

GAIA  
IMPACT FUND

IMPACT  
REPORT  
2021



## About us

Gaia Impact Fund is a French venture capital fund created by a team of entrepreneurs specializing in renewable energy and impact investing. Our goal: to support sustainable and innovative initiatives to ensure affordable and reliable clean energy supply and efficient resource use.

This impact report summarises the progress made by Gaia and its partners during the first four years of its existence. This report combines the experiences of Gaia's investees in the field with the academic research findings to reach a deeper understanding of renewable energy's impact. In the report, we focus on two levels of impact: i) the impact of the Fund itself and ii) the impact our investee companies have on end-users. We coupled this data with targeted studies on subjects that have emerged as central, yet remain under-explored in Gaia's exchanges with entrepreneurs.

## Part 1 Gaia as an enabler of the global energy transition

## Part 2 The economic and social impact of our portfolio companies: a focus on the mini-grid and C&I sectors

## Part 3 Building a carbon emissions framework: Gaia's commitment to a green, low-carbon economy

## Part 4 Solar Home Systems portfolio: an essential service displaying adaptability and resiliency during the Covid crisis

About us	2
Table of contents	3
Foreword	4
Table of figures	5
Definitions : What do we mean by...	6

### Striking a balance between economic, social and environmental impact: why we decided to become a mission-driven company

What is a mission-driven company?	9
Why Gaia decided to become a mission-driven company	10
The path towards responsible missions	10

### 7 portfolio-level KPIs to better reflect our core missions going forward

Why Gaia decided to increase its number of KPIs to track portfolio company performance	12
	12
Gaia in figures	15
Map	16
Portfolio map	18

### Foreword: why documenting MSMEs is crucial to active impact investors

	19
--	----

### Energy challenges are hampering growth prospects of MSMEs across Sub-Saharan Africa and Southeast Asia

	20
--	----

### Formal, informal, small and large businesses: distinct characteristics, common struggles

	22
--	----

### A general theory of change describing the social and economic impact of better energy access for MSMEs

	24
--	----

### Key outcomes in our theory of change

Driving job creation - bridging economic and growth and poverty reduction	29
Value chain development	30
Advancing women's empowerment	32
Increased profit and productivity	34

### Solar Home Systems: introducing clean energy access

	42
--	----

### Mini-grid: a long way away from standardizing measures needed to calculate environmental impact

	43
--	----

### C&I companies

	44
--	----

### Desalination solutions

	46
--	----

### UpOwa: Healthcare

	52
--	----

### Hybrid Social Solutions: Education

	52
--	----

### Solaris Offgrid: Communications and access to information

	53
--	----

### Hybrid Social Solutions: Check Points as one of the major controls in stopping the spread of COVID-19

	54
--	----

## Foreword

Impact investments, as defined by the Global Impact Investing Network (the GIIN) in 2009, "are investments made into companies, organizations and funds with the intention to generate measurable social and environmental impact alongside a financial return<sup>1</sup>.

Over the last few decades, impact investing has become an increasingly discussed topic in both business and public policy, especially after the global financial crisis of 2008.

While the terminology used by investors varies greatly, impact investing is an umbrella term that includes such concepts as sustainable investing, SRI (Socially Responsible Investing), and ESG (investing in companies that operate with best Environmental, Social and Governance practices).

Gaia Impact Fund focuses on "evidence-based impact investments" with the expected range from below market- to market- return in early-stage companies with the purpose of helping its portfolio companies thrive while realizing their social and environmental impact.

Published in 2019, our first impact report specifically focused on the Solar Home Systems sector and the impact five of our portfolio companies made, exploring in considerable depth the companies' sustainable footprint within local communities in Sub-Saharan Africa and South-East Asia. This year we chose a thematic approach to present the impact of our portfolio companies.

The first section of this report is dedicated to the French concept of the mission-driven company, which is used in different ways across the world and has recently been implemented in French law. Gaia has officially adopted this status. We also share the reasons why we implemented new KPIs in 2021 and how they support our missions.

The second part of the report focuses on the role of Mini-grid and C&I sectors, as well as the impact access to clean and affordable energy introduced by companies in our portfolio has on SMEs. We included this section because we are convinced that SMEs play an essential role in fostering growth and promoting economic activity worldwide. We share our findings and research on the impact of clean energy in local communities and SMEs in Sub-Saharan Africa and South-East Asia, summarizing them in our theory a change.



In the third section of the report, we outline our progress in accounting for carbon emissions avoided by companies from diverse sectors. We therein present our views on various methodologies used by the companies in our portfolio to calculate their environmental impact. The final section of the report is dedicated to assessing COVID-19's impact on the companies in our portfolio and the solutions they offered to ensure economic stability, as well as improve the lives of local communities in Sub-Saharan Africa and Southeast Asia during the health crisis.

From field experiences to analytical studies this impact report presents the complex variety of social and environmental impacts of our activity in emerging countries.

Energy access, energy poverty are major challenges of our time and along with the COP21 declarations, we are convinced that significant private investments in those sustainable development projects are essential for powering economic activities and providing a just, healthier and more prosperous future for all.

Modern renewables and energy efficiency are pillars of a clean energy transition that supports development.

**Hélène DEMAEGDT, President of Gaia Impact Fund**

## Table of figures

Figure 1: Key statistics on electricity access in Sub-Saharan Africa and South Asia	20
Figure 2: Number of MSMEs by formality globally and in developing economies	21
Figure 3: Number of MSMEs by formality globally and in developing economies	22
Figure 4: Proposed theory of change describing the impact of better energy access for MSMEs	34
Figure 5: Energy to and from the food value chain	31
Figure 6: Effects of use of electricity	34
Figure 7: Global Greenhouse gas emissions by sector (WORLDWIDE)	38
Figure 8: The GHG Protocol's division of greenhouse gas emissions into scopes	40
Figure 9: Baseline and project scenarios for the methodology	44
Figure 10: Baseline and project scenarios for the methodology	45

<sup>1</sup> Global Impact Investing Network, <https://thegiin.org/impact-investing/need-to-know/#what-is-impact-investing>

# Definitions:

## What do we mean by ...

### Access to energy

The International Energy Agency defines household access to energy as a gradual process: it refers to «a household having reliable and affordable access to both clean cooking facilities and to electricity, which is enough to supply a basic bundle of energy services initially, and then an increasing level of electricity over time to reach the regional average<sup>2</sup>». Access for all to clean and affordable energy has been defined by the United Nations as one of the Sustainable Development Goals to be achieved by 2030.

### Assessing and reporting on impact

Impact assessment seeks to identify, quantify, and attribute changes to the activities of its stakeholders. More insight is collected when impact assessment goes beyond this factual approach to focus on the value attributed to changes made by end-users and society. As such, impact assessment can be used to identify the most effective means of action and how the impact of an activity can be improved<sup>3</sup>.

**Avoided carbon emissions** are emissions that would have been released if an action or intervention hadn't taken place.

### Household enterprise

Non-farm enterprise that is operated by a single individual, or with the help of family members.

### Impact fund

A fund that puts social and environmental benefits at the center of its mission. For example, Gaia uses private investment to finance market-based solutions when representing a viable and sustainable solution to social and/or environmental problems.

### Mission-driven company («société à mission»)

As defined in French PACTE law<sup>4</sup>, a mission-driven company is a new type of enterprise that statutorily includes a social or environmental purpose in addition to profit-making.

### Decentralized solar energy

The production of electricity through small or medium-sized solar installations, which may or may not be connected to the grid. The companies in which we invest offer several types of solutions, adapted to several levels of need in various local situations:

- *Pico-scale solar kits. These small solar devices include a battery, a solar panel, one or more bulbs and often a telephone charging port. They are used as a direct replacement for kerosene or battery-powered lamps.*
- *Solar Home Systems (SHS). With a power typically ranging from 5Wp and 200Wp, these kits are installed on the roof of a building and can power several light bulbs, recharge phones, and sometimes be connected to other devices such as televisions or refrigerators.*
- *Solar installations for commercial and industrial use. These installations can reach several hundred kWp and significantly reduce the carbon footprint of industrial or commercial activities.*
- *Mini-grids. These small-scale distribution systems, ranging from 10 kW to 10 MW, provide local electricity supply to a group of customers, alongside or independently of the national grid.*

### Pay-as-you-go

Pay-as-you-go refers to a credit mechanism through which the customer pays a down payment in order to benefit from the product, followed by a regular payment charged on weekly or monthly basis up until the product is fully paid for, thus lowering the upfront cost of SHS and rendering products more affordable to low-income customers.

### Off-grid households

Access to energy is a central issue for households that are not connected to the national grid. Most of these households are located in rural areas and rely on more expensive, often polluting energy sources. Households with unreliable access to the grid face similar concerns.

### Productive uses

Productive uses can be defined as «agricultural, commercial or industrial activities relying directly on electricity to produce goods or services ». While more powerful devices offer further opportunities, the entire range of off-grid solar devices have the potential to be used in a productive way.

### Social and environmental impact

Social and environmental impact refers to the overall effect of an activity on society<sup>5</sup>. These effects include both direct benefits to end-users, and indirect economic and environmental influences. Impact measurement doesn't only focus on the immediate outcomes of the activity; it attempts to capture the long-term results of a project, which are harder to assess.

### Scope 1 GHG emissions

Direct emissions emanating from stationary or mobile installations situated within the organizational boundary, i.e.: emissions from sources owned or controlled by the organization, such as combustion from stationary and mobile sources, industrial processes excluding combustion, emissions from ruminants, biogas from landfill centers, refrigerant leakages, nitrogenous fertilizers, biomass, etc.

### Scope 2 GHG emissions

Indirect emissions associated with the production of electricity, heat or steam imported for the activities of the organization.

### Scope 3 GHG emissions<sup>7</sup>

The other emissions indirectly produced by the activities of the organization which are not accounted for under Scope 2 but which are linked to the overall value chain, such as: the purchasing of raw materials, services or other products; employee travel; upstream and downstream transportation of goods; the management of waste generated by the activities of the organization; the use and end-of-life of sold products and services; the amortization of production goods and equipment, etc.

<sup>2</sup> International Energy Agency, « Energy Access Outlook 2017: From poverty to prosperity », World Energy Outlook Special Report, 2017, p.21.

<sup>3</sup> Ibid. p.14.

<sup>4</sup> <https://www.economie.gouv.fr/loi-pacte-croissance-transformation-entreprises>

<sup>5</sup> Benjamin Attigah and Anna Brüderle, "Productive Use of Energy - PRODUSE, A Manual for Electrification Practitioners" (GIZ, 2011), [http://www.euei-pdf.org/sites/default/files/field\\_publication\\_file/150907\\_euei\\_productive-use-manual\\_rz\\_04\\_web.pdf](http://www.euei-pdf.org/sites/default/files/field_publication_file/150907_euei_productive-use-manual_rz_04_web.pdf).

<sup>6</sup> Thierry Sibieude and Céline Claverie, "La mesure de l'impact social" (CSESS, 2011), [https://www.avise.org/sites/default/files/atoms/files/20140204/201112\\_CSESS\\_Rapport\\_ImpactSocial.pdf](https://www.avise.org/sites/default/files/atoms/files/20140204/201112_CSESS_Rapport_ImpactSocial.pdf).

<sup>7</sup> [https://www.bilans-ges.ademe.fr/en/accueil/contenu/index/page/corporate\\_reporting/siGras/](https://www.bilans-ges.ademe.fr/en/accueil/contenu/index/page/corporate_reporting/siGras/)

## Part 1 Gaia as an enabler of the global energy transition

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### Striking a balance between economic, social and environmental impact: why we decided to become a mission-driven company

What is a mission-driven company?	9
Why Gaia decided to become a mission-driven company	10
The path towards responsible missions	10

### 7 portfolio-level KPIs to better reflect our core missions going forward

11

Why Gaia decided to increase its number of KPIs to track portfolio company performance	12
--	----

### Gaia in figures

15

### Portfolio map

16

## What is a mission-driven company?

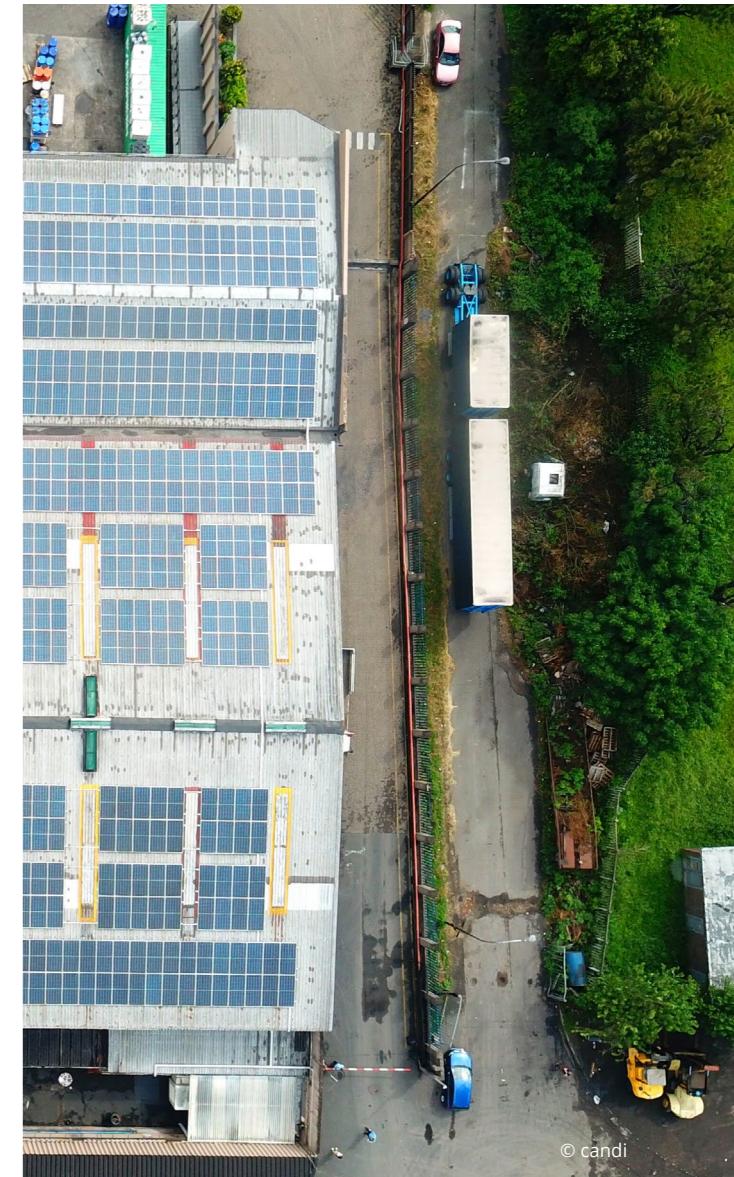
Although France has been a pioneer in developing the concept of social economy, the concept of a social enterprise or a mission-driven company was introduced not so long ago. Contrary to other corporate responsibility models around the world, France has adopted a rather balanced approach in changing the way stakeholders see the company's role in society. It takes a country-level approach in defining mission-driven companies, a concept that has already been introduced by the B Corp movement<sup>8</sup>.

