



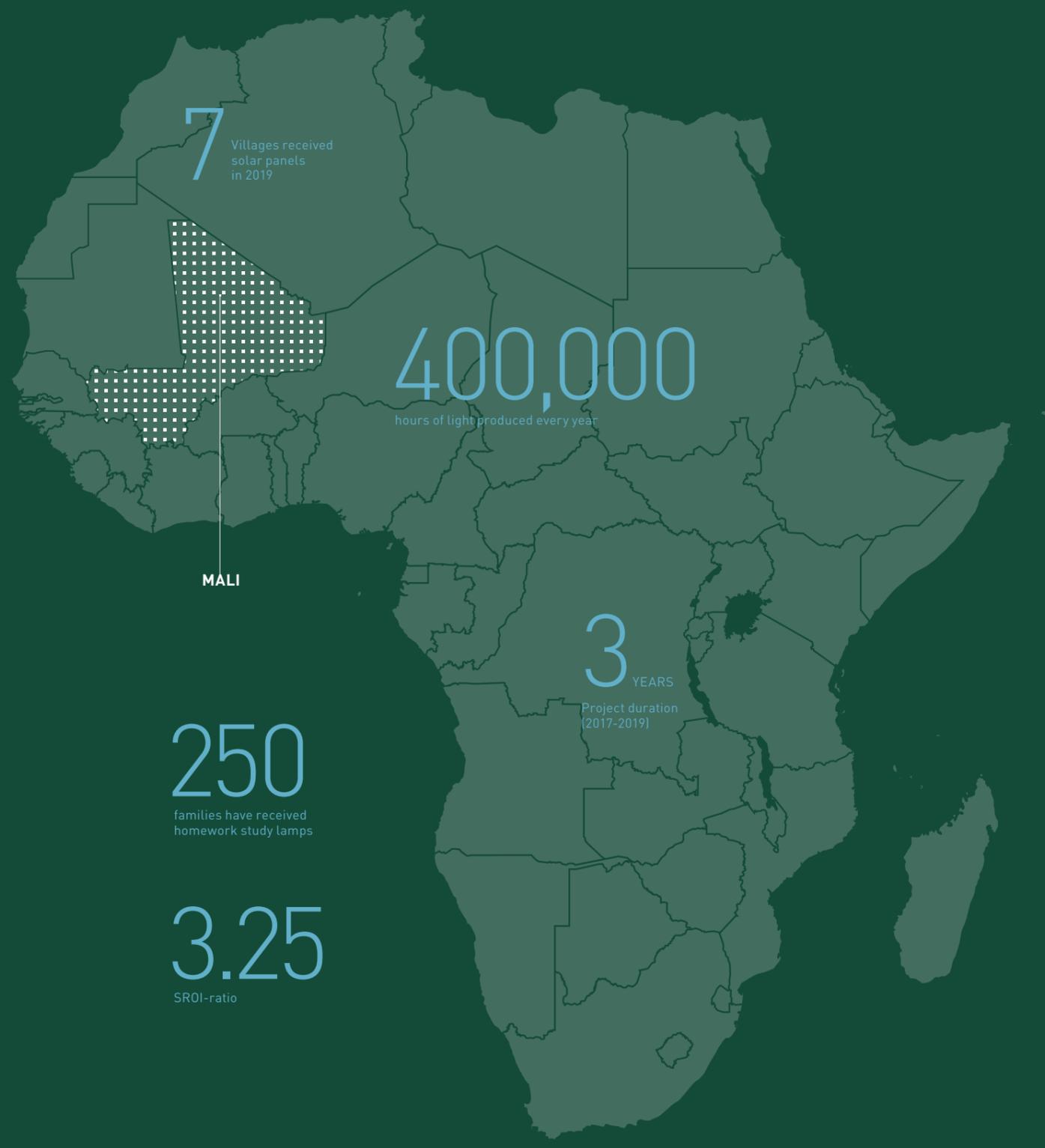
Danske  
Commodities

# LIGHT OVER MALI

Annual Social Return on  
Investment Report 2019

**>25%** of the rural population in Mali has access to electricity

**15,000** people given access to light annually



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# ABSTRACT

**In 2019, the 'Light over Mali' project provided electricity to 15,000 Malians after dark and generated +400,000 hours of light by supplying renewable energy to rural villages in Mali.**



Less than 25% of the rural population in Mali have access to electricity<sup>1</sup>. Danske Commodities helps fight socio-economic challenges like illiteracy and poverty by bringing electricity to off-grid areas of rural Mali. In 2019, Danske Commodities installed solar panels at five schools, five health clinics, established five lamp posts in city centres and distributed 250 solar-powered homework lamps to children.

These new sources of light have provided new opportunities for the villages after dark:

- Health clinics can cool medical supplies, treat diseases or help deliver babies.
- The schools can provide basic education to the adults who work during the day and as such only have the evenings in which to improve their skills.
- Public streetlights help enhance safety at night.
- The homework lamps enable children to study after dark.
- Also, local villagers receive fundamental training in

maintaining the solar panel systems, which is a prerequisite for keeping the solar panels up and running.

For these installations to generate sustainable value for Malian society, priority is given to health and education – for both adults and children. Improved health and education are the first steps to be taken to improve quality of life and to change the entrenched correlation between rates of electrification and illiteracy – which in rural areas of Mali is as high as 70%<sup>2</sup>.

Solar power makes it possible to offer Adult Basic Education (ABE) at local schools to Malians who work during the day, and as a consequence only have the evenings to improve their skills. This educational programme helps enhance the villagers' business savvy, teaching them to negotiate in the marketplace or helping them start a business on their own. Also, pupils use the classrooms to study and prepare for exams, as having light makes it possible for the teachers to provide academic support in the evenings.

Educating local technicians is also a fundamental part of this vision, as electricity is a necessity for the local population to receive education after dark and for health clinics to function after the sun sets.

