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# A Guide to the Light Library model

Lessons, results & recommendations  
from the field: Senegal



**sunny**  
**money**™



A project funded by Lighting Africa, a World Bank/IFC joint initiative, delivered by SunnyMoney in partnership with Agence Senegalaise d'Electrification Rurale.



# Executive summary

The Light Library is a new model designed and delivered by UK charity SolarAid's social enterprise SunnyMoney, in partnership with the Senegalese Rural Electrification Agency (ASER), the World Bank and the Ministry of Education. The Light Library is a donated set of pico-solar lights given to selected public schools in rural areas to enable students to borrow the lights at a nominal fee to take home and use for study after dark. The objectives of the model are to increase access to, awareness of and use of solar lights. The model was designed to support strategies to increase demand and uptake of solar lights for use in off-grid areas of rural Africa. As a second phase to the project, the Light Library model was followed by the SunnyMoney traditional sales campaign in the same region and a control region to use as a comparison to determine the model's effect on demand and uptake.



There was a strong research and evaluation component to the project, including baseline market studies, baseline customer interviews and follow up parent and headteacher interviews.

Nearly 5,000 solar lights were procured for the project, 58 schools selected and an estimated 55,000 people gained direct exposure to the solar lights through the Light Library project. There were other added benefits of the Light Library project, for example, increased community interaction with the school, including increased enrolment.

Demand for solar lights during the sales campaign were dramatically higher in the Light Library schools at 35% of school population, than in the control schools, although there was still high demand in the control region, with 15% uptake. The Light Library model not only appears to have increased uptake through increased exposure, but also seems to have reduced the perception of risk; in Light Library schools the customers included more risk-averse, lower-income families.

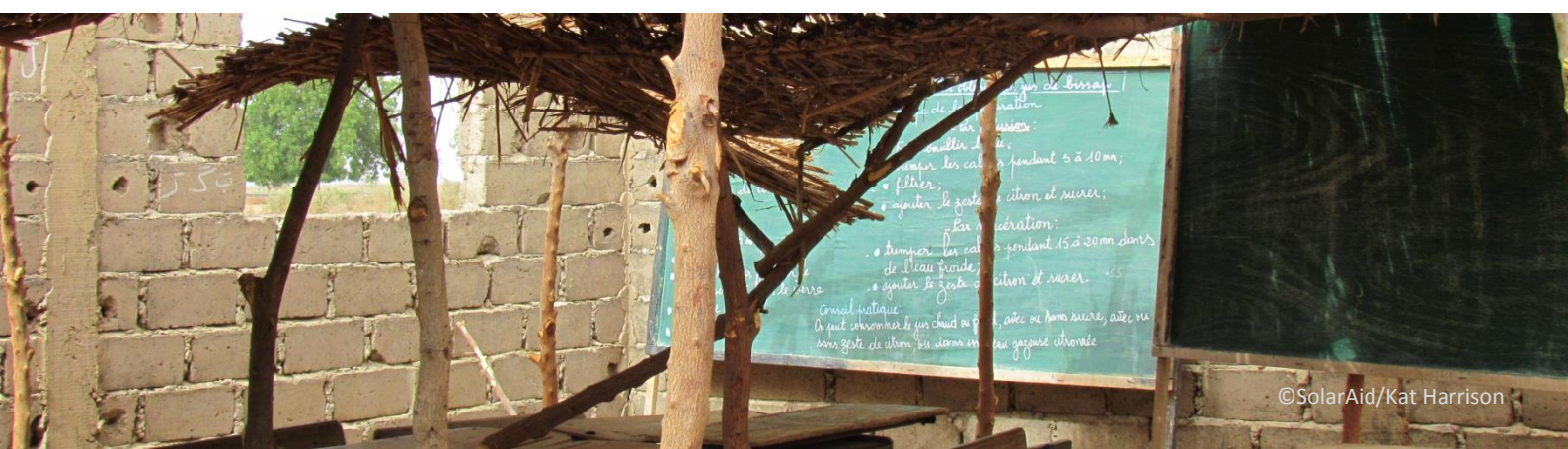
Lessons learned were that partnership was key to effective delivery, and with higher student:light ratios the model could raise awareness amongst a larger population.

It is strongly recommended that those interested in supporting or delivering the model should complement it with a sales element to ensure that increased demand is followed up with sustainable and ongoing supply. Consumer awareness campaigns may achieve a less intensive version of the model and could complement the work. Engaging with government for a healthy policy environment is key to successful delivery.

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# 1. Introduction

The Light Library is a new model designed and delivered by UK charity SolarAid's social enterprise SunnyMoney, in partnership with the Senegalese Rural Electrification Agency (ASER), the World Bank and the Ministry of Education. The Light Library is a donated set of pico-solar lights given to selected public schools in rural areas of Senegal to enable students to borrow the lights to study after dark. The model was designed as a direct response to requests for a distribution model for solar lights that offered exposure to, and built awareness of, pico-solar lights in order to help build trust and demand without undermining strategies to build a sustainable market for the sale of this technology. The model was aligned to support the achievement of ASER and LightingAfrica's national programme objectives for rural electrification. The objective of the model was to support market-building through overcoming two of the main barriers to uptake: lack of trust and awareness.



This report shares information on the design and delivery of the model and the subsequent delivery of SunnyMoney's traditional sales model, 'The School Campaign,' which tested the effect on demand/purchase of solar lights. It shares the results of an evaluation as well as the lessons learned, challenges faced, and key issues addressed. The report then draws conclusions on the usefulness of the model in building a sustainable market for improved access to, and availability of, solar products, and offers guidance and recommendations for various stakeholders such as governments, private-sector, practitioners, policy-makers and donors considering using, implementing, promoting or funding the model.

Key information and results are called out in the orange boxes, as seen to the right, and quotations from stakeholders are called out in pale orange boxes, as seen below.

This report shares details of the design and delivery of the model, as well as evaluation results.

The Light Library was a new model designed and delivered by social enterprise SunnyMoney.

The Light Library is a donated set of pico-solar lights given to selected public schools in rural areas of Senegal to enable students to borrow the lights to study after dark.



## 2. Background to the project

This section provides an introduction to the partners and an overview of the situation in Senegal.

The Light Library model was first delivered as a project in selected regions of Senegal. The project was funded by Lighting Africa and implemented by the UK charity SolarAid's social enterprise, SunnyMoney. It was delivered in partnership with the Senegalese Rural Electrification Agency (ASER) and the Senegalese Ministry of Education. The objectives of the project were to increase access to, and use of, solar lights, and increase awareness of the benefits of using these lights through public schools in rural Senegal. A key aspect of this project was that the solar lights were to be used as a public good and could not be sold or exclusively owned.



### The partners

#### *SolarAid and SunnyMoney*

SunnyMoney is a social enterprise and UK-registered company wholly owned by the UK charity, SolarAid, with operations in Kenya, Malawi, Tanzania and Zambia. In East Africa, the organisation works closely with local education authorities to sell lights to the parents of students to enable families to access clean, safe lighting at home. This model

has been so successful that they have become the largest distributor of portable solar lights in Africa and in March 2014, SolarAid/SunnyMoney reached their one millionth light sale. By building a market for solar lights, the organisation seeks the eradication of the kerosene lamp from Africa by 2020. They are product neutral, offering customers choice, quality and impartial advice. All of the products distributed meet Lighting Africa's Minimum Quality Standards to ensure quality.

SunnyMoney is a social enterprise wholly owned by UK charity SolarAid.

SunnyMoney designed and delivered the Light Library model and had not implemented the model prior to this experience in Senegal. SunnyMoney set up a Project Steering Committee made up of representatives from Lighting Africa, ASER and the Ministry of Education, among others; see below.

#### *Lighting Africa and the World Bank Group*

Lighting Africa, a joint International Finance Corporation (IFC) and World Bank program, seeks to accelerate the development of commercial off-grid lighting markets in sub-Saharan Africa as part of the World Bank Group's wider efforts to improve access to energy.

Lighting Africa aims to catalyse the development of markets for affordable, modern off-grid lighting products.

Lighting Africa is mobilising the private sector to build sustainable markets that provide affordable, modern, off-grid lighting to communities across Africa, which are not on the electricity grid. The program and its partners have brought cleaner, safer and better lighting to close to four million people and are working to increase energy access in order to provide better lighting to 250 million people by 2030.

Lighting Africa designed and managed the tender process, and funded the US\$240,000 project under a grant from the Norwegian Trust Fund for Private Sector and Infrastructure.

### *The Senegalese Rural Electrification Agency*

The Senegalese Rural Electrification Agency (ASER) is an autonomous body attached to the Ministry of Energy in Senegal. ASER is in charge of promoting electrification by providing support to local, national, and international initiatives. Its approach rests upon an electrification plan established by the Ministry of Energy.

ASER is attached to the Senegalese Ministry of Energy and promotes rural electrification.

