1 INTRODUCTION

This Model Guidance accompanies the IFC Food Loss Calculator. It outlines the steps the user should take in order to calculate the Food Loss and Greenhouse Gas (GHG) emissions associated with an investment project aimed at reducing losses along the food value chain. The output of the tool is a breakdown of food losses avoided and total emissions broken down by each stage of the value chain.

2 HOW TO USE THIS TOOL

2.1 Basic user inputs and functionalities

This section covers the basic user inputs and functionality required by the IFC Food Loss Calculator to produce a first level estimate for GHG emissions and food loss savings. Some user inputs covered in this section are mandatory, while others are optional or automatically calculated by the tool. For simplicity, all snapshots included in this section are related to the production stage, but information on the functionalities and user inputs can be applied for all other stages covered by the tool. Additional user inputs that can be provided to improve the estimates provided are described in section 2.2.

2.1.1 Clear and reset data

The *Reset Data* button clears all user inputs (including advanced user inputs) provided within the calculator. The functionality can be used every time the user wants to restart the analysis from scratch.
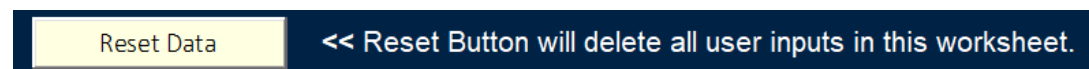

Figure 1: Reset data

2.1.2 Step 1: General Information

The user must provide the appropriate region, country, and commodity from the drop-down lists. The commodity group associated with the commodity is automatically calculated by the tool. For animal proteins only, an additional input on production type is required.

Region*	Africa
Country*	Angola
Commodity*	Bananas
Commodity group 🔒	Fruits
Production Type *(animal protein only)* *	

Figure 2: General information

Every time the user inputs for *Region, Country,* and *Commodity* is edited, the tool automatically resets all defaults values (described in section 2.2) to match the new selection.

The price of the commodity is an optional input that can be provided to measure the financial savings associated with a reduction in food losses.

| Commodity Price *(optional)* | | *USD/t* |

Figure 3: Commodity price

2.1.3 Step 2: Supply chain improvements

Section 2 includes a description of the supply chain stages covered by the tool. By ticking the boxes located on the left side of each column header, the user can activate the calculations for that specific stage. If a stage is not activated, the final outputs will not include losses and emissions for that stage.

Description of supply chain activities and improvements.

☑ **Production (post-harvest)**
Harvest and post-harvest losses (e.g. food preparation peeling, cutting, washing), plastic crates instead of bags for crops, temporary on-farm storage

Figure 4: Supply chain improvements

2.1.4 Step 3: Improvement details

For each supply chain stage, the tool provides a list of improvements that could be implemented to increase efficiency and/or reduce food losses. Two sets of lists are provided depending on whether the user selects a crop or animal protein). The lists are not to be considered as a comprehensive enumeration but rather as an example of some the improvements that may be made across the supply chain. This section does not feed into any of the calculations and is therefore classified as optional.

Supply Chain Stages	Production (post-harvest)
Select main improvement *(crops-only)*	On-farm food processing (peeling and washing, pressing, drying…)
Select main improvement *(animal protein-only)*	
Other improvements	

Figure 5: Improvement details

2.1.5 Step 4: Post-improvement details

This section includes the key inputs that are needed by the tool to calculate food loss savings and emissions. All inputs must be provided for all supply chain stages activated in Step 2.

The user is required to provide the weight of the commodity under exam (in kilos or metric tonnes).[1] This value refers to the typical amount produced, transported, stored, etc. after the improvement measure(s) under exam have been implemented. The user must also specify whether the amount is reported as net of food losses (i.e., excluding food losses) or as gross (i.e., including food losses).[2]

Next, the user must provide the food loss rate observed <u>after</u> the improvements are implemented. The value must be reported as the percentage of food losses over the total amount.

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[1] For milk, the tool assumes a one-to-one relationship between litres and kilos.

[2] Consider the case in which User A knows that, out of 100 tonnes produced at the production, 10 tonnes are lost during harvest, therefore resulting in 90 tonnes of clean product. In this case the user can either report 100 tonnes and select the "No" option to indicate that this refers to the gross amount, or report 90 tonnes and select the "Yes" option to indicate that this refers to the net amount.

Similarly, the user should also provide the food loss rate observed <u>before</u> the improvements had been implemented, in order to calculate the food loss savings achieved. If this data is not available, the tool uses a default food loss rate based on food loss rates reported by the scientific literature and other food loss database (for more details see IFC Food Loss Calculator Methodology).[3]

Supply Chain Stages	Production (post-harvest)
Commodity total after the improvements*	100.00
Unit of measurement (kg, tonnes)*	Tonnes
Is amount reported net of food loss?*	Yes
Site/phase food loss rate after the project *(%)**	2.0%
Site/phase food loss rate before the project (%)	10.0%

^ Recommended input. If data is not available, leave blank.

Figure 6: Post-improvement details

2.2   Advanced User Inputs

This section includes all the optional inputs that can be provided by the user to improve the accuracy of the results by providing additional information.

Advanced Post-harvest Production details

At the production stage, the user can provide information on either: 1) the emission factor associated with the production of the commodity (and the percentage of emissions coming from CH_4 or N_2O emissions); or) the amount of synthetic nitrogen used during production (non-animal protein commodities only).

The former must include an equivalent scope of emissions as the default data (e.g. fertiliser manufacturing, fertiliser application, production fuel and crop residue treatment). Note that any values in the project-specific Nitrogen or yield boxes will be ignored if this option is used.