#### THE OUTCOME

The method used in this paper is the Social Return on Investment (SROI) approach, which is a monetary valuation of the benefits of providing rural villages with light.

The SROI analysis measures and documents the economic value of the social and environmental outcomes from Light over Mali, converting the social efforts into an SROI ratio. The ratio consists of input vs. output, which means comparing the investment to the value created for the Malians involved.

The SROI ratio based on the 2019 evaluation of the project is calculated at 3.25, while over a 10-year period the SROI ratio is 11.62. This monetary estimate means that for every DKK 1 spent on Light over Mali, the project generates DKK 11.62 over a 10-year period.

#### ADDITIONAL VALUE CREATION

However, not all of the value from Light over Mali can be measured monetarily. Additional areas of value have been identified: Light at health clinics help save women and especially babies from dying during childbirth, the public streetlights heighten security and help the villagers avoid dangerous animals during the night, investments in education help keep young people in the local communities and strengthen the rural economy. These effects are also expected to have a long-term impact.

<sup>1</sup> The World Bank. Access to electricity, rural (% of rural population) – Mali.

<sup>2</sup> Nordic Folkecenter for Renewable Energy (2015). Light over Mali. Denmark. Published by Nordic Folkecenter for Renewable Energy.



# PURPOSE

The purpose of this report is to evaluate the value creation of Light over Mali in 2019.

It is a central part of Danske Commodities' approach to corporate social responsibility to measure and evaluate the relationship between the input and outcome of the project to assess the impact and socioeconomic effects of providing rural villages in Mali with solar panels at schools and health clinics.

Consequently, the purpose is to depict the social impact generated for adults, children and local communities in Mali.

# PROJECT PRESENTATION

**With Light over Mali, Danske Commodities helps make renewable energy more accessible. Solar power is a fairly simple solution for bringing electricity to un-served areas of the world, as renewable energy by nature is decentralised and can be installed in every village and on every rooftop without building costly power grids supplied by conventional power.**

Light over Mali is a three-year project running from 2018-2020. DC's project is part of a larger project called Light over Africa, which was established by Mali Folkecenter in collaboration with Nordisk Folkecenter.

Mali Folkecenter is a local NGO that counsels the Malian government on climate change, environmental protection, renewable energy issues and access to sustainable, decentralised energy solutions in Mali and West Africa. Mali Folkecenter was established in 1999 by PhD Ibrahim Togola, who founded the NGO after being a trainee at Nordisk Folkecenter. Over the past 20 years, Mali Folkecenter has built solid experience in working with rural communities, influencing policies and strengthening actors at different levels of responsibility.

Nordisk Folkecenter is an independent Danish NGO and renewable energy research facility, which provides industrial innovation, information, training and implementation of renewable energy technologies and energy savings across the world.

## DANSKE COMMODITIES AND LIGHT OVER MALI

In 2019, Danske Commodities donated DKK 200,000 to Light over Mali to help improve living conditions in seven different villages, creating tangible value for 15,000 Malians.

With solar panels installed at schools, men and women are able to attend evening classes to acquire basic educational skills when they are not working. Also, children from primary and secondary schools can use the classrooms in the evenings to prepare for exams and tests while receiving academic support from teachers.

The solar panels installed at health clinics make the medical facilities operational after dark, increasing the service level and quality of care. This means that the clinics can treat diseases, keep medicine cool and help deliver babies at night.

Children living in remote locations are given solar-powered lamps, so that they can prepare their homework after the sun sets. Moreover, public solar-powered streetlights installed in city centers enable patients to find their way to the health clinics and minimise the risk of theft.

Also, local villagers are trained to install solar panels. Two people from each village – a man and a woman – receive fundamental training in maintaining the solar panel systems.

## ENERGY POTENTIAL IN MALI

Mali is currently reliant on fossil fuel imports, exposing the country to price volatility and unreliable supply. As a result, around 98% of the country's mostly rural population lack access to electricity. However, the potential for renewable energy is vast. Mali has 3046 hours of sunlight per year<sup>1</sup>, which is approximately 55% more than in Denmark (1690 hours of sunlight per year)<sup>2</sup>.

<sup>2</sup> Ogimet. Bamako, Mali. (Online) available at: <http://www.ogimet.com/cgi-bin/gclimat?months=12&lang=en&mode=0&ind=61291&ord=DIR&year=2019&mes=12> (accessed 20 May 2020).

<sup>3</sup> Dmi. Copenhagen, Denmark. (Online) available at: <https://www.dmi.dk/vejrkiv/> (accessed 20 May 2020).

**TABLE 1 MALIAN VILLAGES AFFECTED IN 2019**

VILLAGE	Inhabitants affected	Solar panels on school classrooms	Solar panels on health centres	Solar-powered homework lamps	Solar-powered streetlighting	Training of local technicians
Village of Kolle*	1,059	2	1	50	1	2
Village of Tongoye	799	2	1	50	1	2
Village of Tienbougou	1,535	2	1	50	1	2
Village of Togo	2,345	2		50	1	
Village of Bollé	4,898		1			2
Village of Seribila	2,063		1			2
Village of Falla	2,204	2		50	1	
<b>TOTAL</b>	<b>14,903</b>	<b>10</b>	<b>5</b>	<b>250</b>	<b>5</b>	<b>10</b>

\*In the village of Kolle, the installation of solar panels began in December 2018 and was finalised in 2019.

