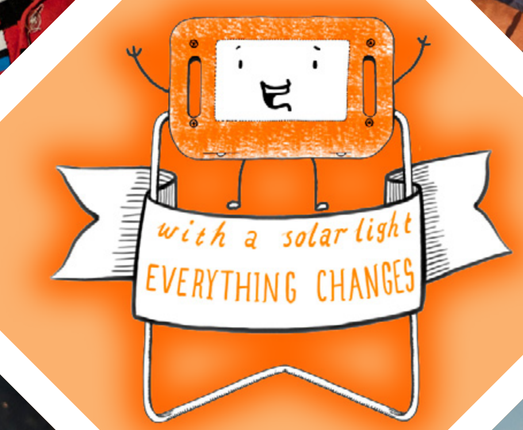
# Market Update

## December 2016

sunny money™

SolarAid 10

THE POWER OF TEN

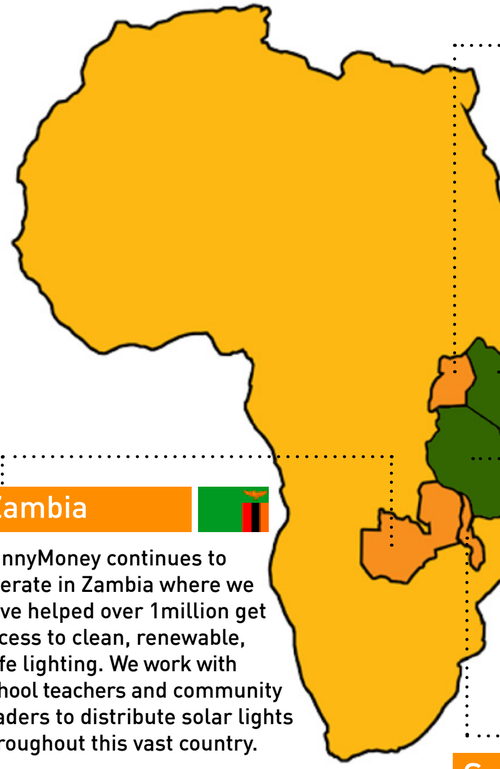


# WELCOME

When SolarAid was founded, in 2006, very few people in rural Africa had heard of solar power and fewer still could afford a solar light. For the past ten years SolarAid has been on a mission, to light up Africa and eradicate the kerosene lantern and although we have made some good progress and helped improve many lives, our work is not over yet.

This report looks at the impact SolarAid has made over the last ten years, focussing on Kenya and Tanzania, where small but thriving solar markets now exist where previously there were none. We like to think we played at least a small part in helping these markets evolve through our social enterprise SunnyMoney, who distribute solar lights to some of the most remote parts of Africa. It's not all thanks to us though, SolarAid and SunnyMoney would not exist without the generous donations of our many supporters. Thank you all for making this possible.

# Catalysing solar markets



## Uganda

SunnyMoney operations continue to expand across Uganda, where our new solar light, the SM100, has generated a huge amount of interest.

## Kenya

We are happy to report that SunnyMoney no longer works in Kenya, because we have helped develop the market for solar lighting, in some areas, to the point that local businesses are operating successfully. Our hope is that these businesses will expand to service the whole of Kenya without the need for further subsidised solar.

## Zambia

SunnyMoney continues to operate in Zambia where we have helped over 1million get access to clean, renewable, safe lighting. We work with school teachers and community leaders to distribute solar lights throughout this vast country.