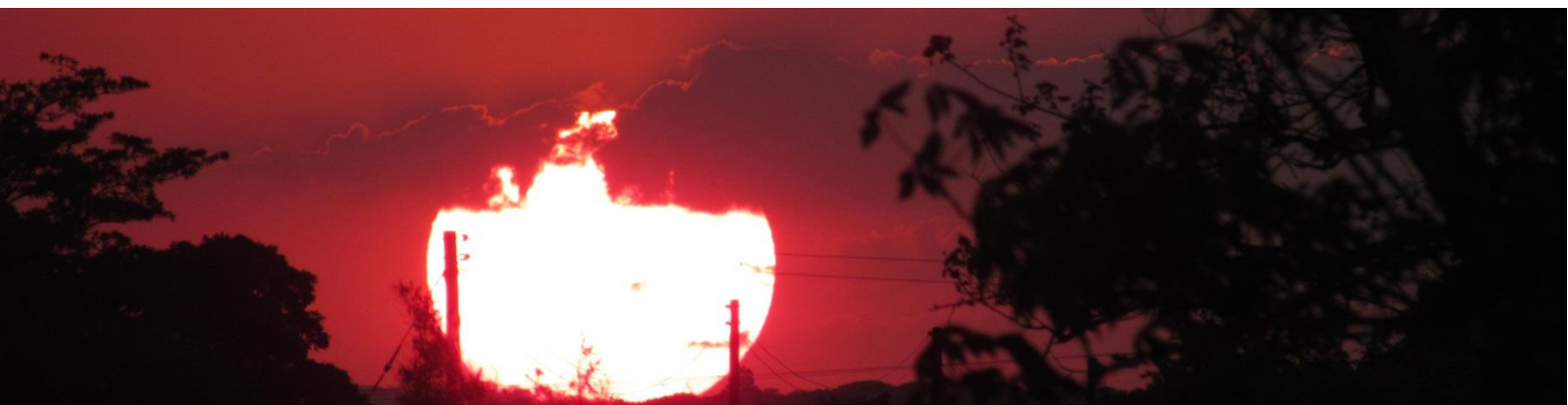
ASER was a key partner in the detailed design of the model in Senegal; supporting SunnyMoney in selecting appropriate solar light products, identifying other key agencies/ministries to include in decision making, and easing importation of products into Senegal.

### *The Ministry of Education*

The objective of the Ministry of Education in Senegal is to ensure equitable access, attendance, attainment, and achievement in education by ensuring good services. The Ministry oversees the curriculum and management of all public schools in the country with national, regional and local level staff including headteachers and teachers.

The Ministry of Education focuses on providing education to the population of Senegal.

The Ministry of Education was a key partner in the delivery of the model in Senegal; supporting SunnyMoney in identifying and selecting the schools that were included in the model, interacting with teachers, and supporting the process.





## The policy environment in Senegal

Senegal has a national electrification rate of 42%, while rural access is considerably lower at 26%.

The government divided the country into rural electrification concessions to be allotted to private operators through a process of competitive bidding, yet most of the regions remain unserved through this process.

VAT and import tariffs currently cost 44% of the value of a solar light imported into Senegal. This has suppressed the market and leads to higher prices for consumers.

There have been discussions about modifying the concessionaire model and eliminating or reducing the solar import tax costs but no changes have been implemented as yet.



# 3. The model

This section provides an introduction to the rationale for funding and designing this model and the objectives and goals the model was designed to achieve. In addition, it shares some of the key risks or assumptions that were in place at the start of the design and implementation.

## The rationale

SunnyMoney was interested to design and deliver this model to identify if it could be an effective way to address three of the key barriers to uptake for customers; lack of awareness, lack of trust, and low-income. The Light Library model addresses all three of these barriers and it was felt that a good market-building complement to the model would be to follow it up with sales and distribution activities. The Light Libraries would raise awareness of the solar lights through providing direct access to them, it would build trust in the products as it would allow families to use the lights at almost no risk, and it could work to address the low-income challenge as families have an opportunity to save the money they would spend on other lighting while using the lights from the Library.



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## The objectives

The Light Library project centred on the procurement and distribution of solar lanterns to students through public schools, in partnership with ASER and the Ministry of Education (MoE). The Light Library model was expected to have a catalytic effect on local market demand for these 'pico'-solar lights. The objectives of the project were to increase access to, and use of, solar lights, and increase awareness of direct and indirect financial and non-financial benefits of using these lights.

The objective of the Light Library was to increase access to, and use of, solar lights, and to increase awareness of the benefits of using the lights.

## Key risks

There was some concern at the outset of designing and delivering this model that it would undermine the market for pico-solar lights. This was a significant concern to both SunnyMoney and Lighting Africa specifically due to the nature of their goals and objectives as organisations. This appears not to have been the case, providing there is supply to meet demand; discussed in more depth below. A key objective of this delivery was therefore to ensure responsible monitoring of this situation to prevent any risk of this happening. Another concern was the sustainability of the model and project. Again, this is addressed in specific sections throughout the report.

## 4. Details of implementation

This section provides detailed information on how the project was delivered with the phased approach explained and addressed.

### Phase 1: The Light Library model

#### *The model*

SunnyMoney delivered a 'library' of solar lights – a *Luminothèque* – to selected public schools in rural areas of Senegal to enable students to study after dark at home. The lights were donated through ASER to the Ministry of Education (MoE) and remain the property of the MoE and the school. They are managed by the school and community and provide access to, awareness of, and exposure to, pico-solar lights for all. Schools can choose to prioritise exam-year students, but other than legitimate prioritisation, all students should have equal access to the lights.

With a token charge per night for borrowing the lights of 5 CFA (less than US\$0.01) for the entry-level lights (lighting only) and 25 CFA (~US\$0.05) for the mid-level lights with phone charging, the use of the library is available to all with the added benefit that the school can raise a small fund to replace the lights at the end of their lifespan, purchase additional lights, or to use for other school expenses as decided by the school committee. In addition, charging a token fee may mean that the lights are valued more than if they were available free of charge.

The decision to continue or not to operate the Light Library during school holidays is to be determined by the school management committee (see below for explanation on this group), though it was encouraged to allow more regular use for community members and also raise some funds for the school. The renting fees were increased because the use of the lights would not be strictly limited to the students during this period. To borrow solar lights during the holidays a deposit of 25% of the purchase price of each light is required, plus 25 CFA per day for lights without phone charging and 100 CFA per day for the lights with mobile phone charging capacity.

In addition to the Library lights, each school was given four mid-level lights for use solely by the teachers to assist in lesson-planning and preparation, and marking. These did not require a rental payment and were provided to ensure that the Library was available solely for students and families, while the teachers also had a chance to use solar lights to enable them to experience and confidently talk about the benefits of this technology to the community.



Students were charged a nominal fee for borrowing lights from the school.

Each school was asked to nominate a Librarian to manage the Library at the school and to either set up a committee or use an existing parent-teacher association/school committee to make decisions on some of the details of the Library management.

### *Implementation*

SunnyMoney’s trained field team visited every single school participating in the project to meet with teachers, the community, and parents. Teachers and the Librarian were given training on the products, and the Library and how to manage it. A manual with materials to support the management was developed by SunnyMoney and given to each school, details below. A meeting was held with the community and parents to share information on the purpose of the Library, its use and management. This provided an open forum to sensitise the community, answer questions and address any issues.

Schools were provided with supporting materials and documents to aid the management of the Light Library.

The idea was that whole families would gain awareness of the lights and their benefits through their use and due to SunnyMoney’s hands-on distribution method.

An outline of the materials provided to each school is included in the Appendix.

### *The products*

A combination of entry-level lights - lower-cost and lower functionality; lighting only - and mid-level lights - more expensive and with phone-charging capability - were identified for the project. SunnyMoney ran a competitive procurement process to select the solar lights they felt would best meet the needs of the project and the users. Apart from cost, the criteria for the selection process considered performance and quality, battery life, warranty availability, and more, see Table 1.

The Light Libraries consisted of entry- and mid-level solar lights.

Table 1: Solar light product procurement criteria

Criteria	Minimum requirements
Performance, specification and quality	The lights have passed Lighting Africa’s Minimum Quality Standards
Battery longevity and technology	Long-lasting Lithium Ion or Lithium Iron Phosphate battery with a life-span of at least 3 years
Payment and credit terms	Deposit payable when ordering: 50% Balance of payment on shipping
Warranty	2 years from date of delivery
Serial number	Visible on unit and packaging box
Ability to adhere to manufacturing and airfreight schedule	Bidders should anticipate all of the supply will be required to arrive in Senegal by no later than 6th April 2013

In addition, organisation and manufacturing credentials such as the following were taken into account: social and ethical credentials, product and manufacturing certifications such as ISO 9001/2, existing manufacturing volumes, ownership structure, organisation size and history, any (African) logistics expertise.






At the end of this process, five solar light products from three different manufacturers were selected.

- *d.light S2* (entry-level light)
- *Greenlight Planet Sun King Eco* (entry-level light)
- *Marathoner/Omnivoltaic MB2-200* (mid-level light)
- *d.light S300* (mid-level light)
- *Greenlight Planet Sun King Pro* (mid-level light)

4,798 solar lights were procured for the project with all distributed to schools minus a small stock left in Dakar for replacements. In terms of volume, the focus was on the entry-level lights with 71% being in this category, see Table 2 for details.

Nearly 5,000 solar lights were procured for the project.

