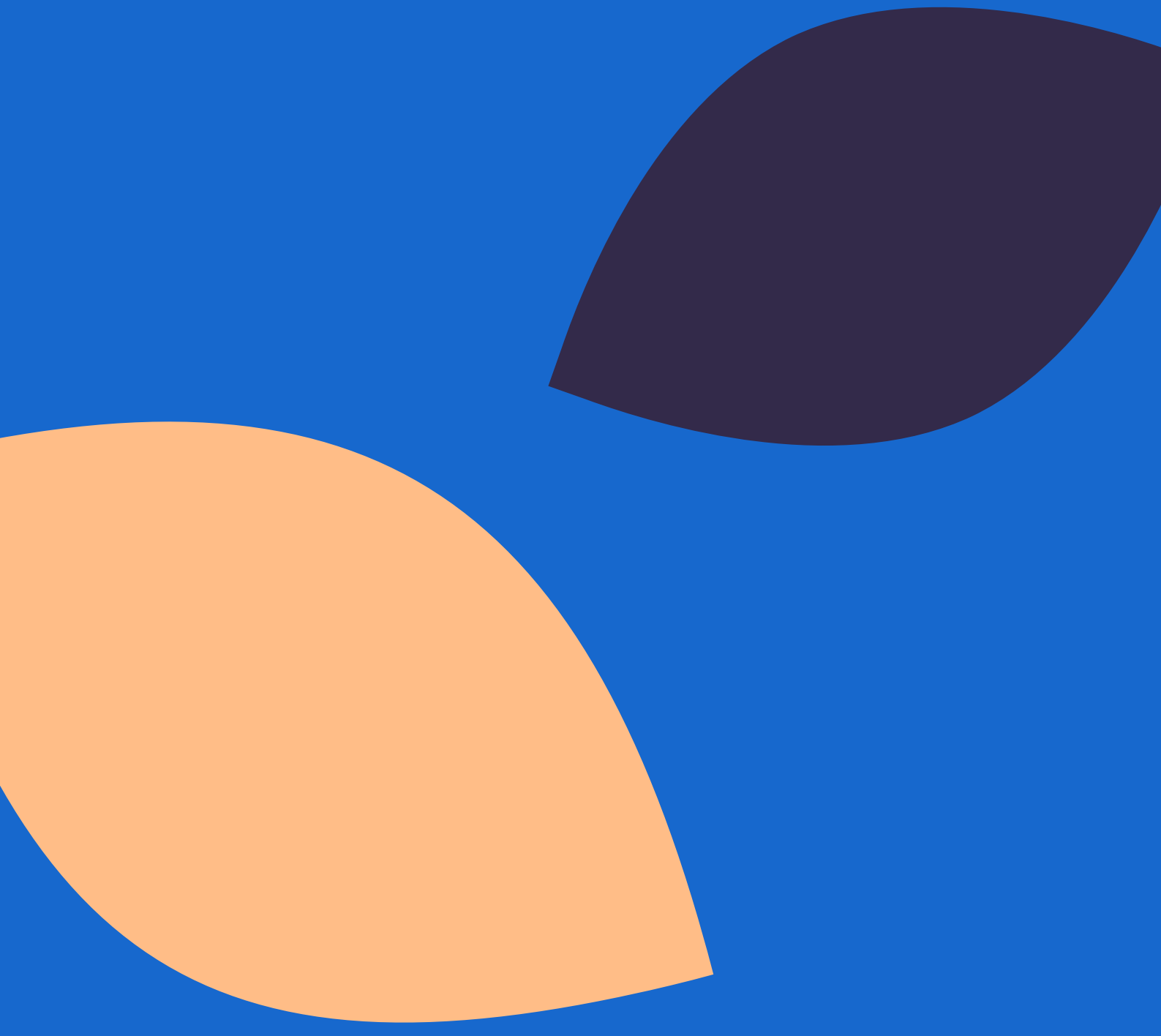


# Linking LCA and SDG 2

Goal 2. Zero Hunger



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## 2 Goal 2. Zero hunger

### 2.1 Introduction

Although the number of undernourished people has dropped significantly over the last few decades, hunger and malnutrition remain a barrier to development for many countries. This SDG aims to end all forms of hunger and malnutrition by 2030, ensuring that all people have sufficient and nutritious food all year round. There is a special focus on undernutrition of children, since this has severe short- and long-term consequences (Unicef, 2015).

