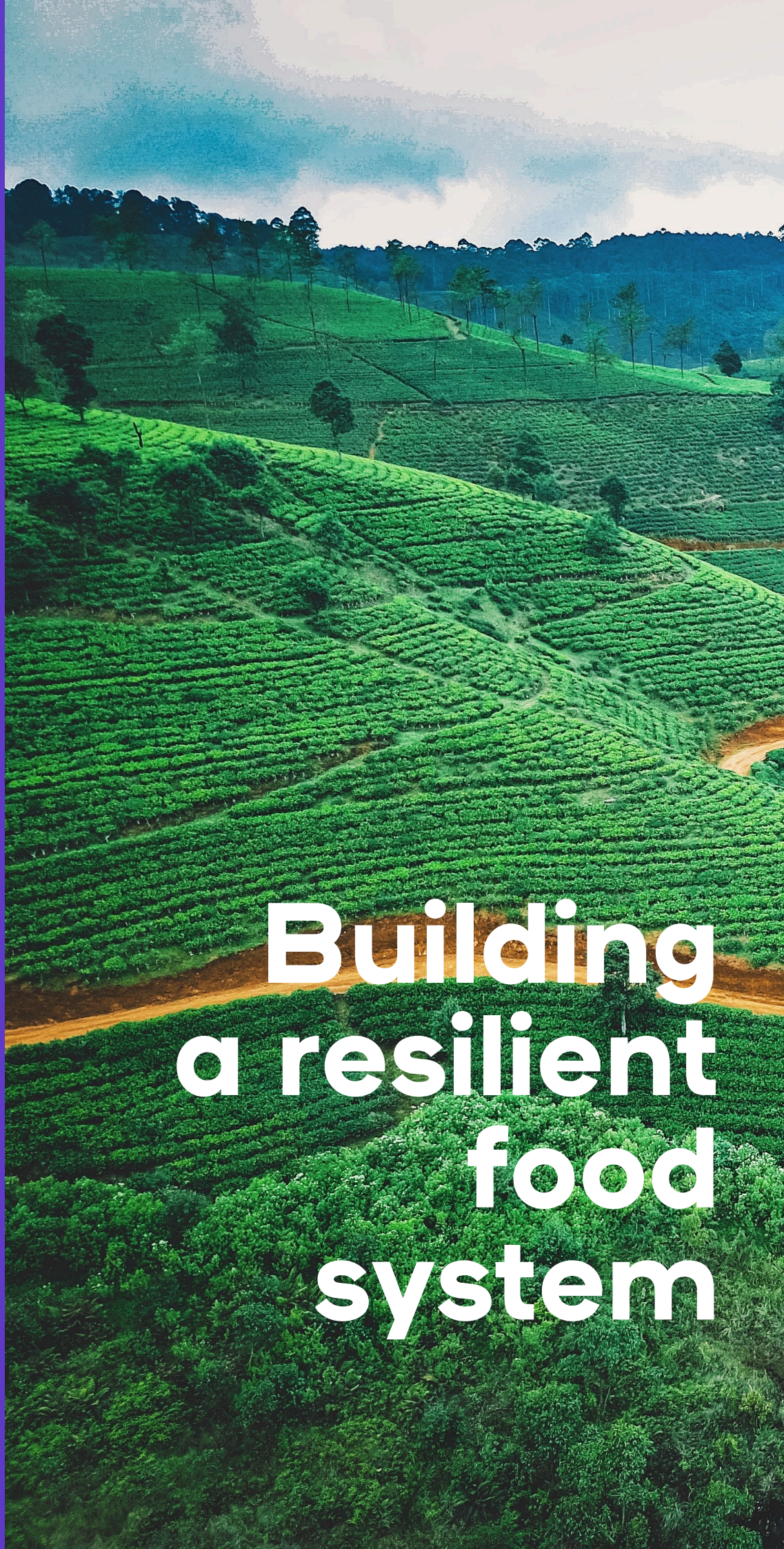
mandala impact capital report 2024



Building a resilient food system

mandala
impact
capital

2024

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OVERVIEW OF MANDALA CAPITAL

MISSION STATEMENT

We aim to create impact along the entire food chain that is both sustainable and scalable.

CORE VALUES

Sustainability:

All our investments and our investee companies' operations are planned and executed in a manner that meets the needs of the present without compromising the ability of future generations to meet their own needs. We also ensure that all our activities strike **a balance between economic, environmental, and social impact** so that they can be maintained in the long run.

Scalability:

We seek to build ventures with solid foundations and business models that have the ability to grow rapidly to manage growing market demands, in order to create maximum impact **in the most cost-effective and time-efficient manner.**

HOW WE INVEST

The investment team at Mandala Capital prides itself in **adopting a structured and comprehensive approach to evaluating investments** in agriculture, food, and food-related businesses. This approach has been developed and continuously refined for more than a decade, building upon more than 200 years of combined experience within the team.

1. THESIS DRIVEN

We are focused in our research, assessing companies against an expansive rubric through which we dive into a sub-sector level of detail, analyse industry trends and potential disruptions, and identify Mandala's unique value-add to the company. This results in stronger conviction, a better diligence process and greater understanding of the right business valuation.

2. DEAL CREATION

We forge strong relationships with the people behind the companies before we invest in them. This allows us to appreciate the nuances behind their strategic and operational decisions that are not captured in spreadsheets, empowering us to become better business partners.

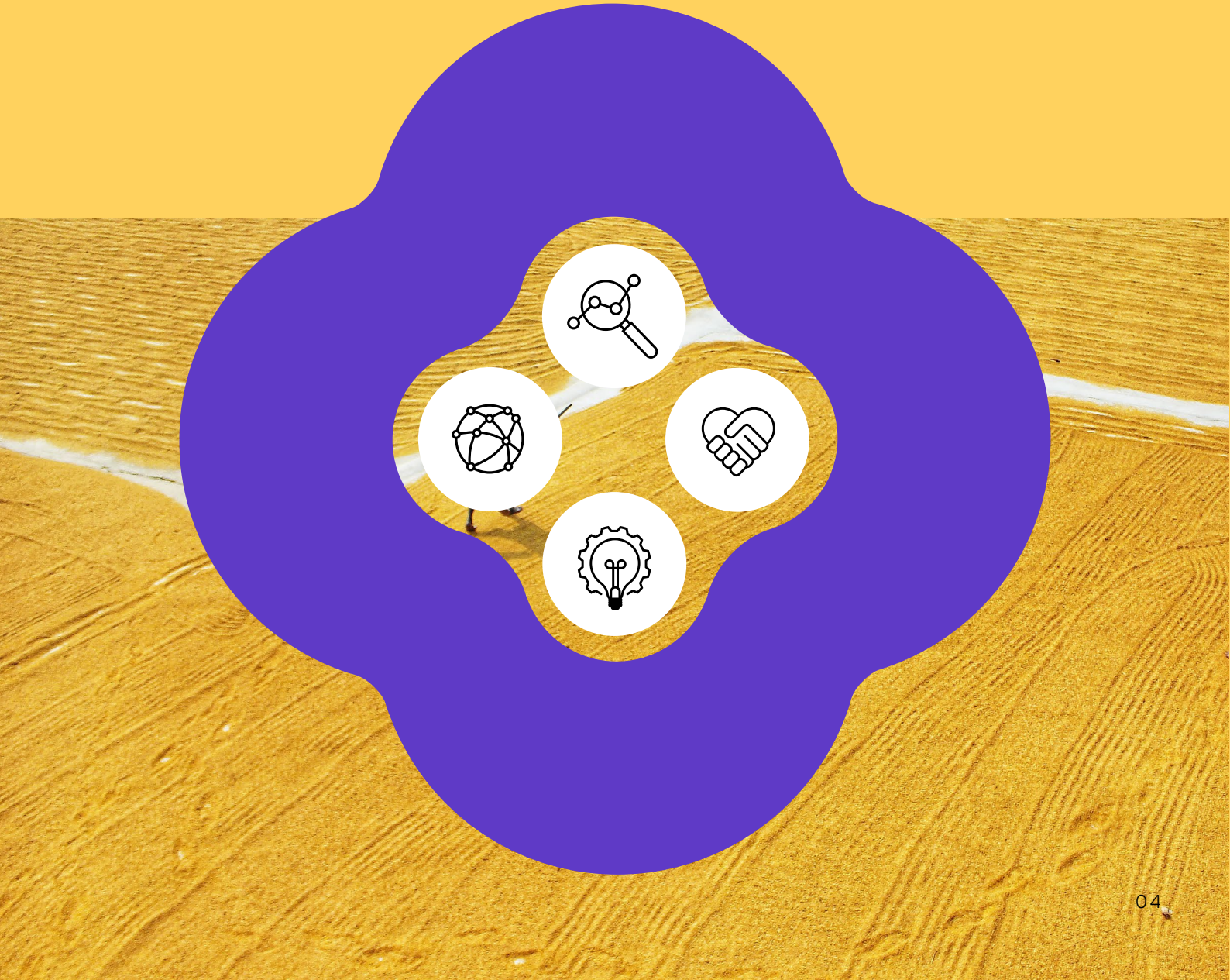
3. DEAL STRUCTURING

We are innovative and creative in deal structuring, providing solutions that are non-typical of private equity firms. Our ability to invest across the capital structure also ensures that we can meet the unique needs of the companies while ensuring stable returns for our investors.

