only for one scenario (baseline or project).	Transport must be included in the Project emissions calculations as stated in the methodology. Transport stage for the Baseline is optional, but PP are incentivized to do so since it will be beneficial for them	No change needed	
25	5	Although Figure 1 and Figure 2 provide guidance behind the key stages of a food chain and thus emissions sources, they also miss key areas of where emissions are released and reduced / removed, e.g. in the food production / growing and processing stage before distribution. And the various FLW destinations and end of life scenarios which occur across the chain - and thus release emissions in various other areas of the food chain i.e. on farm, in distribution, in retail shops or food service catering facilities, in online delivery distribution hubs and transport, and in consumer households / places of work	We agree that MFA can better support users and PP in identifying key hotspots, monitoring FLW data, etc. However it is Verra's intention that the lack of knowledge, tools or capacity does not hinder potential users and PP in applying the methodology. MFA will be therefore suggested but not imposed. As for the reasons to exclude other food chain areas/stages, e.g. upstream emissions, see note in page 10 in the methodology, and response in row 10.	No change needed	
26	7	Step 2 to identify barriers to project implementation. Barriers are currently defined as “(e.g., investment, institutionals, cultural and social barriers.)”	Thank you for the feedback. We will adopt your suggestion to include supply chain barriers as a potential barrier to project implementation.	Adjust barriers to include "supply chain barriers"	
27	8.1	The footnote d for Anaerobic digestion in Table 3 is unclear.	Footnote split as suggested	Minor change added	footnote d from Table 3 split into d and e

28	8.1	Option 1 - The parameter EFi,y in equation (1) includes the related collection/transportation emission factor. Option 2 - Equations (3) and (4) include the transport emission from the baseline scenario. As mentioned in S. No. 14, it is unclear how and when transport emissions have to be considered in the baseline scenario.	Transport emissions in Baseline emissions calculations will likely be included by PP since it's beneficial for them. Option 1 refers to default emission factors when no data is available, Option 2 when PPs have precise information to better estimate the Transportation emissions in the Baseline scenario, as it is stated in the methodology. Excluding these emissions will make the calculated GHG emission savings more conservative, which is aligned with the VCS principles	No change needed	
29	8.2	Equation (5) includes the transport emissions from the project scenario. The description of the parameter PETrans_y is not clear on when these have to be included (see also S. No. 14), what data availability is needed and what happens when not enough data is available to calculate the parameter with Equation (6). Additionally, the case of individual transportation needs to be covered, e.g., people go pick up safed meals individually with different means of transportation, which can be car, public transportation, bike, etc.	We have added an additional note and further guidance regarding the calculation in case of lack of data	Minor change added	added (section 8.2, p.19): "Project emissions from transportation must always be included, whereas project emissions from additional processing should be included whenever is relevant to the project. Emission savings from avoided food/feed production shall be included only when project proponents are able to clearly demonstrate such reductions with sufficient data and complete evidence" (section 8.2, p. 20): "In case of lacking data, project proponents can carry out surveys on users to determine the distance (D,y) and transport modes used by a representative sample of the beneficiaries of the project activities. The amount of recovered food by the sample beneficiaries can be then used to extrapolate the transportation emissions to

					the whole population reached by the project activities.
30	8.2	Equation (7) includes the parameter OEy which includes other emissions from the consumption of additional material needed for the processing and delivering the new food product. It does not seem clear what has to be included under this parameter and when such additional emissions can be seen as de minimis.	A cut-off criterion has been included to guide PP when to include/exclude such materials or additional ingredients (see Section 8.2). In general, emissions from packaging materials must be included.	Minor change added	added (8.2, p.20): "Cut-off or exclusion criterion: if additional materials are less than 1% of the recovered food mass, these additional materials can be excluded from the project emissions calculations.
31	8.3	Leakage has to be considered for the eventual discard of the saved food (calculated with equation (8) and data from Tables 4 and 5) for the potential deviation of food waste from a FLW destination with valorization (e.g. biogas plant). The methodology is not fully clear on how the two potential sources of leakage have to be combined and calculated together. Additionally, the methodology makes contradictory statements in relation to the	Both leakage factors have now been further specified. New formulas added to provide guidance on its calculation	Add clarification and equations ?	add equation for leakage: LF_waste + LF_valorization

		inclusion of food waste with final valorization.			
32	9.2	The parameter “Mass of the recovered food” is measured in tonnes. According to the methodology, data should be submitted as tonnes in wet matter. We suggest that it doesn’t matter if it is dry or wet matter as based on the wide variety of foodstuffs both are possible.	Suggested change adopted	Minor change added	wet matter removed from M_FLW parameter Unit
33	9.2	The monitoring frequency for this parameter is split in Application A and B. The methodology does not refer to such applications.	Modified as suggested	Minor change added	Factor fy changed to f (one for the whole crediting period), references to Applications A or B removed
34	9.3	The methodology lists the information that needs to be included in the monitoring plan. Bullet point six of the provided list (10-year baseline re-evaluation plan) is in our view not applicable for this methodology.	Thanks for the feedback, we will take into consideration.	No change needed	

35		Additional information / propositions - Examples of unintended impacts	Additional examples of unintended impacts added	Added to section 8.3: "Other examples of uninteded impacts that should be accounted for in the leakage emissions are related to other types of FLW destinations with valorization, such as FLW used as animal feed. Recovering food that would have otherwise fed animals may increase the demand for additional feed."	additional example?