Hunger and food security are the two main elements of this goal. Considering the goal of linking LCA indicators to this topic, it makes sense to look into cause-effect relations related to hunger and food insecurity. However, causes of hunger are complex and multidimensional. Ending malnutrition in all forms requires interventions in “food systems, public health, provision of safe water and sanitation, education, and social protection to guarantee the availability of and access to diverse diets; to reduce the susceptibility to disease; to improve the absorption of nutrients; and to increase consumer awareness of the importance of good nutrition” (FAO, 2015). This shows that both the demand as well as the supply side of food systems are important to consider. Economic growth and agricultural productivity are positively contributing to this goal, while environmental degradation, drought and biodiversity loss create food insecurity and thus are contributing negatively (UN, 2020, UNDP, 2020).

In order to further specify how LCA results can be linked to this goal, the next section presents the targets and indicators for SDG 2.

### 2.2 Targets and indicators of SDG 2

This SDG relates broadly to a number of issues that are at the foundation of hunger and food security. It has elements relating to ensuring sufficient supply as well as enough purchasing power with poor people on the demand side. So, the basic premise in achieving this SDG is to balance demand and supply. There is one somewhat outlying element and that is the issue of overweight (target 2.2), which of course does not relate to shortages but rather over consumption and unbalanced diets (another form of malnutrition). Table 2.1 provides an overview of the targets and the indicators.

Table 2.1. The targets and indicators defined for SDG 2

Target	Indicator
2.1 By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round	2.1.1 Prevalence of undernourishment 2.1.2 Prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale (FIES)

<p>2.2 By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons</p>	<p>2.2.1 Prevalence of stunting (height for age <math>&lt;-2</math> standard deviation from the median of the World Health Organization (WHO) Child Growth Standards) among children under 5 years of age</p> <p>2.2.2 Prevalence of malnutrition (weight for height <math>&gt;+2</math> or <math>&lt;-2</math> standard deviation from the median of the WHO Child Growth Standards) among children under 5 years of age, by type (wasting and overweight)</p>
<p>2.3 By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment</p>	<p>2.3.1 Volume of production per labour unit by classes of farming/pastoral/forestry enterprise size</p> <p>2.3.2 Average income of small-scale food producers, by sex and indigenous status</p>
<p>2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality</p>	<p>2.4.1 Proportion of agricultural area under productive and sustainable agriculture</p>
<p>2.5 By 2020, maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed</p>	<p>2.5.1 Number of plant and animal genetic resources for food and agriculture secured in either medium- or long-term conservation facilities</p> <p>2.5.2 Proportion of local breeds classified as being at risk, not at risk or at unknown level of risk of extinction</p>
<p>2.a Increase investment, including through enhanced international cooperation, in rural infrastructure, agricultural research and extension services, technology development and plant and livestock gene banks in order to enhance agricultural productive</p>	<p>2.a.1 The agriculture orientation index for government expenditures</p> <p>2.a.2 Total official flows (official development assistance plus other official flows) to the agriculture sector</p>

capacity in developing countries, in particular least developed countries

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2.b Correct and prevent trade restrictions and distortions in world agricultural markets, including through the parallel elimination of all forms of agricultural export subsidies and all export measures with equivalent effect, in accordance with the mandate of the Doha Development Round

2.b.1 Agricultural export subsidies

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2.c Adopt measures to ensure the proper functioning of food commodity markets and their derivatives and facilitate timely access to market information, including on food reserves, in order to help limit extreme food price volatility

2.c.1 Indicator of food price anomalies

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## 2.3 Classifying the links between SDG 2 targets and LCA impact categories

### 2.3.1 Target 2.1 and 2.2: ensuring safe, nutritious and sufficient food all year round and ending malnutrition

*Target 2.1: By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round.*

*Target 2.2: By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons.*

There are different environmental topics relevant in achieving this relating both to the demand and the supply-side of the topic.