4. VALUE CREATION

We are committed to adding value to every company's operational capabilities post-investment, with a focus on efficiency, capacity and governance. Our network of industry thought leaders and our knowledge of new frontiers empower us to do this effectively.

Through this rigorous approach, we are confident that every deal we are engaged in is **beneficial to our companies, our investors, and our world.**



MANDALA CAPITAL'S PORTFOLIO

Arcadia Biosciences

Arcadia Biosciences develops and commercializes agricultural traits and products that bring value to growers, processors and consumers, while benefitting the environment and enhancing human health.

www.arcadiobio.com

GK Cold Chain Solutions

GK Cold Chain Solutions is a full stack cold chain service provider with a growing network of cold warehouse facilities across India and an extensive fleet of more than 100 refrigerated vehicles, supported by IoT devices.

www.gkcoldchain.com

SAFL (exited)

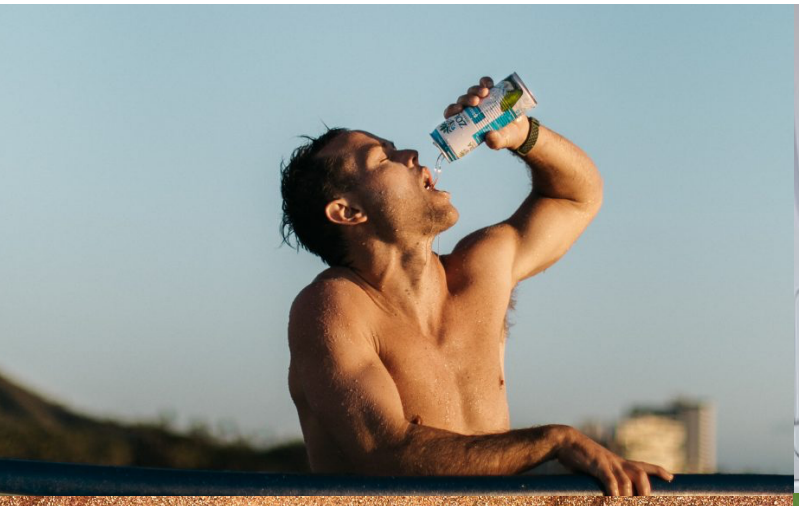
SAFL is the first private sector NBFC in India providing agri-loans with a wide and diverse range of financing options for almost every need of agricultural activity.

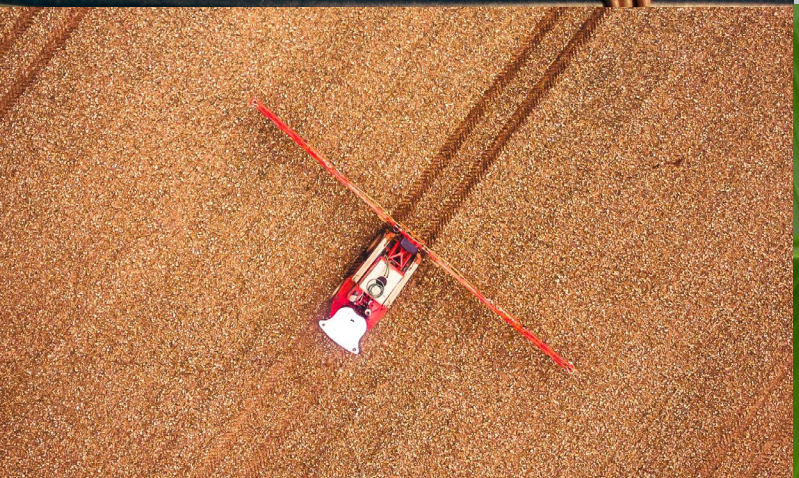
www.safl.in

Godavari Biorefineries

Godavari Biorefineries produces sugar, other foods, biofuels, chemicals, power, compost, waxes, and related products using sugarcane as the primary feedstock.

www.godavaribiorefineries.com





Jain Irrigation Systems

JIS is the largest drip irrigation company in Asia, and the 2nd largest globally. Its subsidiaries are also engaged in food processing, tissue culture, and solar appliances.

www.jains.com

Jain Farm Fresh Foods

Jain Farm Fresh Foods is a subsidiary of Jain Irrigation Systems engaged in food processing, including fruit pulps and concentrates, and dehydrated products.

www.jainfarmfresh.com

EFRAC (exited)

EFRAC is one of the largest integrated food testing and research facilities in India set to be the leading food safety solution provider offering a wide range of technical advice and consultation to the food industry.

www.efrac.org

Keventer (exited)

Keventer is a leading fast-moving consumer goods company business based in eastern India with a wide range of packaged, dairy, and fresh food products spanning across various brands with more than 90 SKUs.

www.keventer.com

IMPACT REPORTING PRINCIPLES

1. Measure and Report Outcomes, Not Just Output

Beyond stating our activities and investment portfolio, we seek to measure the extent to which value has been added to our investments, be it social, economic or environmental impact.

2. Analyse based on Context

We design every metric based on a deep understanding of our investees' background and experiences, derived from the strong, long-term relationship we have with the companies. Understanding the context ensures that our assumptions are sound and that our metrics are relevant.

3. Establish the Difference Made

We strive to measure accurately the incremental contribution Mandala's investments bring to the table. As such, in every metric, we take into consideration the extent to which the outcomes are a result of other factors (**Attribution**) or what would have happened anyway (**Deadweight**), as well as any unintended negative consequences or displaced benefits (**Displacement**).

4. Keep Impact Reporting Accessible and Universal

We translate all the impact created into a familiar, monetary unit and ratio that can be easily understood by all investors, regardless of background and depth of technical knowledge. We believe this will lower the barrier to entry for the impact investing space, encourage more investment, and in turn create even more impact within a shorter time.

5. Report Impact with Transparency

We openly share the calculations for each metric and make explicit the assumptions made. This allows all stakeholders to better evaluate the robustness of our impact measurements and hopefully, find the report more useful.

6. Constantly Learn and Improve

We maintain a posture of learning and openness to feedback, so that Mandala's impact reporting methodology can constantly improve, and its credibility can be established over time.

DEFINITION AND CALCULATION OF IMPACT

Based on the principles laid out above, this is how we define and **measure impact in monetary terms**:

[Impact]

= [Outcomes - Deadweight - Displacement]

x [Attribution]

[Impact per dollar invested]

= [Impact]