<table>
<tr>
<td>36</td>
<td></td>
<td>Additional information / propositions - Example for possible definitions: Key terms of reference and definitions needed to achieve the following:</td>
<td>
<table>
<tr><td></td><td colspan="2">Pre Project</td><td colspan="2">Post Project</td></tr>
<tr><td></td><td>Definition</td><td>End of life scenario</td><td>Definition</td><td>End of life scenario</td></tr>
<tr><td>Food</td><td>Within this food group / type - what is defined as food for the human food chain i.e. by a retail specification, a nutrient quality / score, etc.</td><td></td><td>How has the project changed this initial definition i.e. increased or improved and expanded the use of this resource.</td><td></td></tr>
<tr><td>Food Waste # Edible parts # Inedible Parts</td><td>I.e.
- Edible: still edible but not meeting retailer specification, not meeting food service purchase needs
- Inedible: roots, seafood shell, bones</td><td></td><td>What has the project done to redistribute / recover, prevent, or upcycle these waste streams in both the edible and inedible parts</td><td></td></tr>
<tr><td>Food Loss # Edible Parts # Inedible Parts</td><td>I.e.
- Edible: wonky veg misshapen by rocks in soil / environmental factors and unable to process due to form / shape; livestock / dairy / seafood with a health and safety or food hygiene risk
- Inedible: food damaged by pest / climate impacts or weather e.g. stunting fresh produce or seafood or dairy yields</td><td></td><td>What has the project done to redistribute / recover, prevent, or upcycle these food loss streams in both the edible and inedible parts</td><td></td></tr>
</table>
</td>
<td>FOR DISCUSSION: I think we could 'require' that IF the project proponent is ONLY focused on part of a food - e.g., an 'inedible part' like banana peels - that must be described and reported as it affects assumptions about emissions factors etc. We already say "At a minimum, the food should be classified at a product category level (e.g., meat). Where possible, classifying food at an ingredient level (e.g., beef) will enable the use of more accurate emission factors. This data needs to be specific to the project boundary and related to the activities covered." On page 9, after the bullet "Due to the variability in what is considered “inedible”, project proponents are not required to distinguish between edible or inedible parts of food." we could as the following:

"However, if a project proponent believes that the distinction between parts of a food would affect the calculation of associated GHG emissions, it must take additional steps to adjust the methodology and also follow the reporting requirements in the FLW</td>
</tr>
</table>

				Standard (i.e., to clearly describe the sources used to categorize a material as food or as inedible parts, and describe the approach used to calculate the separate amount - if relevant)."

37		Broadening of the methodology: today, the activities of many companies actively working to reduce food waste are focused on waste avoidance, with a significant and quantified impact on food waste in the retail sector. One could challenge the choice to focus only on the downstream part of these activities, neglecting the upstream part: by consuming a certain quantity of food products rather than throwing them away, one avoids buying a certain part of it, thus avoiding contributing to the emissions associated to the production of another product. "Note: A significant amount of GHG emissions is embodied in the production of food. Using and consuming a higher proportion of available food would therefore, in aggregate, generate reductions in production-related GHG emissions. However, since GHG emissions associated with food supply chain emissions are difficult to prove as having taken place, this current methodology version only covers downstream emissions."	A module will be developed to accompany the methodology to cover avoided upstream emissions for special cases where evidence can demonstrate such reductions. See response in row 10	No change needed	
38		Difference between US and EU regulations: In the EU, the biowaste regulation obliges professionals to turn to recycling channels for this waste, and therefore avoids landfills and incineration, which serve as the baseline scenario for this study. Innovative European approaches would therefore be penalized compared to approaches in countries where legislation is less advanced on the issue.	We are aware of that, but the scope of the methodology is around activities that keep food within the human food chain. EU regulation is fortunately one step ahead in many environmental matters, but the GHG benefits where FLW valorization occurs are likely to be low. Project proponents are still allowed to apply the methodology for such cases, as long as the maths work for them	No change needed	

39	2	"This methodology is applicable in situations where the baseline scenario for the FLW destination has no valorization such as use as soil amendments or energy recovery." Many waste disposal companies including council kerbside collections, are now using AD/ EfW facilities - there is some valorisation so higher in the waste hierarchy than landfill, but lower than keeping food in the human chain. This seems to be allowed for in the methodology, eg section 6, but reads as contradictory here.	It was contradictory, thanks for spotting that. It has been changed	Change made	
40	3	Perhaps not needed, but can it be made clear that food includes food and drink	Included in the definition of "Food"	Can add clarification in footnote that the definition of food includes 'drink'	
41	4.4	Should this include the transport emissions, not just the distance - e.g. an EV or filling a backhaul lorry is lower in impact than a diesel van. Section 5b is more explicit about this, but 4.4 only mentions distance.	Thanks for the suggestion. The transport modes have been added in addition to distances to section 4 , necessary to calculate the transport emissions	Minor change added	transport modes added to 4.4 (now 4.5)
42	4.4	Should the considerations explicitly exclude packaging from the mass of FLW? Does there need to be a consideration for what happens to the packaging v the baseline scenario or explicitly disregard this?	Packaging included in the Project emissions section, under Eq. 7, OE (other emissions)	Change made	need to agree on the cut-off criterion (if 1% then packaging probably excluded)
43	5 b	The Note states that only downstream emission avoidance is included because of the challenges measuring supply chain emissions avoided. This is not the case for companies that are using the FLW to replace another measurable 'virgin' ingredient in the circular economy. In the example of my company, we brew with surplus bakery bread, replacing 25% of malted barley. We know the GHG impact of malt and therefore the direct reduction by reducing malt (in addition to the	A module will be developed to accompany the methodology to cover avoided upstream emissions for special cases where evidence can demonstrate such reductions. See response in row 10	No change needed	use their example to illustrate how avoided upstream emissions can be included

		downstream emissions avoided by preventing bread from being discarded).			
44	8	"Project proponents should use country-specific emission factors where and if available." Will the methodology link to sources that are available and require them to be used, and the latest available e.g. Defra in the UK updated annually	DEFRA source for UK is the kind of country-specific emission factors we refer to. It's a methodology with global coverage, so we cannot include the links and sources for all countries :)	No change needed	
45	8.2	Project emissions to only include transportation and further processing of the food. Should it also include emissions from additional packaging e.g. aluminium cans, perhaps apportioned when the FLW is only a % of the ingredients, or is this explictly excluded (e.g. the beer would have been canned anyway, the benefit is the replacement of malt with bread)? Same question for including a proportion of other operational emissions of the entity e.g. electricity use to run a website/app. I think transport has been included in particular because it's included in the baseline emissions, so just a question for understanding!	Packaging included in the Project emissions section, under Eq. 7, OE (other emissions)	Change made	need to agree on the cut-off criterion (if 1% then packaging probably excluded)
46	8.3	Question - is there a consideration of value in the calculation of leakage i.e. a higher priced product is less likely to be wasted (e.g. sliced white bread v craft beer)	No, the leakage factor are product category specific and linked to the food supply stage. If more accurate data exists, project proponents should use that instead	No change needed	