#### **Environmental LCA:**

- **Climate change** is already affecting the reliability of food production in many areas through changing precipitation, and increased frequency of natural disasters.
- **Water deprivation;** competition for water resources can also have a very significant effect on the ability to irrigate and thus ensure regular supply of food

**Social LCA:** The ability to purchase sufficient amount of nutritious food is mainly reflected in social LCA. It can be described by the following PSM topics:

- **Workers remuneration** this topic relates to having a living wage plus some form of social security (Blakely et al., 2004). In order to be able to fight for a fair remuneration, freedom of association, absence of forced labor and child labor are important, but these

are more conditions that influence remuneration, and thus they are not seen as a condition.

- **Workers discrimination:** discrimination can result in under nourishment and stunting in vulnerable minority populations.
- **Workers work-life balance.** Without a reasonable balance and the right of woman to have sufficient time for breastfeeding, the risk of undernourishment and stunting increases with young children (Heymann et al., 2013, Ogbuanu et al., 2011).
- **Users, health:** While health is defined under SDG 3, some products contain micronutrients and vitamins that counteract stunting and nutrient needs of adolescent girls, pregnant and lactating woman and old persons
- **Users, inclusiveness:** Products containing ingredients that can prevent stunting (Micro Nutrients) in a way it reaches the most vulnerable groups can be seen as a contributor<sup>1</sup>
- **Small-scale entrepreneurs, meeting basic needs** being able to meet basic needs gives the opportunity to buy enough food for a
- **Small-scale entrepreneurs, woman empowerment.** If the position of woman in small scale entrepreneurs group is very weak, this could lead to undernourishment.

### 2.3.2 Target 2.3: Access to land, inputs, knowledge, finance and markets

*Target 2.3: “By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment”*

**Social LCA:** There is a number of topic that influence the elements in this target:

- **Users, effectiveness and comfort.** Products that are designed to make to increase the productivity of smallholder farmers and fishermen can significantly increase the productivity. For other small scale entrepreneurs, more efficient tools or for instance lighting, can increase their earning capacity.
- **Local communities, access to tangible resources.** Companies that share resources with the local communities are contributing to this target
- **Local communities, employment and skill development** in local communities, clearly addresses the element of knowledge transfer and also creating opportunities to be involved in the production of food.
- **Small-scale entrepreneurs, woman empowerment** empowering women provides them the possibility to produce agricultural products and create income
- **Small-scale entrepreneurs, meeting basic needs** enables farmers to also invest in their increasing their agricultural production

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<sup>1</sup> Note that in the Handbook inclusiveness is not meant to mean the opposite of discrimination, but rather the ability to get access of essential products and services to vulnerable and poor people

- **Small-scale entrepreneurs, access to services and inputs** This refers to the ability of all that are involved in the food production to gather knowledge, equipment and things like water, seeds and fertilizer
- **Small-scale entrepreneurs, land rights** without security that the farmer can keep the land, he or she will be hesitant to invest in improving the productivity
- **Small-scale entrepreneurs, fair trading relationships** Without being able to negotiate a good price, smallholders will not be able to invest and increase productivity

### 2.3.3 Target 2.4: Resilient agricultural practices

*Target 2.4: “By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality”*

**Environmental LCA:** there are several indicators that influence the productivity of food production:

- **Climate change** impacts the sustainability and resilience of food production systems
- **Water deprivation;** competition for water resources can also have a very significant effect on the ability to irrigate and thus ensure sustainable and resilient supply of food
- **Land use.** The EF3.0 indicator for land use measures soil quality. This is an important aspect for productivity of food production.
- **Acidification:** acidification has an effect of forests and vegetation, and consequently leads to damage to crops, and thereby influencing soil quality.
- **Terrestrial eutrophication:** eutrophication leads to damage to crops, and thereby influencing soil quality.