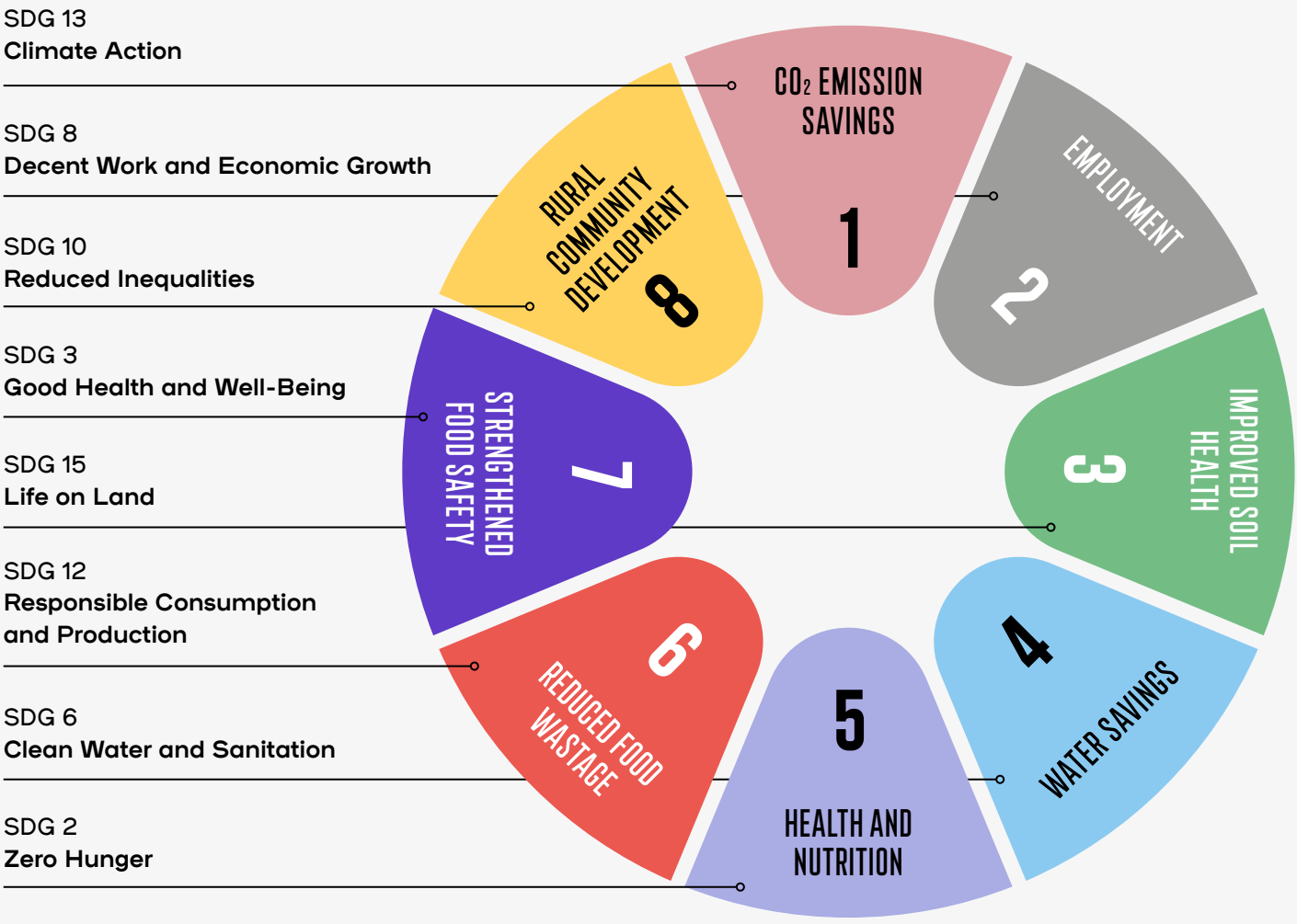
/ [Total investment adjusted to current values[1]]

This model does not distinguish between the effects of equity and debt.

(1)
Based on c. 2% p. a. inflation.

8 AREAS OF SOCIAL IMPACT - ALIGNMENT TO THE SUSTAINABLE DEVELOPMENT GOALS

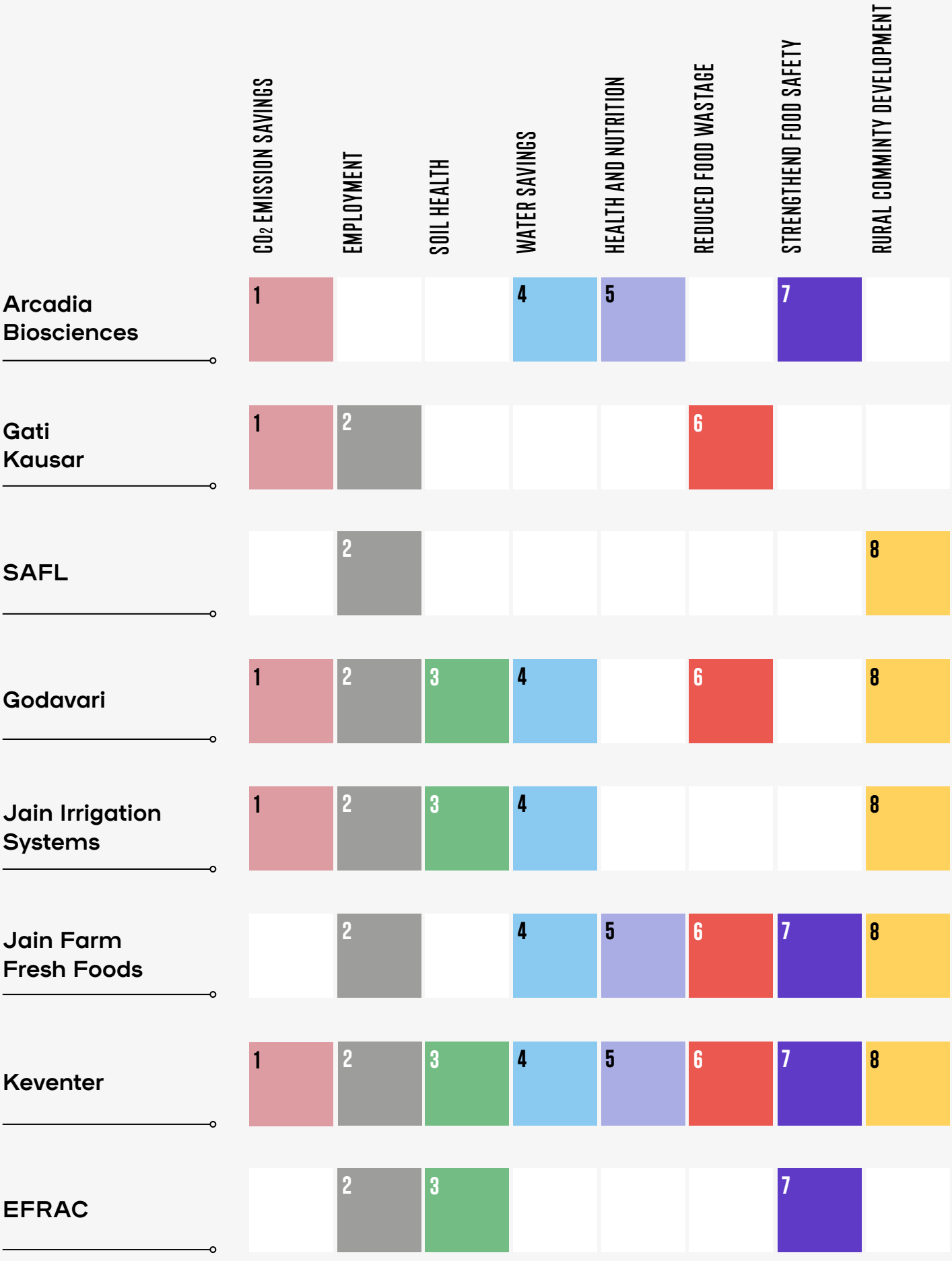
Through Mandala's investments and the efforts of its portfolio of companies, **we have identified these eight primary areas of social impact**:



Each of the eight areas is also **strongly connected to** at least one of **the 17 SDGs.**

Therefore, an alternative way of measuring and reporting Mandala's impact would be the amount of social impact contributed towards each of the SDGs. This can then be compared against UNDP's estimated funding gap required in the developing world to achieve the SDGs, which is USD $2.5 trillion.

SNAPSHOT OF IMPACT ACROSS OUR PORTFOLIO



SNAPSHOT OF OVERALL AGGREGATED SOCIAL IMPACT

The cumulative aggregate social value created by Mandala's investments to 31st Dec. 2023 is calculated to be at least **US $1,150,057,826** or 0.05% of the funding needed to achieve the SDGs.

Mandala's cumulative SRoI ratio stands at 5.3x. In other words, for every US$ 1 invested, approximately US$5.3 of social value has been created over the years across categories including water, the environment, food and nutrition, and livelihoods.

The breakdown of impact created across the 8 primary areas can be seen in Figures 1 and 2 below[2].

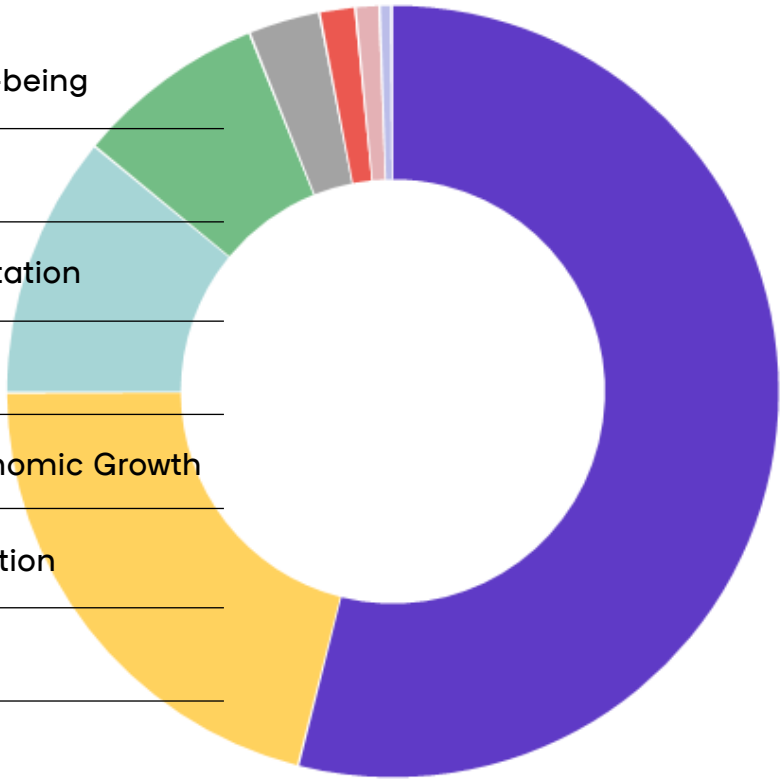
(2)
The impact figures do not include Jan-Dec 2023 numbers from Godavari Biorefineries Ltd (Godavari), Keventer Agro Limited (KAL) and Sustainable Agro-commercial Finance Limited (SAFL)