**TABLE 2 MALI IN BRIEF**

Population	19,553,397
Language	French (official), Bambara 46.3%, Peuhl/Foulfoulbe 9.4%, Dogon 7.2% (Mali has 13 languages)
Capital	Bamako
Religion	Muslim 93.9%, Christian 2.8%, Animist 7%, none 2.5%, unspecified 2.5%
Population growth rate (annually)	2.95%
Median age	16 years
Total fertility rate:	5.72 children born per woman (4th highest rate in the world)
Infant mortality rate	64 deaths / 1000 live births (9th highest rate in the world)
Maternal mortality rate	562 deaths / 100,000 live births (15th highest in the world)
Life expectancy (total population)	61.6 years
Literacy (total population)	35.5% can read and write
GDP per capita	\$2,200 (DKK 14,473)
Net national income per capita <sup>3</sup>	\$1,500 (DKK 10,214)
Population below poverty line	36.1%
Electrification – total population	35.1%
Population without electricity	11 million

Source: 2. Central Intelligence Agency (CIA). The World Fact Book. Mali.

Source: 3. Empower Mali. About Mali. (Online) available at: <http://empowermali.org/about-mali/> (accessed 24 June 2020).

# METHOD



SR0I is a framework for measuring and accounting for a much broader concept of value

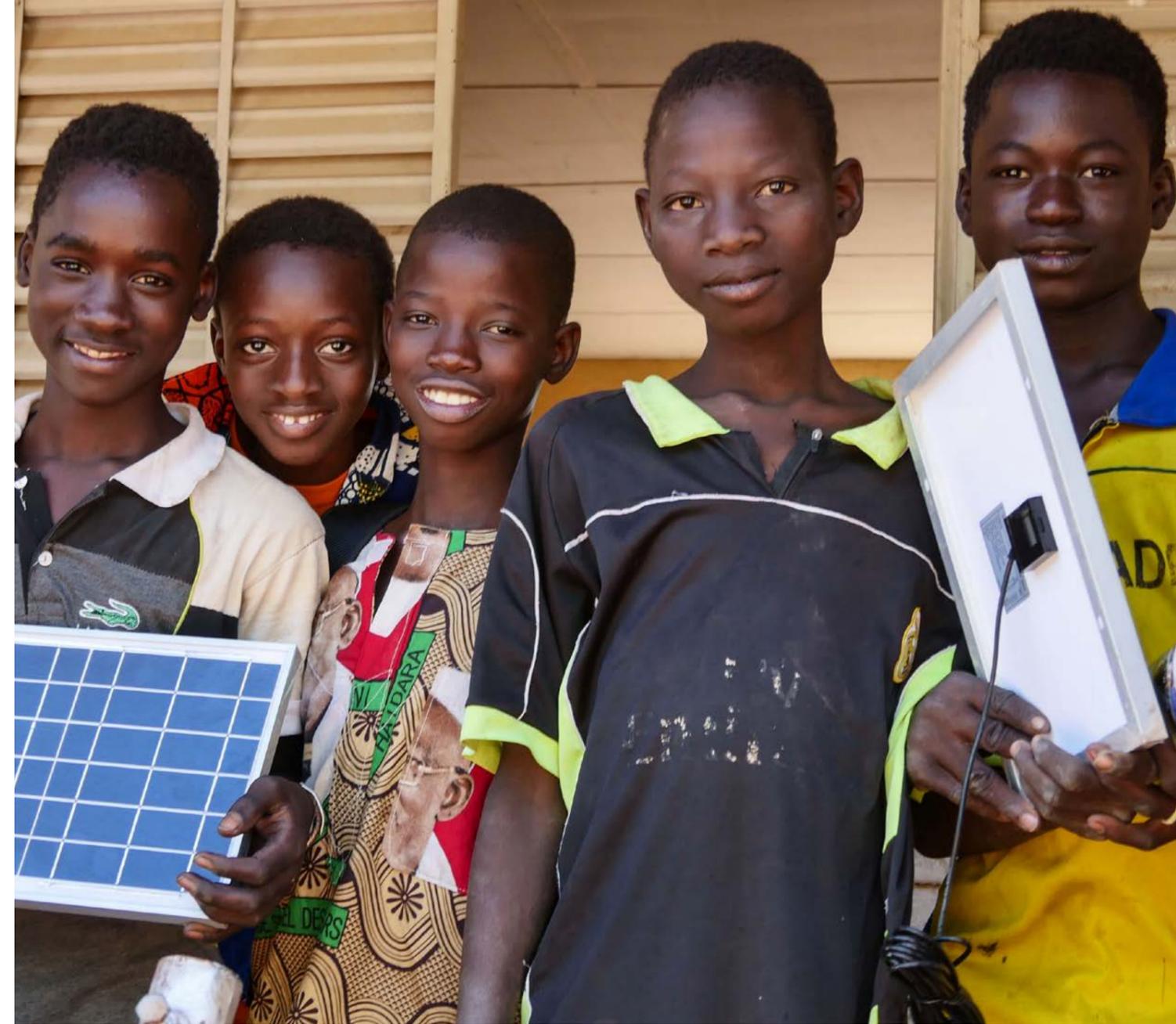
**Social Return on Investment (SR0I) is inspired by traditional economic approaches such as Return on Investment and Cost-Benefit analysis. The SR0I is a modern method developed to quantify and understand the impact created by social projects.**

The SR0I was developed in 2009 by the former Office of the Third Sector (OTS) in the Cabinet Office of the UK Government<sup>1</sup>. By measuring the economic value of social and environmental outcomes, it creates a perspective on whether a development project, social business or a CSR-project is beneficial and profitable. Like a traditional cost-benefit analysis, the SR0I includes a ratio; in this case a Social Return on Investment ratio.

The SR0I accounts for a much broader concept of value by using stakeholder evaluations to value softer outcomes, such as personal development, enhancement of skills, experience and well-being of stakeholders affected by a social project.

#### THE SR0I ANALYSIS INVOLVES SIX STEPS:

- 1) **Establishing purpose and scope** of the analysis and identification of key stakeholders.
- 2) **Statement of results.** Through engaging with stakeholders, an evaluation of the monetary value of input is developed, which shows the relationship between input, output and outcomes.
- 3) **Evidencing outcomes and giving them a value.** Adding monetary value to the results.
- 4) **Establishing impact.** Having collected evidence on outcomes and monetising them, the aspects of change that would have happened anyway or are a result of other factors are eliminated from the analysis.
- 5) **Calculating the SR0I.** Adding up all the benefits, comparing the result to the investment and testing the sensitivity of the results.
- 6) **Reporting, using and embedding.** Sharing findings with stakeholders and responding to them, embedding good outcomes, processes and verification of the report.