Table 2: Details of products selected for the Light Library project

Products			Total number for project	Total number distributed	Number allocated as replacement stock
<b>OVERVIEW</b>	<b>3 brands</b>	<b>5 products</b>	<b>4,798</b>	<b>4,409</b>	<b>389</b>
Entry level (lighting only)		<i>d.light S2</i>	2,035	1,883	152
		<i>Greenlight Planet Sun King Eco</i>	1,350	1,223	127
Mid-level (lighting plus phone charging capability)		<i>Marathoner MB2-200</i>	460	429	31
		<i>d.light S300</i>	518	473	45
		<i>Greenlight Planet Sun King Pro</i>	435	401	34

Despite normally attracting an import tariff of around 40%, thanks to the partnership with ASER, the solar lights imported for the project benefited from tax exemption which meant that more lights could be deployed in the project.

### Site selection

In order to maximise the impact of the project and ensure its success, alongside the partners, SunnyMoney developed a key set of criteria with which to select the region(s) for this first trial project. Criteria for region selection focused on electricity access, poverty rates and school enrolment numbers, for more detail see Table 3.

Regions and schools to participate were selected based on specific criteria.

Table 3: Region selection criteria for Light Library project

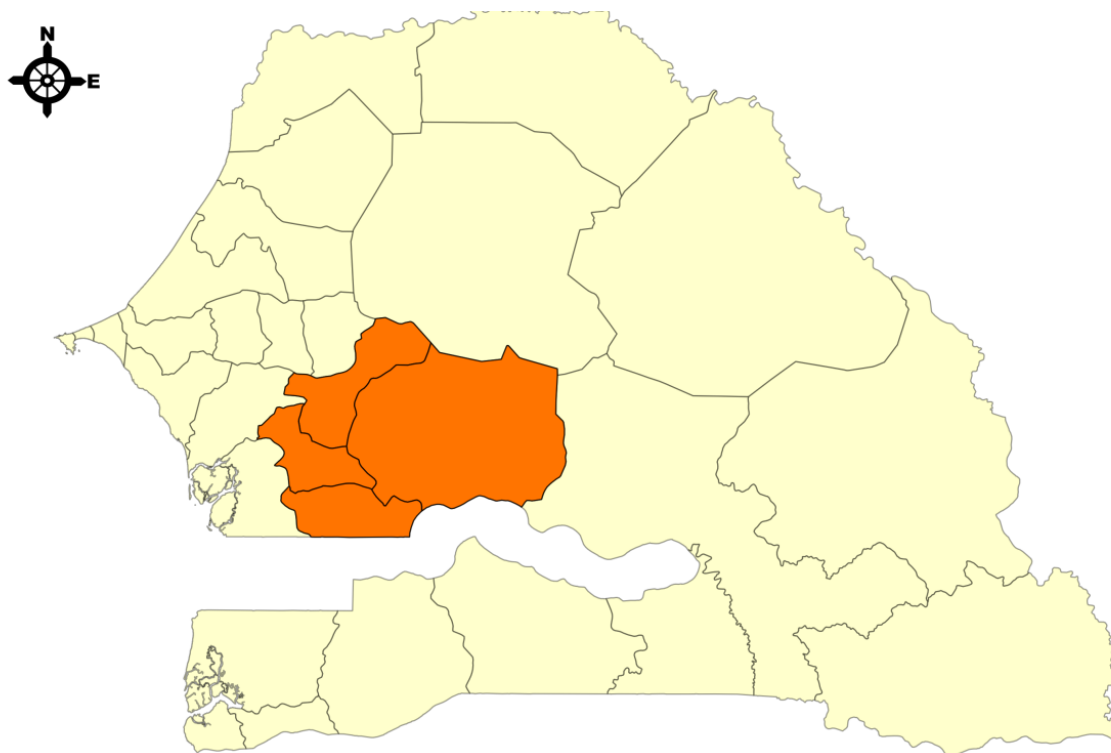
Area of criteria	Indicator of criteria	Criteria	Rationale (target)
Electricity access	Electrification rate	Low rate	To reach those without access to electricity.
	% electrified schools	Low %	To reach those without access to electricity and lower-resourced schools.
Poverty and population	Population density	High rate	To raise maximum awareness amongst population.
	Poverty rate	High rate	To reach those most suitable for products; those unable to access grid electricity and experiencing energy poverty.
Education	Number of schools	Moderate number	A high number of primary schools to reach most members of community.
	Gross enrolment rate	High rate	To reach a wide audience and high enrolment rates suggest sizeable share of families in the region.

Regions with low rural electrification rates, high poverty rates and high school enrolment rates were initially selected. Due to the short nature of the project, regions that were particularly remote and/or with a dispersed population were filtered out.

Ultimately, the neighbouring regions of Kaolack and Kaffrine were selected for the project test, see highlighted regions below in Figure 1.



Figure 1: Map of selected regions for the Light Library project within Senegal



To select the actual schools to be included in the project, the school list was first filtered for schools with no electricity connection. Using information from the Ministry of Education on school population, SunnyMoney then selected schools with 150-500 students to ensure the Libraries reached many people. This was easier logistically than selecting many smaller schools, and still allowed the Libraries to be small enough to be managed by the schools.

The next criteria was filtering from the school list for those with high numbers in the exam classes as they are most likely to need lights for homework and study. Then, the accessibility of the schools was assessed. Given the short timeframe of this project, it was decided that schools that were very remote should not be included.

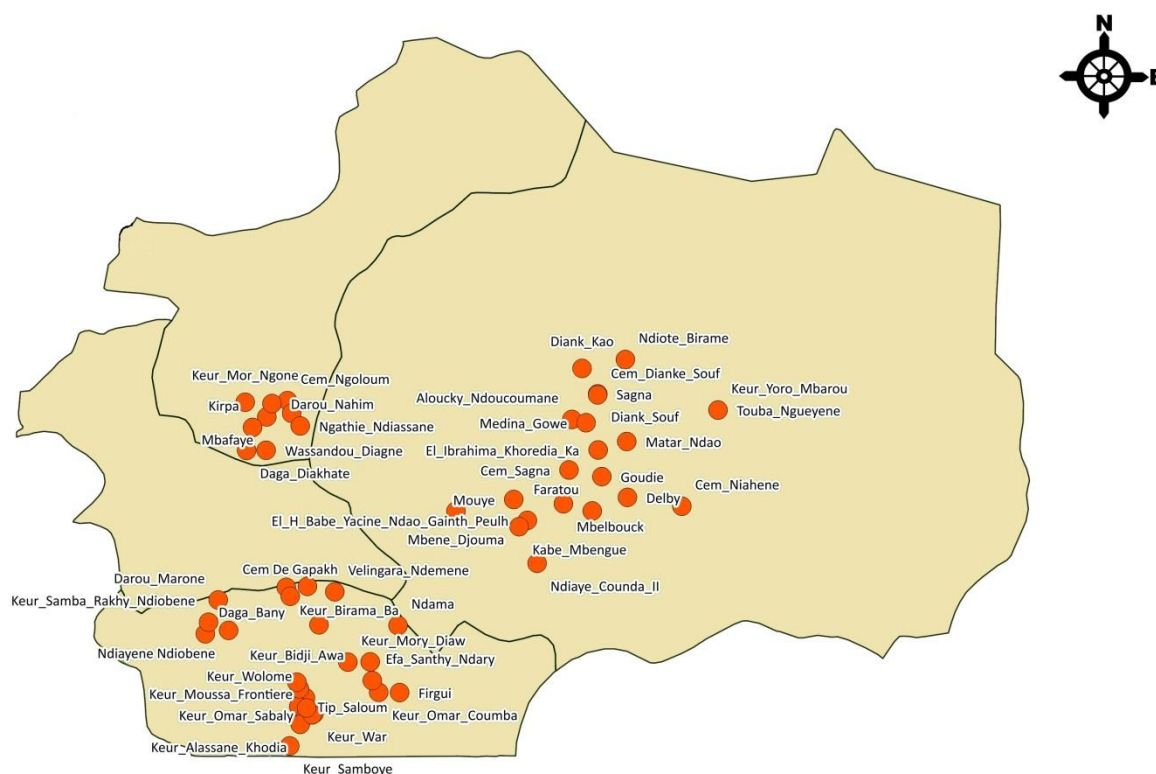
After this process was completed, districts within the regions were chosen based on accessibility to focus the project in: Katakél and Sagna in Kaffrine, and Paoskoto and Mbadakhouné in Kaolack.

Ultimately, the list was checked with the partners, including local-level Ministry of Education staff to provide information on community engagement and teacher competence. Each headteacher was phoned by the SunnyMoney team to verify enrolment numbers and to assess willingness to participate in the project.

The final list identified 24 schools in the Kaffrine region and 34 in Kaolack; 58 schools in total, see Figure 2.

In total, 58 schools in Kaffrine and Kaolack regions were selected.

Figure 2: Map of selected schools for the Light Library project within selected regions



### *Sustainability and accountability*

SunnyMoney created a Light Library Project Management Committee at the national level who provided input into the project design and implementation and after handover, at the end of the project, oversaw the running of the project. This Committee is made up of members of representatives from the Ministry of Education, the Senegalese Rural Electrification Agency, the Inter-sectorial Committee for Implementation of Synergies between the Energy sector and other Strategic Sectors for Poverty Reduction (CIMES), the Ministry of Energy, the Centre for Studies and Research on Renewable Energies (CERER) and Lighting Africa. Local level Ministry of Education staff also played a critical role in the monitoring and management of the Light Libraries at the local level.