Figure 1 **Summary of Impact** created by Mandala Capital up to 31st December 2023

	Jan - Dec 2023		Cumulative	
Primary Area of Impact	**Total Impact** (US$ million)	**Impact per $ invested (SRoI)** (US$)	**Total Impact** (US$ million)	**Impact per $ invested (SRoI)** (US$)
CO_2 Emissions	0.01	0.00005	3.2	0.01
Employment	0.8	0.01	20.9	0.1
Improved Soil Health	0.002	0.00001	112.4	0.5
Water Savings	12.8	0.1	126.9	0.6
Health and Nutrition	0.04	0.0003	0.8	0.004
Reduced Food Wastage	0.2	0.001	4.8	0.02
Strenghtened Food Safety	25.3	0.2	632.0	2.9
Rural Community Dev.	17.6	0.1	249.2	1.1
TOTAL	**56.7**	**0.4**	**1,150.0**	**5.3**

Figure 2 **Portfolio Breakdown by SDGs**

55%	SDG 3	Good Health and Well-being
22%	SDG 10	Reduced Inequalities
11%	SDG 6	Clean Water and Sanitation
10%	SDG 15	Life on Land
2%	SDG 8	Decent Work and Economic Growth
0.4 %	SDG 12	Responsible Consumption
0.3 %	SDG 13	Climate Action
0.1 %	SDG 2	Zero Hunger



These monetary values were calculated based on the definition of impact described in Definition and Calculation of Impact and rely heavily on the data collected by Mandala's investee companies. Where estimates or assumptions were required to serve as proxy or to quantify impact, these are described in the subsequent pages to provide full disclosure and transparency behind the reported figures.

Despite efforts to be as accurate as possible in these calculations, as the measurement primarily focuses on tangible outcomes, many other benefits such as the improved well-being of individuals who gained employment, or whose communities were developed, and the second-order benefits to their families and children have not been quantified yet. This suggests that the impact calculations are likely to underestimate the true social value created by Mandala Capital and its portfolio of investees.

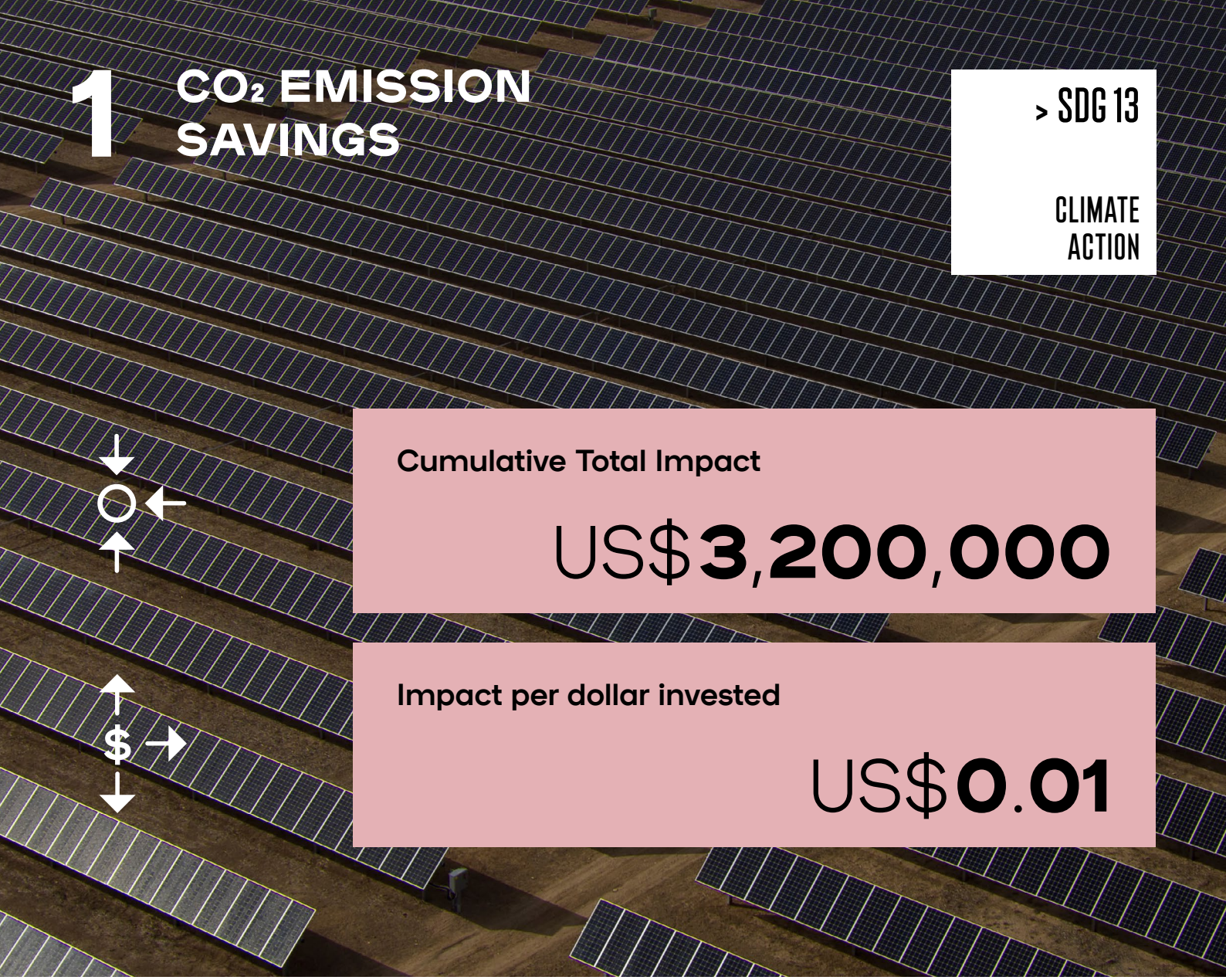
The team at Mandala Capital will constantly improve its impact measurement and reporting methodology, and continue to bring all stakeholders an increasingly reliable and meaningful report in the coming years.

The subsequent pages will cover each area in more detail, including how the impact figures were measured and calculated.

1 CO_2 EMISSION SAVINGS

> SDG 13

CLIMATE ACTION



Cumulative Total Impact

US$**3,200,000**

Impact per dollar invested

US$**0.01**

How we measure impact

This metric measures the value to the environment and the nation in terms of CO_2 emission savings earned by building and operating cogeneration (cogen) and solar plants and equipment compared to their conventional coal-fired counterparts.

This metric aggregates the environmental and economic damages avoided and the added financial benefit to the nation through the sale of carbon credits on emission trading schemes.

(Additional installed capacity of cogen plants
× %CO_2 emissions savings from cogen plants)
+ (Additional installed capacity of solar plants and equipment
× %CO_2 emissions savings from solar plants)

×

(Social costs per ton of CO_2 avoided during the period
+ Trade value per ton of CO_2 saved)

×

Average % equity stake and % debt share

=

IMPACT PER YEAR

Key assumptions

1. The amount of CO_2 emissions saved by cogeneration and solar plants compared to regular coal-fired plants is derived from international research studies,[3] which take into account the lifecycle of CO_2 emissions of the different sources of electricity, including the construction of the plant, its operation and maintenance, and the electricity generation (fuel combustion) process.

2. The social cost of each additional ton of CO_2 emitted is estimated to be US$37 according to past research studies,[4] calculated on the basis of decreased agricultural yields, harm to human health, and lower worker productivity due to climate change.