47		We appreciate the work being done to standardise the accounting of FLW prevention. Whilst we are unlikely to use it to create and sell carbon credits, we would like to use it to quantify the positive impact of us using a waste food internally (insetting to net our emissions) and to communicate this benefit to customers (who we will sell the processed otherwise wasted food to so they can use it to reduce their net emissions). This will significantly help us to grow our impact and share the positive impacts of the circular economy.	Thanks for the support and understanding. If your company is willling to communicate on such environmental benefits we recommend to perform a LCA study with peer review (ISO or PEF)		
48		As noted above, we would want upstream emissions to be included, which we can accurately measure as we are substituting a purposely grown crop for a surplus alternative. Over 70% of the emissions we divert happen upstream so we want this methodology to be a true reflection of our impact	An module will be developed to accompany the methodology to cover avoided upstream emissions for special cases where evidence can demonstrate such reductions. See response in row 10	No change needed	respond after deciding what we will do with upstream emissions

49		Breakthrough Energy Ventures is a leading climate technology investment company looking to reduce GHG emissions across all sectors of the economy including a robust portfolio of food and agriculture innovation companies. We feel strongly that the preservation of food nutrition plays an important role in reducing global GHGs and support VERRA's work in further defining the classification of different sources in these sectors. This comment pertains specifically to the definition of Food Loss and Waste (FLW) used by the draft methodology. As per Champions UN SDG Target 12.3 2016 Progress Report (referenced by the draft methodology), any food materials used for animal feed are considered to be a form of FLW, "diverting material from the food supply chain" [1].	See response in row 16		The interpretation by Champions 12.3 for the purpose of SDG Target 12.3 does NOT consider animal feed as part of what's "food waste" - i.e., to be cut in half by 2030.
50		We strongly support the inclusion of upstream emissions	See responses in row 10 and 16	No change needed	

51	2	The objective of the proposed methodology is too narrow in scope by only considering net GHG reductions from keeping food (edible/inedible) in the human food chain. Recycling and upcycling food loss and waste sources into animal feeds has been ignored in the current definition and methodology and must not excluded from consideration because they can contribute to reductions in GHG emissions in food animal production when included in animal diets. There are numerous examples of inedible agri-industrial by-products (e.g., bakery by-product meal, meat and bone meal, wheat middlings) that have been recycled into animal feeds for many decades, and contine to be, and they represent various types of food losses and waste from all types of food supply chains. In fact, the third highest priority in U.S. EPA food waste and loss hierarchy is to recycle food loss and waste into animal feed. Therefore, a revised definition is needed in the this VCS methodology framework.	See responses in row 10 and 16	No change needed	Animal feed is certainly an important outlet, producing high value. However, this methodology is focused on keeping food in the human food supply chain (if that was its initial intention). Even if the animals fed with FLW are then at a later stage consumed by humans, this methodology does not include these indirect routes of 'food for people.'
52	2	In addition to the previous comment, a designation between pre-consumer and post-consumer food loss and waste is needed. Post-consumer food scraps represent significant nutrient sources that no longer have value in the human food chain, but they have signficant nutritional value if thermally processed and used in animal feeds. The net effect of doing this is three-fold: 1) avoidance of GHG emissions from landfills or lesser value disposal methods, 2) achieving greater nutrient recovery (nitrogen and phosphorus) by upcycling post-consumer food scraps into animal feed, and 3) reduction in GHG emissions attributed to animal feed by partially replacing common ingredients such as corn and soybean	See responses in row 10 and 16	No change needed	This methodology does not take a point of view on the value of animal feed. If a methodology doesn't exist for animal feed and the related GHG emissions, perhaps that would be of interest to develop

		meal that have a much greater GHG and envirmental footprint in animal agriculture than food loss and waste sources.			
53	2	Situations where the FLW has no energy or soil amendments function are very rare… This limitation minimizes applicability or results in fundamentally wrong outcomes	See responses in row 10 and 16	no change needed	
54	5	Current description only describes the option of recovery of (in the base line lost or wasted) food. This is only a small subset of the potential interventions listed in Appendix 2. For instance manufacturing line optimization (which may for instance include introduction of refrigerated storage). Such intervention would affect energy use.	Only additional GHG emissions that are incurred by the project to recover the food, respect to the baseline, need to be included. In the example you make, these emissions from higher energy use would fall in the PE_processing factor (equation 7), included in equation 5, section 8.2 page 19	Consider changing title of Figure 1, Table 2, and Figure 2 to make it more clear that this is a simplistic depiction.	Agree and this is included in the methodology: "GHG emissions from food transport and processing (e.g., additional food processing to convert the food recovered into new food products, or further transportation activities, like home delivery), must be included when applicable.5"

55	5	Excluding GHG emissions related to food production is a dramatic decision, which in our opinion undermines the link between FLW reduction and climate action. Actually food climate impact is largely dominated by emissions in the production phase (except for product that are transported over large distances and/or by air). The major benefit of FLW reduction is the indirect effect of lowering demand for agricultural crops…	See responses in row 10 and 16	No change needed	
56	8	Limiting the scope of FLW to only direct GHG emissions in FLW processing is considered inadequate for composting. When applied in soil, carbon in compost is fixed in the soil for many years, with significant negative climate impact factor. I am aware that this seems to make FLW reduction for streams that are currently composted unattractive, but this potential benefit would become small if emissions in agricultural production were taken in consideration.	Thanks for your suggestion. We are aware of the potential C sequestration from applying compost to soils. However, there is a great uncertainty in such sequestration, given the various types of climates, soils and agricultural practices that can follow the amendments. Most of the added carbon would be respired back to the atmosphere and the remaining fraction would be arguably considered as additional. For example, if the FLW destination would be landfill, the related C would have also been stored there in any case. A recent report by WRI did not consider soil C sequestration as a robust, credible climate mitigation strategy due to the many uncertainties remaining around these estimates "Adding mulch or manure are proposed strategies to add carbon to soils but, in effect, double-count their carbon which would have contributed to carbon storage elsewhere." (WRI 2018 - Creating a sustainable food future). Including such uncertain sequestration potential would therefore violate the Additionality, Conservative and Measurable VCS principles	No change needed	