**Social LCA:** The social topics are identical to the ones listed under target 2.3 and are not repeated here.

### 2.3.4 Target 2.5: genetic diversity of seeds, plants, animals, including fisheries, and the fair and equitable sharing of the benefits of the resources

*Target 2.5: “By 2020, maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed.”*

This target refers to genetic diversity of seeds, plants, animals, including fisheries; this could somehow be reflected with the endpoint biodiversity as developed in ReCiPe and other endpoint methods. However, such endpoints are meant to reflect the biodiversity in natural and other systems, and not in protecting the diversity in seeds used in agriculture. While recognizing that biodiversity in natural systems can be a resource for increasing the biodiversity in seeds we think this link is too indirect.



### 2.3.5 Overview of links

In

Figure 2.1 the overview of the links between LCA impact categories and SDG 2 is shown.

Figure 2.1 Overview of links between LCA impact categories and SDG targets for SDG 2

## 2.4 Characterizing the relation between LCA and SDG 2

In this paragraph, the nature of the relation between the impact categories and the targets of SDG 2 are defined. This step determines the score needed to qualify as a contribution to a target, per target and impact category. The first section describes how environmental impact category indicator results can be linked; the second section does the same for social metrics.

### 2.4.1 Environmental LCA

Table 2.2 environmental topic linking to SDG 2

LCA impact category	Rationale	Requirements to be counted as a contribution to SDG 2	
<b>Climate change</b>	SDG target 2.1 and 2.4 Important threat to productivity and irregular food supply, due to extreme weather event and drought	+2	The environmental impact is a lot lower than the reference product (>10%)
		-2	The environmental impact is a lot higher than the reference product (> 10%)
<b>Water deprivation</b>	SDG target 2.1, 2.2 and 2.4 Water deprivation is likely to be a negative contributor to food production and malnutrition. This is particularly the case in regions with water scarcity.	+2	The environmental impact is a lot lower than the reference product (>10%)
		-2	The environmental impact is a lot higher than the reference product (> 10%)
<b>Land use</b>	SDG target 2.4 Land use relates to degradation of soil quality, which is an important aspect for food production.	+2	The environmental impact is a lot lower than the reference product (>10%)
		-2	The environmental impact is a lot higher than the reference product (> 10%)

<b>Acidification</b>	SDG target 2.4	+2	The environmental impact is a lot lower than the reference product (>10%)
	Acidification influences the quality of the soil, which is an important aspect for productive food production.	-2	The environmental impact is a lot higher than the reference product (> 10%)
<b>Terrestrial eutrophication</b>	SDG target 2.4	+2	The environmental impact is a lot lower than the reference product (>10%)
	Eutrophication influences the quality of the soil, which is an important aspect for productive food production.	-2	The environmental impact is a lot higher than the reference product (> 10%)

## 2.4.2 Social LCA

Table 2.3: Social topic linking to SDG 2

Stakeholder	Social topics	Rationale	Requirements to be counted as a contribution to SDG 2
<b>Workers</b>	<b>Remuneration</b>	SDG target 2.1 and 2.2 refer to having sufficient and nutritious food. This is strongly related to having purchasing power, which is then linked to having at least a living wage.	+2 All workers are paid a living wage and receive additional social benefits.
			-2 Not all workers are paid the legal or industry minimum wage.
	<b>Discrimination</b>	SDG targets 2.1 and 2.2 Particular relevant for the nutrition of young children if woman do not have equal access to nutrition, not enough time to provide	+2 The company or facility has a PDCA process in place to pro-actively promote non-discrimination. The commitments, performance, progress and effectiveness of programs are reported publicly. The top management of the company or facility have publicly recognized non-discrimination as a key priority.