#### THERE ARE TWO WAYS OF APPROACHING THE SR0I:

- 1) An evaluation which is conducted retrospectively and based on actual outcomes that have already taken place.
- 2) A forecast which predicts how much social value will be created if the activities meet their intended outcomes.

This SR0I report consist of an analysis of actual achievements, value and impact of Light over Mali in 2019 as well as a 10-year SR0I ratio, which predicts the long-term effects of the project. The purpose of employing both an evaluation and a forecast is for the SR0I to provide a much broader perception of the value created as change and development of skills evolve over time.

<sup>1</sup> Social Value UK (2012). A guide to Social Return on Investment.

# STAKEHOLDERS

The SROI ratio is calculated based on the stakeholders affected by the installation of solar panels in Mali. The below overview describes how the different groups are involved and whether or not they are included in the analysis.



**TABLE 3** DESCRIPTION OF STAKEHOLDERS

GROUP	Effect	Included in analysis
Danske Commodities	Danske Commodities funds the entire project. No funding, no project.	Yes. Danske Commodities is included on the input side of the SROI.
Nordisk Folkecenter	Nordisk Folkecenter provides administrative services and continuous follow-up.	Yes, indirectly. Salaries are included in the input.
Children receiving homework lamps	Children living in remote locations will receive a solar lamp to help them do homework and prepare for tests after dark.	Yes. Providing homework lamps is included in the analysis.
Children in general	The village children will be able to get more school support, because teachers and classrooms are available after dark.	Yes. The enhanced educational possibilities for children in general are included.
ABE participants	The adult villagers receive education in terms of basic literacy, math, health and contraceptive information.	Yes. The effects of ABE are included by using data from the affected stakeholders, existing scientific reports and data from the World Bank.
Children of ABE-participants	The children of the parents that attend evening classes are believed to get enhanced support from home to continue schooling, spend time on homework, etc.	No. It is difficult to estimate a monetary value of these spill-over effects, even though the World Bank documents that ABE affects children in a positive manner.
Teachers	Education after dark would not be possible without solar panels or teachers and classrooms.	Yes. To establish a broader picture of the value created, we have included the teachers' perception of the effects.
Local solar panel technicians	Local villagers receive fundamental education in installation and maintenance of the solar panel systems.	Yes. Because training local technicians is a prerequisite for keeping the solar panels up and running.
Personnel at health clinics	The solar panels at the health clinics help the personnel treat diseases, keep medicine cool and prevent women and babies from dying during childbirth, because the medical facilities are fully operational after dark.	Yes. The health clinics are included. Enhancing productivity by reducing sickness among the workforce would not be possible without medical personnel or medicine.
Villagers in general	The health clinics can treat more patients and provide better care after dark, which reduces illness and enhances general well-being. Also, having lamp posts in city centres enhances safety.	Yes. As the number of sick days are minimised, the village population can work more often, and this will affect their level of income. And the increased safety minimises the risk and worries about crime at night.

# DATA

## An SROI analysis has three data entry points: input, output and outcome.

Output and outcome data are based on interviews with the different stakeholder groups affected by solar panels installed in Mali, as different perspectives are an important aspect of the complete analysis as well as the validity of the information. Interviews are conducted by combining open-ended qualitative questions and close-ended quantitative questions.

Furthermore, data is derived from quantitative data<sup>1</sup> from the World Bank, insights from both Mali Folkecenter and Nordisk Folkecenter and scientific research papers, including an evaluation conducted by the Norwegian Agency for Development Cooperation<sup>2</sup> and a systematic academic review, Returns to Investment in Education by educational scholars George Psacharopoulos and Harry Patrinos<sup>3</sup>.

A part of the data is derived from HACT's Social Value Bank – the largest set of methodologically consistent social value metrics produced, including 636 well-being valuations<sup>4</sup>. The outcome in terms of well-being effects is based on research from HACT. Moreover, the World Bank measures global poverty using an international poverty line set at \$1.90 a day. To ensure that the

well-being effects of Light over Mali can be compared across economies of the world, purchasing power parity (PPP) adjustments are made throughout the calculations. PPPs are calculated by collecting and analysing data on the prices of the same goods and services across many economies, and measuring what the price of an item is in one country relative to another<sup>5</sup>.

### QUOTES FROM STAKEHOLDERS

A selection of statements from the different stakeholder groups is presented below, giving a more nuanced picture of the underlying data as well as the value experienced.

*"The homework lamps make it easier for me to revise and prepare for exams. I can also go out of the house more at night. Now I have more courage and my results are better than last year."* - Student, 13 years old

*"More than 200 students have made use of the solar panels installed in the classrooms, where they can read, do exercises and prepare their homework in the evening. It has made learning easier, improved students' knowledge and resulted in a good grade average. Overall, it increases the students' chances of continuing their studies and fosters a sense of solidarity amongst the students".*  
- Teacher, 55 years old

*"Electricity at the health clinic during night-time has broken the darkness, eased our work and the security of the clinic, encouraging especially more women to visit. Now, we can treat patients 24 hours a day, reducing the number of sick people. The light enables childbirth, consultation and minor surgeries – and is a positive change and assurance for the people in the village".*  
- Health clinic personnel, 46 years old



### RESEARCH AND DATA LIMITATIONS

Improvements in the quality of life, feelings and well-being of individuals are very difficult to estimate. The SROI analysis attempts to measure this by asking stakeholders how they themselves value the change, i.e. how important it is to them and how it has changed their lives. Some will argue that qualities such as self-confidence have an intrinsic value that is simply not reducible to a monetary value<sup>6</sup>. Furthermore, the collected data contain uncertainty factors like social desirability bias, which occurs when respondents answer questions in a manner that will be viewed favourably by others, because of the norm or simply by a natural wish to depict success<sup>7</sup>.