57	8	Anaerobic digestion results in energy and digestate. Both effects are not reflected in the emission factors. Consequently I also expect differences between streams with different DM content.	The presented EF reflect only the fugitive emissions from the digester (assumed to be the same, since they are designed to operate in optimal conditions with a mix of organic components) and the digestate application. The dry food will produce more CH4 than the wet ones, but the methane is anyway recovered by the plant and used, so it's outside the boundary of the project	No change needed	
58		As for landfilling I would expect differences in GHG factor for composting and combustion.	Thanks for flagging that. The related EF have been adjusted according to the DM% of the food categories and Table 3 has been updated accordingly.	EF of Table 3 updated	
59	General	A common destination for FLW is animal feed; this option is lacking in the methodoly description.	See responses in row 10 and 16	No change needed	
60	General	As explained above, in the proposed methodology the system boudaries exclude the most impacting activities: agricultural production and compost application. This would - next to providing quite inadequate results - not directly support food supply climate impact reduction (could lead to contradictory outcomes to LCA scope 3 analyses).	see responses in row 10 and 16	No change needed	
61	7	Barriers (in step 2) are described as preventing PPs from carrying out the proposed project activity. This is not enough to demonstrate additionality. Some barriers could prevent a specific activity, but there could be other activities that lead to the same impact and which are not prevented by the barrier.	The identification of barriers preventing implementation must be connected to a specific activity, i.e., the project activity being considered by the project proponent. While a variety of activities *could* have impacts on food waste, this would not be a relevant consideration.	No change needed	

62	7	Both criteria for "investment analysis" are inadequate. For the first one, it is not because similar activities have only been implemented with grants in teh past, that there is necessarily a barrier today. Economic conditions change. Past profitability is informative, but not a barrier in itself. For the second one, it is not sufficient to look only at a cost comparison. An investment analysis tipicaly requires to look at the change in return on investment, which compares the cost/benefit ratio of both activities. Maybe discarding food has a lower cost than keeping it in the human supply chain, but keeping it in the chain also has a higher benefit, which means that the overall investment benefit is higher for keeping it inside the human supply chain. This is relevant here, because food waste represents a significant financial loss, and hence there is a clear economic benefit in reducing it.	The first criteria, that similar activities have only been implemented with grants or non-commercial finance, is an investment barrier utilized by the CDM in their well-established additionality tool. Without a commercial finance stream, activity implementation will be limited. The second criteria, that there is a lower cost to discard food, is context-dependent. For example, the discarded food could be by-products from processing; efforts to re-purpose this food would likely have a significant upfront cost, meaning it would be cheaper to discard the excess food. Please note that this is a non-exhaustive list of criteria. Ultimately, the VVB assessing a project will determine whether the barriers and supporting evidence are a sufficient demonstration of additionality.	No change needed	
63	7	The strength of the barriers can vary a lot, especially the ones in the institutional barriers section. Demonstrating the existence of one of these does not make the project additional. E.g. there could be a lack of skilled workers trained on the issue of FLW, but high awareness among consumers which means there is low FLW. The barriers here are too general and would make it easy to show additionality.	For a barrier to be sufficient grounds for demonstrating additionality, there must be credible evidence provided that shows the barrier specifically prevented the project activity from being implemented. A common practice analysis then accompanies this barrier analysis; both of these steps must be met for an activity to be additional. With the example you provide, if there was a low amount of FLW due to high awareness among consumers, then there would be no incentive to generate a carbon project to reduce FLW using the VCS methodology.	No change needed	

64	7	Being "first of its kind" does not make an activity additional. It is not a barrier.	As defined by the CDM, a "first-of-its-kind" activity is considered additional so long as it meets the following critera: "The project is the first in the applicable geographical area that applies a technology that is different from technologies that are implemented by any other project, which are able to deliver the same output and have started commercial operation in the applicable geographical area before the project design document is published for stakeholder consultation or before the start date of the proposed project activity." While identifying other technologies, project proponents should use publically available information, for example, from governments, industry associations, & other sources on the market penetration of these other technologies.	We will flesh out the definition of "first-of-its-kind" in the methodology and refer to the specific CDM tool that addresses this rule.
65	7	In step 3, it is not appropriate to use "reports by industry associations" to demonstrate that the adoption of the activity is not common practice. How are "industry ssociations" defined? Could this be an association to which the activity proponent is a member? This is not peer reviewed. This is not credible litterature to base an additionality assessment on.	An industry association is defined as an organization that supports companies and employers of a particular type of industry. The use of industry association reports is permitted in several VCS methodologies, particularly when considering activities that have limited sources of credible evidence that can support claims. Please keep in mind that any report provided as evidence would be verified by the VVB assessing the project.	Expand definition to include industry & trade associations

66	7	The following rule is inappropriate: "A project proponent may include project instances where more than one activity to keep food from leaving the human supply chain will be implemented at the same location8. When evidence on adoption rates for the combined activities does not exist, the project proponent may multiply the adoption rates of the individual activities to estimate the combined, or "stacked", activity adoption rate." That can lead to common practice activities being passed as innovative. One could have an activity that has a 30% adoption rate, and one that has a 50% adoption rate (hence both are considered common practice because above the 20% threshold), and the combination would give a rate of 15%. Eventhough both activities are common practice, their combination would be deemed innovative. This is not a good way of plugging the absence of data.	The weighted average approach is intended to address scenarios where the combination of 2 or more practices is innovative, but the stacking of these activities faces barriers. We will add a clause that any activity under 20% common practice is automatically deemed additional (so long as it also demonstrates barriers and regulatory surplus).	Add clause that any activity under 20% common practice is automatically additional on its own	
67	8.1	In option 1, the use of the same default factors at a global level carries a high level of uncertainty. This calculation cannot be approved without an uncertainty assessment. If no uncertainty measurement is possible, then this methodology is not sufficiently robust.	We refer to the sentence in the methodology "Despite being from a U.S. source, these emission factors are globally representative for these four FLW destinations since they are technology-based —rather than geography-dependent. Project proponents should use country-specific emission factors where and if available"	No change needed	