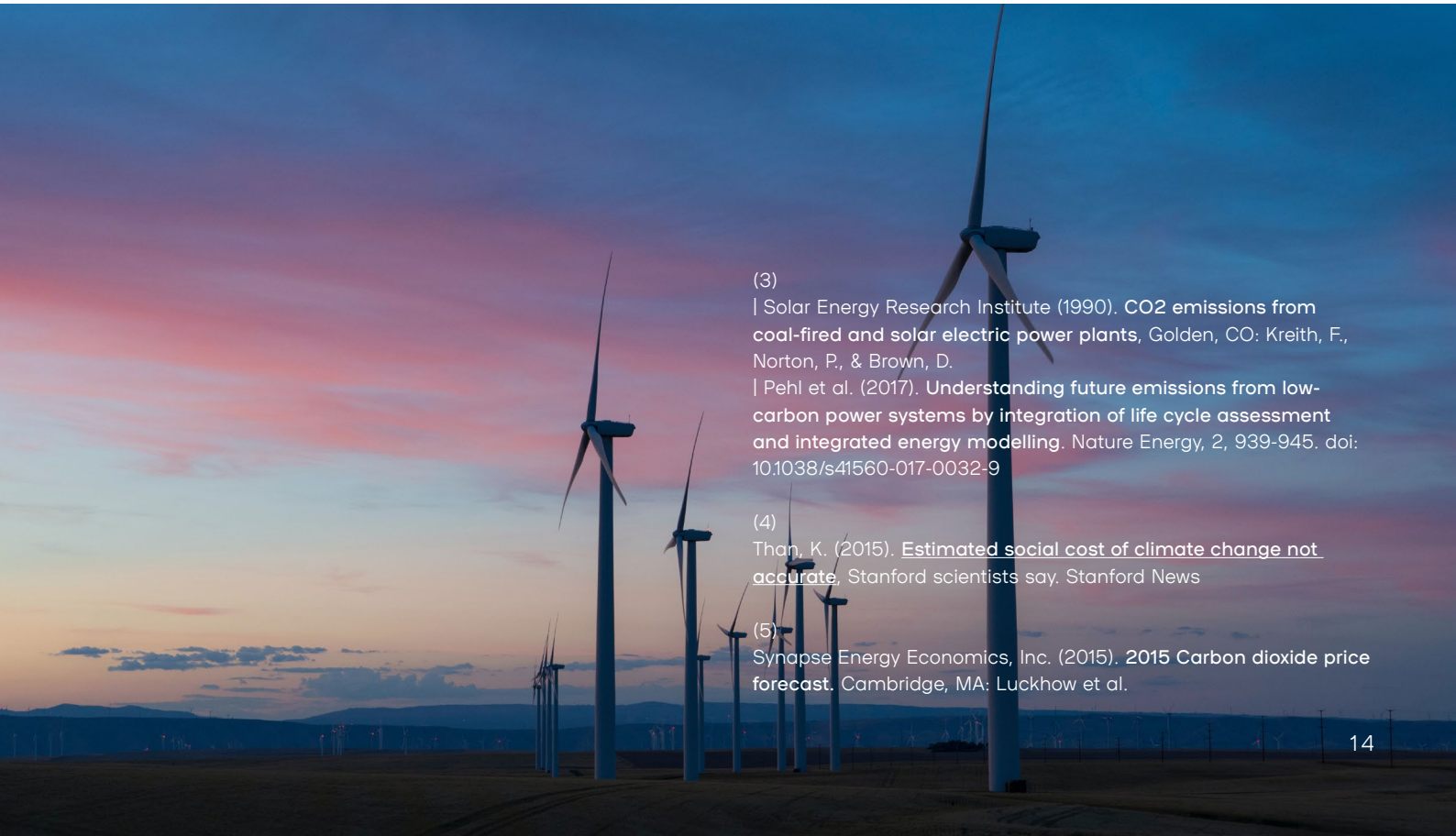
3. The value per ton of CO_2 traded is estimated to be US$20, based on the midcase CO_2 price forecast made on existing emissions trading systems.[5]

Impact analysis

Attribution of the impact is accounted for via the portion of Mandala Capital's equity stake and share of debt in the companies.

Deadweight is not applicable because the metric is calculated based on the savings in CO_2 emissions due to the technology used, in the absence of which there would be no carbon-saving measures in place.

There is also no need to separately account for **displacement** for solar plants and equipment in this metric as the CO_2 emissions produced in building solar plants or equipment is already taken into consideration when calculating the difference in lifecycle emissions. For cogen plants, as there are no reliable estimates of the amount of CO_2 produced in building a cogeneration unit or heat recovery system, the displacement component is not accounted for. However, this is not expected to be large and should not affect the impact figures significantly.



(3)
| Solar Energy Research Institute (1990). **CO2 emissions from coal-fired and solar electric power plants**, Golden, CO: Kreith, F., Norton, P., & Brown, D.
| Pehl et al. (2017). **Understanding future emissions from low-carbon power systems by integration of life cycle assessment and integrated energy modelling**. Nature Energy, 2, 939-945. doi: 10.1038/s41560-017-0032-9

(4)
Than, K. (2015). Estimated social cost of climate change not accurate, Stanford scientists say. Stanford News

(5)
Synapse Energy Economics, Inc. (2015). **2015 Carbon dioxide price forecast.** Cambridge, MA: Luckhow et al.

2 EMPLOYMENT

> SDG 8

DECENT WORK AND ECONOMIC GROWTH

Cumulative Total Impact

US$**20,900,000**

Impact per dollar invested

US$**0.1**

How we measure impact

This metric measures the value to the people who receive employment because of the companies' operations, made possible by the investment. This metric quantifies the additional income earned by the employees, after considering the income they would otherwise have received.

A discount factor equal to Mandala Capital's equity stake in the investee is also applied to more accurately account for the incremental value creation that occurred as a result of Mandala Capital's investments.

Total employee spend per year

- Employee spend on urban employees
- (25%

× Employee spend on male, rural and low-income employees)

- (17.5%

× Employee spend on female, rural and low-income employees)

×

Average % equity stake and % debt share

=

IMPACT PER YEAR

Key assumptions

1. Urban employees that were hired by Mandala Capital's investees are assumed to receive a similar wage compared to that they would receive from other employers; hence this amount is subtracted from the impact calculation.

2. Rural and low-income workers are defined as workers employed outside Tier 1 and Tier 2 cities and are on average expected to earn four times less than urban dwellers.[6] As such, we deduct only 25% of the spending on (male) rural / low-income employees to account for the incremental impact created.

3. According to India's Open Government Data Portal, the average agricultural daily wage rate for women is approximately 70% of men's wages.[7] Hence, we deduct 17.5% (70% of the 25% used above) of the employee spend for low-income female workers in the impact calculation.

Impact analysis

Attribution of the impact is accounted for via the portion of equity stake and share of debt Mandala Capital has in the companies.

To account for **deadweight**, expenditure on urban employees was deducted from the impact figure and discount factors were applied on the employee spend on rural and low-income employees.

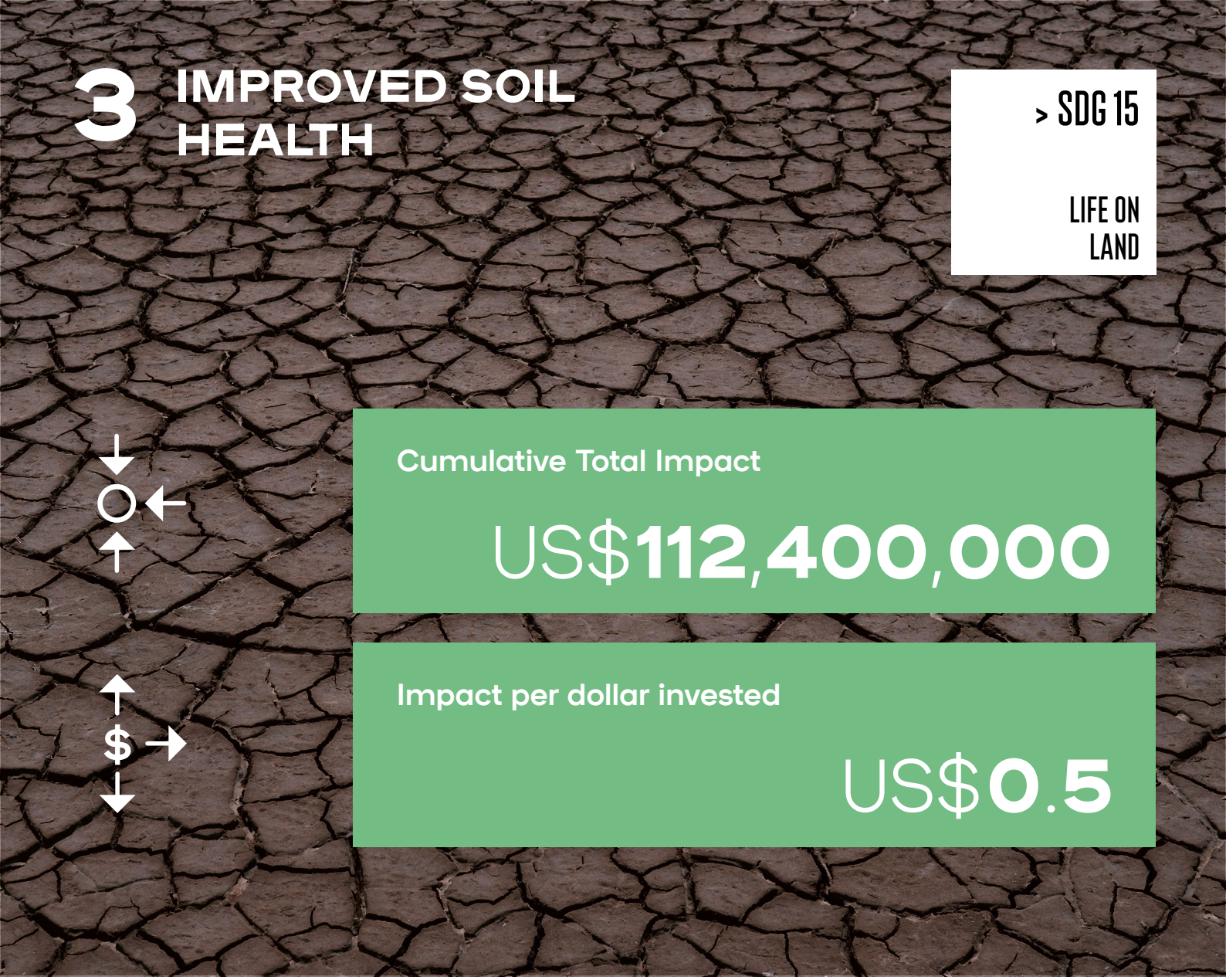
(6)
Datta, P. (2004, July 3). **The Great Indian Divide.** Frontline, 21(4), 28-31