A Light Library Project Management Committee was formed.

By having a community meeting, asking the schools to create a Light Library Management Committee and having signed agreements it was believed that the Light Libraries would remain the property of the school and would be used to provide opportunities for students to study after dark for many years to come.

As the project was designed to be handed over to the Management Committee to manage at the end of the project timeframe, it was envisaged that upholding warranties on the solar lights might be challenging. However, SunnyMoney have decided to maintain a longer term presence in Senegal



and can assist, where possible, with claiming replacements for faulty lights from manufacturers, which can be handed over to the Committee to manage.

To ensure that the solar lights are still available in schools, in the event of any faults or breakdowns, a replacement stock of 8% of the total solar lights shipped to Senegal were kept in storage at ASER. During the School Campaign phase (see below), SunnyMoney offered to manage this replacement process at the schools, more details later.



## Phase 2: The School Campaign

### *The model*

Approximately six months after the end of Phase 1, Light Library delivery, SunnyMoney began implementing their traditional, award-winning School Campaign model. This model was developed in 2011 in Tanzania to catalyse markets and has been successfully scaled up and replicated across Kenya, Zambia and Malawi, resulting in SunnyMoney rapidly becoming the largest ‘last mile’ distributor of LightingAfrica quality-assured solar products in Africa.

SunnyMoney works through schools alongside the Ministry of Education. SunnyMoney’s teams meet with the local education authority and check if they are happy for the campaign to be run in their region/district. They then arrange zonal/area headteacher meetings where groups of headteachers will visit a hub location and the SunnyMoney field team will give a workshop on pico-solar lights, their benefits, and how the campaign works. The headteachers are given fliers to hand to students to give to their parents and a sample light for use in demonstrations and to show students and parents, and are encouraged to arrange meetings with parents and the community to tell them about the opportunity. The SunnyMoney customer centre calls the headteachers each week to offer assistance and to collect a rough idea of orders. Then 2-4 weeks after the initial meeting, the field team will revisit the hub location, the headteachers will come to collect the lights for their school students and hand over the money.

SunnyMoney delivered their traditional distribution model as follow up to the Light Library project.

*“The meeting was interesting in the sense that we are really aware now of the management of the lights (functions, capacities and other technical aspects).”*

Boubacar Tall, Headteacher

### *Implementation*

SunnyMoney ran a School Campaign to meet demand, test the viability of a market-based approach to providing access to pico-solar lights and to test the efficacy of the Light Library model as a tool to raise awareness and exposure to solar lights. SunnyMoney ran the School Campaign in the 58 Light Library schools in the Kaffrine and Kaolack regions. SunnyMoney also selected the Louga region, using the same criteria as above, as a control region and 58 control schools to run the School Campaign in, see Table 4. SunnyMoney worked with a reduced field team and conducted two

A control region was chosen to run the traditional model in to test effects of the Light Library model.

headteacher meetings in Kaolack, one in Kaffrine – the original Light Library areas, and two meetings in Louga, the control region.

Table 4: Indicators for Light Library and control regions

Indicator/Region	Kaffrine	Kaolack	Louga
Rural electrification rate	4.8%	19.4%	20.5%
Electrified schools	35.7%	32.4%	26.2%
Population density	52 people/km <sup>2</sup>	155 people/km <sup>2</sup>	34 people/km <sup>2</sup>
Poverty rate	46.2%	23.8%	31.9%
Number of primary schools	387	636	824
Gross enrolment (primary)	50.8%	108.2%	74.8%

As this was the first time SunnyMoney was running its School Campaign model in Senegal, it based its sales forecasts and solar light stock procurement on its experience of operating in East Africa and made the assumption that demand for lights would be even higher in the schools which had participated in the Light Library project. Within the first two weeks of running the School Campaign in Senegal, it became evident that orders for solar lights had surpassed estimations, and hence more solar lights were procured and imported to Dakar to meet this higher than anticipated demand.

It was estimated that in the Light Library schools there would be an uptake (number of solar lights sold as a proportion of school population) of 19% of entry-level and 13% of mid-level solar lights. In the control schools, with no prior interaction with SunnyMoney or the Light Library model, an uptake of 5% of entry-level lights and 2% of mid-level lights was estimated. See page 33 for actual uptake.



### *The products*

Because the School Campaign in Senegal was a small-scale test project, SunnyMoney chose to keep the product range simple and selected the *d.light* S2 as the entry-level solar light and the *Greenlight Planet Sun King Mobile* as the mid-level light with phone charging capability.

The School Campaign provides an offer price for the solar lights which is a one-time opportunity and may not be found in the market or as a retail price after the campaign, but doesn't undermine the market as it allows early adopters to be introduced to the technology at a reasonable price. The *d.light* S2 (left below) was sold for 4,500 CFA (~US\$9.50) in the School Campaign and the *Greenlight Planet Sun King Mobile* (right below) was sold for 15,000 CFA (~US\$31) in the School Campaign.



*d.light* S2

- gives 4 hours of light
- Integrated solar panel
- 2 year warranty
- up to 5 year lifespan



*Greenlight Planet Sun King Mobile*

- up to 36 hours of light with three settings
- charges mobile phones
- separate 1.5 Watt solar panel
- 1 year warranty
- up to 5 year lifespan

# 5. Results and impact

This section provides an overview of the research methods used and then shares the key results of the Light Library model and its impact on The School Campaign sales.

## The research conducted

There was a strong monitoring, evaluation (M&E) and research component to all parts of the project delivery; SolarAid have a strong focus on M&E and research to inform strategy design and process, to inform programme delivery and to allow accountability to donors and stakeholders. Because the Light Library was a new model, never delivered before, it was even more imperative that the research element was integral to the project design and delivery. As such, a comprehensive set of M&E and research activities were carried out.

As with SolarAid's current impact measurement and research activities, the evaluation used mixed methods; collecting qualitative and quantitative data, where possible. It engaged with a variety of stakeholders: customers, parents, the public, head-teachers, the Light Library Project Management Committee members, school committee members and traders in local markets.

### *Phase 1: The Light Library project*

The SunnyMoney field team conducted baseline market observations, trader surveys and public surveys in the selected Light Library regions. This research enabled SunnyMoney to ascertain the initial level of awareness, supply, and demand for pico-solar lights.

The field team conducted structured baseline interviews with teachers, parent-teacher association/school committee members, and parents at the organised school workshops. Parent interviews, for the most part, took place prior to SunnyMoney presentations to get a true baseline of attitudes towards, awareness of, and opinions on pico-solar lights. Teacher and PTA member interviews took place after the workshop to gather information on programme design; to record reactions to the project including concerns and opportunities expressed, and to better deliver future implementation. During the workshop itself, the SunnyMoney Research Assistant recorded attendance, general attitude, and key questions asked and answers given.

There was a strong M&E component throughout the project design and delivery.

### Research conducted:

- 15 market observations
- 1,492 public survey interviews
- 135 trader survey interviews
- 206 baseline customer interviews
- 148 follow up parent interviews (Light Library)
- 116 baseline headteacher questionnaires
- 58 follow up headteacher interviews (Light Library)
- 28 follow up parent-teacher association member interviews (Light Library)

Structured follow up interviews were conducted with parents, teachers and PTA members a few weeks after project implementation; they enabled SunnyMoney to capture initial successes and challenges of the Light Library activity, changes in awareness of, and opinion on, pico-solar products. The same respondents were interviewed as were interviewed during the baseline to offer a direct comparison. However, due to the short timeframe of the project, this follow up exercise was done reasonably soon after project delivery and it was felt it didn't offer a long enough term evaluation of the project successes.

### *Phase 2: The School Campaign*

SolarAid committed to conducting a fuller impact evaluation of the Light Library project; more rigorous follow up research to understand the longer-term impact of the Light Library project and to enable the production of this report for sharing results and guidance. The research in Phase 2 also monitored the success of the School Campaign to offer a chance to assess whether demand for solar lights was affected by exposure/awareness, and if so, to what extent.

The following research tools were used: structured interviews with parents, teachers and school committee members at Light Library schools, market observations, public surveys and trader surveys in the control region, structured interviews with solar light customers, baseline questionnaires with headteachers who attended the meetings, and structured interviews with members of the Light Library Project Management Committee.



### **The results of the baseline market studies**

A baseline market study was conducted in rural areas of the Light Library regions; Kaffrine and Kaolack in May 2013. A similar study was conducted in rural areas of the comparison region: Louga in March 2014.

A market study in both regions showed similar baseline environments.

The results show a low level of electricity access in the areas surveyed, a population mostly living below the poverty line<sup>1</sup> and spending a considerable amount of household income on lighting (around 10%) in both areas. The control region had slightly higher average family sizes and higher spending on lighting with a slightly lower per person income and lower levels of access to electricity.

For both regions, there was a high level of expressed interest in purchasing a solar light with similar opinions on the benefits of the lights: usefulness, providing opportunity for saving money, as well as similar concerns around the reliability, quality and size of the light.

Overall there was a low level of awareness of pico-solar lights in the Light Library regions prior to the implementation of the model, but a reasonable level in the control region (45%); this could be due to the slightly more recent timeframe of this study i.e. while both were baseline studies before

<sup>1</sup> Using the US\$1.25 per person per day threshold.