68	8.1	The exclusion of "avoided emissions from co-product offsets" under the baseline is problematic, especially given the lack of clarity in how this is treated in the leakage section. If food waste is used to generate electricity, there are some avoided emissions that must be included in the baseline. Taking food away from the facility will lower electricty production. This seems to be addressed in the leakage section, but the methodology for calculating this is unclear. It would be more straightforward to include this in the baseline. The same applies to other cases, e.g. food waste used as fertiliser, which reduces the use of other types of fertilizers.			
69	8.2	There is a major ommission in the calculation of project emissions, in that it assumes that the consumption of food within the human supply chain leads to no emissions. Food only seems to generate emissions when it is "waste", but not when it is consumed. This is not accurate. The methodology itself states in sectino 8.1 that "Around 50% of the mass of the DM in food is carbon, which when digested, burned, or in some way respired or transformed, is released to the atmosphere in the form of (biogenic) carbon dioxide or methane.". Note the word "digested" here. When humans consume the food, this generates emissions. Ignoring these will lead to under-estimation of project emissions, and hence over-crediting. There could also be other types of emissions to be considered at this stage, such as those resulting from cooking food before it can be consumed.	Good point. However, these emissions will also occur in the baseline, as all FLW will be eventually respired and converted into biogenic CO2 sooner or later. We have covered this in the following statement in section 5.b "Activities excluded from the project boundary are those that would continue to occur as part of typical food storage, handling, cooking and consumption, such as refrigeration or freezing, cooking, digestion of food and treatment of human excreta, and discarding food (which is already covered by the leakage factor)."	No change needed	

70	8.3	The section on leakage requires this: "Project proponents must include the GHG implications of removing food from the FLW destinations and account for these as an additional leakage factor.". But there is no explanation on how this should be done, only an example (of food diverted from a facility that relied on it to generate energy). The methodology also does not list more examples of cases where this leakage should be taken into account (e.g. when food waste is used as a fertilizer). There is also no explanation about how this effect should be combined with the default factors in tables 4 and 5 to provide an overall leakage factor, as used in equation 8. The methodoloy is incomplete in this regard, and should not be used as such.	more examples and further guidance were added		add further guidance on leakage of valorization..
71	General	The methodology is currently incomplete in that it will likely underestimate project emissions, and carries significant uncertainty without quantifying it. The way it is currently framed does not make it clear that only projects with net positive climate impacts will get credits, and that no over-crediting will take place.		No change needed	

72	8.1	Equation 3, proposed for calculating baseline methane emissions, is based on a simplified version of a more thorough and specific equation in the same CDM tool (Emissions from Solid Waste Disposal Site, Version 08.0) that allows for the inclusion of site-specific waste streams and incorporates a methane generation (decay) rate constant (*kj*). By only allowing for the use of the simplified version of this tool in Option 2 for Baseline Emissions calculations, the proposed methodology not only precludes the use of more detailed, site-specific food waste stream data, it may also result in differential incentives for food loss and waste activities based on the use of global defaults instead of project-specific information.	Thanks for pointing that. Project proponents may use the referred CDM tool and equation to account for these emissions in a more precise manner (site-specific) if they have access to the data necessary to apply the formula.	Sentence added: "A more thorough and specific equation in the same CDM tool may be used for the inclusion of site-specific waste streams if enough data is available to the project proponent.	Add site-specific formula and specific approach from CDM tool?
73	8.1	Equation 3 includes a duration of 20 years for calculating methane emissions resulting from the landfilling of waste in a single year. This duration is not specified in Equation 15 of the referenced CDM tool (Emissions from Solid Waste Disposal Site, Version 08.0)	Well spotted. The 20 year period selection refers to the Table 2 in same Appendix of the cited CDM tool. The default factors provided in the simplified approach go up to 20 years.	No change needed	
74		Robin Food NGO and others around the world are working on helping households reduce food waste, involving multiple stakeholders. These projects have potential to reduce FLW carbon emissions significantly, especially in developed countries. Creating a VCS framework for FLW prevention would help make these projects feasible and create signficant income for initiatives like ours, which could help scale our operations and impact.	Thank you for this feedback. Reducing FLW at the household level is simultaneously extremely challenging but much needed. In the U.S., studies show that the average household wastes about 32% of food purchased.	No changed needed	

75		In order to create a holistic framework to encompass such impact - it is important to include upstream emissions to the equation (such as emissions from growing the food), otherwise approximately 70% of the carbon impact of our work will not be accounted for.	We understand your critique and concern, but we must adhere to the conservative principle and only allow GHG benefits that can be backed by actual data. See response in row 10 for more info.	No change needed	
76		Inclusion of upstream emissions	We understand your critique and concern, but we must adhere to the conservative principle and only allow GHG benefits that can be backed by actual data. See response in row 10 for more info.	No change needed	
77		How does the methodology deal with ITMO compliance? Would it be contractual at project level rather than part of the methodology? Which CC's on the VCS register would be ITMO compliant?	The methodology does not address ITMO compliance; rather, this is covered at the Program level.	No change needed	