France's recently introduced PACTE law rethinks how companies have the potential to contribute in light of the economic, political, societal and environmental challenges that have arisen in recent years and re-establishes the "company" as a mission-driven entity.

For companies, it is no longer a question of philanthropy, protecting company image, or mere compliance with legal obligations; rather, it is about making commitments and integrating them into the very core of the company's productive activities. It envisions a new type of commercial company that connects a company's traditional profit-making ambitions with societal ones (*raison d'être*).

In order to publicly identify as a mission-driven company, the following conditions must be met:

- The company should have a valid "*raison d'être*" in accordance with France's 1835 Civil Code;
- The company should specify one or more social or environmental goals in pursuing its activities;
- The company should set up all necessary performance monitoring procedures as related to its missions.
- The execution of its social and environmental objectives should be verified by an independent third-party body.



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<sup>8</sup> Since 2006, B Corp Movement has been promoting strong values of change to make businesses "a force for good". B Corp's goal is to certify companies that integrate social, societal and environmental objectives into their business model.

## Why Gaia decided to become a mission-driven company

As stated in 2020, our mission is to be an investment partner that spurs and finances the global emergence of renewables for the benefit of all populations, to be active and responsive in the crucial start-up phase of innovative companies, and to support entrepreneurs' ambitions in establishing a profitable, sustainable growth model that generates jobs and opportunities while also encompassing a high social and environmental impact.

In 2020, by officially introducing its environmental and social objectives and its raison d'être, Gaia Impact Fund formalized its status as a mission-driven company, an ambition dating back to Gaia's creation in 2016.

To bring our raison d'être to life – contributing to the sustainable development of emerging markets - we set the following objectives:

- To finance the energy transition;
- To combat global warming by promoting renewable energy and carbon-free solutions, as well as investing in companies located in Sub-Saharan Africa and Southeast Asia;
- To support entrepreneurs as the cornerstone of emancipation and economic growth;
- To give impetus to the realization of UN SDGs 1, 5, 6, 7, 8, 9, 10, 13 and 15 to ensure a more sustainable future.

In addition to monitoring the performance of the company, our Investment Committee and Mission Committee are responsible for ensuring that GAIA carry out its mission and actively contributes to the United Nations Sustainable Development Goals.

**Gaia Impact Fund has committed to making its own operations carbon neutral**

<sup>9</sup> 2KPI of the 2X Challenge led by the G7 Development Finance Institution. It serves as an instrument in the FDI toolkit to direct capital towards women's development.

## The path to ensuring a responsible mission

As a mission-driven company, we believe that our purpose is to generate social and environmental benefits, which lies at the root of our activities and everyday work.

This year, Gaia Impact Fund introduced the following objectives at the Company level, which will be continuously monitored and tracked:

- Offset & avoided carbon emissions. Gaia Impact Fund has committed to making its own operations carbon neutral;  
We have been offsetting our carbon emissions since 2019;
- Increase the number of carbon-neutral companies in our portfolio. Starting in 2021, we are going to audit our portfolio companies to assess their Scope 1 and Scope 2 carbon emissions in order to better compensate them;
- Increase the number of full-time jobs created;
- Improve the % of women in the workforce;
- Raise the % of women in the leadership position<sup>9</sup>.

## 7 portfolio-level KPIs to better reflect our core missions going forward

To ensure that our mission is properly carried out, we set out 7 portfolio-level Key Performance Indicators ("KPIs") that are continuously monitored by our Investment Committee - 2 of those KPIs were introduced this year (2020).

MISSION	KPI
To finance the global environmental transition	1. Amount of money raised by our portfolio companies
To participate in efforts that combat global warming, particularly by promoting renewable energy solutions	1. Amount of MW installed (for Mini-grids and C&I companies) 2. Carbon emissions avoided
To support entrepreneurship as a means of emancipation, economic growth, and resilience	1. Number of full-time positions created 2. Share of women in the workforce and share of women occupying C-level positions 3. Number of SMEs and public institutions (customers of our portfolio companies) with access to energy
To actively contribute to the realization of the United Nations Sustainable Development goals so as to ensure a better and more sustainable future on earth (in particular, UN SDGs 1,5,6,7,8,9,10,13,15)	1. Number of beneficiaries with access to energy

## Gaia as a company

**5**

full-time jobs created

**40%**

of women making up the workforce

**1**

woman in a leadership position

**13,29**

tonnes of carbon emissions compensated\*

\* Gaia offsets its carbon emissions by transferring them to the Southern Cardamom REDD+ Project, which protects 497,000 hectares of tropical rainforest in South-West Cambodia, therein preventing more than 3 million carbon emissions annually.



## Why Gaia decided to increase the number of KPIs to track the performance of its portfolio companies

### 1. Gender parity

Many studies<sup>10</sup> prove a strong correlation between gender diversity and improved business outcomes, such as better customer experience, bolstered human capital, improved competitiveness, and enhanced corporate performance. Several studies revealed that, operationally, gender-balanced teams outperform teams with a lower percentage of women. According to one gender research study, company profits tend to increase as the share of women increases towards 50%<sup>11</sup>. Furthermore, women tend to spend more of their earned incomes on their families to provide better nutrition, health care, and education – investments that tend to have far reaching effects on families and communities at large. However, these findings have not translated into widespread action in the investment world.

At Gaia Impact Fund, we decided to integrate and monitor gender KPIs both at the company level, and throughout its investment lifecycle. This year, Gaia joined the 2X Challenge initiative to further promote gender diversity, officially introducing two new KPIs at the company level – the number of women in leadership positions, and the number of women in the workforce. We also promote the hiring and empowerment of female talents whenever possible. Gaia Impact Fund applies this gender lens in many of its operations; to identify off-grid companies that promote diversity, to monitor the gender progress of its current portfolio of investees, and to self-analyse the Fund's operational management.

We also officially introduced these KPIs in our investment process: Gaia keeps track of the number of women in its portfolio companies, including at the workforce, senior management and board level through KPIs in line with 2X Challenge criteria<sup>12</sup>. These KPIs inform the company's investment process and the monitoring practices of Gaia's investees quarterly, ensuring that its investee companies' KPIs improve as they grow.



<sup>10</sup> For example, Professor Letian Zhang, "An Institutional approach to gender diversity and firm performance", Harvard Business School  
<sup>11</sup> Sander Hoogendoorn, Hessel Oosterbeek, Mirjam van Praag, "The impact of gender diversity on the performance of business teams: evidence from a field experiment", July 2013  
<sup>12</sup> 2X Challenge Indicators are aligned metrics to measure the gender impacts of investments, <https://www.2xchallenge.org/criteria>

## Oolu Solar: Supporting women in West Africa

As one of the fastest growing off-grid solar companies in West Africa, Oolu Solar believes that gender equality and female economic empowerment are fundamental tenets of a progressive society. Oolu's belief in gender equality is two-fold: socially, it helps advance society for the better; economically, it brings a range of potential business benefits.

Because Oolu believes that gender promotion can lead to enhanced business performance via increased productivity, competitiveness, staff satisfaction and retention, it decided to introduce new gender-inclusive policies. These policies have helped attract talent, thus creating a diverse workforce.

Using ICRW's gender scoring tool for off-grid energy companies<sup>13</sup>, Oolu assessed its gender baselines according to four categories: entrepreneurship, leadership, employment and consumption.

### Women's representation

#### ENTREPRENEURSHIP

50% of its co-founders and 31.5% of its capital is directly women-owned

#### LEADERSHIP

50% senior management positions occupied by women; 50% being country managers and 33% being part of the Board

#### EMPLOYMENT

34% of full-time staff in Francophone countries are women

#### CONSUMPTION

women are the focal point of Oolu's services given that they benefit from the lightening of traditional household duties

Based on baseline findings and its strategic goals, Oolu implemented its Gender Policy across all its operating units in March 2020, focusing on the following goals:

- Demonstrate leadership internally and publicly on gender equality;
- Ensure internal policies promote gender equality;
- Create a more gender-inclusive workplace culture;
- Develop an internal female management pipeline;
- Increase female applications for technical roles in the off-grid solar sector.

Specific actions taken include: the establishment of a gender committee which meets quarterly to discuss gender initiatives; the implementation of a new internship program for 3-5 women every 3-6 months in underrepresented professions; and introduction of new policy on parental leave, which allows additional flexibility for parents. Moreover, Oolu Solar joined the Women's Economic Principles Network.

<sup>13</sup> <https://www.icrw.org/gender-smart-investing-resource-hub/>

## 2. Number of MSMEs and public institutions with access to energy

At Gaia Impact Fund, our mission is to promote access to capital for companies deploying renewable energy solutions across emerging economies. We support companies directly by partnering & investing in them. We also support companies indirectly, by financing renewable energy solution providers that leverage capital for the purpose of offering cost-efficient and flexible energy solutions to micro enterprises, SMEs, public institutions, and larger manufacturing/ processing plants.

To properly track the dual impact of our activity on MSMEs, we have decided to include two KPIs to our reporting framework starting in 2021:

KPI 1 - Amount of external investments received by our portfolio companies

KPI 6 - Number of SMEs and public institutions (customers of our portfolio companies) with access to energy

We believe that reporting new SME clients as a separate customer segment from retail households (reported on according to standard GOGLA methodology) will help catalyse research & debates on the specific impact of renewable energy on businesses. To help spur the debate, we are proposing a full-fledged, MSME-specific theory of change in this report (see section 2 for details). We are convinced that better, cheaper and cleaner energy for MSMEs in emerging markets will drive job creation, women's empowerment, increased profit and productivity, and long-lasting environmental impact.

*To read more on our theory of change, please refer to Part 2 of the report*



## Gaia in figures

**2017**

**First investment of the fund.**

**4**

**Segments in energy access :**

- Solar Home Systems
- Commercial & industrial customers
- Minigrids
- Solar tech

**12**

**sustainable development goals contributed to**

- UN SDG 1 : No poverty
- UN SDG 3 : Good health and well-being
- UN SDG 4 : Quality education
- UN SDG 5 : Gender equality
- UN SDG 7 : Affordable and clean energy
- UN SDG 8 : Decent work and economic growth
- UN SDG 9 : Industry, innovation and infrastructure

**11**

**Early-stage Investments.**

**19**

**Countries in which we operate.**

**UN SDG 10 : Reduced inequalities**

**UN SDG 11 : Sustainable cities and communities**

**UN SDG 12 : Responsible consumption and production**

**UN SDG 13 : Climate action**

**Our impact in figures (such as recorded from the date of Gaia's investment to end of year 2020) :**

**745 295**

**People benefitting from an improved access to energy.**

**40**

**MSMEs (customers of our portfolio companies) with improved access to energy**

**113 936**

**tons of CO<sub>2</sub> avoided**

**1156**

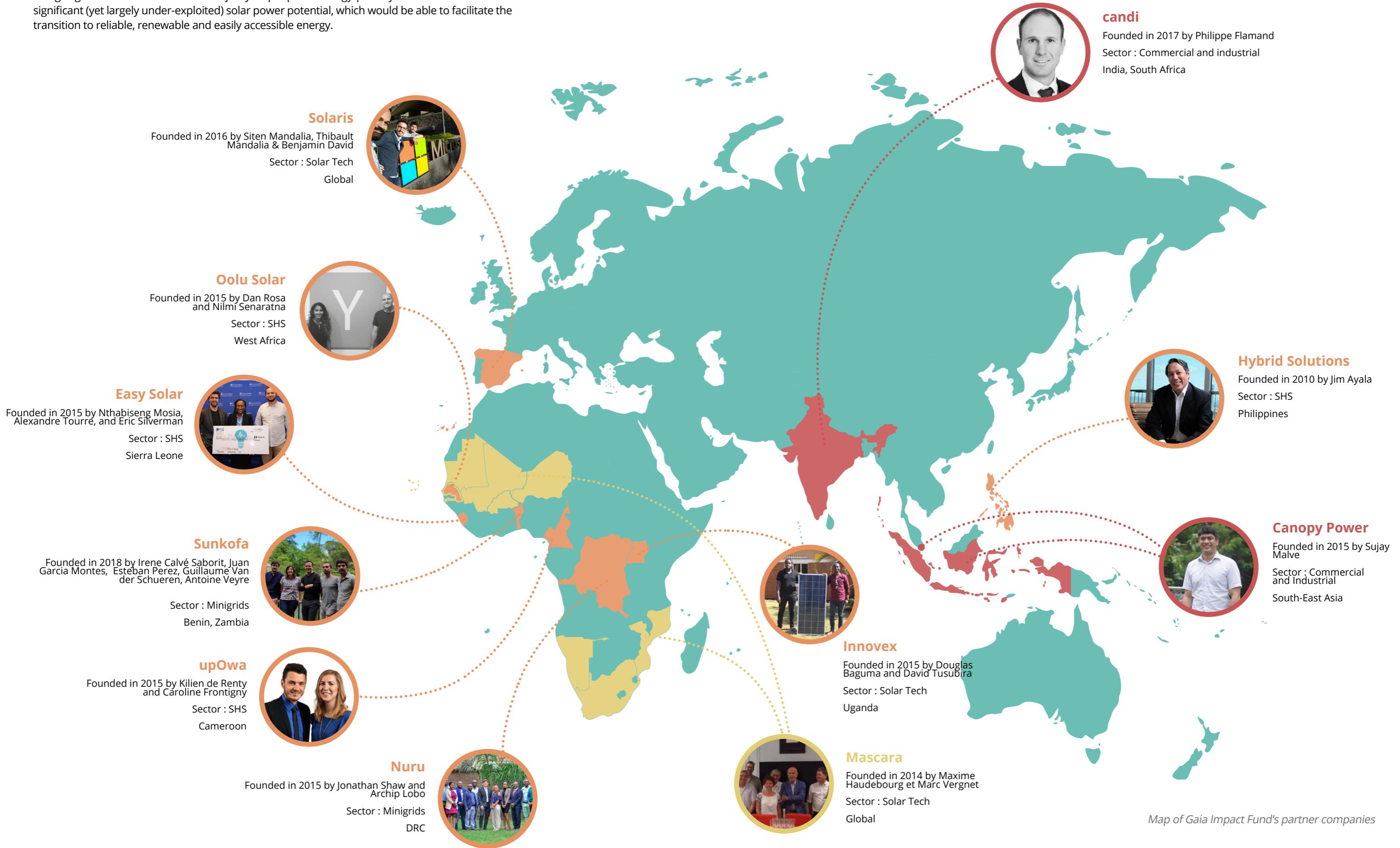
**local full-time jobs directly created by our portfolio companies**

**27,4%** of women in the local workforce in our portfolio companies

**17,4%** of women in leadership positions

## Portfolio map

The companies in which we invest are located in Sub-Saharan Africa and Southeast Asia, both being regions that account for the majority of people in energy poverty. These areas also have significant (yet largely under-exploited) solar power potential, which would be able to facilitate the transition to reliable, renewable and easily accessible energy.