There are also challenges linked to determining an appropriate discount rate as well as considering potential risk factors when projecting values into the future forecasting of impacts after five or 10 years<sup>8</sup>.

- 1 Lauglo, Jon. (2001). Engaging with adults: the case for increased support to adult basic education in Sub-Saharan Africa.
- 2 Burnet, Nicholas (2015). Education for development. Estimating the costs and benefits of education from a health perspective.
- 3 Psacharopoulos, George and Patrinos, Harry Anthony (2002). Returns to Investment in Education. Policy research working paper. World Bank.
- 4 HACT (2018). UK Social Value Bank Calculator. Version 4.0.
- 5 The World Bank. Adjusting for price differences across the world.
- 6 The Guardian. Can SROI help the voluntary sector measure value.
- 7 Nederhof, J. Anton (1985). Methods of coping with social desirability bias. A Review. In European Journal of Social Psychology.
- 8 Social Value UK (2012). A guide to Social Return on Investment. Stage 5. Calculating the SROI.



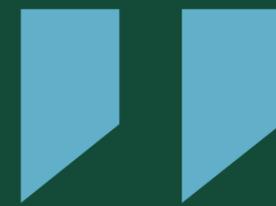
Light enables childbirth, consultation and minor surgeries. Now, we can treat patients 24 hours a day, reducing the number of sick people

Health clinic personnel, 46 years old



Now I have more courage and my results are better than last year

School student, 13 years old



It increases the students' chances of continuing their studies and fosters a sense of solidarity amongst the students

Teacher, 55 years old

# CALCULATIONS

**A detailed description of the calculations for the input, output and outcome of the evaluation and forecast is provided in the following section.**

## INPUT

Input is defined as the total amount of resources used to operate the project for a given period – in this case 2019. The input consists of Danske Commodities' donation of DKK 200,000.

## OUTPUT

The output is a quantitative statement of the number of activities and people involved in Light over Mali in 2019.

## Energy production

One output aspect is energy production – specifically the amount of light generated by the solar panels. Each solar panel generates the following amount of energy:

- Solar panels for one school: light up two classrooms for four hours per day
- Solar panels for one health clinic: light up the clinic for nine hours per day
- Solar panels for one lamp post: light up the public square for eight hours per day
- Solar-powered homework lamps: generate light for eight hours per day on a low light setting and four hours on a high light setting

For the villages overall, the solar panels installed at schools, health clinics and for public streetlights can generate 105 extra hours of light per day. Adding 250 solar-powered homework lamps that run on the high light setting to the equation, the solar panels can generate a total of 1105 hours of light per day. In a year, the panels produce more than +400,000 hours of extra light combined for the villages.

## Experienced impact

The output also consists of the qualitative and quantitative statements of the people impacted by the project, as several stakeholder groups have experienced a number of different effects.

Furthermore, the effects of education and access to health treatments after dark make up a large part of the SROI ratio, as light is the prerequisite for the two.

## OUTCOME

The outcome is the effect the project has had on the stakeholders. The outcome falls in two parts: an evaluation of the project's effect in 2019, followed by a forecast of the project after a 10-year period.

## OUTCOMES OF THE EVALUATION

In 2019, it was a priority to help the broader community of Mali. Therefore, we have been able to help seven different villages and approximately 15,000 people in total. In 2018, 30 Malinese received ABE in the evenings, whereas it was not possible to conduct ABE in 2019 due to deficient infrastructure and a lack of local ABE teachers in the decentralised villages. However, all the solar panels have been installed and some of the villages might offer ABE at a later point, because they now have the facilities to do so. Instead, priority was given to general health and safety, education of local solar technicians and to improving the educational conditions for children both at local schools and at home.

**TABLE 4** OUTCOMES OF THE EVALUATION OF 2019

OUTCOME TYPE	Description of outcome	Value
Reducing sickness	The health clinics with solar panels are able to treat more patients and provide better care after dark, which reduces illness and enhances general well-being. In relation to the Social Value Bank, the effect of good overall health is included in the calculation.	DKK 179,015
Educating local technicians	Training 10 local villagers in installing and maintaining the solar panel systems provides them with a very useful craft, which gives the local technicians better access to the job market – which is characterised by a lack of qualified, skilled technicians to meet the growing demand for off-grid solar power installations. In relation to the Social Value Bank, the effects of general job training and confidence are included in the calculation.	DKK 52,680
Increasing safety	The five lamp posts installed in city centres minimise the risk of people becoming a victim of a crime or an animal attack at night. In relation to the Social Value Bank, the effect of not being worried about crime is included in the calculation.	DKK 115,522
Children receiving homework lamps	250 school children living in remote locations have each received a solar-powered homework lamp, which among other things has improved their school and social life as well as their grade averages. In relation to the Social Value Bank, the effect of improved confidence is included in the calculation.	DKK 137,514
Children using classrooms in the evening	About 1000 school children from the five villages with solar panels installed at the schools use the classrooms at night to do homework and prepare for tests. In relation to the Social Value Bank, the effect of improved confidence is included in the calculation.	DKK 165,016
<b>TOTAL OUTCOME</b>	All stakeholders	<b>DKK 649,746</b>



A number of deductions have been carried out throughout the calculations above, because some stakeholder groups only experience a part of the well-being effects and with different levels of intensity. Moreover, to present the most accurate estimate possible when calculating the effects and to isolate the impact of Light over Mali, the aspects of deadweight, displacement, attribution are taken into account in the calculations.