The latter is only available for crops and it is not visible for animal proteins. If the user knows how much synthetic fertilizer is used during the production and its composition this can be used as input here. Firstly, the user should input the Nitrogen amount contained within the fertilizer measured in kilograms (rather than the total amount of synthetic fertilizer used). Next, the user may select from a drop-down menu whether the amount of Nitrogen in the previous cell is per hectare or per tonne of production. Lastly, the user may input the crop yield as tonne per hectare. For example, if 100kg of

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[3] For cotton, eggs, and flour the food loss rate before the project is mandatory as no reliable data on these commodities is available.

4

synthetic fertiliser is applied with the composition: 25:20:10, then the input would be 25kg of nitrogen. It is normally expected that either both are left blank or both are populated. If only one value is provided, the tool calculates the corresponding value for the other input based on the scientific literature available on the relationship between nitrogen and yield. A warning is provided if the input values for Nitrogen or yield are outside of the range of options that are considered realistic, in which case it may be necessary to take expert advice on whether the project data is accurate.

Option a) Emission factor

Emissions per tonne	
% of CO2e coming from CH4	*0%*
% of CO2e coming from N2O	*0%*

Option b) Synthetic Fertilizer information

Nitrogen Applied to Synthetic Fertilizer	
Unit of Measurement for Nitrogen	*kg of Nitrogen per tonne of production (kg N/tonne)*
Yield per Year	

Advanced Transport (pre- and post-processing) details

At the transport stage, the user can provide information on the distance travelled by the commodity and either: 1) the emission factor associated with transport-related activities (either in terms of CO2 emissions per tonne.km or fuel efficiency of the fleet); or 2) additional details on the transport mode and conditions. The tool provides the default values used in the calculations in the absence of user inputs. These can be changed by simply populating the cells with a new input by typing a new value in the corresponding cell or using the drop-down lists provided.

Distance travelled by the merchandise in the selected country. *(If the dedicated storage site is the same as production put 0. Leave blank to apply the national average.)*

625.00

Please fill in data for one of the following options:

Option a) Emission factor

Emissions factor type

Trip emissions (kg CO2e/tonne.km)

Emissions factor value

0.08

Option b) Information on transportation mode

Transport mode	Truck
Fuel type	Diesel
Category	Average (all trucks)
Temperature control	Ambient
Road conditions	Fair

Advanced Storage (pre- and post-processing) details

At the storage stage, the user can provide information on either: 1) the emission factor associated with the storage of the commodity; or 2) details on temperature control; or 3) additional information for the time in storage and associated energy consumption. The tool provides the default values used in the calculations in the absence of user inputs. These can be changed by simply populating the cells with a new input by typing a new value in the corresponding cell.

Option a) Emission factor

Emissions per tonne

0.00

Option b) Information on temperature control

Is any dedicated storage ambient or temperature controlled, heated and/or chilled

Option c) Information on time in storage and energy consumption

Time in Storage	*3.5*
Electricity consumption	
Natural gas consumption	*0.00*

6

Advanced Processing details

At the processing stage, the user can provide information on either: 1) the emission factor associated with the processing of the commodity; or 2) additional information on the energy consumption associated with processing activities.

A) Emission factor

Emissions per tonne	0.56	tCO2e/tonne commodity

B) Energy consumption

Electricity consumption	1.09	kWh/tonne
Natural gas consumption	1.33	kWh/tonne

Advanced Retail details

At the retail stage, the user can provide information on either: 1) the emission factor associated with the retail activities associated with the commodity; or 2) additional information on the store type.

A) Emission factor

Emissions per tonne	0.04	tCO2e/tonne commodity

B) Store type

Store type	Superstore (1400 to 5000 m2)

Advanced Landfill details

In the landfill section, the user can provide information on the percentage of food losses going to landfill (excluding losses used as animal feed or composting) and either: 1) the emission factor associated with a tonne of commodity going to landfill; or 2) details on the landfill type and climate zone. The tool provides the default values used in the calculations in the absence of user inputs. These can be changed by using the drop-down lists provided.

Food losses going to landfill or thrown away along the supply chain (%) | 57%

A) Emission factor
Emissions per tonne of commodity going to landfill | 0.160 | tCO2e/tonne commodity

B) Landfill type and climate
Landfill Type
Climate Zone | Tropical, dry

2.3   Results

Once all these inputs have been entered, the model will calculate food losses and emissions avoided by the improvement for all value chain stages selected in section 2. The first row shows food losses avoided. Underneath, the improvement is calculated as the percentage improvement between the ex-ante and ex-post loss rates.

After, the tool provides a summary with the breakdown of GHG emissions saved by the improvement. The values are reported for carbon dioxide, methane, and nitrous dioxide. All emissions data is reported in tCO_2e.

The following section reports the amount of financial savings associated with the improvement (if the commodity price has been provided in section 1), and the equivalent land area saved (assuming that the increase in net product available due to the reduction in food losses would translate into less land needed to be cultivated).

Finally, the additional comment section explains how the food loss was estimated by the tool. The information reported depends on user inputs and data sources used in the calculation, and in particular:

- Which data source was used to estimate the amount of food losses saved (user input, FAO Food Loss database), and the level of granularity used (country/region and commodity/commodity group).

- If the ex-post loss rate is higher than the ex-ante loss rate, then amount of waste saved is reported as zero and a warning message is produced asking the user to provide a valid estimate.

	Production (post-harvest)
Avoided losses per year	9.07
Improvement	80.0%

Total GhG emissions saved per phase per year	**2.82**
Carbon Dioxide (CO_2) Emissions saved	1.99
Methane (CH_4) Emissions saved	0.83
Nitrous Oxide (N_2O) Emissions saved	0.00

Total financial savings	$ 907.03
Equivalent land area saved (hectares, crops only)	2.64

Additional comments	The results above are calculated using food loss rates reported by the user.