SunnyMoney operations, the Kaffrine/Kaolack market study was done 10 months earlier. Interestingly, respondents in the control region estimated the price of an entry-level light at over double the estimates from the Light Library regions; this could be because they were more aware of solar lights, as evidenced above, but perhaps weren't actually aware of the very small lights.

The key learnings, and comparisons, are below in Table 5.

Table 5: Key results from baseline market research

	Light Library regions	Control region
<b>Number of market observations</b>	8	7
<b>Number of trader interviews</b>	66	69
<b>Number of public interviews</b>	960	532
<b>Average household size</b>	9	13
<b>Average monthly household income</b>	\$145	\$148
<b>% respondents living below the \$1.25 per person per day poverty line</b>	84%	94%
<b>% of respondents with access to electricity</b>	27%	9%
<b>Main source of lighting (for those with no access to electricity)</b>	battery lights (85%)	battery lights (78%)
<b>Average household monthly expenditure on lighting (for those with no access to electricity)</b>	\$5.72	\$9.55
<b>Lighting expenditure as % of household income</b>	7%	11%
<b>Average hours of lighting used per evening</b>	4.6	4.5
<b>% of public respondents who were aware of pico-solar lights</b>	20%	45%
<b>% of public respondents who expressed interest to purchase a pico-solar light</b>	92%	85%
<b>% of public respondents who felt the price of the sample solar light was cheap or reasonable (other option: expensive)</b>	38%	66%
<b>Perceived benefits of solar lights</b>	save money (54%) useful (49%) reliable (23%)	useful (50%) save money (45%) useful for child study (20%)
<b>Perceived negatives of solar lights</b>	no negatives (61%) unreliable (18%) too small (10%)	no negatives (55%) unsure of quality (13%) too small (13%)
<b>Estimated cost of entry-level solar light</b>	2,654 CFA (US\$5430)	5,712 CFA (US\$11.65)

Full reports on these market studies are available at SolarAid (see contact details at end of report).

## The results of the Light Library project

Although the initial criteria for selecting schools for the Light Library project identified those with student populations of between 150 and 500, due to inaccuracy of data provided, the student numbers were, on average, 30% of those given. This meant that in the 58 schools that participated, 6,115 students had access to the solar lights for study. An estimated 55,000 people had direct exposure to the technology with many more community members gaining exposure through friends and neighbours.

An estimated 55,000 people gained direct exposure to the solar lights through the Light Library project.

148 parents were interviewed as a follow up to the Light Library project; of these, 102 had chosen to buy a solar light of the sample size. All headteachers at Light Library schools were also interviewed.

### *Usage of the Light Library*

95% of the headteachers reported that they had a Light Library Management Committee; on average made up of three men and one woman. 95% of the headteachers also reported that their nominated Librarian was still active in managing the Library at their school.

All students had access to the Light Library with some schools prioritising exam year students.

At each school, all students had access to the Light Library with 21% of schools prioritising students taking exams. One school prioritised students from poor families and another prioritised those that had no access to electricity; otherwise there was equal access for all students. 93% of the headteachers said that all students at the school had registered to borrow the lights in the Library.

*"[The parents] are very satisfied because some of them could not afford to give their flashlight to their children every time they needed it to do their homework."*

Landing Djiba, Headteacher

78% of the headteachers felt that girls borrowed the lights more often than the boys at school. The main reason given for this was that there were more girls at the school, though some teachers noted that girls were more motivated and/or parents were more inclined to respond to girls' needs.

*"The programme is great and can lead to the development of the rural areas."*

Ndoubé Diop, Parent

Of all the parents interviewed, 76% had used a light from the Light Library. Interestingly though, all of those who chose not to buy a solar light had used one from the Library so this was not the reason for not purchasing, as discussed later.

*"The solar light is something which helps people living in rural areas to have access to energy for light."*

Aliou Sarr, Parent

## Management of the Library

The majority (68%) of the headteachers at the Light Library schools reported that the Library was being run as per the manual and guidance provided. This was asked as an open question so this does not mean the other 32% were not managing the project in line with instructions. 47% of the headteachers specifically talked about having involved the teachers, community and parents in the running of the project.

According to the headteachers, every school was charging for use of the lights in the Library. According to the parents, 98% of those that borrowed a light from the Library paid a fee.

17% of the headteachers said the school was charging more than the recommended fee of 5 CFA per night (~US\$0.01) for the entry-level lights, while 22% of the parents said they were charged more; up to a maximum of 50 CFA per night.

For the mid-level lights, 9% of headteachers said they were charging more than the recommended fee of 25 CFA (~US\$0.05) per night, while 4% of parents had experienced this; up to a maximum of 100 CFA.

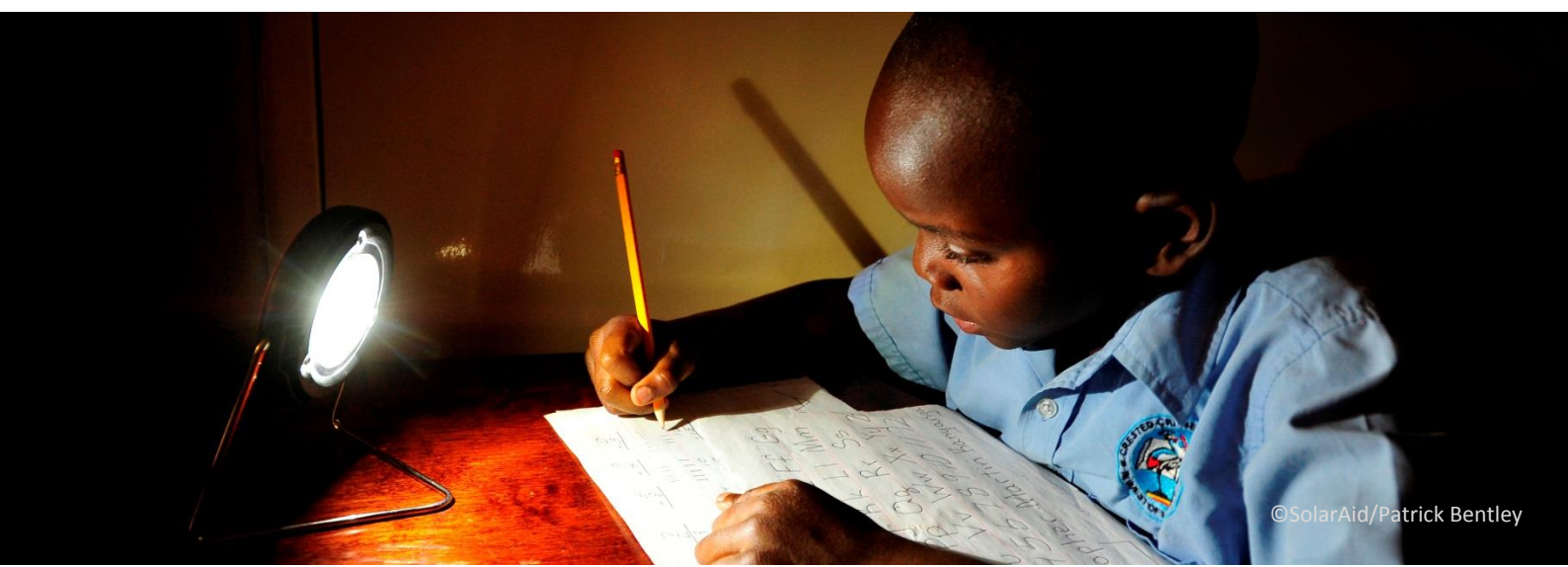
These figures are broadly in-line with each other so it's reasonably fair to assume that the majority of schools were following the charging guidelines set out in the Light Library project manuals.

While a large number of the parents did not know how the funds from the Light Library were going to be used, 24% said that they were being used to buy new solar lights to add to the school's Light Library and 24% said the funds were being used on school expenses.

The majority of schools were charging for the use of the solar lights in the Library.

*"At the beginning I didn't believe it, but now, I am so content because [the Library] can be used to light the house and charge our phone too."*

Oiseynou Ndaw, Parent





### Opinions on the solar lights

All parents said that their opinion of solar had changed since the Light Library project at their school. 41% of the parents specifically mentioned that the lights were brighter than they had thought they would be, 13% that they were money-saving and 9% that they lasted a long time in terms of lighting hours.

When asked if parents would recommend using a solar light to others after using one from the Light Library, all said yes.

All parents said that their opinion of solar had changed since the Light Library project at their school.

All parents said that they would recommend solar lights to others, after using one in the Light Library.

*"I understand now [solar's] usefulness. It is economical."*

Sada Ndiaye, Parent

*"After using the solar light, I found that it was brighter than I thought."*

Adama Cissé, Parent

*"The solar light has changed our opinion, at the beginning we didn't believe in it, but after using it we see that this is something very interesting to experience."*

Sada Ndiaye, Parent



### Opinions on the Light Library

The reaction from the teachers to the Light Library was very positive. 59% of all the headteachers talked about how the project helped their pupils, 16% mentioned the support it gave to the teachers, 14% said the Library led to improved school results, and 14% said it was good for the school.

86% of the headteachers felt that the community had been supportive of the project and 71% felt that there were changes in the way the parents and community now interacted with the school, as a result. 56% felt that the parents were now more involved in the school, 22% said that the project was helping to increase school enrolment and 7% said the project had bought interest in the school.