## Part 2

### The economic and social impact of our portfolio companies : a focus on the mini-grid and C&I sectors

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Foreword: why documenting MSMEs is crucial to active impact investors 19

Energy challenges are hampering growth prospects of MSMEs across Sub-Saharan Africa and Southeast Asia 20

Formal, informal, small and large businesses: distinct characteristics, common struggles 22

A general theory of change describing the social and economic impact of better energy access for MSMEs 24

Key outcomes in our theory of change 27

Driving job creation - bridging economic and growth and poverty reduction 29

Value chain development 30

Advancing women's empowerment 32

Increased profit and productivity 34

## Foreword: why documenting MSMEs is crucial to active impact investors

While MSMEs (Micro, Small and Medium Enterprises) are a central vector in the job creation, income growth, and overall economic development in emerging economies, they surprisingly remain a grey zone in energy access impact reporting & literature. Historically driven by individual solutions for rural households, the energy access sector has been focussing for nearly a decade on retail sales while elaborating an ever-more precise theory of change, thereby demonstrating the positive impacts of solar home systems on rural households<sup>14</sup>. At the same time, energy access financiers and debt providers have allocated a growing share of their financing capacity to projects targeting non-rural, non-household customer segments such as SMEs, large manufacturing plants, and institutional buildings – such “C&I” customers gradually earning their own buzzword in the industry.

At Gaia Impact Fund, we have actively supported i) the diversification of the energy access sector across various customer segments and ii) increasingly specialized business models and specific unit economics. We have invested in C&I solar companies, and more recently, in third-generation mini-grid operators, thereby combining competitive offers for C&I clients with those in retail. Therefore, we welcome the diversification of investment targets within the energy access financing community.

That said, MSMEs as a whole remain broad and ill-defined, especially in emerging markets. As an active impact investor, we have identified some of the specific dimensions lacking documentation.

The first concerns what it means for our portfolio companies to focus on B2B distribution strategies. As an active specialist investor, we've identified the need to ramp up both our pre-investment audit frameworks and post-investment advisory knowledge base to properly assess and advise companies on B2B energy access best practices. Significant challenges lie ahead. MSMEs as a

category encompasses a broad variety of businesses in emerging economies – from micro village businesses, to off-grid agro-processing plants and peri-urban free-zone manufactures - therein implying radically heterogenous acquisition and servicing strategies, plus coinciding cost structures. As concerns segmentation as a business development & maintenance process: are MSMEs a valid category from an electrical demand standpoint? Is supporting SMEs vs. productive uses of energy comparable strategies?

The second concern is about bridging the support gap between SMEs as a growing customer base of energy access companies, and matching this funding strategy with a proper impact assessment framework. What is the specific impact of electrifying a business with a clean generation asset? Is the customary energy access theory of change directly applicable in this case? Do we need to take into account business-specific inference chains to build an explicit MSME-focused theory of change? Is investing in MSME electrification as impactful as investing in household electrification? Is there a risk of “mission drift” for impact investors refocussing on C&I?



<sup>14</sup> <https://www.gogla.org/welcome-to-the-gogla-impact-hub>

## Energy challenges are hampering growth prospects of MSMEs across Sub-Saharan Africa and Southeast Asia

Recent World Bank surveys state that the top two constraints of MSMEs in Sub-Saharan Africa and Southeast Asia are i) access to finance and ii) access to energy. The poor quality of electricity supplies in many developing countries is perceived by MSMEs to impact their operations negatively.

It is indisputable that electricity and business are closely interconnected, and, according to numerous studies, energy supply has a significant impact on economic activity<sup>15</sup>. Power outage - which can last up to 6.5 hours in Sub-Saharan Africa and 5.3 hours in South Asia – and voltage fluctuation can damage equipment, halt production, and as a result, lead to a decrease in productivity and loss of income/customers. Interruptions to power supply may also lead to extraordinary expenses such as the need to repair or replace broken equipment, the cost of rotten food, as well as the cost of additional sources of energy, such as backup generators, which are the preferred mitigation tool for many MSMEs.

For small businesses, the most critical element of electricity supply is its cost. Based on our research, we identified that access to affordable energy in Sub-Saharan Africa and South Asia is extremely expensive in comparison to the average income in these regions, thus preventing local businesses to expand, or even survive. This is why we consider that access to cheap and reliable energy is a crucial element in MSME profitability and growth.

Figure 1: Key statistics on electricity access in Sub-Saharan Africa and South Asia

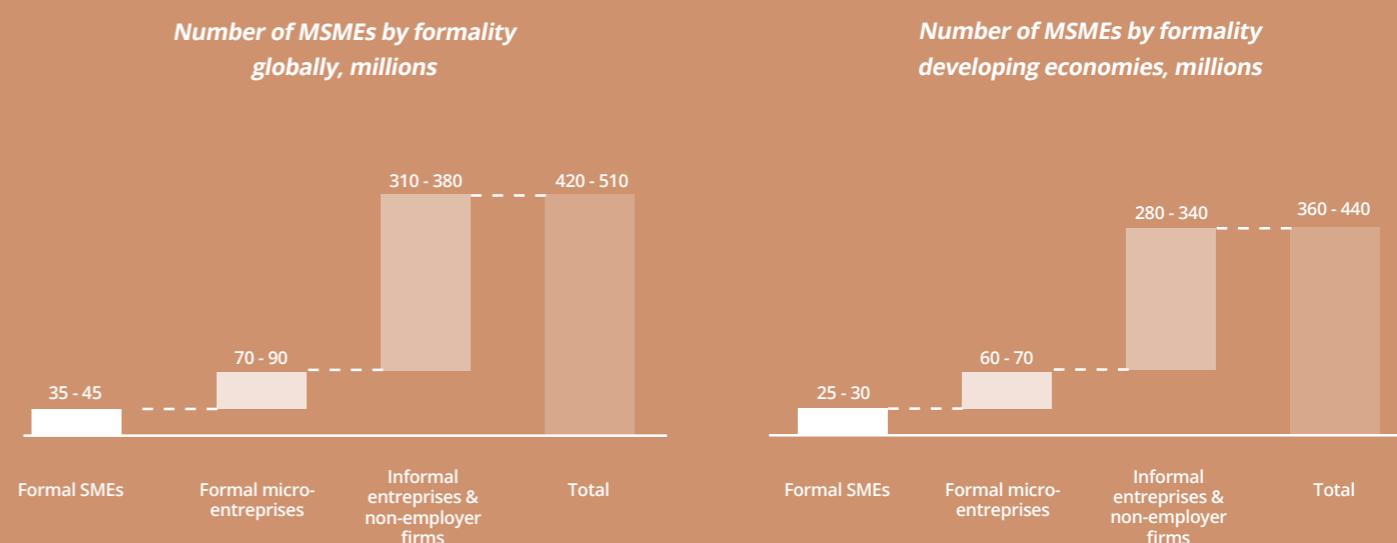
	Sub-Saharan Africa	South Asia	High income countries <sup>16</sup>
Access to electricity (2018)	47.7%	91.6%	100%
Access to electricity, rural (2018)	31.5%	87.6%	100%
Time required to get electricity (days) (2019)	109.6	86.1	66.7
Number of electrical outages in a typical month	8.5	25.4	0.3
Duration of a typical outage (hours)	6.5	5.3	0.9
Percentage of firms experiencing electrical outages	75.6%	66.2%	22.2%
Costs to get electricity (as a percentage of income per capita)	4,737%	1,894%	79%
Percentage of SMEs identifying electricity as a major constraint	41.7%	46.1%	43.8%

Sources: World Development Indicators, Data Bank; The World Bank Enterprise Surveys

## Formal, informal, small and large businesses: distinct characteristics, common struggles

Another important issue is how to differentiate MSMEs from households, as well establish an appropriate definition. In the global economy, micro, small and medium enterprises ("MSMEs") usually occupy the place between large corporations and micro-organizations. That said, there remains the issue of inconsistent defining and heterogeneity of what MSME implies across industries, governments and financial institutions. Nowadays, it is becoming more and more evident that MSMEs have the potential to be more meaningfully defined by their functional characteristic rather than formal criteria, such as its number of employees, annual revenue and total assets. For example, the World Bank continues to rely on country specific standards, meaning that it has not set out a common definition. Nevertheless, the most commonly accepted guideline remains the number of employees a company has, the company's assets, its annual turnover, or the business' legal structure. It is extremely difficult to assess the true number of MSMEs due to the existence of large, informal business sectors that go unmonitored in many countries - especially in those with poor data collection methods and insufficient resources. The line between formal and informal enterprises (usually called "household enterprises") is usually ambiguous, with varying definitions being used in different countries attempting to categorize economic activity.

Figure 2: Number of MSMEs by formality globally and in developing economies



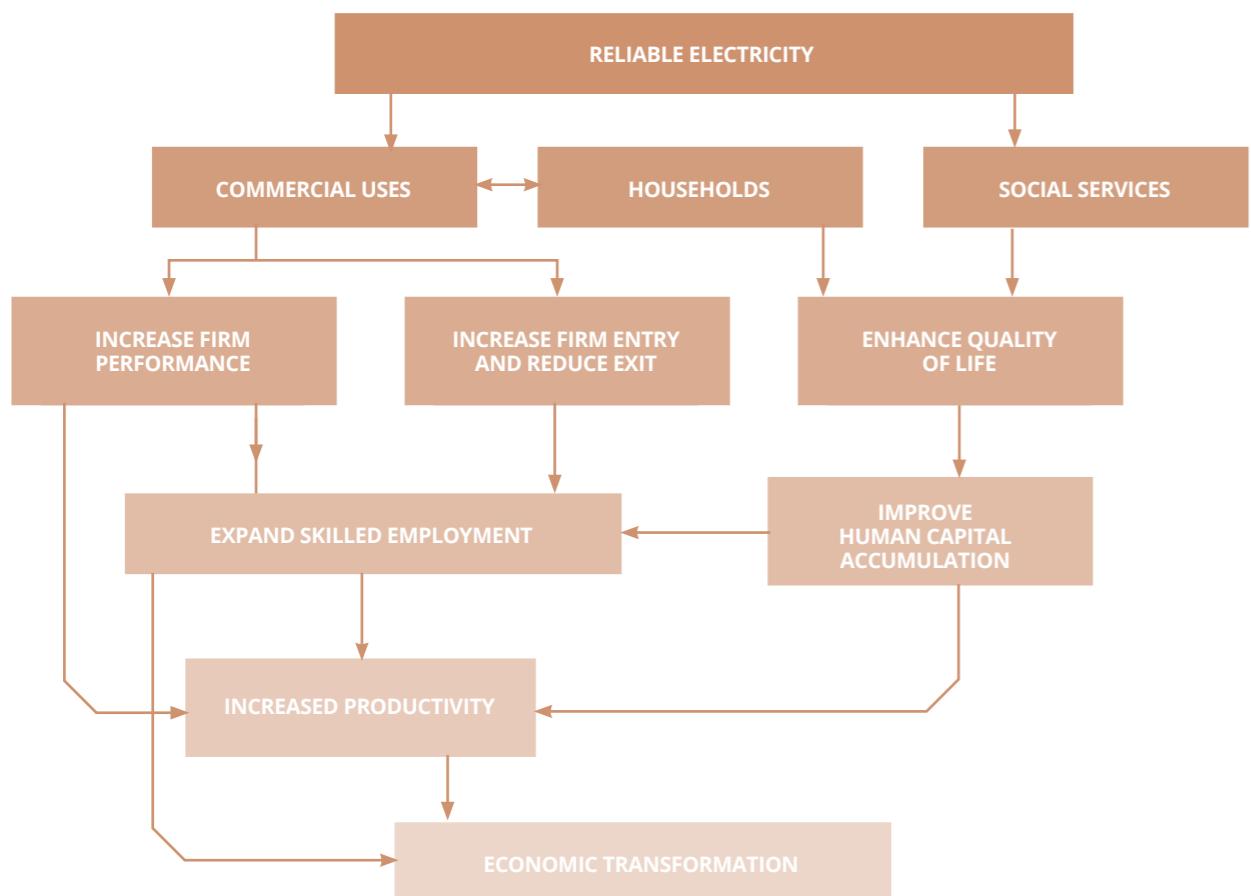
Source: IFC Enterprise finance Gap Database (2011).