Deadweight is the change that would have happened anyway without the donation. In this project, the deadweight is estimated to be 20%. Displacement looks at whether the social change displaced something else or has unintended consequences. This is expected to be very low. Attribution acknowledges that some of the created value can be attributed to others – which is the aspect that generates the most substantial deductions in this report, i.e. by 50% to 90%.

It is recognised that enhancing productivity by reducing sickness among the workforce will not happen without medical personnel or medicine. Education after dark will not be possible without solar panels; nevertheless, education will be impossible without teachers and classrooms. These elements are also deducted from the value. The drop-off effect is presented in the calculations of the forecast below.

**Outcomes of the forecast**

A forecast is an attempt to project the future value of all the outcomes achieved in the evaluation. The 10-year forecast predicts a total net present value of DKK 18,851,283. The forecast is based on a new donation of DKK 200,000 every year, which is allocated to new villages with new participants. All investments continuously generate output but with a year-on-year

drop-off effect of 10%. The forecast is discounted using a discounted cash flow (DCF) analysis, entailing that the time value of money is considered. In the model, a 4% return on capital has been used.

**CALCULATING THE SROI RATIO**

The SROI ratio is calculated by dividing the value of the net output by the value of the net input.

$$\frac{\text{Output}}{\text{Input}} = \text{SROI ratio}$$

The SROI ratio is a metric that shows how much value is generated in DKK for every 1 DKK of value put into the project. The ratio falls in two parts: one for the evaluation, where the ratio shows the immediate value created, and one for the forecast which estimates the value creation after 10 years.

**EVALUATION**

The total input spent on the project is DKK 200,000 and the output is calculated at DKK 649,746. The SROI ratio is therefore 3.25, as shown below. This means that for each DKK 1 spent on Light over Mali, DKK 3.25 was generated for 2019.

$$\frac{\text{Output}}{\text{Input}} = \frac{649,746}{200,000} = 3.25 = \text{SROI ratio}$$

**FORECAST**

If we look at the 10-year forecast, the net spending of Light over Mali sums to DKK 1,622,000 and the total net output sums to 18,851,283 DKK.

$$\frac{\text{Output}}{\text{Input}} = \frac{18,851,283}{1,622,000} = 11.62 = \text{SROI ratio}$$

**TABLE 5 FUTURE CASH FLOWS (DKK)**

	1	2	3	4	5	6	7	8	9	10
Group 1	595,471	535,924	482,332	434,098	390,689	351,620	316,458	284,812	256,331	230,698
Group 2		649,746	584,772	526,295	473,665	426,299	383,669	345,302	310,772	279,695
Group 3			649,746	584,772	526,295	473,665	426,299	383,669	345,302	310,772
Group 4				649,746	584,772	526,295	473,665	426,299	383,669	345,302
Group 5					649,746	584,772	526,295	473,665	426,299	383,669
Group 6						649,746	584,772	526,295	473,665	426,299
Group 7							649,746	584,772	526,295	473,665
Group 8								649,746	584,772	526,295
Group 9									649,746	584,772
Group 10										649,746
<b>TOTAL</b>	<b>595,471</b>	<b>1,185,670</b>	<b>1,716,850</b>	<b>2,194,911</b>	<b>2,625,167</b>	<b>3,012,397</b>	<b>3,360,903</b>	<b>3,674,560</b>	<b>3,956,850</b>	<b>4,210,912</b>



**TABLE 6 DISCOUNTED CASH FLOW ANALYSIS (4%)**

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Investments	-200,000	-200,000	-200,000	-200,000	-200,000	-200,000	-200,000	-200,000	-200,000	-200,000
Total Output	595,471	1,185,670	1,716,850	2,194,911	2,625,167	3,012,397	3,360,903	3,674,560	3,956,850	4,210,912
Net Cash Flow	395,471	985,670	1,516,850	1,994,911	2,425,167	2,812,397	3,160,903	3,474,560	3,756,850	4,010,912
Present value of Net Cash Flow	380,261	911,308	1,348,474	1,705,259	1,993,310	2,222,678	2,402,027	2,538,827	2,639,513	2,709,628

# SENSITIVITY ANALYSIS

The forecast is based on assumptions – and with assumptions comes uncertainties. This section presents different sensitivity analyses that examine how changes in the assumptions affect the SROI ratio. This gives an idea of the ratio’s sensitivity in different scenarios.

## SENSITIVITY ANALYSIS GENERAL JOB TRAINING (TECHNICIANS)

% EXPERIENCING FULL EFFECT	0.0%	18.8%	37.5%	56.3%	75%	81.3%	87.5%	93.8%	100.0%
SROI	3.18	3.20	3.21	3.23	3.25	3.25	3.26	3.27	3.27

## SENSITIVITY ANALYSIS HIGH CONFIDENCE (TECHNICIANS)

% EXPERIENCING FULL EFFECT	0.0%	12.5%	25.0%	37.5%	50%	62.5%	75.0%	87.5%	100.0%
SROI	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.39	3.44

The sensitivity analysis shows that a decent SROI ratio is sustained even in worst case scenarios. If the ratio is to diminish, radically multiples of the above scenarios should deteriorate at the same time, which is unlikely. Moreover, the analysis shows that it is possible to achieve an even higher positive outcome in the future.