(7)
Open Government Data (OGD) Platform India (2015). Average Agricultural Daily Wage Rate Rural in Rupees.

3 IMPROVED SOIL HEALTH

> SDG 15

LIFE ON LAND



Cumulative Total Impact

US$**112,400,000**

Impact per dollar invested

US$**0.5**

How we measure impact

This metric measures the value to the environment and the nation in terms of improved soil health by the soil testing activities performed by Mandala Capital's investees and their resulting recommendations and implementations to the tested land holdings.

This metric quantifies the incremental crop value as a result of extended soil fertility and improved health due to the soil testing services and resulting improvements in land management.

Acres of soil tested
- Healthy soil
- Severely damaged soil

×

Extension of soil life in years

×

Crop value per acre per year

×

Average % equity stake and % debt share

=

IMPACT PER YEAR

Key assumptions

1. According to national statistics provided by the Indian Council for Agricultural Research and the Indian Space Research Organization,[8] an estimated 30% of arable land is in very good health and 58% of arable land is severely damaged and would not return to a healthy state in the short term via agricultural management efforts.

Thus, we estimate that 12% of arable land are in the mild or early stages of degradation and can be easily reclaimed with proper agricultural management practices given the right information about the soil's nutrient levels.

2. Based on a previous case study of similar land management projects in India,[9] the outcome of implementing recommendations arising from soil testing can extend at least some proportion of damaged soil by 1 year. This is the value used to estimate the average life extension of the land sampled for testing.

Impact analysis

Attribution of the impact is again accounted for via the portion of Mandala Capital's equity stake and share of debt in the companies.

Deadweight is considered in the impact calculation by discounting soil that is irreversibly or severely damaged and cannot be reclaimed easily, as well as soil that is already healthy and will not receive significant quality improvements.

Displacement is considered negligible because the samples taken are small and have no expected negative impact on the soil health or the quantity/quality of crops produced.

There is much room for improvement for this metric to more comprehensively quantify the increase in crop value due to increased yields and improved food quality, but we are limited by the availability of data and local research to provide a reliable measure of such impact, which also differs based on the crop grown and environmental factors.

The value-add of stronger food security in the country and environmental impact of reduced fertilizer usage are also excluded in this impact calculation.

(8)
In "**Degraded and Waste Lands of India**" (2010), a report by the Indian Council for Agricultural Research and the National Academy for Agricultural Sciences, India is reported to have 141 million hectares of arable land, out of which 100 million hectares (71%) is under-going degradation. An article by Indian Space Research Organization estimates that 81 million hectares (58%) is experiencing desertification.

(9)
| Farming communities in India improve soil fertility and earn higher income. (n.d.). Source: undp.org
| Sustainable land and ecosystem management in shifting cultivation areas of Nagaland for ecological and livelihood security. (n.d.).

4 WATER SAVINGS

> SDG 6

CLEAN WATER AND SANITATION

Cumulative Total Impact

US$**126,900,000**

Impact per dollar invested

US$**0.6**

How we measure impact

This metric measures the value to the environment in terms of water savings earned by the technology utilized and activities engaged by Mandala's investees.

There are 3 main sources of water savings across Mandala's investees: drip irrigation technology (which uses up to 70% less water as compared to flood irrigation), rainwater harvesting, and water reuse and recycling. This metric quantifies the cost savings earned from the water that is saved.

(Meters of drip irrigation sold
× Average annual water savings per meter lateral)
+ (Cubic meters of water recycled or reused for gardening
× Cubic of water per cubic meter)

×

Average % equity stake and % debt share

=

IMPACT PER YEAR

Key assumptions

1. The average annual water savings per meter lateral is derived based on self-reported data from the investee companies, taking into account the land fallowing period and the monsoons.

2. The cost of water is derived from the typical water price in most major states of India, which is 15 INR (or US$ 0.21) per kilolitre.[10]

Impact analysis

Similar to previous metrics, **attribution** of the impact is accounted for via the portion of Mandala Capital's equity stake and share of debt in the companies.

Deadweight is considered negligible as there would be no water savings in the absence of the companies' irrigation projects or water conservation activities.

Displacement to the environment is also considered negligible; while many irrigation systems and projects could have consequences on the local water supply and soil salinity, the use of micro-irrigation systems by Mandala Capital's invested companies avoids these negative effects, bolstering confidence in the calculated impact figure.

In fact, the reported figure is likely to be a conservative estimate of the true impact created given that the cost of water in some cities is much higher than the typical price used. Furthermore, the positive spillover effects of the micro-irrigation projects undertaken by Mandala's invested companies on the environment and on the farmers have also not been included in this calculation.

(10)
| Gonsalves, O. (2018, Apr 5). India's industrial water rates and supply. | Merchant, T. (2014). To save water, pay for it. Forbes India.

5 HEALTH AND NUTRITION

> SDG 2

ZERO HUNGER

Cumulative Total Impact

US$**800,000**

Impact per dollar invested

US$**0.004**

How we measure impact

This metric measures the value added to the nation in terms of healthy fruits and vegetables sold to people due to Mandala Capital's investees' operations. This metric measures the monetary value of the food that is sold.

Tons of fruits and vegetables sold
× Average value of ton of food

×

Average % equity stake and % debt share

=

IMPACT PER YEAR

Key assumption

Based on inputs from the investee companies, the average value of 1 ton of food is taken to be Rs 500 (c. US$7.1).

Impact analysis

As there is no practical way to measure the differential impact of the consumption of specific foods on a person's health and well-being, it was not immediately feasible to calculate impact in terms of healthcare costs saved or stronger economic productivity due to avoided illnesses.

Consumption of food sold on the market cannot be tracked reliably as well. Hence, this metric simplifies the impact calculation to an aggregate of the market value of the healthy foods that are sold as a baseline proxy of the social impact of providing quality food to people.

As more literature and research is conducted, a more compelling and comprehensive calculation for this metric will be developed.

Attribution of the impact is accounted for via the portion of Mandala Capital's equity stake and share of debt in the companies.

Deadweight and **displacement** are both considered negligible here as it is unlikely that the amount of fruits and vegetables in people's diets are hitting a saturation point or that there is an over-supply of fresh, healthy produce that would lead to wastage.

6 REDUCED FOOD WASTAGE

> SDG 12

RESPONSIBLE CONSUMPTION & PRODUCTION

Cumulative Total Impact

US$**4,800,000**

Impact per dollar invested

US$**0.02**

How we measure impact

This metric measures the value added to the nation in terms of food wastage avoided due to Mandala Capital's investees' operations.

There are 2 primary methods used in preserving the food - cold chain technology and food processing. This metric measures the monetary value of the food that is preserved.

Cold chain capacity owned and leased
\+ (Reefer trucks owned and leased
× Average reefer truck capacity)
\- Portion of food double counted

×

% Food wastage avoided due to cold chain

+

Tons of processed food

×

% Food wastage avoided due to processing

×

Average value per ton of food

×

Average % equity stake and % debt share

=

IMPACT PER YEAR

Key assumptions

1. The average reefer truck capacity is derived based on self-reported data from the investee companies.

2. Based on investee companies' inputs, the average value of 1 ton of food is taken to be Rs 500.

3. The typical wastage incurred without cold chain technology or without food processing was then derived from secondary research and based on international and regional research sources.[11]

Impact analysis

Attribution of the impact is again accounted for via the portion of Mandala Capital's equity stake and share of debt in the companies.