	<p>breastfeeding or caring for their children.</p> <p>The promotion of non-discriminatory behavior could also influence the behavior of men against woman at home, and avoid violence at home</p>	+1	The company or facility has a PDCA process in place to pro-actively promote non-discrimination.
<b>Work life balance</b>	<p>SDG target 2.1 and 2.2</p> <p>Not being able to spend enough time for breastfeeding can cause stunting</p>	-2	<p>Hours worked in a normal working week, not including overtime, exceed 48 hours</p> <p>OR, if working hours are not registered,</p> <p>The company or facility takes no actions when the negative impacts are measured or obvious.</p>
<b>User</b>	<p>SDG targets 2.1 and 2.2</p> <p>While health is defined under SDG 3, some products containing micronutrients and vitamins that counteract stunting and nutrient needs of adolescent girls, pregnant and lactating woman and old persons</p>	+2	There is solid science-based evidence that normal use of the product enables and contributes to an improved health condition for users in comparison to alternative solutions, AND the company or facility has a continuous user-facing program in place to raise awareness and educate users on health-related issues associated with the product.
	<p>SDG target 2.1 and 2.2</p> <p>Relevant for companies that produce seeds, fertilizer, plant protection and agricultural equipment, and have special schemes to ensure the accessibility</p>	+2	The solution offered by the company is designed and marketed with the clear objective to give the most vulnerable groups in a society access to essential products and services at considerably lower costs than traditional solutions.
		+1	The solution offered by the company is designed and marketed to give all users access to essential products and services, including some of the vulnerable groups in a society.

	<b>Effectiveness and comfort</b>	SDG target 2.3 and 2.4 Products that are designed to make to increase the productivity of smallholder farmers and fishermen can significantly increase the productivity. For other small scale entrepreneurs, more efficient tools or for instance lighting, can increase their earning capacity	+2	There is science-based evidence or 3rd-party market research that the offered product or service solution improves effectiveness or comfort compared to standard solutions. The people using it report improved satisfaction.
			+1	The product is best in class in terms of effectiveness, efficiency or comfort, AND the company has a dossier or other evidence that shows how the product or service has been designed to maximize effectiveness, efficiency or comfort.
<b>Local communities</b>	<b>Access to tangible resources</b>	Target 2.3 and 2.4: Companies that share resources with the local communities are contributing to this target	+2	The company or facility has a PDCA program in place to address the local community's access to tangible resources (beyond the requirements set in the local laws). Commitments, performance, improvements and effectiveness of programs are disclosed publicly.
			+1	The company or facility has a PDCA program in place to address the local community's access to tangible resources (beyond the requirements set in the local laws).
			-2	Incidents of actual damage, adverse impacts or risks to the community's access to tangible resources have been discovered, but a corrective action plan with a timeline for completion has not been developed.
	<b>Employment and skill development</b>	Target 2.3 and 2.4 Companies that involve local people and encourage knowledge	+2	The policies and commitments are published, and a grievance mechanism is in place to handle complaints about how staff is selected and how the commitments are handled.

	transfer and also creating opportunities to be involved in the production of food.	+1	The company or facility has committed to a long-term program to grow local employment or at least keep the workforce stable. The company actively contributes to skill development in connection to its future need for staffing and the staffing of its subcontractors and smallholders.	
<b>Small-scale entrepreneurs</b>	<b>Meeting basic needs</b>	SDG target 2.1, 2.2, 2.3, 2.4	+2	Small-scale entrepreneurs' access to safe water sources, improved sanitation facilities and food security is regularly monitored to control whether the current conditions are not deteriorating.
		This has both a demand and supply side; not being able to satisfy basic needs could cause hunger; In case these entrepreneurs work in the food supply, this could lead to less productivity or farmers abandoning their fields and move towards cities	+1	Actions targeting small-scale entrepreneurs' basic needs are undertaken (awareness raising programs, best practices). Evidence indicates that > 80% small-scale entrepreneurs find the provided interventions useful.
			-2	A majority of the small-scale entrepreneurs does not have access to safe drinking water and improved sanitation facilities. Most of the small-scale entrepreneurs feel that they do not have a sufficient food supply throughout the year. Opportunities for improvement have not been identified. OR Local conditions and risks are not assessed.
	<b>Access to inputs and services</b>	SDG target 2.3 and 2.4	+2	Evidence indicated that the offered services and inputs are used by the majority of small-scale entrepreneurs.
		Defined as: The extent to which small-scale entrepreneurs have access to inputs such as credit, banking or a secure method for storing and saving money, good-quality seeds, and services such as ICT, electricity and infrastructure (e.g. roads, bridges, schools).	+1	>=80% of small-scale entrepreneurs are satisfied with the services and inputs offered
			-2	No actions (screening, evaluation, monitoring) have been taken to assess the local conditions and evaluate improvement opportunities OR Circumstantial evidence indicates that small-scale entrepreneurs' access to services or inputs is limited.