78	8.2 Project Emissions	The current scope in the methodology and associated equations to calculate the Project Emissions only apply to interventions that occur at the same node in the supply chain where the FLW would have been occurring and are therefore focused on interventions that divert FLW to a new destination once it is already likely to become waste ("recover food" is the term used in the text). With changes just to section 8.2, this methodology could be applicable to a much broader set of projects that are reducing GHG emissions by avoiding FLW. Projects that prevent FLW by keeping food in the intended value chain (as opposed to recovering food and sending it elsewhere) may be implemented at a node in the supply chain further upstream than where the FLW prevention will occur. For example, solutions to extend shelf-life (e.g., edible coatings, modified atmosphere plastic packaging) are often integrated in the produce packinghouse but a majority of the FLW these solutions prevent occurs in retail stores and consumer homes. Some solutions already listed in Appendix 2 could fit this description.	That is indeed the case for interventions where the FLW is recovered somewhere else in the food chain. These GHG emission savings are allowed in this methodology so long the PP has sufficient evidence to demonstrate that (which may be very challenging to obtain if the activity is far from in the supply chain from the point where the FLW avoidance actually occurs). All factors in equation 5 shall be included "whenever and if applicable". Sentence has been modified accordingly	Minor change added	Sentence changed to: "Project emissions from transportation and from additional processing should be included whenever and if they are relevant to the project"
79	8 Quantification of GHG Emissions Reductions and Removals (applicable to multiple subsections: 8.1, 8.3, 8.4). This comment	There are interventions that can reduce FLW at multiple stages in the value chain with one set of project activities (e.g., better supply-demand planning, shelf-life extension). The methodology as written would not capture FLW at multiple stages within one project.	Thanks for the suggestion. Equations modified accordingly. Please note that only those GHG emission savings that can be backed by sufficient evidence can be used in the calculation.	Minor change added	change equations to include multiple stages and add disclaimer or. Note about the evidence that is needed to support every GHG saving calculation (at each food chain stage)

	would also apply to section 9 Monitoring.				
80	General				
81	General	Water consumption is not considered to assess the impact of the new process to divert the FLW	Thank you for raising that. GHG emissions from additional water use are expected to be negligible. However, these are covered in the PE_processing factor in Equation 5: "Project emissions from electricity consumption or other energy and/or material use for additional processing, storage, etc. in year y (tCO2e), if considered additional for the recovery of food (see Equation 7)"	No change needed	
82	General	Unclear who can apply/benefit from the carbon credit	Verra is agnostic about the project proponent, so long as the requirements set out in Section 3.6 of the *VCS Standard, v4.2* are met. As defined by the VCS, a project proponent is the "individual or organization that has overall control and responsibility for the project, or an individual or organization that together with others, each of which is a project proponent, has overall control or responsbility for the project."	No change needed	
83	General	One major point when it comes to upcylcing is not mentionned : resources optimisation	Thank you for this feedback.	No change needed	
		We need to add that the FLW inventory must be developed in line with the requirement of the FLW Standard.	Done	Change made	
		Typo: replace FWL with FLW (sentence above Table 4)	Done	Change made	

APPENDIX 2: DOCUMENTS REVIEWED

S.No.	Title of document	Version	Provided by
1	Methodology for avoiding greenhouse gas emissions by keeping food in the human supply chain	1.0	Developer
2	VM0018	1.0	Others
3	Methodology for the avoidance of greenhouse gas emissions through composting of food waste using insects	1.0	Others
4	AM0083	1.0.1	Others
5	AMS-III.AO	1.0	Others
6	AMS-III.F	12.0	Others
7	AMS-III.G	10.0	Others
8	Organic Waste Composting Project Protocol	Version 1.1	Others
9	U.S. Landfill project protocol	Version 5.0	Others
10	Public Stakeholders Comments	-	Developer
11	The Food Loss and Waste Accounting Standard (FLW Standard	2016	Others
12	The GHG Protocol for Project Accounting (GHG Protocol, 2005)	-	Others
13	Connecting Food Loss and Waste to Greenhouse Gas Emissions: Guidance for Companies (FLW Protocol, 2021)	-	Others
14	VM0042 Methodology for improved agricultural land management	1.0	Others
15	GHG emission factors hub (EPA, 2021)	-	Others
16	Emissions from solid waste disposal sites, CDM methodological tool	8.0	Others
17	CDM Methodology Tool: 24 – Common Practice	3.1	Others
18	*Documentation for Greenhouse Gas Emission and Energy Factors Used in the Waste Reduction Model (WARM): Organic Materials Chapters*	*November 2020*	Others
19	U.S. Environmental Protection Agency (EPA)	-	Others
20	CDM Methodology Tool 12: Project and leakage emission from transportation of freight	01.1	Others
21	VCS Standard	4.3	Others
22	VCS Methodology Requirements	4.1	Others

23	Methodology Form Template	V4.1	Others
24	https://www.climateactionreserve.org/	-	Others
25	https://cdm.unfccc.int/	-	Others
26	https://www.goldstandard.org/	-	Others
27	https://www.globalcarboncouncil.com/	-	Others
28	https://verra.org/	-	Others
29	https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2020	-	Others
30	https://www.fao.org/platform-food-loss-waste/flw-data/en/	-	Others

APPENDIX 3: COMPETENCE STATEMENT

Competence Statement			
Name	Shreya Garg		
Country	India		
Education	M.Sc. (Climate Science & Policy), TERI University		
Experience	9 Years +		
Field	Climate Change		
Approved Roles			
Team Leader	YES		
Validator	YES		
Verifier	YES		
Methodology Expert	AMS.I.A., AMS.I.C., AMS.I.D., AMS.I.F., AMS.II.D., AMS.II.G., AMS.II.J., AMS.III.AV., AMS.III.BL, ACM0002, ACM0012		
Local expert	YES (India)		
Financial Expert	NO		
Technical Reviewer	YES		
TA Expert	YES (TA 1.2, TA 3.1)		
Reviewed by	Shifali Guleria	**Date**	26/04/2022
Approved by	Deepika Mahala	**Date**	26/04/2022

Competence Statement	
Name	Kaviraj Singh
Education	Ph.D. (Environmental Engineering), IIT Delhi Masters (Energy & Environmental), DAVV Indore
Experience	15 Years +
Field	Climate Change & Environment
Approved Roles	

Team Leader	YES		
Validator	YES		
Verifier	YES		
Methodology Expert	AMS-I.D., AMS-II.D., ACM0006, AMS-I.A., AMS-I.C., AMS-II.B., AMS-III.H, ACM0002, ACM0001, AM0080, ACM0018, ACM0017, AM0056, AM0073, AMS-III.AU, VM0042		
Local expert	YES (India)		
Financial Expert	YES		
Technical Reviewer	YES		
TA Expert (X.X)	YES (TA 1.1, TA 1.2, TA 3.1, TA 13.1, TA 13.2)		
Reviewed by	Shifali Guleria (Quality Manager)	**Date**	13/07/2022
Approved by	Deepika Mahala (Technical Manager)	**Date**	13/07/2022