Deadweight is not applicable here because the metric is calculated based on the food wastage avoided due to the preservation or processing technology used; in its absence there would be no measures in place to avoid such wastage.

Displacement could occur in the form of damaging nutrients in the food when undergoing processing - in that case, even though the physical form of the food is preserved, the nutritional and health value may be compromised. This is however considered to be low and severely outweighed by the increase in provision of food and food choices to consumers, especially in India which has a high (40%) post-harvest loss of fresh fruits and vegetables.[12]

Given that food processors can also add nutritional value to the food through their processing methods, the net value-add is considered to be positive. To avoid over-complicating the impact calculation, both the negative and positive impacts of processing on the nutritional value of food are not considered in the measurement.

(11)
| The International Institute of Refrigeration. (2009). **5th informatory note on refrigeration and food**. France.
| Asian Productivity Organization. (2006). **Postharvest management of fruits and vegetables in the Asia-Pacific region**. Italy: Rolle, R.

(12)
Asian Productivity Organization. (2006). **Postharvest management of fruits and vegetables in the Asia-Pacific region**. Italy: Rolle, R.

7 STRENGTHENED FOOD SAFETY

> SDG 3

GOOD HEALTH AND WELL-BEING

Cumulative Total Impact

US$**632,000,000**

Impact per dollar invested

US$**2.9**

How we measure impact

This metric measures the value added to the consumers in terms of illnesses or deaths avoided relating to foodborne diseases as a result of Mandala's investees' activities that strengthen food safety.

There are 2 primary activities involved in reducing consumers' exposure to contaminated food: cold chain technology and testing of processed foods. This metric measures the healthcare and economic cost savings of the avoided illnesses and deaths.

IMPACT PER YEAR =

(Market share of cold chain capacity owned and leased
× % Contamination risk avoided due to cold chain)
+ (Market share of reefer trucks owned and leased
× % Contamination risk avoided due to reefer trucks and market share of food tested)
+ (Market share of food tested
× % Contamination risk avoided due to reefer trucks and market share of food tested)

×

Estimated Indian population consuming packed or processed foods

×

Annual average healthcare spending on FBDs

×

Average % equity stake and % debt share

Key assumptions

1. The proportion of the Indian population consuming packed or processed foods is assumed to be 75%, based on estimates provided by the investees.

2. The contamination risk avoided due to cold chain technology, taking into account the contributions of each component in the cold chain process, and the contamination risk avoided due to testing of processed foods, is estimated based on findings from international research studies.[13]

3. The cost of illness/death is calculated via the human capital approach; total health-care costs for foodborne diseases (FBDs) in India in 2010 amounted to USD $1.8 billion for 100 million cases.[14]

Impact analysis

Attribution of the impact is again accounted for via the portion of Mandala Capital's equity stake and share of debt in the companies.

Deadweight and **displacement** are considered negligible. Deadweight could occur in the form of consumers being their own "guards" against eating spoiled food and hence avoiding contamination, but this is difficult to estimate. By implementing cold chain technology and setting up a food testing lab, there are no expected negative impacts created since food safety can only be improved.

One limitation of this metric is that it does not quantify the full societal impact of food testing. For instance, the economic costs of foodborne diseases and the losses in the agricultural and food sectors and the trade impacts are not accounted for in this calculation.

There are also other food safety initiatives, such as food safety clinics, conducted by Mandala Capital's investees which are challenging to include in the impact calculation. The impact that these could achieve in conjunction with testing and refrigeration would be much higher.

(13)
| Microbiological testing. (n.d.). **meatpoultryfoundation.org**
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8 RURAL COMMUNITY DEVELOPMENT

> SDG 10

REDUCED INEQUALITIES

Cumulative Total Impact

US$**249,200,000**

Impact per dollar invested

US$**1.1**

How we measure impact

This metric measures the value added to the rural community and people's lives because of the companies' operations and expenditures, made possible by the investment.

The metric quantifies the added income earned or credit obtained by the farmers, the additional capital expenditure investments in the rural areas, and the added CSR spending made by the companies.

(50%
× Payments made to farmers for purchases of goods)
- Market value of goods
+ Value of equipment sold to farmers
+ Credit extended to farmers
+ Capital expenditure investments in rural areas
+ CSR spending

×

Average % equity stake and % debt share

=

IMPACT PER YEAR

Key assumptions

1. Payments made to farmers are mostly done via the facilitation of farming contracts, where Mandala Capital's investee companies would pay the farmer either the current market price or the pre-agreed price, whichever is higher.[15] We have assumed the additional value-add to the farmers to be 50% of the total payments made.

2. For many farmers, the only alternative to the loans offered by Mandala Capital's investees are local moneylenders, whose credit terms are significantly worse: payment cycles are short, collateral and paperwork requirements are challenging to meet, and interest rates are high. Therefore, as farmers are unlikely to obtain any credit at equivalent terms otherwise, there is no deduction applied on the value of credit extended to farmers.

Impact analysis

Attribution of the impact is accounted for via the portion of Mandala Capital's equity stake and share of debt in the companies.

To account for **deadweight**, a generous estimate of the market value of goods was deducted from the impact figure. This however does not take into account the additional value-add of the income stability and increased profits that contract farming provides to the farmers.

Displacement from the capex investments is assumed to be negligible at present, given that the investments are greenfield projects and the factories are built on existing company-owned land or rented land - farmers are thus not displaced through this process. All environmental standards are also adhered to in these projects. The value of other small business activity that is crowded out or replaced by the capex spending cannot be estimated reliably and is thus omitted in this calculation.

The positive outcomes arising from the rural community development efforts of Mandala Capital's investees - such as improved individual and community well-being and stronger businesses - are also not included in the impact calculation, leading to an arguably underestimated impact figure.

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CASE STUDY
NUTRITION TECHNOLOGIES

In 2022, Mandala Capital launched Mandala Innovation, a new platform that aims to support early stage agritech companies with high potential through their journey from pre-profitability to profitability, scale and consolidation.

Through Mandala Innovation, we invested in Nutrition Technologies, a Singapore based company focused on the production of sustainable animal feed ingredients and biofertilizers.

The global population is estimated to reach **8.5 billion by 2030**, with consumption of fish and meat expected to increase significantly.

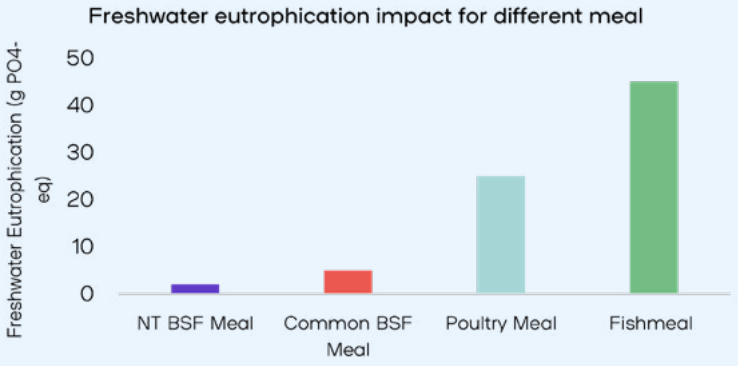
2 billion tonnes of animal feed will be required to satisfy growing demand every year. However, protein supply from traditional sources is forecasted to fall short by 150 million tonnes per year, in particular fishmeal.

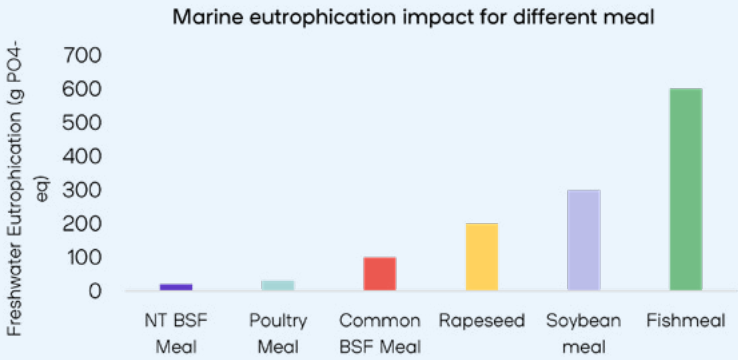
Scalable alternative protein sources are required to fulfil the growing demand for protein and in turns animal feed.

Nutrition Technologies has developed a proprietary insect farming, harvesting process and fermentation technology to bioconvert food waste into a high-protein ingredient, an organic fertilizer and an oil ingredient.