## SENSITIVITY ANALYSIS GOOD OVERALL HEALTH

% EXPERIENCING FULL EFFECT	0%	4%	8%	11%	15%	19%	23%	26%	20%
SROI	2.35	2.58	2.80	3.02	3.25	3.47	3.70	3.92	4.14

## SENSITIVITY ANALYSIS NOT WORRIED ABOUT CRIME

% EXPERIENCING THE FULL EFFECT	0.0%	0.1%	0.3%	0.4%	0.5%	5.0%	10.0%	15.0%	20.0%
SROI	2.67	2.82	2.96	3.10	3.25	8.45	14.22	20.00	25.78

## SENSITIVITY ANALYSIS IMPROVEMENTS IN CONFIDENCE (CHILDREN RECEIVING HOMEWORK LAMPS)

% EXPERIENCING FULL EFFECT	0.0%	2.5%	5.0%	7.5%	10.0%	12.5%	15.0%	17.5%	20.0%
SROI	2.56	2.73	2.90	3.08	3.25	3.42	3.59	3.76	3.94

## SENSITIVITY ANALYSIS IMPROVEMENTS IN CONFIDENCE (SCHOOL CHILDREN)

% EXPERIENCING FULL EFFECT	0.0%	1.3%	2.5%	3.8%	5%	8.8%	12.5%	16.3%	20.0%
SROI	2.42	2.63	2.84	3.04	3.25	3.87	4.49	5.11	5.72



# ADDITIONAL VALUE CREATION

Throughout the analysis, it has become clear that Light over Mali creates more long-term value than measured in the analysis – value that is difficult or nearly impossible to measure. The following section presents additional value created by the project, based on knowledge from the World Bank, scientific research papers and insights from both Mali Folkecenter and Nordisk Folkecenter.

# 01

Modernising rural areas help provide the pull needed to keep young people in the local communities instead of them migrating to large cities, thus strengthening the rural economy.

# 04

ABE shows positive effects on the health of all family members, as the participants have been taught about hygiene, vaccination and general cleanliness.



# 03

The health clinics help save women and especially babies from dying during childbirth.

# 02

The public streetlights will heighten security after dark, minimising the risk of theft and help the villagers avoid dangerous animals during the night.



# 06

ABE focus on contraception and fertility, which minimise the number of children being born. Families can improve their prospects of escaping the poverty trap with fewer children to care for and raise.

# 05

Local men and women given basic training in electricity and solar panels can utilise their newly-acquired skills elsewhere, giving them access to the broader job market in Mali.



# 07

Increased education widens the range of confident behaviour in the marketplace for the villagers. They can buy and sell with less fear of being cheated.



# 08

The installed solar panels make it possible for villagers to recharge their cellular phones at the schools, easing the communicative infrastructure.



# CONCLUSION

**Light over Mali creates tangible value for 15,000 people in rural Malian villages. The value is created by generating +400,000 hours of light annually by placing solar panels at schools, health clinics and in lamp posts and giving school children homework lamps.**

The new sources of light give the villages new opportunities after dark. The schools are available for educational purposes after dark and villages can offer basic education to the adult population, children can use the classrooms during the evenings and the homework lamps enable children living in remote locations to study after dark. The public streetlights enhance safety and help sick people find their way to the health clinic at night. Also, the clinics can treat more patients and help deliver babies safely.

Last, but not least, technical training in solar energy installation and maintenance are provided to local villagers, which is a prerequisite for keeping the solar panels up and running.

Based on an evaluation of the project in 2019, the SROI ratio is calculated at 3.25. Over a 10-year period, the SROI ratio is 11.62. This means that for each DKK 1 spent, DKK 11.62 is generated over 10 years. The values achieved are based on educational programmes and access to medical assistance; increasing the knowledge, health, productivity and general well-being among the villagers.

Light over Mali creates thousands of hours of light, allowing schools and health clinics to function after the sun sets. With electricity, the full potential of the dark hours can be realised. New opportunities arise as the solar panels generate and store energy during the day, providing the population with light after dark.



## SOLAR PANELS

installed on schools, health clinics and lamp posts



## LIGHT WHEN IT'S DARK

extended days



## HEALTH

Improved treatment conditions  
Decreased sickness  
Reduced infant mortality  
Lowered childbirths



## EDUCATION

Improved living standard  
Increased income-levels  
Empowered entrepreneurship  
Redressed power imbalances

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Photo credit: Mali-Folkecenter Nyetaa



# APPENDIX 1: IMPACT MAP

STAKEHOLDERS	STEP 1	STEP 2			STEP 3		NO. OF STAKEHOLDERS	STAKEHOLDERS EXPERIENCING EFFECT	TYPE OF INDICATOR	VALUE PER UNIT GBP	YEARLY GROSS VALUE (DKK) PPP ADJUSTED	STEP 4				STEP 5
	CHANGE	INPUT	OUTPUT	OUTCOME	INDICATOR	SOURCE						DEAD WEIGHT	DISPLACEMENT	ATTRIBUTION	DROP OFF	NET VALUE
Health clinic patients	Reducing sickness	Donation DKK 200,000	Solar panels at five health clinics	Ability to treat more patients, keep medicine cool and provide better care	Good overall health	HACT (2014)	100	15%	Social Value from Social Value Bank	€ 20.141	895.076 kr.	20%		75%		179.015 kr.
Villagers in general	Increasing safety		Five lamp posts in city centres	Minimised risk of being a victim of a crime or an animal attack at night	Not worried about crime at night	HACT (2014)	7942	0,5%	Social Value from Social Value Bank	€ 12.274	1.444.021 kr.	20%		90%		115.522 kr.
Children receiving homework lamps	Enabling homework and preparation for exams		250 solar-driven homework lamps	Improved school and social life	Improvements in confidence	HACT (2014)	250	10%	Social Value from Social Value Bank	€ 9.283	687.568 kr.	20%		75%		137.514 kr.
School children in general	Enabling homework and preparation for exams		Solar panels at five schools	Improved school and social life	Improvements in confidence	HACT (2014)	1000	5%	Social Value from Social Value Bank	€ 9.283	1.375.136 kr.	20%		85%		165.016 kr.
Solar panel technicians	Improving skills		Training of local technicians	Improvement of skills	General job training	HACT (2014)	10	75%	Social Value from Social Value Bank	€ 1.567	34.819 kr.	20%		50%		13.928 kr.
					Increased belief in themselves, because the villages rely on their skills to keep the solar panels up and running.	High confidence	HACT (2014)	10	50%	Social Value from Social Value Bank	€ 13.080	193.760 kr.	20%		75%	

# APPENDIX 2: ASSUMPTIONS AND MEASUREMENT UNCERTAINTIES

The analysis is based on a number of assumptions and factors that affect the conclusion. This table describes these assumptions and explains how they can affect the results of the analysis.