Headteachers felt that the parents and students had responded positively to the project, in particular through improved study and participation in school life. They reported that parents were interested to use the lights because they save money/are economical, they support child study and better school results, there are other uses for the solar lights in the home, they have no access to other lighting and the parents are able to charge their phones.

The reaction from the parents to the Light Library was also very positive, as highlighted by the headteachers. 56% of those interviewed remarked on the usefulness of the project for villagers/those living in rural areas, 32% talked about how the project helps students and 11% said that the project was economical for the parents.

Some schools experienced increased enrolment as a result of the Light Library.

*"[The parents] are now more involved in school affairs. There is a better communication between the community and the school and the number of new students for the first year has increased."*

Thierno Sow, Headteacher

*"[The Library] has played a very important role in the school because it urges parents to bring their children to school."*

Babcar Ndome, Headteacher

*"The project has participated in the development of the school. Thanks to it, the children study longer at night, the enrolment rate has increased and the results are better too."*

Thierno Sow, Headteacher



## Impact of the Light Library

98% of the parents who borrowed a solar light said that the lights were used for child study and all parents said that there was equal access for their children at home i.e. the light use was not prioritised based on age, gender or other reasons. On average, children were studying for three hours each evening when they had access to the solar light. 96% of the parents said this was more than on a normal evening without the solar light.

Nearly all parents who had a chance to use a light from the Library (98%) found that their expenditure on other lighting products was reduced; on average by 560 CFA a week (~US\$1.16). They reported noticing other changes from using the solar lights; 50% talked of the lights helping their children to study, 11% said that they gained time in the evening to do work, activities or chores.

The headteachers felt that there had been noticeable impact on students having used the Light Library at school. 48% of headteachers said they had noticed improved school results since the project began nine months earlier. 29% talked about having noticed the children studying more and in better conditions, 12% talked about the students being more motivated and interested to learn. On the whole, the headteachers remarked that there had been improvements in attendance, motivation, concentration and performance; and particularly that the changes were noticed in boys and girls equally.

Nearly all parents said that their children studied longer using a solar light, compared to before.

Headteachers noticed improvements in attendance, motivation, concentration and performance of students.

*"Our children at school are now very motivated to learn at night, more than before the Light Library's arrival."*

Aliou Diassé, Parent

*"[The students] are studying better and the success rate has increased noticeably."*

Abdoulaye Ly, Headteacher

Nearly all parents experienced savings from using a solar light from the Light Library.

*"The solar light helps us to save money and to live in a good condition."*

Abdoulaye Ndiaye, Parent

*"My expenses are strongly reduced while using the solar light."*

Aliou Diassé, Parent



### *Faulty lights and breakages within the Libraries*

SunnyMoney expected a higher breakage rate of the solar lights than just from manufacturer error (which is normally estimated at around 2%); as there is an element of moral hazard. This is because with no personal ownership of the solar lights there is less incentive for those renting them to take as good care of them.

As a result, the Light Library, within the first nine months, saw 5% of solar lights reported broken, faulty or damaged by the schools. The fault rate was higher for certain products, which also suggests that the durability differs between manufacturers and models.

While delivering Phase 2 of the project; the School Campaign, SunnyMoney replaced all faulty lights in the Libraries from the replacement stock being held at ASER. When asked in the follow up interviews, 91% of the headteachers said they knew who to contact if they had challenges with or questions about the Light Library at their school, meaning ongoing management was clear.



### *Challenges faced and suggestions for improvement*

36% of the headteachers interviewed had not experienced any challenges with the Light Library at their school. 16% said there were not enough lights; however, the Library was purposefully designed not to provide the same number of lights as student population so these comments more reflect mismatched expectations rather than poor delivery of the project. There were four headteachers out of 58 who felt that some people in their school community did not have enough resources to rent a light.

*“It is a bit difficult sometimes because we are in rural areas and most people don’t have enough resources to borrow lights on a regular basis.”*

Thierno Ndiaye, Headteacher

95% of schools experienced non-return, damage and/or breakage to the solar lights in the Library. This occurred on a reasonably low scale though; on average, schools experienced four broken lights, of which one was not returned, two were faulty, and one was damaged. While this represents a higher fault rate than expected, it still represents around 5% of the Light Library lights.

Each headteacher was asked if there was anything that had worked particularly well at their school that they would like to share. Some headteachers talked about how the funds were being used and that the project had led to improved teaching and learning opportunities more generally. However, one or two mentioned the success of having a school committee set up to manage the project, as recommended in the SunnyMoney delivery model. This seems to have eased management and enhanced effectiveness of the model.

### Potential sustainability of the Library

In an average Light Library school, if all of the solar lights were being used 85% of the time (i.e. six days a week) this would generate around 621,000 CFA (~US\$1,300) of 'revenue', assuming the school was charging the recommended fee, over three years (the expected lifespan of the solar lights; though many are expected to last up to seven years). This roughly equates to the cost for replacement of the entire Library of lights; suggesting the Library can be self-sustainable at the schools if the collected funds are set aside for this purpose. What's more, as some families purchase solar lights, see below on the results of the School Campaign, there may be more opportunity for those who didn't purchase to use the Library lights more regularly. Those that chose not to buy may be lower-income families; and so having more regular access to the solar lights may enable them to save money over a longer period of time and, therefore, have funds to purchase a light at a later date.



### Conclusion

Ultimately, the results of the Light Library project evaluation suggest that the solar Light Libraries were in regular use at the schools, were well received by the school community, and were bringing positive changes to student learning and teacher conditions.

The response from the parents and headteachers suggests that there was a change in awareness and opinion of solar as a result of the exposure to the products that the project brought. Families experienced money savings and had an opportunity to try the lights in a risk-free environment; enabling them to test the product in their own time, in their own setting and see how the lights could fit into their lifestyle. The sales figures in the School Campaign certainly suggest this to be the case, see below for the results of Phase 2.

*"We find that the solar light is more effective than the torch light or candles."*

Seydou Dia, Customer

*"The Light Library is something very positive. We never knew that we could have lights with energy from the sun."*

Adama Cissé, Parent



## The results of the School Campaign

The School Campaign included 116 schools; 58 as a follow up to the Light Library project and 58 new ones. Just four schools (3% in each region) did not have any solar light purchases; this could either be due to no interest and/or low awareness from the parents and community or little sharing of communication by the headteacher.

The SolarAid research team collected completed questionnaires from all 116 headteachers who attended the School Campaign meeting. This was to allow us to assess initial thoughts on the School Campaign for future learning and improvement for SunnyMoney, but also to assess expected demand as well as existing awareness among headteachers of this technology.

### *Headteacher interaction*

All but one of the headteachers who attended our meetings were male. All of them found the meeting interesting and felt that there would be interest from students and parents at their school.

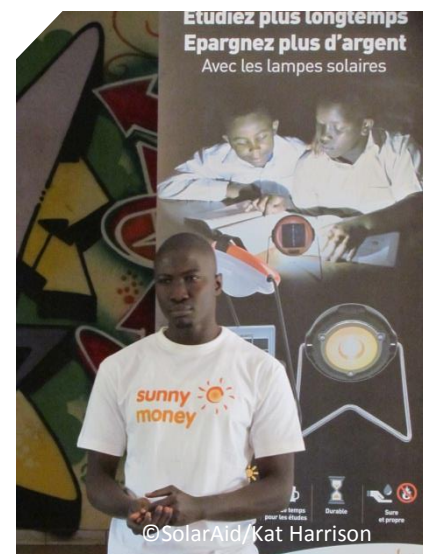
All 58 headteachers in Light Library schools had seen the pico-solar lights before; as expected since they manage them at their school. None of the 58 headteachers in the control region had ever seen or heard of a pico-solar light before.<sup>2</sup>

### *Customer profiles*

104 baseline interviews were conducted with customers who bought a solar light in the comparison region and 102 in the Light Library regions. This was to understand the motivating factors for purchasing a solar light and to ascertain whether the Light Library project contributed to that decision. Table 6 shows the customer profiles for each region.

The Light Library school customers have slightly larger families with lower per person income, less access to electricity and they spend less on lighting per week. This suggests that the Light Library region customers were of a slightly lower income level than the control region.

71% of customers at Light Library schools said that the Light Library affected their decision to purchase a solar light; 53% of customers said they would not have bought a solar light without having tried it first. This may suggest that the Light Library model encourages lower income, more risk-averse customers to purchase solar lights as the trust and exposure element is key to purchasing decisions.



Over 70% of customers at Light Library schools said the Light Library affected their decision to purchase a solar light.

The Light Library model encourages lower income, more risk-averse families to purchase solar lights as addresses the trust and exposure barrier.

*"It is not safe to buy something you don't know."*

Aliou Ba, Customer

<sup>2</sup> This was not just a test of the term 'pico-solar light' but also a description of the type of technology.