In this way, the upcycling of food production waste helps close the loop in the food system and create a circular economy.

SDG 14 **Life below water**





Nutrition Technologies uses feed formulas which contains less co-products from the agri-food industry, resulting in much lower eutrophication compared to other animal meal.

Freshwater eutrophication Impact:

BSF meal by Nutrition Technologies produces almost **78 times less phosphate than fishmeal** and **11 times less than poultry meal.**

Marine eutrophication impact:

Insect meal produced by Nutrition Technologies emits **63 times less nitrogen than fishmeal** and almost **37 times less than soya.**

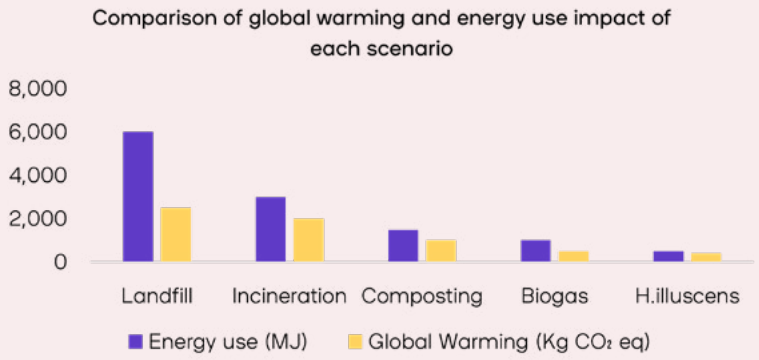
SDG 12 **Responsible consumption and production**

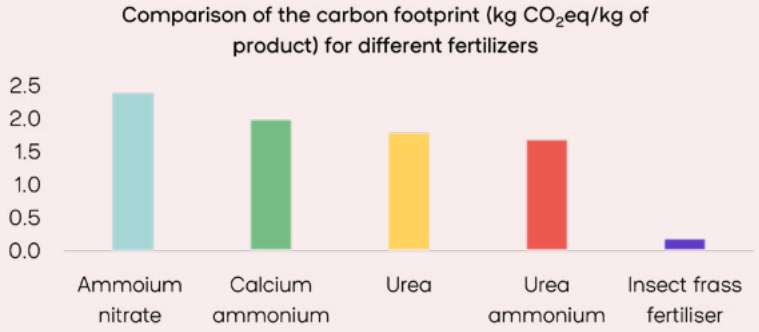
Bioconversion using BSF emits the least greenhouse gases and consumes the least energy compared to existing system.

On average the bioconversion scenario emits **17.5 times less CO_2 and** uses **9 times less energy** to recycle waste than using a landfill.

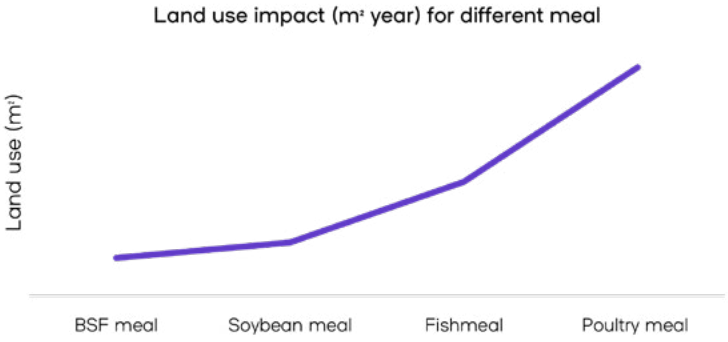
While composting creates similar value in resources via waste degradation, bioconversion **only takes half the energy** to do so, and creates **half the impact on acidification and eutrophication of freshwater.**

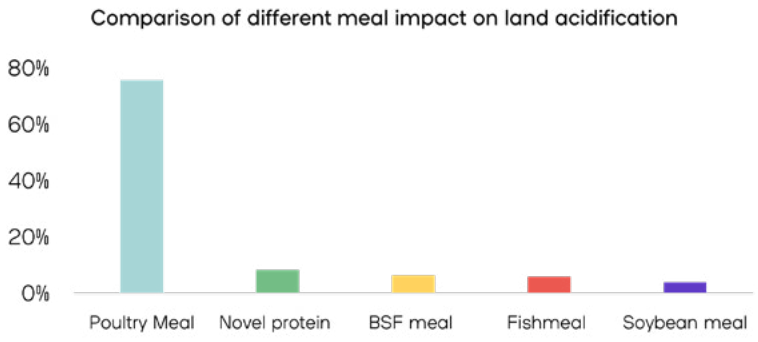
Assuming grains are produced wholly using BSF frass and that the BSF are fed with grain by-products, the carbon footprint of BSF fertilizer is **10 times lower than that of chemical fertilizers.**





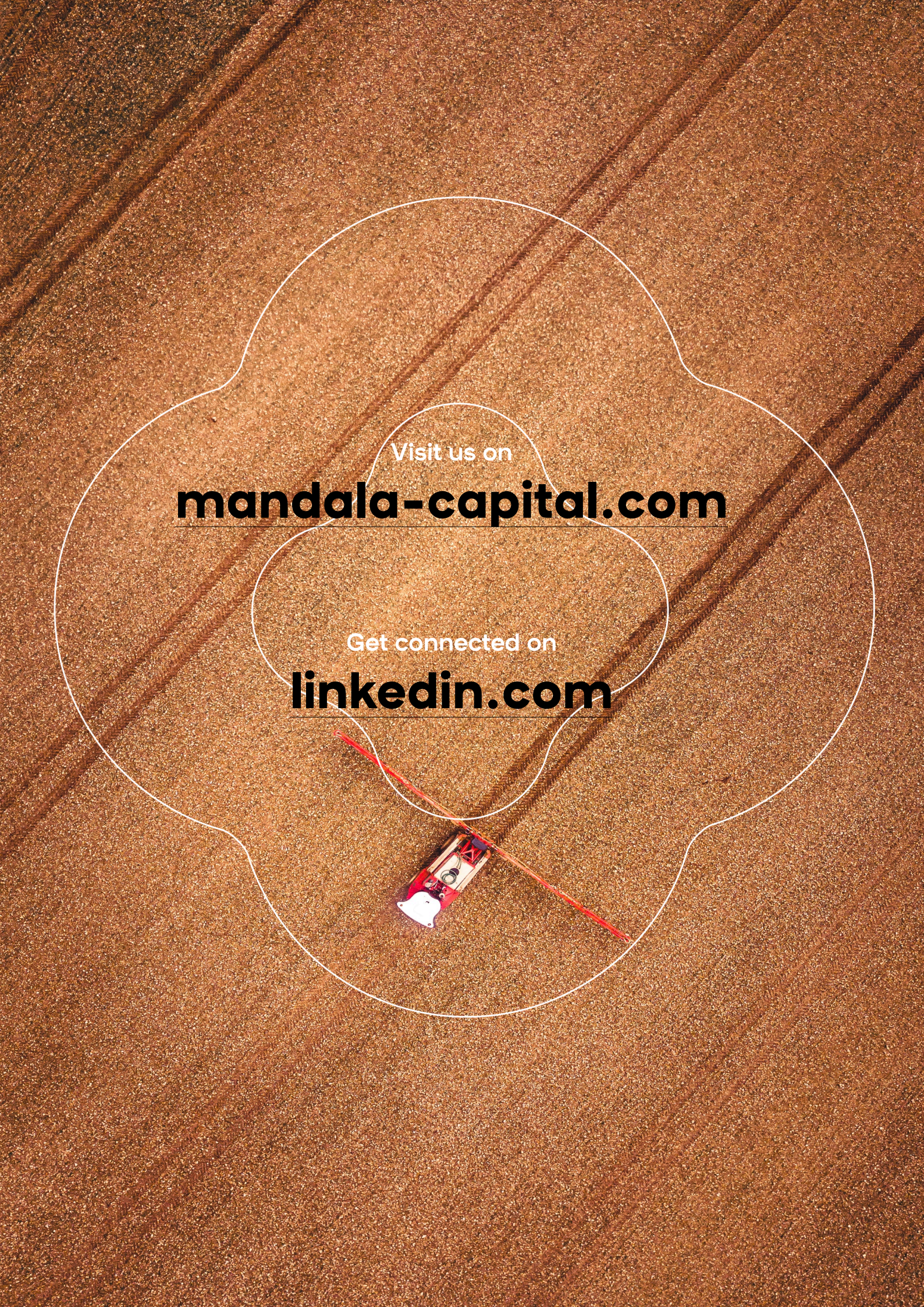
SDG 15 **Life on land**





Nutrition Technologies uses a vertical farming system which is highly land efficient, requiring significantly **less land compared to traditional protein production methods.**

In addition, the impact that BSF meal has on land acidification is more than **10 times smaller compared to poultry meal.**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