<sup>15</sup> For example, Velasquez and Pichler, 2020

<sup>16</sup> High-income: OECD

Based on the academic literature and practical surveys<sup>17</sup>, one could infer that MSMEs are distinct from large corporations in many ways; namely, they are more often owned and managed by the same person and have less defined business structures, are more focused on short-term needs and survival than on long-term profitability and strategical development, are more often only able to hire unskilled workers and provide on-site training, are less technologically sophisticated, and are more likely to be deeply rooted and active in one community. The MSME category itself is heterogeneous, encompassing village stores, the informal service sector (barbershops, bars, restaurants), small agro-processing facilities that may be operated by a micro enterprise/ merely operated by a coalition of individual farmers, small-scale manufacturing activities executed by carpenters, tailors or welders, all the way up to bigger operations such as rural agro-processing plants, peri-urban manufactures, workshops, and large plants.

Figure 3: Number of MSMEs by formality globally and in developing economies



Source : Africa Development Forum, Electricity access in Sub-Saharan Africa: Uptake, Reliability, and Complementary Factors for Economic Impact

As a central component of this report, we argue that, although quite heterogeneous, micro to medium size companies share common characteristics. First, MSMEs account for up to 90%<sup>18</sup> and 99%<sup>19</sup> of all businesses in Sub-Saharan Africa and Southeast Asia, respectively. Second, from an economic standpoint, entrepreneurial activity – save perhaps subsistence farming – is usually separated from household finances. Companies of all sizes then, including the smallest ones, represent a specific commercial segment with specific needs and hurdles, and servicing those needs requires a specific business model. Last but not least, in emerging markets, companies of all sizes face similar challenges when it comes to access to affordable & reliable energy. As a consequence, the transformational impact of better energy provision can be described in a uniform way for companies of all sizes (see figure 4).

<sup>17</sup> For example, OECD, "Small businesses, job creation and growth: facts, obstacles and best practices".

<sup>18</sup> IFC, "SME Initiatives", <https://www.ifc.org/wps/wcm/connect/d3b0345a-d6ba-4028-8b21-594553773166/IFC-SME-Factsheet2012.pdf?MOD=AJPERES&CVID=jUwYke>

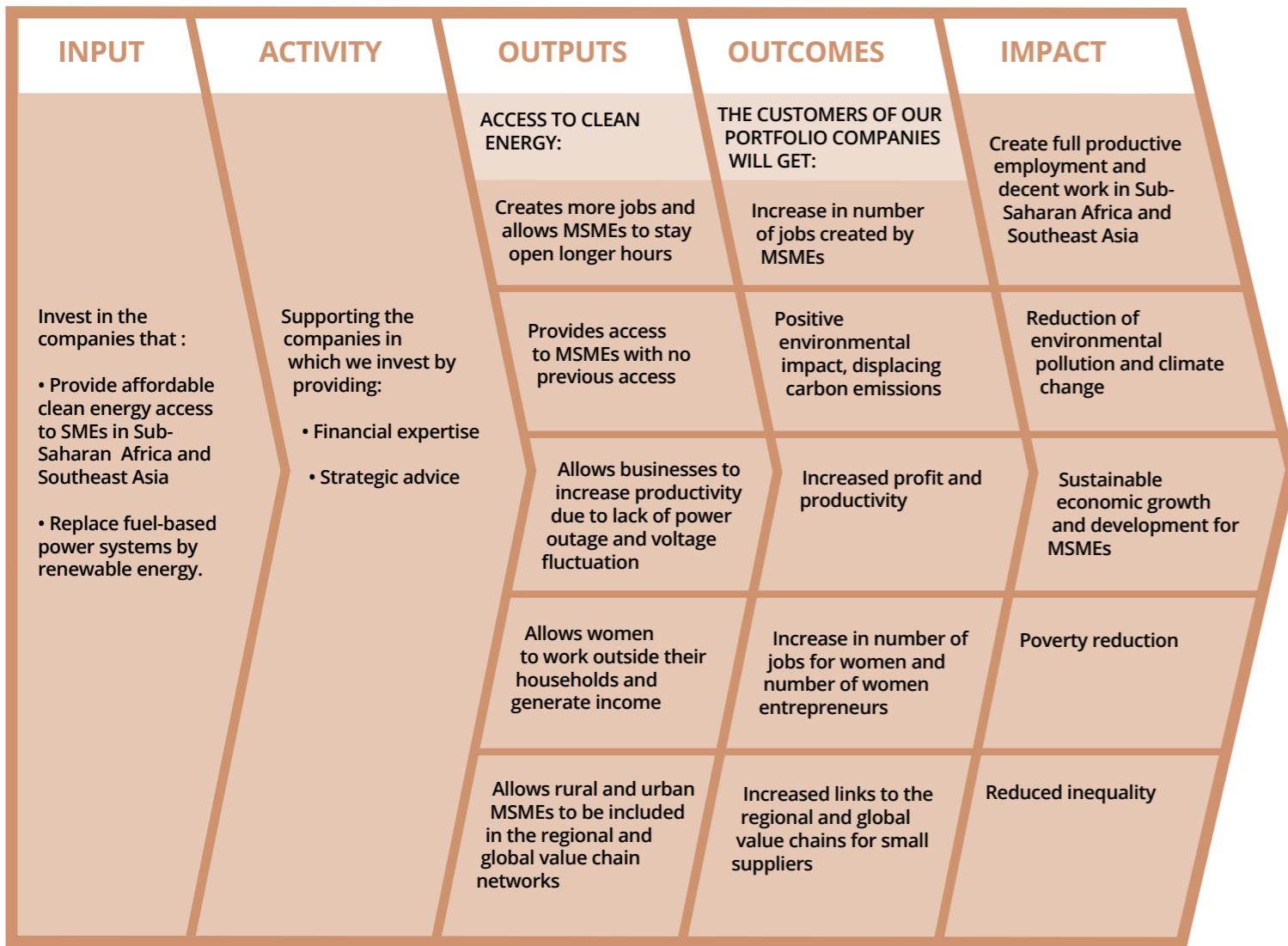
<sup>19</sup> ISEAS, Yusof Ishak Institute, The Missing Small Businesses of Southeast Asia, 22 July 2020.



## A general theory of change describing the social and economic impact of better energy access for MSMEs

We believe that the benefits to businesses of clean & affordable energy provision go way beyond first-degree effects such as savings on operational expenditures. Productive uses of electricity for MSMEs are drivers in improving the socio-economic impacts of energy access via increased profit, bolstered productivity and inclusion in value chains, women's empowerment, poverty reduction through local job creation, and positive environmental impact. Under a work in-progress status, and seeking to stimulate debates across the energy access community and beyond, we introduced an MSME-focused theory of change that reflects the ongoing discussion between Gaia Impact Fund and the companies in our portfolio, the interviews of investees' employees, and the reviews of studies and reports cited/mentioned in this report.

Figure 4: Proposed theory of change describing the impact of better energy access for MSMEs



### DEFINITIONS USED FOR THE THEORY OF CHANGE<sup>20</sup> :

**THEORY OF CHANGE** - a comprehensive description and illustration of how and why a desired change is expected to happen in a particular context. It is focused in particular on mapping out or "filling in" what has been described as the "missing middle" between what a program or change initiative does (its activities or interventions), and how it leads to goal attainment. It does this by first identifying the desired long-term goals, therein working backwards to identify all conditions (outcomes) necessary (and their causal relationship) for the goals to be achieved.

**ACTIVITY(IES)** - actions taken or work performed through which inputs, such as funds, technical assistance and other types of resources are mobilized to produce specific outputs.

**OUTPUT(S)** - the products, capital goods and services that result from a development intervention – may also include changes resulting from an intervention, which prove to be relevant to the achievement of outcomes.

**OUTCOME(S)** - a result or effect that is caused by, or attributable to the project, program or policy. Outcome is often used to refer to immediate and intended effects.

**IMPACT** - A result or effect that is caused by, or attributable to a project or program. Impact is often used to refer to the overarching effects of a program that occur in the medium- to long-term, and can be intended or unintended, positive or negative.

<sup>20</sup> All definitions are from the glossary compiled by Impact Project Management, <https://impactmanagementproject.com/glossary/#/>

We interviewed a handful of company representatives (in which Gaia has invested) to better understand the most significant impacts their company has on MSME customers.



### **Interview with Eric BIDONG, Head of Platform Hardware, Nuru**

**In your opinion, what are the most significant outcomes of providing clean & reliable energy access to MSMEs?**

**Since we have put our 1.3 MW solar mini-grid in Goma into operation, we have heard a lot of impactful stories, like how access to clean and affordable energy allowed local communities, MSMEs and C&Is to change their lives.**

**To the community, households are establishing businesses, acquiring new appliances like televisions, which seriously reduces juvenile delinquency and contributes to childhood education, but also iron boxes, fridges, etc. that completely change the story and the culture of our people. We witness first hand the job creation that reduces the unemployment rate, and the security brought by the deployment of streetlights.**

**On the MSME and C&I side, we have seen the improvement of business activities – acquiring new tools and equipment to increase the quantity of the product or the service, the rise of revenue due to the reduction of diesel use and generator maintenance, etc. Assessing electricity needs through 1-month data logging prior to C&I grid connection has been instrumental in controlling expenses and reliable revenue forecasting.**

### **Interview with Irene CALVÉ SABORIT, co-founder, Sunkofa Energy**

**In your opinion, what are the most significant outcomes of providing clean & reliable energy access to MSMEs?**

**The most significant outcome is the generation of added-value. With reliable power, our clients can plan ahead when to use their machines and how to sell their product, which generates an increase in added-value. If this added-value is captured by our clients (if they are owners of the productive machines, they can capture added-value this way), then it will be used either to increase production and thus decrease the cost of selling goods, and result in either buying and trading additional products. This has redistributed wealth within the village, increasing the overall welfare as well as the ability to pay.**



## **Key outcomes in our theory of change**

Based on our observations and discussions, we believe that there are five main outcomes of providing clean and reliable energy access to MSMEs:



### **JOB CREATION**

Access to energy allows for longer hours of operation, thus driving job creation, boosting productive employment and decent work



### **VALUE CHAIN DEVELOPMENT**

Access to energy allows rural and urban MSMEs to be included in global and regional value chains, thus leading to poverty reduction and market expansion for goods and services produced by small suppliers



### **WOMEN EMPOWERMENT**

Women can work outside their households and engage in income-generating activities, thus benefitting from economic growth and reduced inequality



### **INCREASED PRODUCTIVITY AND PROFIT**

Lack of power outages and voltage fluctuations allows for increased productivity and as a result, increased income, which creates sustainable economic growth for MSMEs



### **ENVIRONMENTAL IMPACT**

Access to clean energy allows for reductions in carbon emissions and environmental pollution, thus supporting climate resilience

*Please refer to the part 3 of the report for more examples*

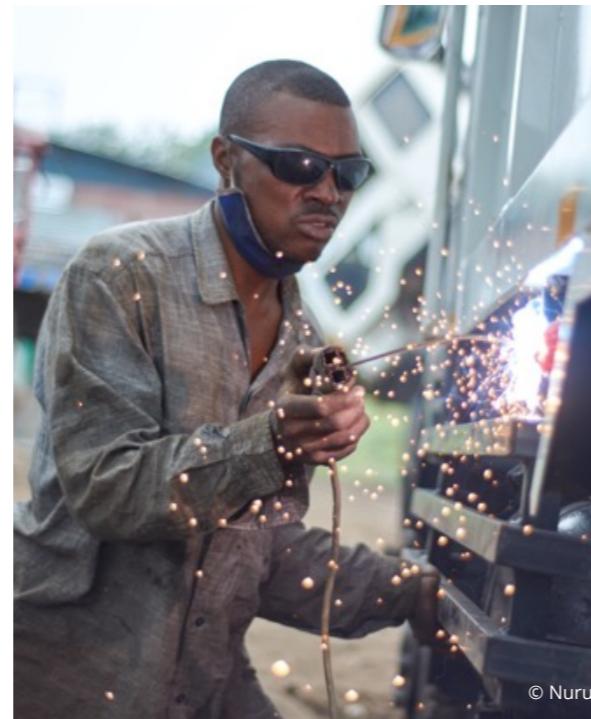
*Please refer to the next section to read more about each outcome, as well as specific examples.*

## Jobs creation and the socio-economic impact of C&I solutions and mini-grids

**Driving job creation - a bridge between economic and growth and poverty reduction.** According to the World Bank, around 600 million jobs are needed over the next 15 years to absorb the youth entering the labour market, the great majority of those jobs projected to come from the private sector. In emerging markets, most formal jobs are generated by MSMEs, which account for every 7 out of 10 jobs<sup>18</sup><sup>21</sup>.

MSMEs in Sub-Saharan Africa and Southeast Asia have a key role in creating more jobs, both in formal and informal sectors: studies all over the world assert that informal MSMEs contribute to over 50% of Gross Domestic Product, and are credited with creating 60% of jobs .

MSMEs are diverse in nature, ranging from minuscule stores and manufacturing facilities to service enterprises. These enterprises are usually focused on short-term needs and are only able to hire unskilled workers that can be trained on-site. They also lack access to reliable & regular electricity and water supply, which prevents them from staying open after dark.



© Nuru

Mini-grid and C&I sectors have a significant impact, both in terms of direct and indirect job creation, though there is no specific data on exactly how many new jobs are created. Enhanced or new energy access allows local communities and businesses to increase productivity via the (partial) mechanization of manual processes, the ability to stay open late, or even the opportunity to launch new businesses, thus generating new jobs for local communities.

## Nuru: Driving job creation

In the Democratic Republic of the Congo, less than 10% of the population has access to electricity today, thus leaving DRC the country with the largest number of people without access to electricity in Africa, after Nigeria. Mini-grids account for more than half of all new electricity sources in Africa<sup>22</sup>.

In 2020, Nuru commissioned a mini-grid plant with a capacity of 1.3 MW in the Ndoso district. The company aims to provide electricity to 5 million Congolese by 2024.

Nuru's energy services inspired a Ndoso entrepreneur – Mr. Innocent Butsiri – to expand his barber shop business.