Table 6: Profile of customers

	Light Library regions	Control region
Average household size	14	11
Average number of children at school per household	6	4
Average monthly household income	\$196.36	\$189.30
% of customers with variable income	79%	67%
% respondents living below the \$1.25 per person per day poverty line	90%	86%
% of respondents with access to electricity	2%	13%
Main source of lighting (for those with no access to electricity)	battery light (90%)	battery light (92%)
Average household monthly expenditure on lighting (for those with no access to electricity)	\$4.65	\$8.15
Lighting expenditure as % of household income	3%	6%
Average hours of lighting used per evening	3.0	3.7
% of respondents who were aware of pico-solar lights	100%	0%
Average monthly expenditure on mobile phone charging	\$1.17	\$1.82
Reason(s) for purchasing solar light	For child study (85%) For family activities (20%) To light the house (general lighting) (12%)	For child study (73%) To light the house (general lighting) (31%) To save money (26%)

97% of the comparison region customers said that the source of lighting used by their children before the solar light purchase for study after dark negatively affected their study time and/or motivation. It is clear to see why the main reason for purchasing the solar light was to support child study and why 52% of these customers said that the light would be prioritised for use by the children in the household. It is also key to note that due to the distribution model that SunnyMoney uses and their marketing strategy, the solar lights are presented as an opportunity for supporting education with the solar lights as a tool to aid this; so this is likely to shape the results and reasons for purchase.

*“We have bought this type of solar light for our children at school to have good conditions to read and learn their lessons at night.”*

Mohamed Diame, Customer

In both areas, nearly all customers said they were recommended to buy the solar light by someone they trusted; in general the headteacher, though in some cases the children at school or family members. For nearly all customers, this influenced their decision to buy the solar light.

A recommendation from a trusted source influenced all customers' decision to purchase a solar light.

In both areas, there were very similar opinions on the price of the products with 94% of control region customers and 100% of Light Library school customers feeling the price of the entry-level solar light offered was cheap or reasonable (the other option was expensive). All control region customers and 93% of Light Library customers felt the price of the mid-level solar light offered was cheap or reasonable also. We might have expected to see opinions in the Light Library region as different because the customers may value the solar lights more having had the opportunity to use them. However, with such high rates of opinion on the reasonableness of the price, this possibly suggests more that the marketed price was felt to be a good value compared to what households were currently spending on lighting, and of course this question was asked of those who chose to make the purchase, so it is potentially unrepresentative of the general public.

*"I decided to buy a solar light because where we live there is no electricity. We need energy to light rooms in order for our children at school to have good condition to read and learn their lessons at night."*

Mathar Khoya, Customer

It is interesting to look at the average customer profile in comparison to the average public profile from the market studies; this also reflects the subset of the population that chose to purchase a solar light and points to a different uptake characteristic in the Light Library areas.

In the Light Library regions, the average household size of the customer was higher than the general public, whereas it was lower in the control region. Average monthly household income was higher in both regions; perhaps unsurprisingly, showing that those that chose to buy had slightly higher than average incomes.





### *Uptake and sales*

In the control schools, there was an uptake of 15% of the student population purchasing a solar light overall; of which 12% were entry-level lights and 3% were mid-level lights. This demonstrates a successful campaign when looking at SunnyMoney operations in East Africa. This suggests there is an unmet demand in rural areas of Senegal, some of which may be due to limited distribution networks, which may in part be because of high import tariffs and an uncertain policy environment.

Demand for solar lights in the Light Library areas was more than double the demand in the control region.

In the Light Library schools, there was an uptake of 35%; with 21% entry-level solar light sales and 14% mid-level light sales.

This shows a more than double uptake of solar lights in Light Library schools and a particularly high uptake for the more costly and higher capacity mid-level solar lights. The mid-level lights represent a bigger commitment due to the higher price, which is not insignificant for families living in rural Senegal.

While this is a small-scale project, it does still represent a sale of 3,104 solar lights within an eight week period. What's more, the SunnyMoney team were receiving calls from headteachers with additional orders after the first delivery meetings. An overview of the sales and uptake figures are in Table 7 below.

Table 7: Purchase rates of solar lights

	Light Library school sales	Non-Light Library school sales
<b>entry-level solar lights</b>	1,279	781
<b>% entry-level uptake</b>	21%	12%
<b>mid-level solar lights</b>	859	185
<b>% mid-level uptake</b>	14%	3%
<b>total sales</b>	2,138	966
<b>uptake as % of school population</b>	<b>35%</b>	<b>15%</b>

### *Reasons for non-purchase*

Over half of the parents that did not buy a solar light said the reason was that they didn't have the money to afford the lights. A third of the parents said that they were ready and waiting for a second delivery of lights so that they may buy one; SunnyMoney had to cap orders because the demand was higher than the number of lights that had been imported into the country.

### *Policy environment and pricing*

While these purchase rates suggest real interest for solar in the market as a whole, the lack of awareness of the pico-solar lights highlight very low levels of availability and distribution of these products. A key reason for this is likely to be the high import tariffs and taxes which may have led to little development and investment in Senegal for off-grid lighting products. SunnyMoney, working alongside ASER, benefited from tax exemption for both phases of this project, but where this is not available, or where the tax policy does not change, the extra cost is likely to be passed onto the customer, which is likely to negatively affect uptake.

Positive engagement with members of the government through the Project Management Committee as well as positive results and response to the Light Library project were important in persuading the government to revisit the concessionaire model and review how best to support the market; discussions around the policy environment. Because pico-solar lights, as evidenced by the Light Library project in Senegal, touches on so many elements of poverty: fuel, energy, income, education, health, and communication, there is a strong case for supporting a tariff reduction or elimination for these types of products, which provide a first step towards modern energy access.

*"[The children] didn't really want to study with the firewood but they had no choice."*

Dame Ndiaye, Customer

*"[The solar light] would help students and teachers, households as well as the entire population in rural areas to do more at night (study, prepare lessons, prepare food, chores)."*

Ousmane Konate, Headteacher

### **Conclusions on the model**

The Light Library model provided awareness, access and exposure to pico-solar lights as an alternative to traditional or inefficient lighting methods such as candles, kerosene lamps and battery torches/flashlights. It allowed low-income families to try the products and have an opportunity to see how they would fit with their lifestyle at very little risk. This allowed families to build trust in the quality and usefulness of the technology as well as save money in the short-term.

The Light Library model, through raising awareness and exposure to the pico-solar lights, increased interest and willingness to purchase. When the SunnyMoney School Campaign reached schools there was a very high uptake as a result of prior access to the lights through the initial project.

While the Light Library raises awareness and exposure to the solar lights, it does not help to catalyse a market for the solar lights in isolation. The only way to do that is to complement the model with an element of sales and distribution. Through this route, it supported an increased uptake of solar lights, thereby making the distribution more cost-effective and reaching many more people in a shorter length of time. Before we move to Recommendations, the report first highlights some of the challenges and lessons learned.

# 6. Lessons learned

This section provides an overview of some of the key challenges faced and the lessons learned that, taken into account, will enable more effective future delivery of such a model.

## Partnerships are key

The Light Library model, and indeed the School Campaign, would not have been so successful without the key partnerships that enabled collaboration, learning, delivery and planning.

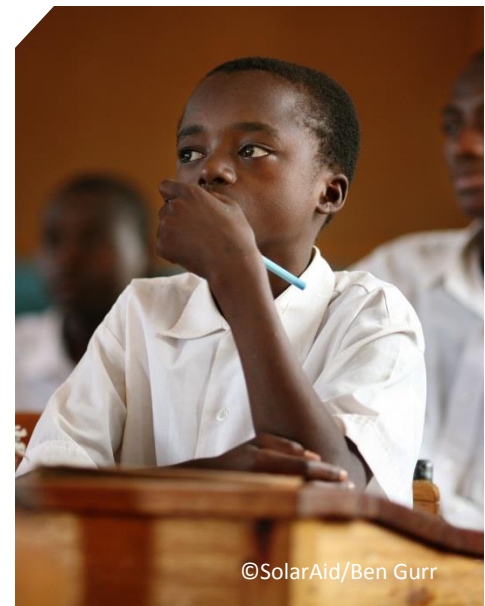
The presence of the Inter-sectorial Committee for Implementation of Synergies between the Energy sector and other Strategic Sectors for Poverty Reduction (CIMES), set up under the initiative of the Senegalese Rural Electrification Agency (ASER), greatly facilitated the creation of the Light Library Project Management Committee and getting key partners, especially the Ministry of Education, on board to share, discuss and input.

ASER played a crucial role in supporting the design and implementation of the project and ensured the project was as successful as possible through facilitating the tax exemption on imported products and helping to shape the direction of the project.

Without the Ministry of Education, SunnyMoney would have struggled to gain insight to education management within Senegal, access to information that was key for the selection criteria, and linkages with local level Ministry of Education staff including headteachers who ultimately managed the project. When working through public schools, this relationship is key.

It is unlikely that SunnyMoney would have trialled this model without specific funding to support it. SunnyMoney seeks to be a commercially viable model and while there is some analysis to be done on the cost effectiveness of such an approach for increasing uptake, it is unlikely that SunnyMoney would have had the funds to test on this scale, certainly in a new country. It should, therefore, be recognised that this is not an inexpensive model even though it brings great benefits and impact.

SunnyMoney spent considerable time and funds on reaching each school individually to build relationships with the teachers, school committees and local community. While this project may have been delivered without this level of last mile access, it is unlikely the project would have been so well managed, integrated and successful. Having that direct access enabled the public communication of the purpose and guidance for the project at each school. Village leaders attended the meetings and their buy-in was key to the smooth running of the project in the school community. SunnyMoney



Without key partnerships the project would not have led to increased interested and support for policies that support market growth.

feel that this close connection facilitated efficient and effective running of the programme in schools.