<b>Women empowerment</b>	SDG target 2.1, 2.2, 2.3 and 2.4: If the position of women in small scale entrepreneurs group is very weak, this could lead to undernourishment. Empowering these women enables them to generate income and be productive	+2	Evidence indicates that the thought practices are applied. The local situation is continuously monitored.
		+1	Most women believe that the offered activities are useful (correspond to their needs and interests).
		-2	The role of women in growing crops is not evaluated and recognized within the value chain, and no actions are undertaken to identify opportunities for gender-inclusive interventions  OR generic data sources indicate that female small-scale entrepreneurs' role is not recognized regionally.
<b>Land rights</b>	SDG target 2.3 and 2.4: without certainty that a farmer can keep the land, it will not be stimulated to invest in better agricultural practices	-1	Most of the small-scale entrepreneurs do not have documented legal rights to land  OR Evidence indicates that there is a substantial risk of land grabbing. Most the small-scale entrepreneurs think that their land rights are not secure.
		-2	Security of land rights is not monitored or known.
<b>Fair trading relationships</b>	SDG target 2.3 and 2.4 When farmers have no access to knowledge on price and quality standards, and a very weak negotiation position, they cannot be expected to invest in better agricultural practices	+2	Small-scale entrepreneurs can obtain premiums.
		+1	Actions are taken to encourage small-scale entrepreneurs to join collectives, cooperatives and associations/groups.
		-2	No assessment is conducted to understand small-scale entrepreneurs' perception and knowledge of price structure and quality standards.

## 2.5 Scoring matrix for SDG 2

Based on the tables above, the following summary can be made as a checklist for determining if the LCA results can support a contribution to SDG 2.

Table 2: Scoring matrix for determining whether the LCA results can indeed support SDG 2

SDG 2	Blocking	Contributing	
<b>Target 2.1 End hunger</b>			
Climate change	-2		+2
Water deprivation	-2		+2
Discrimination		+1	+2
Remuneration	-2		+2
Work-life balance	-2		
Health			+2
Inclusiveness*		+1	+2
Meeting basic needs	-2	+1	+2
Women empowerment	-2	+1	+2
<b>Target 2.2 End malnutrition</b>			
Climate change	-2		+2
Water deprivation	-2		+2
Discrimination		+1	+2
Remuneration	-2		+2
Work-life balance	-2		
Health			+2
Inclusiveness*		+1	+2
Meeting basic needs	-2	+1	+2
Women empowerment	-2	+1	+2

**Target 2.3 Agricultural productivity**

Effectiveness and comfort*			+1	+2
Access to tangible resources	-2		+1	+2
Employment and skill development			+1	+2
Meeting basic needs	-2		+1	+2
Women empowerment	-2		+1	+2
Access to basic services and inputs	-2		+1	+2
Land rights	-2	-1		
Fair trading relationships	-2		+1	+2

**Target 2.4 Resilient agricultural practices**

Climate change	-2			+2
Water deprivation	-2			+2
Land use	-2			+2
Acidification	-2			+2
Terrestrial eutrophication	-2			+2
Effectiveness and comfort*			+1	+2
Access to tangible resources	-2		+1	+2
Employment and skill development			+1	+2
Meeting basic needs	-2		+1	+2
Women empowerment	-2		+1	+2
Access to basic services and inputs	-2		+1	+2
Land rights	-2	-1		
Fair trading relationships	-2		+1	+2

\*link can be established under certain conditions (see section about the related target)



## 2.6 Literature

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