Nuru's reliable and affordable energy access enabled Innocent's barber shop to hire four new employees and increase their hours of operations by three hours per day - from 6 pm to 9 pm - resulting in cost savings and additional income per month. The additional hours of operation were also made possible by the enhanced security offered by Nuru's solar-powered public streetlights.



*"I own a hairdressing salon by the name of Wati B in the Ndoso neighbourhood. The electricity I use here is Nuru's, and this energy supports me given that we use all sorts of devices with electrical resistance, all without any trouble... Nuru's electricity helps my business 24/7 because with Nuru's public lighting, clients come back late and see that there is no obscurity. They can come get a haircut around 8 pm or even 9pm. That helps me a lot because I can satisfy all the needs of my clients."*

**Innocent Butsiri, Nuru's client**

<sup>21</sup> For example, Mwanza and Benedict, 2018; Mintah and Darkwah, 2018.

<sup>22</sup> IEA, Democratic Republic of the Congo Energy Outlook, 2019



## Value chain development

In recent years it has become increasingly important to embrace value chain development in order to stimulate economic growth and combat rural poverty. According to many studies<sup>23</sup>, one of the key requirements in creating effective value-chains is the existence of reliable infrastructure, including access to affordable and sustainable energy, water supply, and transportation telecommunications.

In fact, weak infrastructure in Africa and Southeast Asia aggravates the logistical gap that excludes rural and local MSMEs from existing value-chains. Integration of MSMEs into global and regional value-chains is one of the most critical elements in ensuring sustained development today, as it offers great potential to bolster MSME earnings. Global value-chains make up 84 % of multinational enterprises' international production networks, meaning they have become the engine of the global economy<sup>24</sup>. In order to become competitive, MSMEs need to increase participation in foreign markets: several studies support that internationalized enterprises report higher sales and growth<sup>25</sup>.

Sub-Saharan Africa and many countries in Southeast Asia are not even fully integrated into regional supply-chains, and investments into infrastructure – particularly relating to clean energy - would help small enterprises in finding new customers and suppliers, facilitate access to innovative technology, and bring down the costs of income-generating activities, thus boosting their productivity.



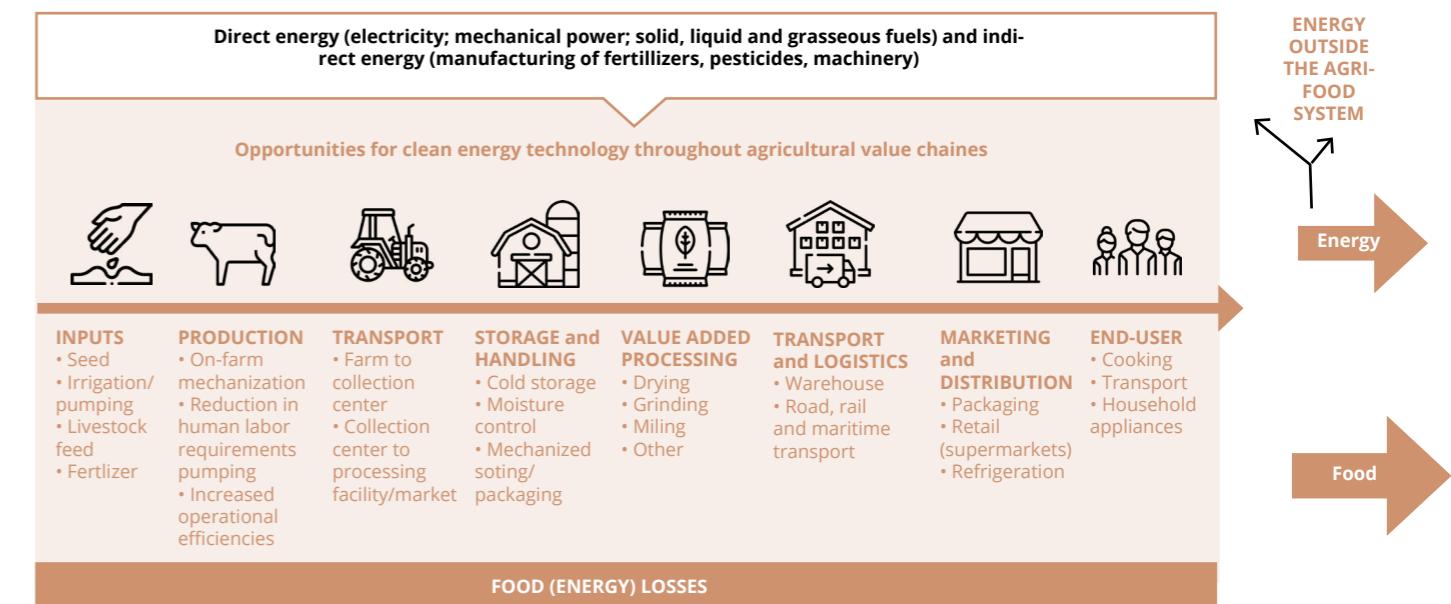
Several studies have shown that rural electrification is a key enabler and driver of sustainable development, and value-chain inclusion of rural areas (especially agriculture) would stimulate economic activity and provide the food needed for the local population<sup>26</sup>. Lack of affordable energy leads to both pre- and post-harvest losses, and a lack of refrigeration throughout the supply chain represents a significant obstacle to agricultural efficiency.

South Africa, for example, has identified many opportunities to develop solar infrastructure in rural communities. The national grid infrastructure in South Africa's rural areas is unreliable and weak, which doesn't allow farmers to realize their full potential: outage fluctuation have historically led to crop losses as high as 5%. Farmers are in desperate need of sustainable power solutions, which will in turn ease their precarious situation: currently, farmers largely rely on manual labour, and the lack of affordable and sustainable energy offers no favours when it comes to crop irrigation, or livestock water provisions/facility heating.

We believe that access to clean and affordable energy will help rural communities close the gaps in their supply and value-chains, as well as create added-value for the well-being of local communities, including environmental co-benefits.

*To see how access to energy helped local women-owned MSMEs integrate into a local value-chain, please refer to the example on page 34.*

Figure 5: Energy to and from the food value chain



source : FAO/SAID, 2015

<sup>23</sup> INSERT REFERENCE.

<sup>24</sup> United Nations Conference on Trade and Development, "Small business comes in many different forms but for millions of people around the world it is a route out of poverty and a chance at a better life", 13 September 2017

<sup>25</sup> International Trade Center, "Promoting SME Competitiveness in Africa, Data for De-risking Investment", 2018

<sup>26</sup> For example, George Kyriakarakos, Athanasios Balafoutis, Dionysis Bochtis, Proposing a paradigm shift in rural electrification investments in Sub-Saharan Africa through Agriculture, 12 April 2020



## Advancing women's empowerment

Women have always been recognized as one of the major end users of energy. They have consistently occupied a central role in the household by engaging in house chores such as fetching firewood, cooking, and heating that require clean and sustainable energy. According to one study<sup>27</sup> in South Africa, rural electrification raised women's employment in electrified communities by 9.5 percent. This is most likely because it released women from household duties and enabled microenterprise activity, all the while having an indeterminate impact on the community's male labour rates.

Though the majority of Southeast Asia and Sub-Saharan Africa's women are employed, they continue to occupy lowest-paid and unskilled jobs in the informal sector, or otherwise own an MSMEs, both of which incur a number of difficulties. Women-owned MSMEs usually have similar obstacles to male-owned MSMEs, but in reality, many shared challenges are more daunting and/or difficult to confront as a woman. Women have less access to essential inputs such as land, finance, technologies, property, equipment and utilities, which mean reduced profits and productivity in comparison to male-owned MSMEs. These challenges play a central role in understanding the gender gap in MSME performance.

We believe that access to energy plays an essential role in harnessing women's entrepreneurial potential and closing the gender gap. Several studies illustrate that an increase in women's literacy rates leads to employment and enterprise development. Access to clean and affordable energy also allows women to reduce the time constraints of domestic responsibilities and as a result, creates more opportunities for formal income generating activities in the local economy.

**According to the International Finance Corporation (IFC), women-owned SMEs in developing countries account for 30 - 37 %, or about 8 - 10 million SMEs. Nowadays, women's entrepreneurship has become more common in Africa than anywhere else in the world, and African women make up to 50 % of the continent's self-employed and represent 25 % of its employers .**



## Cold Storage and Women's Empowerment

The electrification of rural communities in Ndoso has had a transformative impact on women-owned MSMEs.

Before Nuru commissioned its 1.3 MW solar-hybrid metro-grid in February 2020, dozens of market women had to travel several kilometers each day to store and preserve their fish and meat products in distant cold storage units.

Traveling any additional distance to refrigerate food items costs valuable time and money. Many of these women live day-to-day, and the burden of daily transportation costs puts even more pressure on their low monthly incomes.

In response to the challenges faced by these women, Ndoso entrepreneurs launched 3 different cold storage businesses. Today, these enterprises employ 16 people and serve more than 55 market women who sell their fish and meat products in Ndoso.

As a result, local women are saving valuable time and money by being able to reduce their daily transportation costs.

Several of these women sell their wares along Ndoso's main market road – the very same road that recently had a series of 35 public streetlights installed by Nuru! These lights empower market women by granting them an extra 2-3 hours after sundown to sell their products. More than just a simple convenience, these streetlights illuminate a significant part of the neighbourhood, thereby creating a more secure environment for selling products and returning home after dark by foot.

<sup>27</sup> Taryn Dinkelman, "The effects of rural electrification on employment: New evidence from South Africa," American Economic Review 101, no. 7 (2011): pp. 3078-3108.



## Increased profit and productivity

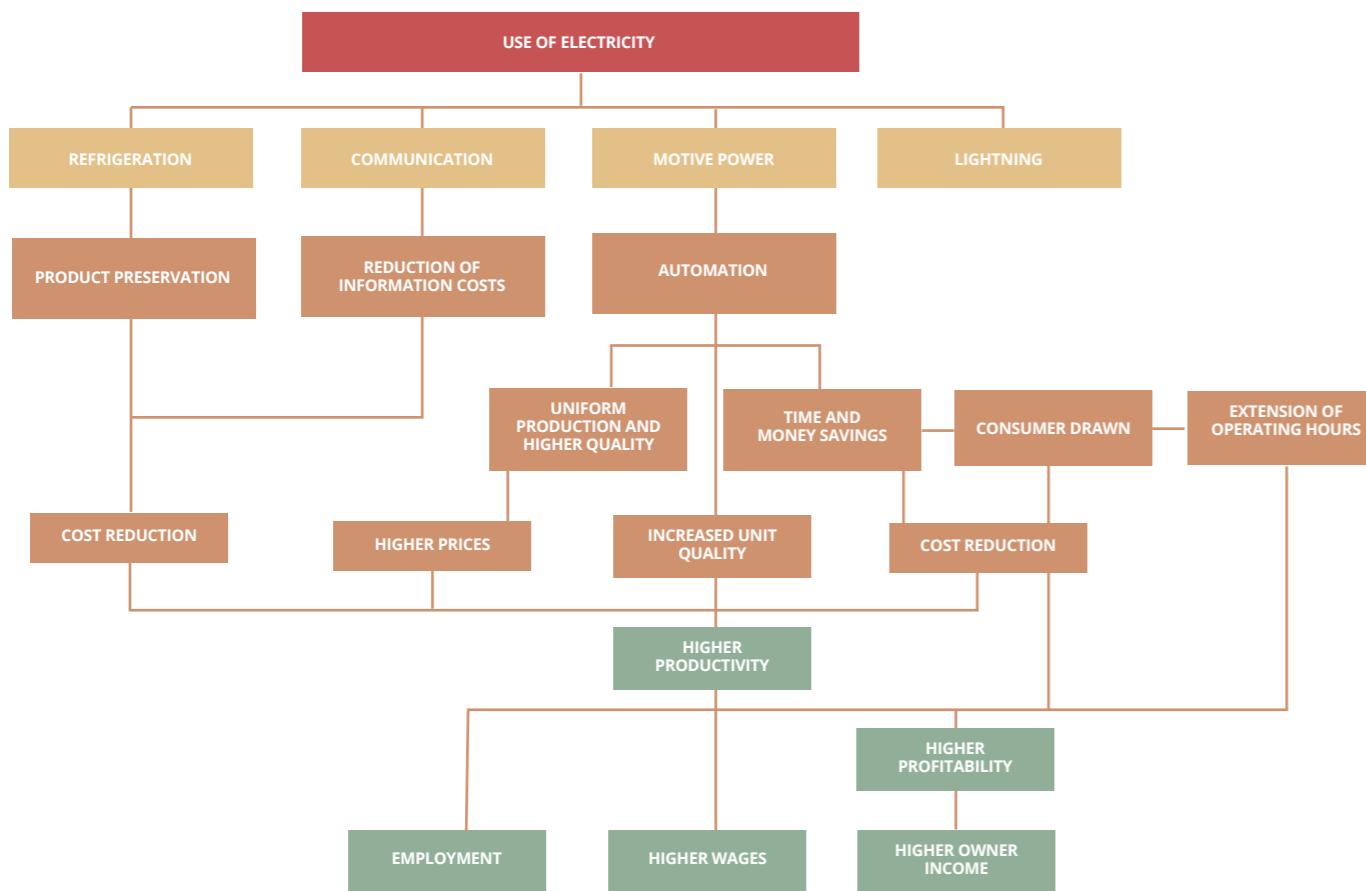
It is evident that large businesses have better access to energy and infrastructure than MSMEs do, which allows for better efficiency and productivity.

The existence of a large informal sector of MSMEs in Southeast Asia and Sub-Saharan Africa means that the productivity gap in these regions is even wider: small enterprises tend to operate in low value-added and labour-intensive domains. The productivity gap between registered and unregistered firms in a study of 24 African countries is estimated to be around 120%<sup>28</sup>. Closing the productivity gap is likely to have two direct effects: 1) it would contribute to GDP growth because of increased SME productivity, and 2) it would mean better jobs and higher pay in the low-wage segments of the economy<sup>29</sup>.