Competence Statement			
Name	Divij Varshney		
Education	M.Tech. Renewable energy systems B.Tech. Electrical Engineering		
Experience	1.5 years		
Field	e.g., Climate Change & Environment / Industry		
Approved Roles			
Team Leader	Yes (VM)		
Validator	Yes (VM)		
Verifier	Yes (VM)		
Methodology Expert	NO		
Local expert	NO		
Financial Expert	NO		
Technical Reviewer	NO		
TA Expert (X.X)	NO		
Trainee	YES		
Reviewed by	Shifali Guleria, Quality Manager	**Date**	24/09/2022
Approved by	Deepika Mahala, Technical Manager	**Date**	24/09/2022

APPENDIX 4: FINDINGS OVERVIEW

Table 1. CL from this verification

CL ID	01	Section no.	4	Date : 05/08/2022
Description of CL				
The following observations are required to be clarified from section 4, applicability a) Applicability condition 2 quotes "All recovered food must adhere to relevant food health and safety legislation". The statement does not provide clarity in cases where the project developer might be importing or exporting. b) Under condition 5 the various requirements on baseline and transport modes have been referred to which are further elaborated in the next sections. The extent of information that needs to be provided here is not clear. c) The text also refers to a sampling plan however the preferred plan or method has not been specified. d) At several places 'waste management records' have been referred to; however, it is not clear if self-declared records would suffice for the requirement.				
Project participant response				**Date :** 06/09/2022
a) We deem it is covered by the adjective "relevant", which refers to, in our view, the legislation of the applicable countries where the food recovered by the project intends to be marketed (be it for local consumption, to be imported or exported) b) Under condition 5 the different information needs and data requirements to properly apply the methodology are listed. Further details are given in the following sections, as pointed out by the reviewer. c) Thanks for pointing that out. A short clarification has been added as an Appendix with several references, where it is further explained the sampling methods, the procedure and standards that can be followed, if needed and applicable. d) Right. Self-declared records would suffice, not to put too much burden on project proponents - and a note that externally verified records are preferred.				
Documentation provided by project participant				
DOE assessment				**Date:** 15/09/2022
a. The explanation given has been reviewed and found to be acceptable. The word 'relevant' has already been used to refer to the legislation of the applicable countries. b. The information and data requirements that will be needed to apply the methodology is indeed stated in the condition 5. The relevant section has been reviewed and further details are found to be properly stated in the sectios. c. The sampling plan has been added as an appendix 3. The sampling has been reviewed and found to be appropriately added. d. The explanation given has been reviewed and found to be acceptable. For 'waste management records', Self-declared records would suffice. CL#01 is CLOSED.				

Table 2. CAR from this verification

CAR ID	01	Section no.	5	Date : 05/08/2022
Description of CAR				

The following observations are required to be clarified from section 5, project boundary a) Types of project activities listed in appendix 2 include farm level and processing level interventions. However, the project boundary does not seem to be inclusive of the food production areas. b) The order of preference of the data sources is not clearly laid out in the text; for instance it is not clear on what can be construed as data and under what conditions can assumptions be made. There could be instances where informal segregation or non-documented establishments might be in place. How would the reliability of the established baseline scenario be considered reliable?
Project participant response **Date :** 06/09/2022
a) "the project boundary encompasses the region(s) or state(s) where food ends up (the FLW destination) under the baseline scenario". This definition covers, in our view, every stage of the food value chain. If food is lost or discarded at the farm level, that region or country would be part of the baseline scenario, as described in this sentence. b) If there is no evidence or non-documented segregation or food treatment, the methodology cannot be applied. This requirement is laid out in condition 5 under section 4 Applicability conditions.
Documentation provided by project participant
DOE assessment **Date:** 15/09/2022
a. The explanation given has been reviewed and found to be acceptable. The project boundary comprises of the region(s) or state(s) where the food end up (the FLW destination) which could be at the farm level and, at the processing level. b. The explanation given has been reviewed. Applicability Condition 5 clearly states out all the information that will be needed to apply the methodology CAR#01 is CLOSED.

CAR ID	02	**Section no.**	6	**Date :** 05/08/2022
Description of CAR				
The following observations are required to be clarified from section 6 Baseline scenario a) The time frame for establishing the baseline scenario has been mentioned as one year; it is not clear how the yearly variations would be factored. There may be exceptional instances leading to high/low production owing to seasonal variability; data from a year might be insufficient to arrive at normal numbers.				
Project participant response				**Date :** 06/09/2022
a) Thanks for pointing that out. Seasonal and geographical variability is now addressed in the new Appendix 3, where a simplified but representative sampling procedure is explained. A minimum of 4 samples per year (one per season) should be carried out, in case of absence of waste management records. On the other hand, if waste management records exist, they probably cover that variability already, since they typically reflect annual FLW data. Moreover, it is stated that "In the absence of sufficient data for a year period, or in case of an anomalous year (e.g., because of serious disruptions due to a natural disaster or a pandemic like COVID), a 3-year average may be considered."				
Documentation provided by project participant				
DOE assessment				**Date:** 15/09/2022

a. The revised methodology document has been reviewed. seasonal and geographical variations are now addressed in appendix 3. Moreover, if all the records of FLW like waste management records are available which have the actual data of the FLW transported then the seasonal variations are already covered, which is found to be appropriate.

CAR#02 is CLOSED.