Without these partnerships, the project would not have led to increased interest and support for policies that support market growth.

### Guidance but not rules

While the Light Library project had specific and detailed objectives, the detailed design of the project was discussed and determined within the Project Management Committee. Decisions around payment for borrowing lights, key criteria to consider and the process for local management were all made together. This allowed specific insight by relevant experts on how processes worked in their area of knowledge i.e. school management processes.

Alongside this, though the Light Library as a model was clearly defined, there was some element of flexibility at the school level. There were certain 'rules' that were non-negotiable: the solar lights remained a public good i.e. the property of the school and that the lights were available for all equally. But, there were certain elements that were up to the school as it was felt that ownership and empowerment within the boundaries would make for a more effective and sustainable management of the project.

For example, it was up to the school committee to decide how the funds from the Light Library were to be used; it was suggested that schools may wish to keep money aside for replacing lights at the end of their lifespan.

It was suggested that schools rented out the lights for three days at a time, at maximum, to ensure that as many students and families as possible got a chance to use the lights, but again, this was up to the school as long as there was equal access for all.

This ownership and flexibility also allowed schools to interact with their committees and members and that meant that the parents and community felt they had some say in the running of the Library. At some schools, as noted above, this led to more interest and interaction from the parents, and increased enrolment of children at the school.

### Reach more people with higher student:light ratios

A key lesson learned, was the challenge with accuracy of data. With a longer timeframe it may be more effective to use this time to confirm enrolment data with schools individually. As a result of the short timeframe for this project, SunnyMoney



The project encouraged schools to interact with the community for effective management.

With higher student:light ratios the model could raise awareness amongst a larger population.

had to rely on Ministry of Education figures which were significantly inflated. This led to a much higher student:light ratio than first planned. With a higher student:light ratio, many more families would have an opportunity to test and try the solar lights, as it stands, the project will provide much more hands-on and regular opportunities for a smaller population to use the lights because there are around seven lights to every 10 students; it was first envisaged that the student:light ratio would be around half of that at one light for every three or four students.

### Upholding warranties

Another key challenge that had to be overcome was the honouring of warranties for the solar light products. This was key to the process as it allowed parents using the lights from the school to see that if the light was faulty it would be replaced and this would help to build trust.

Honouring warranties is not an easy or cheap process though, and is particularly challenging if the organisation delivering the Light Library does not have longer-term plans for operating in the same area.

Schools that are most appropriate for a Light Library are likely to be in rural areas where electrification rates are low and poverty high. This means that there are often long distances to cover to reach schools where Light Libraries are. Transportation is expensive, but so also is the importation and shipping of replacement lights from the manufacturers. For this test project, SunnyMoney bought replacement lights so that faulty lights could be replaced. The process needs to be fully considered.

The vast majority of these lessons feature in the Recommendations section below, along with other things to consider.



Honouring product warranties for this project alone is a challenge.



# 7. Recommendations

This section provides a conclusion of the effectiveness of the Light Library model as well as recommendations for those considering replicating or delivering such a project.

## Complement with supply and sales

Light Libraries are effective at building the off-grid lighting market as part of a broader strategy involving supply and sales. This evaluation strongly suggests that the model can build demand but without a sales component, it builds awareness, trust and demand but results in unmet demand and dissatisfaction.

For the Light Library model to achieve the objective of supporting market-building there must be complementary sales and supply activities.

## Consider the objective of the model

The Light Library project delivered by SunnyMoney in Senegal had a clear set of objectives, however, it had many different impacts and benefits. There is opportunity to use the model to achieve different objectives than the SunnyMoney project set out to. For example, the evaluation of the Light Library suggests that it could be used as a tool to facilitate improved educational outcomes through supporting child study, teacher preparation and improving learning and teaching conditions. It also seems to support community cohesion and interaction with the school.

What is most relevant for this report, however, is that it appears to have a significant impact on helping create demand for solar lights, which resulted in more people buying solar lights in areas with Light Libraries than those without. That is not to say that it cannot have all of these impacts, but it is important for the planning phase to determine which outcome it is trying to achieve and therefore determine the relevant partners and communication strategy.



## Engage with government for a healthy policy environment

It is imperative to engage with government when delivering this model in countries with an unfavourable, unclear, or uncertain policy environment around VAT, import tariffs and taxes. Uptake and demand for these products are so sensitive to price that tax is key. High taxes and tariffs are likely to be passed onto the consumer in the form of higher prices which may price out lower-income families and become too much of a commitment and risk to those with little awareness or exposure to this new technology. An uncertain or unclear policy environment will not attract investment and interest to work in this area and as a result there is likely to be little availability or choice available for consumers.

## Consumer awareness

Light Libraries, which expose rural communities to physical samples of solar lights which they can use, appear to be an excellent way of educating the public about solar lights and helping them make informed decisions.

There may be other, less-intensive ways to raise awareness of solar lights. Consumer awareness campaigns using local media; posters, radio, and newspapers may assist in letting people know about the technology and any corresponding availability. The effectiveness of such a campaign has yet to be tested and one challenge is that it does not address the exposure barrier in the short-term. Of course, to the extent that consumer awareness strategies might reach the slightly higher-income group and those more willing to take risks on a new and unknown technology, in the long-term, lower-income households may gain exposure through friends and neighbours having a solar light. In Senegal, where there is such low penetration, it may take a long time before this kind of approach leads to lower-income families making the commitment to buy a solar light.

And just like the Light Library model, raising awareness has little effect on the market if there is not a corresponding supply chain where generated demand can be met. Where a consumer awareness campaign may have most impact is in conjunction with a Light Library model and a sales/distribution model. This may then achieve the task of addressing multiple barriers to uptake of the solar lights in rural areas most in need: it may address exposure through the Light Library, tackle awareness through the awareness campaign and respond to availability through a sales network. Where the consumer awareness strategy specifically focuses on raising awareness of quality products this may build greater trust both in the short-term and in the long-term where populations purchasing lights see that they are durable, sustainable and life-changing.



Consumer awareness campaigns could have real impact in conjunction with the Light Library model and a sales element to meet demand.

## Support available from SunnyMoney

SunnyMoney is keen to support those interested in implementing, promoting, delivering or funding the Light Library model. SunnyMoney would be open to delivering additional Light Libraries if funded, however, SunnyMoney would not do this in isolation. They believe, as expressed above, that without supply, sales and last mile distribution there will be less impact and ultimately the objective of improving access to safe, clean, affordable energy would not be achieved. SunnyMoney is well-placed to deliver the Light Library model again in conjunction with their own sales model or to support those wishing to implement or fund the Light Library model by following up with the sales element. SunnyMoney believes that the most effective action would come in four parts:

1. Consumer awareness which can be delivered in a number of ways;
2. Consumer exposure through the Light Library model which SunnyMoney could advise, support, deliver or follow up on;
3. Distribution through a sales model which SunnyMoney could do using their innovative School Campaign model or other distributors working in this sector, and;
4. Sustainable market building through supporting the establishment of more lasting access and distribution. SunnyMoney would do this through their agent networks model which is fast being developed and trialled in East Africa, alongside other operators.

SunnyMoney has kindly offered to make the materials, tools and manuals used in the Light Library model available publicly and act as an advisor, support or consultant to those wishing to implement a Light Library model.

SunnyMoney are well-placed to support, deliver or advise on most elements of a successful market-building strategy.



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# 8. Contacts and useful resources

## SunnyMoney contact details

If you wish to access the market studies, Light Library materials or contact SunnyMoney for advice and support please contact:

Kat Harrison

Director of Research & Impact (at time of project: Senegal Programme Manager)

[kat.harrison@solar-aid.org](mailto:kat.harrison@solar-aid.org)

## Useful resources

SolarAid website [www.solar-aid.org](http://www.solar-aid.org)

SunnyMoney website [www.sunnymoney.org](http://www.sunnymoney.org)

Lighting Africa website [www.lightingafrica.org](http://www.lightingafrica.org)

ASER website (French) [www.aser.sn](http://www.aser.sn)

Ministry of Education website (French) [www.education.gouv.sn](http://www.education.gouv.sn)

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# 9. Appendix

## Materials for schools

Below is an outline of the materials given to each school in the Light Library project to enable effective management and delivery of the model.

- A letter to the parents that the teachers could distribute via students to inform them of the project
- A poster to be put up at school to ensure the purpose of the Library and the charging fees were shared
- A poster to share the benefits of the solar lights
- A Library product register – each solar light was numbered to allow easy tracking
- A manual for the teachers, Librarian and school committee:
  - an introduction to the project
  - how the Library works
  - roles and responsibilities of the Librarian and school committee
  - how to open and operate the Library
  - how to use, recharge and maintain the lights
  - support available
  - questions and answers
  - resources available
  - examples of completed registers
- Library registers to support the Librarian in tracking where the lights were, when they were due to be returned and the payment process
- Product manuals for each pico-solar light in the Library
- A Library agreement to be signed by the headteacher, Librarian and witnessed by one of the SunnyMoney field team.
- A signed goods received note to outline the number and types of products handed to the school.

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The benefits poster given to each school to display publicly to raise awareness of the solar lights