Several studies revealed that the effects of electricity access on productivity is highly dependent on context and country. Most authors nevertheless identified significant positive links between energy consumption and MSME productivity. Electricity infrastructure and the consumption of electricity are generally understood to be positively correlated with productivity and economic growth (Rud, 2012a). A research on 26 African countries states that poor infrastructure quality has a significant negative impact on total factor productivity (Escribano et al., 2009).

We believe that access to clean and affordable energy for MSMEs will allow owners to stay open longer hours and decrease their production costs, thus boosting MSMEs' productivity and income.

Figure 6: Effects of use of electricity



<sup>28</sup> La Porta and Shleifer, 2011

<sup>29</sup> International Trade Center, "Promoting SME Competitiveness in Africa, Data for De-risking Investment", 2018

## candi: driving productivity and profit increase through energy access

candi builds, finances and operates solar rooftops for C&I clients in both India and South Africa. The company was able to secure significant savings on the electricity bills of all its clients during the past year, this being especially important during the COVID-19 lockdown wherein electricity usage was comparatively very low since companies didn't operate at 100% capacity. Thanks to the net metering framework in India, solar power generated but not consumed was exported to the main solar grid, which could eventually be used in the second half of the year. This allowed candi's customers to reduce their national grid energy consumption, thereby decreasing their costs.

For example, schools (a sector candi serves), currently have zero electricity charges since the energy produced during the lockdown is still being used from the grid storage!

On top of these examples, candi made sure to support its customers by extending the deadlines for payments from 30 days to 90 – 120 days and offering PPA extension and the temporary shutdown of plants during the lockdown in places where net metering was not applicable.

In South Africa, access to solar energy is vital for MSMEs to remain sustainable and competitive in the market given rapidly rising energy costs: national electricity tariffs have increased by 512% from 2007 to 2020<sup>30</sup>. In situations where businesses were unable to financially maintain consistent power supply - especially during COVID-19 crisis- solar energy was key to keeping operating costs low, candi contributing to such accessibility.

## **Part 3**

### **Building a carbon emissions framework: Gaia committed to a green, low-carbon economy**

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Solar Home Systems: introducing clean energy access	42
Mini-grid: a long way away from standardizing measures needed to calculate environmental impact	43
C&I companies	44
Desalination solutions	46



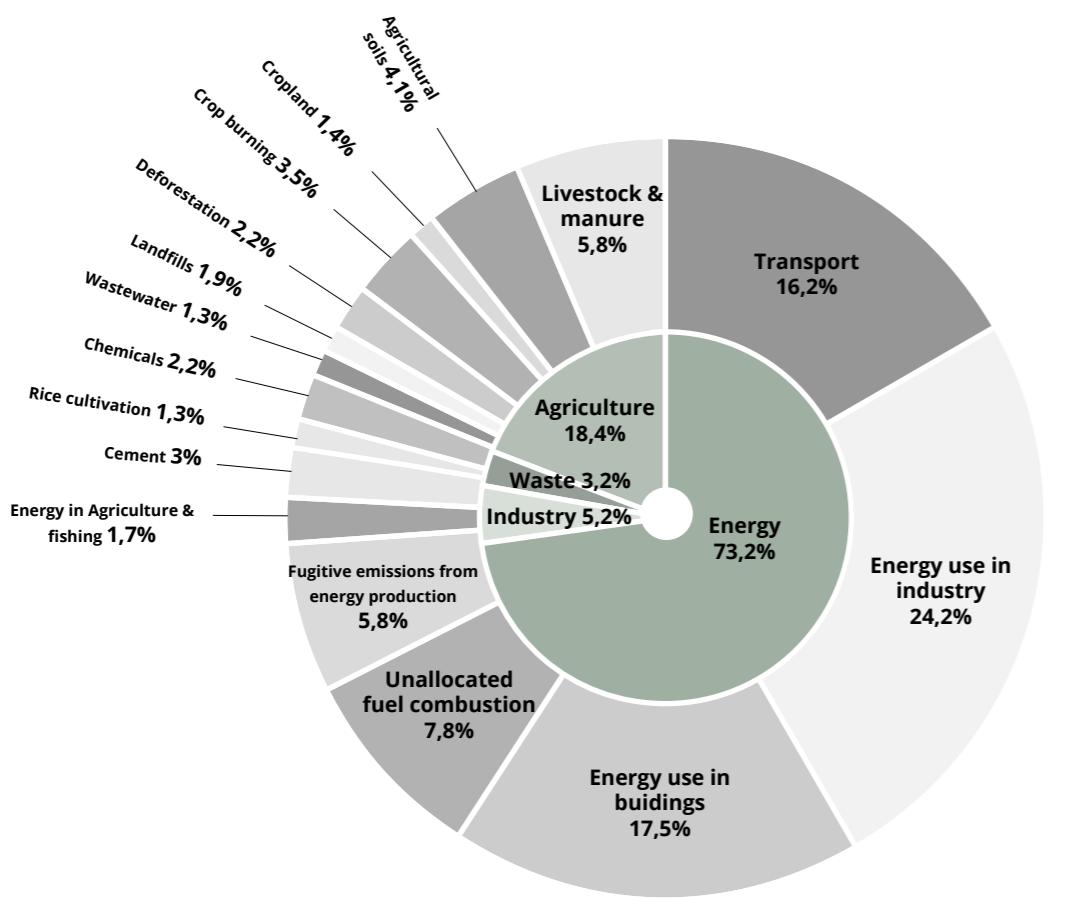
## Building a carbon emissions framework: Gaia committed to a green, low-carbon economy

Energy generation is the largest sources of greenhouse gas emissions ("GHG"), responsible for up to 73% of total emissions globally<sup>31</sup>. Efforts to reduce carbon emissions and to combat climate change are usually focused on the energy sector, such as carbon dioxide (CO<sub>2</sub>), which comprises 74 % of GHGs.

In 2018, Africa accounted for around 4% of the world's energy-related carbon dioxide (CO<sub>2</sub>) emissions despite being home to around 17% of the population. While having contributed a relatively small share to global carbon emissions, Africa is among the regions that are the most exposed to the effects of climate change. Its ecosystems already suffer disproportionately from climate change and future impacts are expected to be substantial<sup>32</sup>. This will have serious implications on Africa's food production and agriculture as well as its economic development and poverty reduction ambitions. It is expected that the intensity and frequency of natural disasters such as droughts, floods, and fires will intensify, potentially resulting in the massive disruption of livelihoods for population living in exposed areas.

In Southeast Asia, though the region's current share of global emissions is relatively small (4.3% in 2018), natural disasters and catastrophes like typhoons and floods are becoming more severe and extreme. In recent decades, there has been a spike in the region's carbon emissions, which have shown to increase faster than in any other region in the world. Long coastlines and heavily populated low-lying areas make the region's 640 million + inhabitants some of the world's most vulnerable to weather extremes and rising sea levels associated with global warming<sup>33</sup>. Growing energy demand and growing fossil fuel usage creates a serious risk to public health.

Figure 7: Global Greenhouse gas emissions by sector (WORLDWIDE)



Source: OurWorldinData.org – Climate Watch, the World Resources Institute (2020)

The economic and social impact of climate change has been known to be devastating. To fully tackle the climate crisis, the world should decrease emissions in all sectors and switch to renewable energy. To do so would be key in driving down GHGs and setting the population on a course for a more sustainable and environmentally friendly future.

As we mentioned in the first part of the report, carbon emissions avoided is one of the key metrics used by Gaia Impact Fund to track the impact of its investments towards UN SDG 7: Affordable and clean energy. Our purpose is to implement a unified approach to calculating carbon emissions avoided, which (in our opinion) would allow investors, companies, policymakers and other stakeholders assess the impact created by our investees in a consistent and coherent manner.

Measuring a portfolio's carbon footprint is a complex business: not only can it imply multiple, diverse scopes (see Figure 8), but also involves various heterogenous methodologies unique to the sectors in which our portfolio companies operate. Other issues include how to identify credible and reliable baseline scenarios, and how to ensure the quality of data. For the sectors that our companies operate in, there are not always universal methodologies (except for SHS), and companies (including their investors) tend to report conflicting figures of carbon emissions displaced, which undermines the credibility of results and prevents industry-wide aggregation.

In order to address these issues, we have elaborated on the tools that allow us to calculate Scope 1 & 2 emissions displaced and take into account specific criteria of portfolio companies' projects that were not considered in existing methodologies.

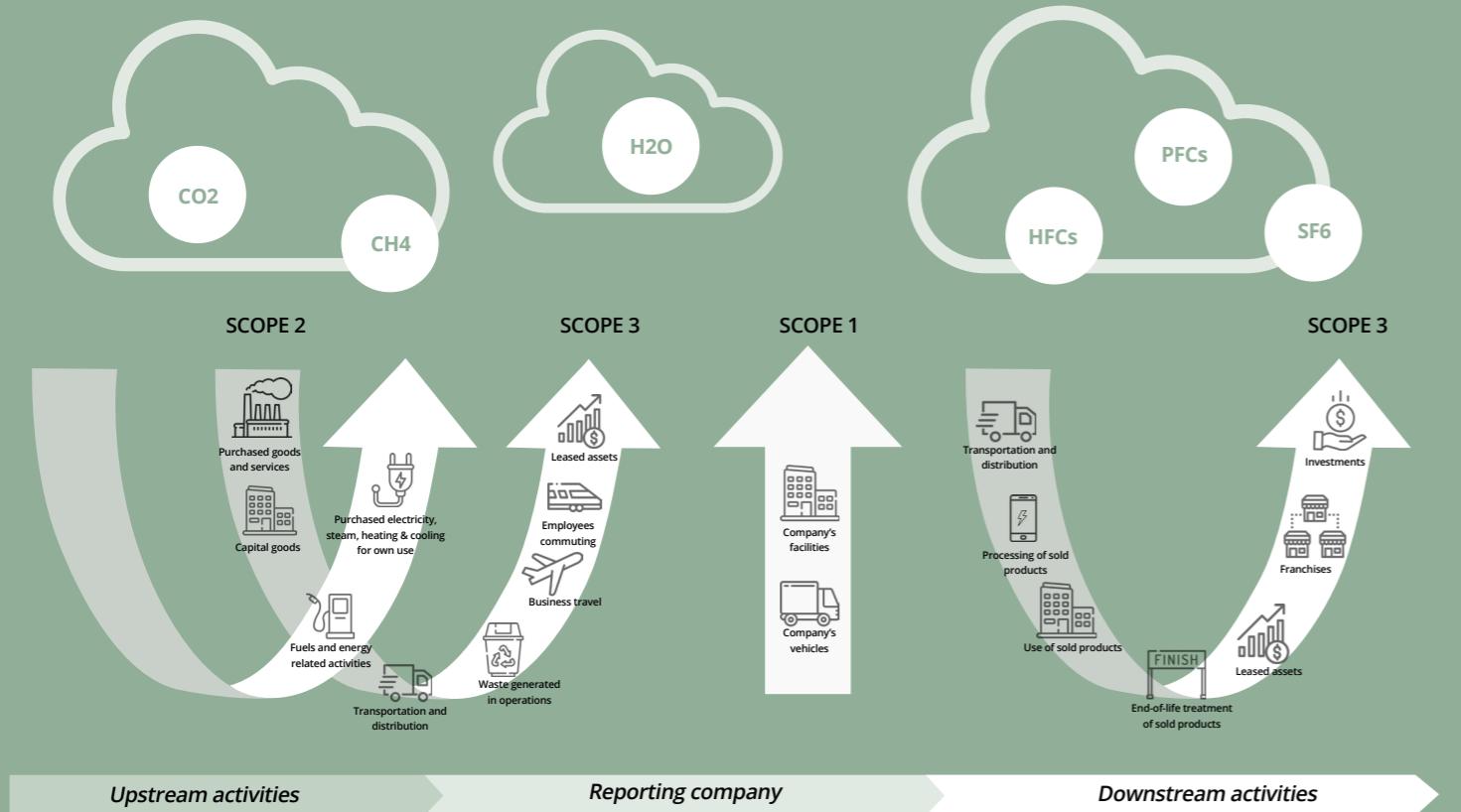


<sup>31</sup> OurWorldinData.org – Climate Watch, the World Resources Institute (2020).

<sup>32</sup> IEA, Africa Energy Outlook, 2019

<sup>33</sup> IMF.org, Boiling Point, <https://www.imf.org/external/pubs/ft/fandd/2018/09/pdf/southeast-asia-climate-change-and-greenhouse-gas-emissions-prakash.pdf>

Figure 8: The GHG Protocol's division of greenhouse gas emissions into scopes



#### DIRECT EMISSIONS:

**Scope 1 emissions** are emissions from operations that are owned or controlled by the reporting company. Examples include emissions from combustion in owned or controlled boilers or vehicles.

#### INDIRECT EMISSIONS:

**Scope 2 emissions** are emissions from the generation of purchased and/or acquired electricity, steam, heating, or cooling consumed by the reporting company. Examples include use of purchased electricity, steam, heating, or cooling.

**Scope 3 emissions** are all indirect emissions (not included in scope 2) that occur in the reporting company's value-chain, including both upstream and downstream emissions. Examples include production of purchased products, transportation of purchased products, or use of sold products.



We continue our work in collaboration with our portfolio companies to calculate the environmental impact of the renewable solutions and provide reliable, credible data diverse stakeholders. We fervently believe that the companies in our portfolio have a significant positive impact by providing access to clean and reliable energy to the thousands of households and MSMEs in Sub-Saharan Africa and Southeast Asia, not only in terms of environmental impact, but also by driving the green energy-efficient economy in emerging markets.



## Solar Home Systems: bringing clean energy access

Currently, Gaia Impact Fund reports avoided carbon dioxide emissions from the Solar Home Systems sector following GOGLA<sup>34</sup> methodology. Before GOGLA Impact working group launched its tool in 2015, there was no standard for calculating impact in the sector. As a result, organizations used dissimilar approaches or were limited in their capacity to report and communicate on the issue<sup>35</sup>.

This framework allowed for the introduction of a consistent approach to measuring company impact as concerns those operating in the off-grid solar sector, thereby allowing investors, non-governmental organizations and other stakeholders to compare the metrics of same-sector companies.