CAR ID	03	Section no.	7	Date : 05/08/2022

Description of CAR

The following observations are required to be clarified from section 7 additionality

a) The evidence type is not specific enough to be used as means of validation.

b) Under common practice analysis the following criteria was found missing

- *a. Definition of scale (criteria based on emission reduction amount or in terms of energy or amount of food avoided)*
- *b. The geographical extent of the project to be considered for analysis (considering the methodology could be applied to grouped project activities). See definition of project boundary and the boundary to be considered for this assessment*
- *c. Time scale of assessment*

c) The adoption rate calculation is not clear enough and misses the component of analyzing cross effects of the implementing activities

Project participant response | **Date :** 06/09/2022

a) The evidence types have been updated to reflect that evidence must come from independent third parties (a study conducted by the project developer would be insufficient).

b) The scale is based on the amount of food waste avoided, i.e., whether the intervention is recovering more than 20% of the food wasted in a region.

c) The geographical extent covers the entire project spatial boundary, which includes the region or state where food ends up (FLW destination) in the baseline scenario, and the region or state where the recovered food is consumed as a result of the project activities. For grouped projects, per the VCS Standard v4.3, Section 3.5.11-3.5.12, when one single baseline scenario or additionality demonstration cannot cover the entire geography of a project, there would need to be stratification of the project. In this case, the common practice analysis would need to be applied to each project strata; this is captured within the rules of the VCS Standard which must be followed by any project proponent using a VCS methodology.

d) Time scale of assessment has been added into the Additionality section (within previous 10 years of project start date).

e) The methodology has been revised to remove the impacts of cross-effects from stacking interventions. Rather, each intervention's status as "common practice" must be assessed individually. This is to maintain a conservative approach to demonstrating additionality and to avoid positive interactions between interventions that might be overlooked when multiplying adoption rates.

Documentation provided by project participant

DOE assessment	Date: 15/09/2022
a. The revised methodology has been reviewed and the necessary changes are made by the developer. The independent third parties has now been added in the evidence type. b. The revised methodology has been reviewed and the necessary changes are made by the developer. Under common practice analysis, *Definition of scale, geographical extent, Time scale has been added. The added information has been reviewed and found to be appropriate.* c. The revised methodology has been reviewed and the necessary changes are made by the developer. CAR#03 is CLOSED.	

CAR ID	04	Section no.	8	Date : 05/08/2022
Description of CAR				
The following observations are required to be clarified from section 8 emission reduction quantification a) The methodology permits the users to use the default values or project specific values; clauses of their application could be made clearer keeping in mind the conservativeness and application with respect to geographical extent of the projects and practices followed b) A standard food category could be made part of the methodology to gather specific information c) The mass of recovered food in equation 1 of the methodology does not capture the category of food and destination in the baseline to lead to accurate results d) The methodology provides options for calculation but the conditions or preferential order for using these options is not defined e) The methodology is not factoring in the water weight in its calculation				
Project participant response				**Date :** 06/09/2022
a) There are 2 options for calculating the GHG emissions. Second option provides guidance on how to calculate project specific emissions, if landfill site data is available. First option provides default values per waste treatment technology reported in Table 3, which are applicable world-wide. Country-specific emission factors shall be used if and where available, as stated. A clarification has been added for those cases and countries without dedicated waste management (FLW destinations of “land application”, “not harvested”, “refuse/discards/litter”), where composting emission factors (aerobic decomposition) shall be applied as a conservative assumption. b) We are unclear by what is meant by a “standard food criteria”. The methodology requires a breakdown in quantities of food based on the overarching categories of “wet”, “semi-wet”, and “dry”. Can you please provide additional clarity on what this finding refers to and if it’s suggesting a further breakdown for the different food types included in the project. c) Correct. Equation 1 has been modified to include this aspect. d) The sentence introducing Option 2 method has been modified to clarify this, it now reads “This option is the most accurate method to calculate the baseline emissions and therefore it must be used if more detailed information is available for the landfill FLW destination in the baseline scenario” e) Thanks for flagging that. We have double-checked, the methodology does factor in the water content in all its calculations but one, Equation 3 under Option 2, which was not accurately reflecting Equation 15 borrowed from the CDM tool. Option 1 now covers the water weight through the M_FLW parameter, that needs to be monitored, since the water (or dry matter) content needs to be specified in this calculation route to appropriately select the corresponding emission factors. Option 2 covers the water weight content now through the W_org,y parameter (before M_FLW), as defined by and laid out in the referred CDM tool.				
Documentation provided by project participant				
DOE assessment				**Date:** 15/09/2022

a. The clarification added has been reviewed. The project proponent must apply the country specific emission factors for the emission calculation if the data is not available then the world wide emission factors can be applied as a conservative approach.
b. The revised document as per discussion has been submitted. The necessary changes of defining food category and how the emission factor must be chosen with respect to that has been mentioned and found to be appropriate.
c. The mass of recovered food in equation 1 of the methodology has now been updated to capture the category of food and destination in the baseline.
d. The revised methodology has now been reviewed. the explanation for using the two options has now been added in the relevant section.
e. The revised methodology has been reviewed and the necessary changes are made by the developer.

CAR#04 is CLOSED.

CAR ID	05	**Section no.**	9.2	**Date :** 05/08/2022
Description of CAR				
The following observations are required to be clarified from section 9.2 data and parameters monitored a) For mass of recovered food, the methodology does not define the minimum categories to be reported or information on form of food and water content. The kind of acceptable sources or survey design could be included for more reliable results b) For the distance travelled, type of vehicles used can also be reported as in tool 12 of CDM to effectively calculate the transport emissions.				
Project participant response				**Date :** 06/09/2022
a) Can you please provide clarity on what is meant by defining minimum food categories? All the recovered food mass flows must be monitored, as stated in section 9.2, under the table of the parameter M_{FLW}. The methodology recommends project proponents to strive for a full characterization of the recovered food streams in terms of water content, as described in that part, since DM content is a critical parameter for GHG emissions from waste (thus for avoiding them and hence, for generating carbon credits). A guidance on representative food waste sampling has been included as an Appendix. b) A reference to the CDM tool 12 has been included				
Documentation provided by project participant				
DOE assessment				**Date:** 15/09/2022
a. The revised document as per discussion has been submitted. The necessary changes has been made in the methodology to define the acceptable sources and survey design. Appendix 3 has been added as a FLW representative sampling, which was reviewed and found to be appropriately added. b. The reference to Tool 12 has now been included for the distance travelled. CAR#05 is CLOSED.				