## POSITIVE EFFECTS ▲

### Number of affected stakeholders

The annual number of people affected by the project is 15,000. If the number is higher next year this would have a favourable effect on SROI.

### Well-being effects

If the well-being effects in the evaluation are underestimated, the outcome and the SROI ratio will be higher than reported.

### Long term effects

We estimate that each villager receiving education will have an increased salary for ten years. This number could be significantly higher and thus have a positive effect on the SROI ratio.

### Sickness

We estimate that the average amount of absence days of each member of the workforce will be reduced by one day, because of improved knowledge about health and treatment conditions after dark. This number could possibly be higher, which would have a positive effect on SROI.

### Other value creation

If other value creation could be measured, this would have a positive effect on the SROI ratio.

## NEGATIVE EFFECTS ▼

### Number of affected stakeholders

If the number of affected stakeholders is lower, it will have a negative effect on the SROI ratio.

### Well-being effects

If the well-being effects in the evaluation are overestimated, the outcome and the SROI ratio will be lower than reported.

### Long term effects

We estimate that each villager receiving education will have an increased salary for ten years. This number could be lower and thus have a negative effecting on the SROI ratio.

### Education

We estimate the effects of ABE, but we do not know how great an impact the teaching has. Poor educational quality could have a negative effect on the SROI ratio

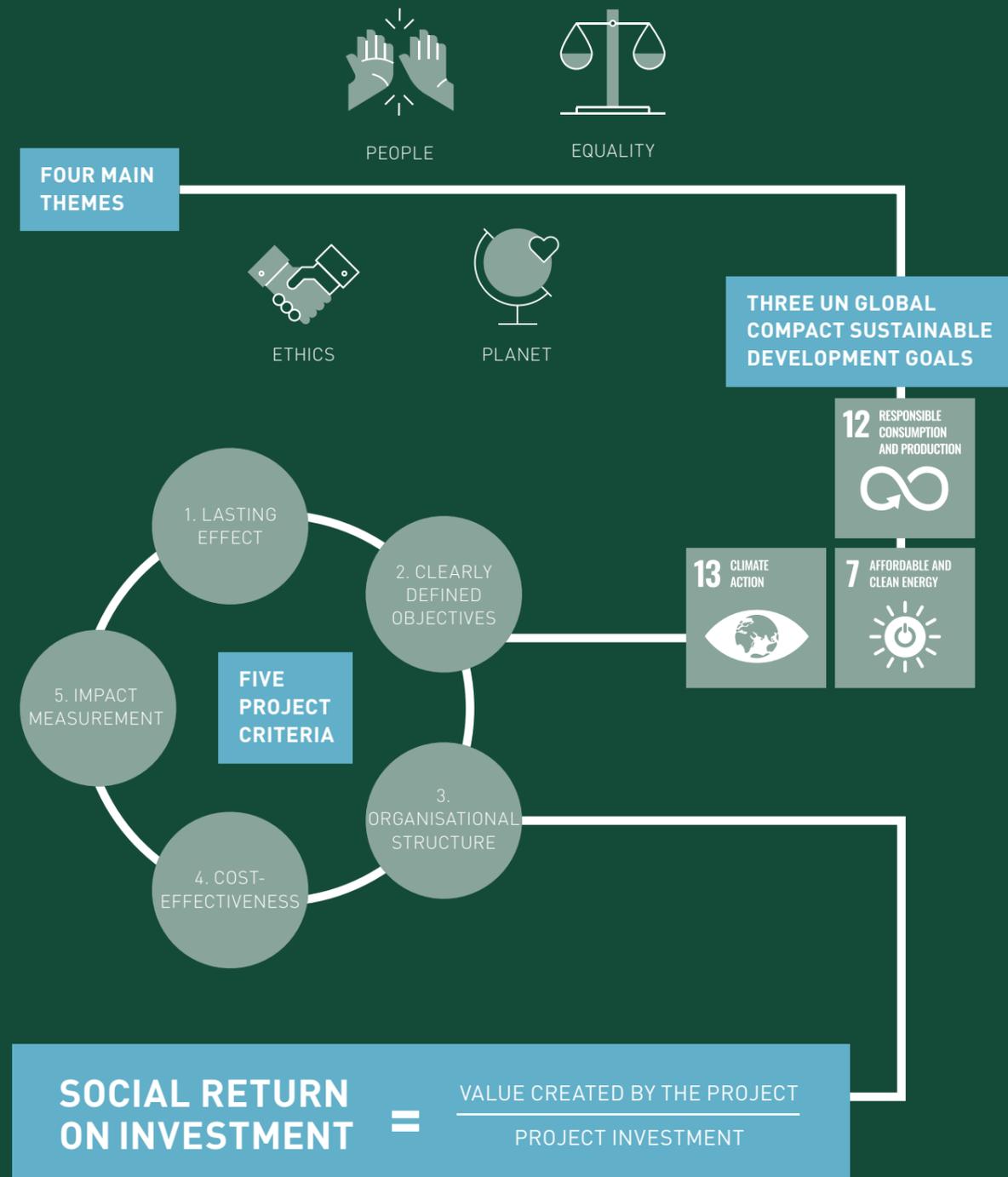
### Deadweight and drop-off

In this project, the deadweight is estimated at 20% and the year-on-year drop-off effect is estimated at 10%. If the deadweight and drop off turn out to be higher in the future, the SROI ratio will be lower than estimated in the analysis.



# OUR APPROACH

We strive to create long-term growth for the company while at the same time supporting the ongoing development of a more efficient, transparent and economically-viable energy market. Supported by our vision of trading for an efficient tomorrow, we employ a Corporate Social Responsibility approach covering different levels of project criteria.





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