In this sector, social impact is therefore measured and compared based on the number of products sold or deployed to end-users, also taking into account the specific differences between company sales and operating models. Differentiation is made between the cash sales business model (in which the number of sales should be discounted for the share of products that may have been lost or damaged), and the PAYGo sales model (in which users should apply a discount for loss factor). In some specific cases, the framework requires the calculation of all products sold, while in other cases, the estimated number of currently operating systems is more relevant (which implies using the lifetime of products sold).

GOGLA's methodology also takes into account factors such as discount for losses and discount for repeat sales. In the first case, it refers to the percentage of solar products sold that do not end up in customer homes due to theft, loss or damage. In the second, the coefficient refers to the percentage of units sold that qualify as repeat sales to households with a solar home system already in place so as to avoid double counting.

Presently, 4 companies in our portfolio have fully adopted this methodology; we track the progress of our investees as concerns the amount of carbon emissions displaced quarterly.

### 5 Solar Home System companies in Gaia's portfolio

**107 589 tonnes of CO2 emissions avoided since Gaia's investment**



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<sup>34</sup> GOGLA is the global association for the off-grid solar energy industry.  
<sup>35</sup> GOGLA, "Social Impact Report, July - December 2015".

## Mini-grids: a long way away from standardizing measures to calculate environmental impact

Today, the mini-grid sector does not have any widely accepted methodologies to account for carbon emissions avoided. The plethora of existing methodologies either use: i) only one default emissions factor (which vary between countries), ii) one and the same default energy source that was previously used by mini-grid customers (in most cases, diesel genset), or iii) the amount of energy produced by the specific mini-grid (which is not precise given that the amount of energy produced is not always fully consumed). That said, it is extremely complicated for our companies to adopt one of these methodologies because mini-grid companies usually serve a variety of customers with different energy sources prior to being connected to mini-grids (from rural households to commercial telecom companies).

In order to calculate emissions avoided, the first step is to identify a baseline scenario that encompasses various sources, including: the regulatory requirements of a specific country, the average benchmark adopted in a particular industry, or the amounts of carbon emissions avoided prior to mini-grid installation. To calculate the impact of its portfolio companies, Gaia decided to join sector-level efforts and adopt a tool<sup>36</sup> recently developed by SEforALL<sup>37</sup>, which allows the environmental impact of mini-grid solutions to be assessed by calculating the carbon emissions avoided. This involves taking into account the range of different energy sources used prior to connecting to mini-grids, the energy consumed by customers and the different energy sources used by mini-grids<sup>38</sup>.

The tool requires inputs that are specific to a mini-grid project, such as the country, number of mini-grid connections by customer segments, monthly average consumption, as well as specific information relating to baseline emissions such as prior energy sources. This requires mini-grid developers to collect accurate information and blow-by-blow descriptions of customers and their prior energy sources, including kerosene lamps or candles for lighting, diesel generators, solar home systems or the grid in some cases.

### 2 mini-grid companies in our portfolio

**138 tons of CO2 emissions avoided since Gaia's investment**

#### Nuru: Decreasing carbon footprints

A cooperative with 17 mills recently switched from using expensive, high maintenance and polluting diesel-powered mills, to electric mills powered by Nuru's solar-based electricity.

Mr. Hekima (pictured left) is one of Nuru's happy customers. His new electric mills allow him to grow his business and bolster his income-generating activity. The flour produced by the mills is used to make FouFou or FuFu, a dough-like foodstuff used as a medium to eat other food items.

This switch was made possible by an 18-month financing option provided by Nuru. The cooperative will save hundreds of dollars in annual fuel and maintenance costs, and will lower their CO2 emissions by 86,7 metric tons of CO2/year according to preliminary estimations.

<sup>36</sup> The tool is in the process of UNFCCC approval, which would make it the official reference for the Mini-grid sector.

<sup>37</sup> Sustainable Energy for All is an international organization that works in partnership with the United Nations and government leaders, the private sector, financial institutions, civil society and philanthropists to drive action towards the achievement of the Sustainable Development Goal 7 (SDG7) – access to affordable, reliable, sustainable and modern energy for all by 2030 in line with the Paris Agreement on climate.

<sup>38</sup> Sustainable Energy for All, "Mini-Grid emissions tool cover note", Universal Energy Facility



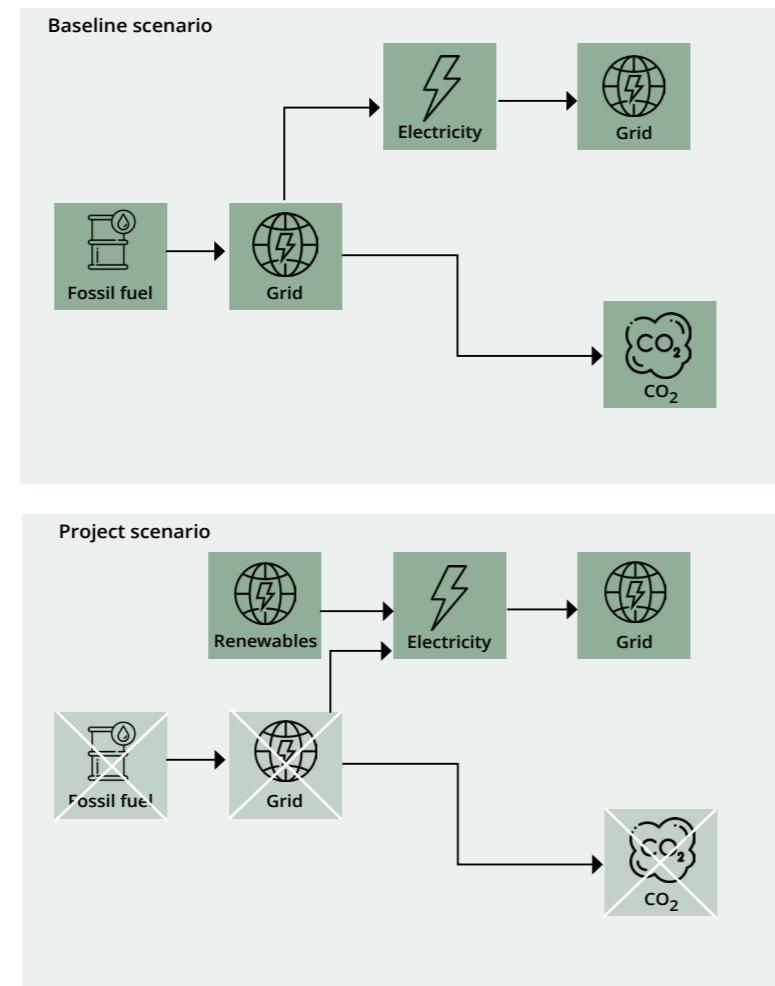
## C&I companies

There exists a range of methodologies that allow C&I developers to gauge their environmental impact, but no harmonized methodology that can be used for all companies in the sector, allowing both on-grid and off-grid connections to account for carbon emissions avoided. At Gaia, we believe that the range of methodologies issued by UNFCCC allows companies in our portfolio to reliably calculate their impact by taking into account criteria specific to projects implemented by our investees.

candi, a solar rooftop company, uses the methodology "AMS-I.D. Grid Connected Renewable Electricity Generation" developed and approved by UNFCCC standards for grid-connected facilities to calculate the amount of CO<sub>2</sub> emissions displaced. Thanks to real-time remote monitoring, the company collects kWh production from the solar system and consumption from the offtaker, which allows them to quantify the amount of kWh displaced from the grid. The avoided CO<sub>2</sub> emissions are compared to the baseline using the grid emission factor reported by respective local government. candi is also working closely with South Pole<sup>39</sup> in order to further monetize its environmental impact through renewable energy certificates and carbon credits.

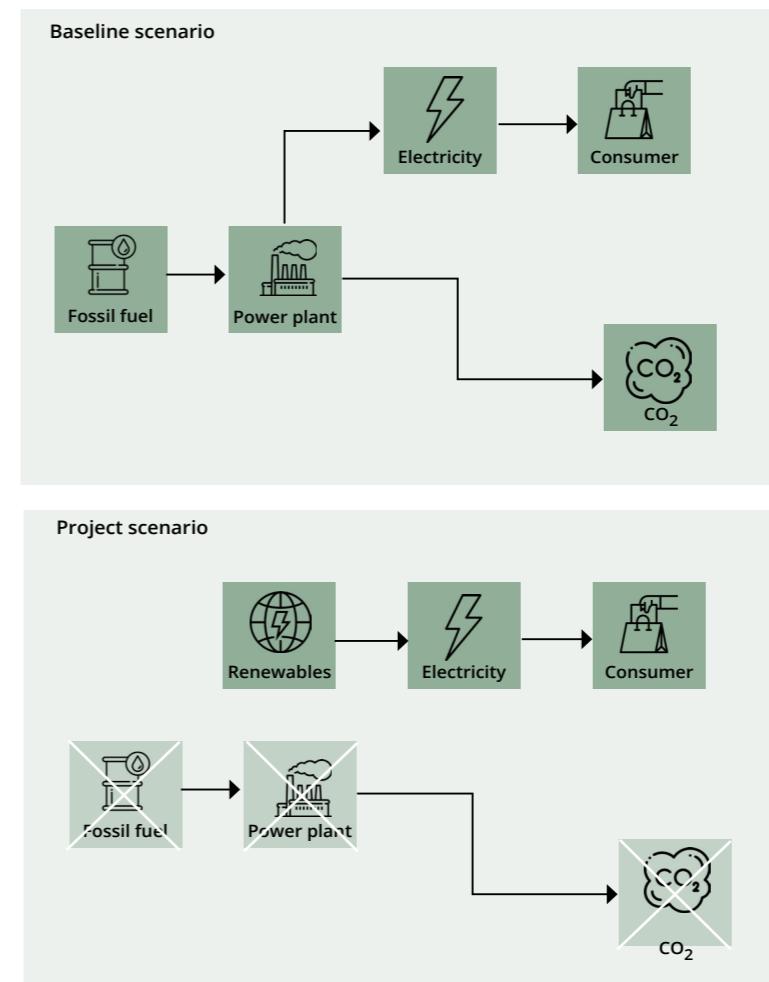
source : CDM Methodology Booklet, UNFCCC

Figure 9: Baseline and project scenarios for the methodology



## Building a carbon emissions framework

Figure 10: Baseline and project scenarios for the methodology



Canopy Power, a solar hybrid mini-grid company, previously utilized a "Greenhouse Gas Equivalencies Calculator"<sup>40</sup> which estimated emissions. The company has now switched to a methodology called "AMS-I.F. Renewable Electricity Generation for Captive Use and Mini-grid", issued by the UNFCCC. The methodology allows for the calculation of carbon emissions avoided for mini-grids with single off-takers, taking into account the emissions factor of three different levels of load factors for baseline emissions. Gaia Impact Fund is working closely with Canopy Power to implement this new methodology.

source : CDM Methodology Booklet, UNFCCC

For Canopy Power customers (mainly eco-resorts located in Southeast Asia's remote islands), access to clean off-grid energy is essential. One of its customers, a resort by the name of Telunas Resorts located in the Indonesian archipelagos 40 km away from the nearest power grid, installed a microgrid that reduced its diesel consumption by more than 60%, a significant contribution to the resort's award winning eco-credentials. Before the microgrid was installed, Telunas had to transport large quantities of diesel fuel over long distances by boats every month. Logistics for getting diesel fuel on site was way more complex, creating even more environmental pollution, and potential coral destruction during fuel delivery. The diesel generator also produced noise pollution during the night, which was an inconvenience for guests. According to the co-founder of the resort, Eric Baldwin, "the major motivation to get access to clean energy was to have a positive environmental impact by reducing our carbon footprint while minimizing our power usage and providing a better experience for our customers. We also hope that our experience will encourage other resorts to follow our example".

## 2 C&I companies in our portfolio

**4529 tons of CO<sub>2</sub> emissions avoided since Gaia's investment**

<sup>39</sup> South Pole is one of the leading providers of global sustainability financing solutions and services, allowing a wide range of public and civil sector organisations to accelerate the transition to a climate-smart society.

<sup>40</sup> The "Greenhouse Gas Equivalencies Calculator" is a tool developed and published by the United States Environmental Protection Agency.

## Desalination solutions

One company in our portfolio - Mascara Nouvelles Technologies - developed the world's first industrialized reverse osmosis desalination technology via battery-free photovoltaic solar energy, which provides drinking water without producing CO<sub>2</sub> emissions.

With its promise of providing clean drinking water for growing populations in water-stressed regions, water desalination has become a critical technology. This trend nevertheless has disastrous environmental effects: desalinating 1000 cubic meters of water per day consumes the rough equivalent of 100 tons of oil per year. The resulting greenhouse gas emissions raise questions about the sustainability of a technology that in turn, has enormous environmental benefits<sup>41</sup>.

There is no existing methodology that is utilized by the desalination sector. In order to calculate impact, we developed a tool in collaboration with Mascara, which enables the company to calculate Scope 1 and Scope 2 emissions based on several methodologies that were developed by UNFCCC<sup>42</sup>. Scope 1 mainly concerns chemical releases, which remain a huge environmental challenge for the desalination sector. The major part of the sector's emissions relates to energy consumption, which are accounted for in Scope 2. These CO<sub>2</sub> emissions are calculated from several inputs: desalination unit capacity, baseline energy sources, desalination unit energy consumption and availability period. This tool has allowed Mascara to report an accurate number of tons of CO<sub>2</sub> avoided based on actual country-specific baseline scenarios (national grid, diesel genset) and leverage the full potential of their unique desalination technology, which can run on solar without battery (grid-connected or not).

To calculate carbon dioxide emissions produced per m<sup>3</sup>, the efficiency of the desalination unit is multiplied by the relevant emission of the energy source.

**1 desalination company in our portfolio**

**1680 tons of CO<sub>2</sub> emissions avoided since Gaia's investment**



<sup>41</sup> Gude, V.G. "Desalination and sustainability—An appraisal and current perspective". 2016.

<sup>42</sup> For example, "Energy saving through the use of the reverse osmosis technology in the water desalination process".

## Part 4

### Solar Home Systems : an essential service displaying adaptability and resiliency during the Covid crisis

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<b>UpOwa: Healthcare</b>	52
<b>Hybrid Social Solutions: Education</b>	52
<b>Solaris Offgrid: Communications and access to information</b>	53
<b>Hybrid Social Solutions: Check Points as one of the major controls in stopping the spread of COVID-19</b>	54

Having thus far weathered the challenges of the COVID-19 crisis, the off-grid solar industry has demonstrated its importance in providing essential energy access for millions of households and businesses in developing countries.

COVID-19 has threatened the lives of millions of people across the globe and has disrupted an expanse of sectors, including sustainable energy. Within the span of a couple weeks, the virus brought numerous developing countries to a standstill, harming millions of lives, households and businesses in the process.

The COVID-19 crisis has essentially reversed the progress made to increase access to sustainable, affordable and reliable energy. In Sub-Saharan Africa - home to three-quarters of the almost 800 million people around the world who don't have access to electricity - the number of those lacking electricity surpassed 590 million people in 2020, an increase of 13 million people (or 2%) from last year<sup>43</sup>. Though Southeast Asia has made significant progress in providing access to electricity in recent years, it is nevertheless estimated that 218 million residents still lack access. Without electricity, individuals lack a core, basic necessity for poverty alleviation, as well as and the foundation of building resilience to the global health crisis<sup>44</sup>.

COVID-19 has shown that energy access is essential in fighting the pandemic, preventing the spread of the virus and helping people survive during lockdown measures: countries rely on energy to power healthcare facilities, keep people connected from their homes, transfer information, and carry out online education during confinements. Yet, for communities that don't have reliable energy access, such coping measures are not easily obtained. As the economy steadily deteriorated as the pandemic went on, an increasing number of households in Africa and Southeast Asia were unable to pay their electricity and utility bills, hitting the poorest and most underserved hardest.

According to GOGLA, the off-grid solar (OGS) industry demonstrated its importance in providing essential energy access for millions of households and businesses in developing countries. Like almost all industries, however, the OGS sector has also taken a hit by COVID-19. The first half of 2020 saw sales of off-grid solar lighting products fall by 26%, with only 3 million sold<sup>45,46</sup>.

We continuously monitored the impact of COVID-19 on the performance of companies in our portfolio, assessing country-level measures, operations, sales and business, human resources and overall financial situation.

In terms of operations and business, many companies experienced increased travel difficulties, which have also hindered sales, the distribution of solar home systems, and in some cases, have led to an increase in costs, thus resulting in lost income. In comparison to budgeted figures, the sales of our investee companies decreased by up to 40% in the first half of 2020.. Considering cash balances at the end of March 2020, most portfolio companies reduced expenses given the uncertainty of future operations and the predicted impact on revenue in the months to come.

SHS sector companies that Gaia invested in used a range of mitigation strategies that were aimed at supporting their operations during lockdowns, helping governments combat the pandemic, and supporting population with innovative solutions.



<sup>43</sup> According to World Energy Outlook 2020's analysis. IEA, "SDG 7: Data and projections, Access to affordable, reliable, sustainable and modern energy for all, Flagship report", October 2020, <https://www.iea.org/reports/sdg7-data-and-projections/access-to-electricity>

<sup>44</sup> Sustainable Energy for All, "The recover better with sustainable energy guide for Southeast Asian nations", 2020

<sup>45</sup> GOGLA, "Off-Grid Solar Market: COVID-19 Drives 26% Drop in Sales, Slowing Energy Access but Investors Remain Positive about Industry Performance", <https://www.gogla.org/about-us/blogs/off-grid-solar-market-covid-19-drives-26-drop-in-sales-slowing-energy-access-but>

<sup>46</sup> GOGLA, "Global off-grid solar market report, Semi-annual sales and impact data", January-June 2020

<sup>47</sup> Sustainable energy for all, Powering Healthcare, <https://www.seforall.org/powering-healthcare>

## Easy Solar and upOwa: measures for households with limited resources

As travel restrictions were implemented during the peak of the pandemic, Easy Solar launched an Online Sales Platform that enabled Sierra Leoneans to purchase and receive solar lanterns, home systems, appliances and cooking stoves across the country, directly from or to their house. This initiative was extremely important for its most vulnerable and underserved populations as they battled the emerging health and economic crisis.

UpOwa decided to decrease the price of all commercialized solar kits, as well as provide additional free days of light to its active customers. This measure has allowed households with limited revenues to access clean, reliable and affordable light and energy during the pandemic.



## UpOwa: Healthcare

*COVID-19 has intensified the vulnerabilities of healthcare systems around the world. Long before the pandemic made daily headlines, the lack of reliable power in healthcare facilities was undermining the quality of treatment for millions of people in Sub-Saharan Africa and South Asia. Though they expected to be at the frontline of fighting the COVID-19 pandemic<sup>47</sup>, the majority of healthcare facilities in Southeast Asia and Sub-Saharan Africa do not have access to affordable, clean and reliable electricity.*

Cameroon was not an exception. Health centres were especially under strain during the crisis. UpOwa's Flash kits, ensured reliable solar-powered light during medical treatments and operations in case of power outages from the national grid. This included the non-connected but crucial health centres located in Cameroon's rural areas.

For example, 25 Flash kits were bought by Spanish NGOs to be installed in rural dispensaries (mainly maternity centres) to ensure the continuous care in several Cameroonian regions.

## Hybrid Social Solutions (HSS): Education

*COVID-19 has brought about a new reality of deepening inequality in the education sector. Governments have had to rethink how quality education can be delivered in order to prevent such inequalities from plaguing an entire generation of youth, thus setting UN SDG 4 of Quality Education back decades. The solutions and innovations proposed by solar home system companies have proven to help underserved children continue their studies online inclusively and equitably*

Nicole Capili is a student at Palar Integrated School in Taguig, Philippines. When schools were closed due to COVID-19 in March, the government shifted to delivering education online through daily video calls. Students would complete assignments and tests at home through paper modules, which would be picked up and returned weekly. Because Nicole already had a solar system and a solar fan, she could easily complete her modules during the evening. However, without a laptop and wi-fi, she had to use a cell phone outside the house to participate in video calls. Lacking access to stable internet, Nicole

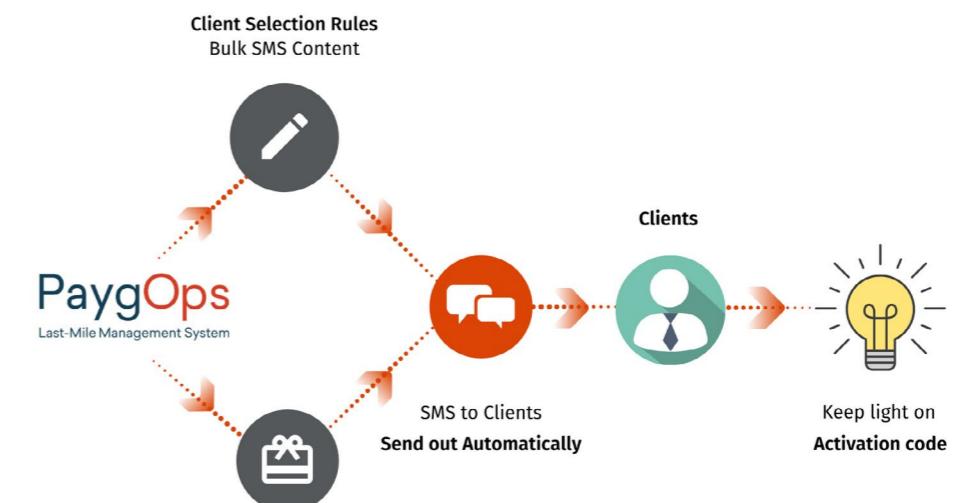
couldn't join online classes and as a result, started to fall behind despite always being an honours student. When the new school year started, Nicole's parents purchased a second-hand tablet and prepaid broadband wi-fi, which was then connected to their solar system and TV. They were able to afford this equipment thanks to the savings they gained on electricity from their HSS solar home system. Now, Nicole can participate in zoom calls with her teacher and classmates. Her performance this semester has greatly improved, and her parents hope that she will become an honours student once again!

<sup>47</sup> Sustainable energy for all, Powering Healthcare, <https://www.seforall.org/powering-healthcare>

## Solaris Offgrid: Communications and access to information

*Digital technologies were the main tool in supporting the public health response to COVID-19. The media has played an essential role in informing citizens on COVID-19 symptoms, the development of the disease, and promoting precautionary measures.*

Solaris Offgrid, global provider of pay-as-you-go solutions for last mile developers, has decided to streamline communications during the crisis by developing a bulk SMS campaign functionality powered by PaygOps so as to enable distributors to send customized messages to its customers concerning special promotions or grace periods. This helped ensure that end-user devices stayed on during the lockdown, which came as a major relief to many during these challenging times.



## Hybrid Social Solutions (HSS): Check Points as one of the major controls in stopping the spread of COVID-19

As one of the preventive measures aimed at controlling the spread of the pandemic, many governments implemented restrictions not only for international, but also domestic travel. When COVID-19 hit the Philippines - the second hardest hit Southeast Asian country - the government took a regional approach to restrictions, implementing a nationwide stay-at-home quarantine on 16 March 2020, and establishing thousands of quarantine control points (QCP) to slow down the spread of virus.

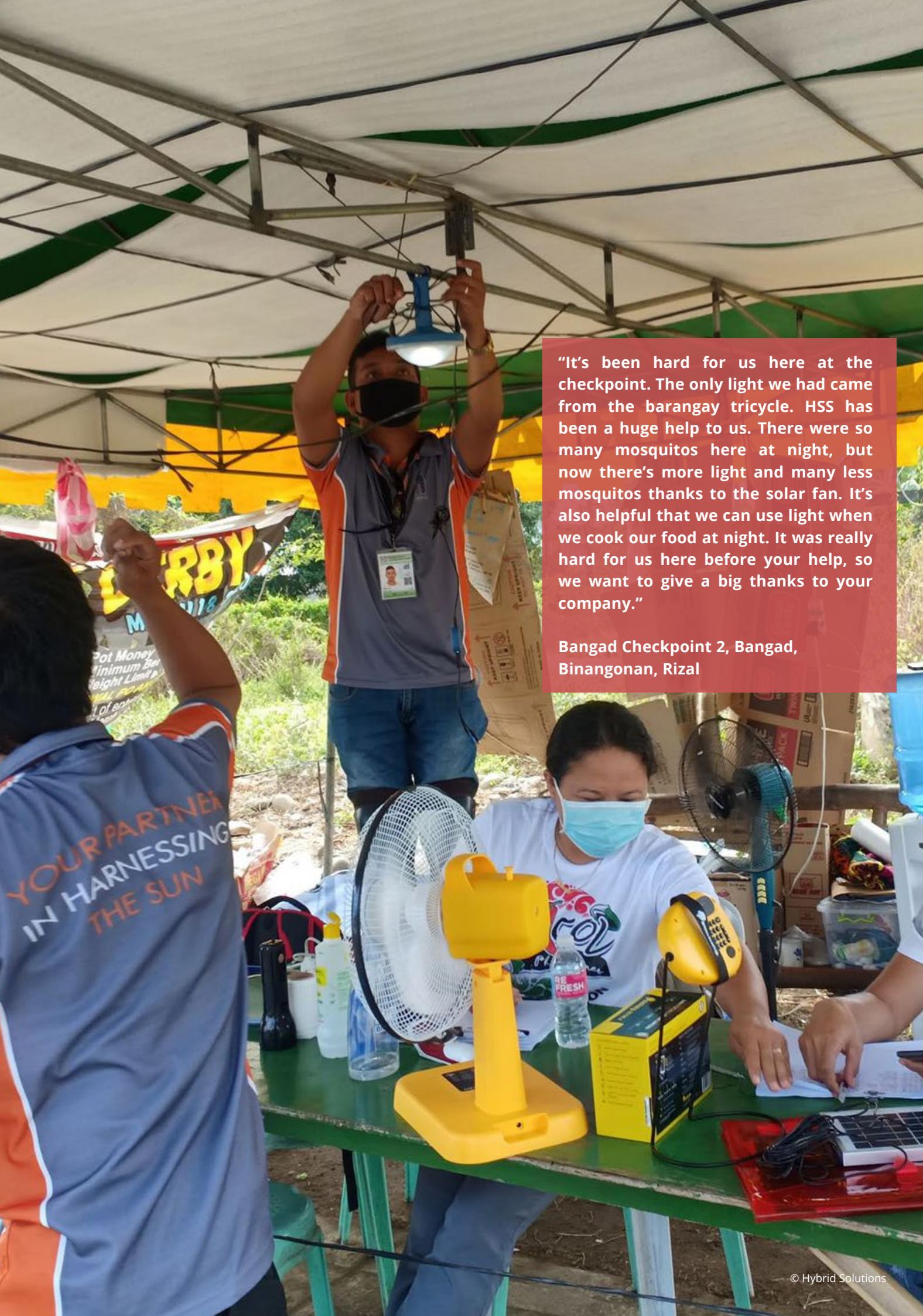
Frontline workers restricted unauthorized travel to prevent virus transmission, recorded temperatures to detect potential cases, and monitored active COVID-19 cases.

Manning checkpoints was challenging, dangerous, and difficult for personnel: the majority of QCPs were open-air tents equipped with basic furniture and no access to electricity. Monitoring became massively difficult and even life-threatening at night. For example, there were reports of incidents where volunteers were hit during the night by vehicles passing through control points due to the poor visibility. QCPs nevertheless stayed open 24/7 to perform duties such as vehicle inspection

and monitoring, but without proper lighting, the productivity of health volunteers was limited to daylight hours, thus hindering their role as the centre of community protection.

To respond to the crisis, Hybrid Social Solutions launched a program to 'solarize' COVID-19 QCPs: the program relieved frontline teams manning checkpoints via the deployment of various solar-powered equipment such as solar radios, solar light chargers and solar fans. HSS provided solar-power systems to 134 disadvantaged QCPs in 40 municipalities, a total of 2158 health volunteers having benefitted from this program.

**Impact of solar products on frontliners per benefit (results of the survey of checkpoints)**



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