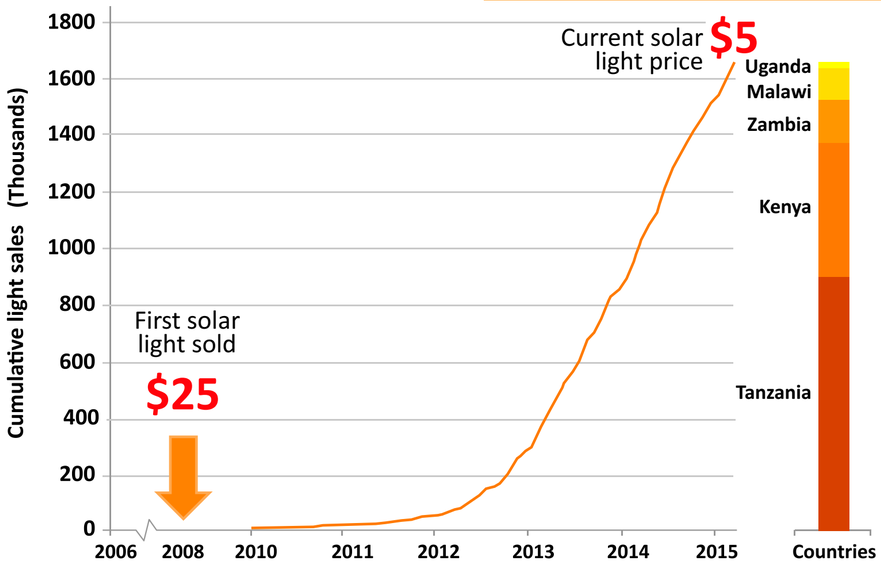
## Tanzania

SunnyMoney has also moved on from Tanzania, where the market has developed to the point that local solar lighting businesses have taken off. Our hope is that these businesses will expand to service the whole of Tanzania without the need for further subsidies.

## Malawi

After the floods of 2015 the drought in 2016 has caused huge problems for 6.5 million people in Malawi. SunnyMoney's work is now more important than ever because it helps people save money by switching to solar.

## Solar light sales over 10 years of SolarAid




When we first started selling solar lights back in 2008, the cheapest light we could sell was $25 but now, with the SM100 we are able to sell solar lights for just $5 in rural Africa. SunnyMoney's sales in Kenya and Tanzania helped build up a market for solar lamps, larger phone charging lights and solar home systems to the point that both these countries now have thriving solar markets. SunnyMoney have now pulled out of these markets to concentrate on creating opportunities for new communities and catalysing other markets in other African countries.

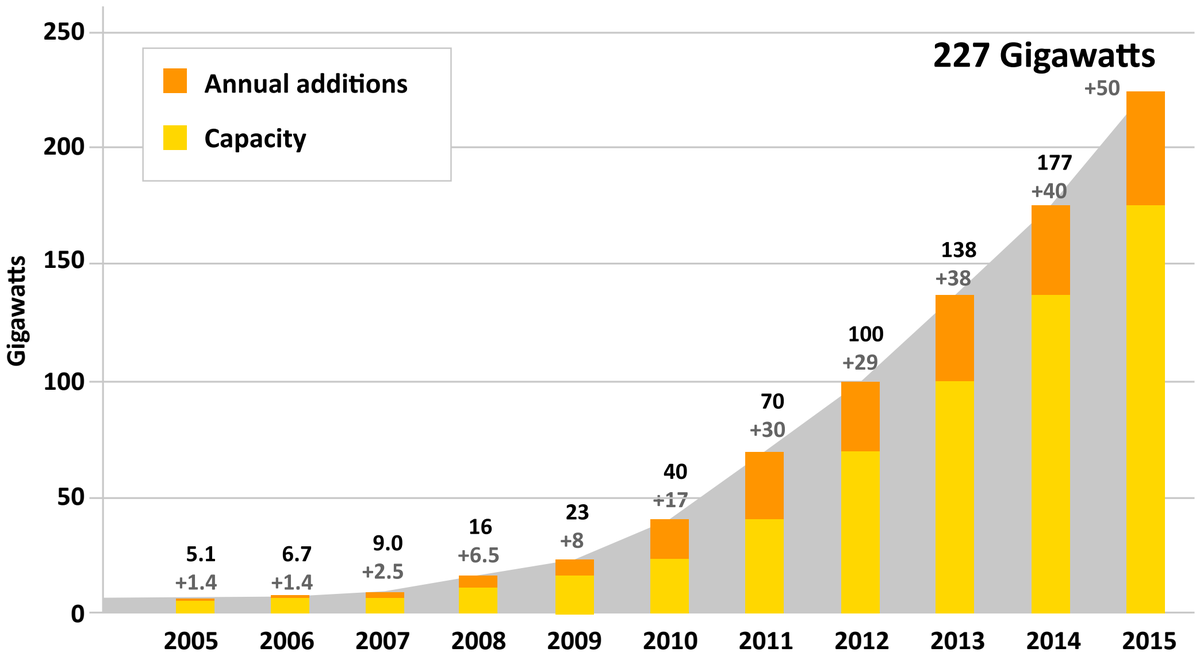
# The Big Picture

Over the past 10 years many things have changed in the world. SolarAid has worked in six countries in Africa and run pilot projects in South America. We've learned valuable lessons and had to adapt and evolve to stay relevant and to ensure we deliver the greatest impact possible.

The biggest, most observable, change has been the speed with which solar energy has taken off globally, and the increased interest in the African solar market from entrepreneurs, solar companies and investors alike.

The global solar market has grown from just 6.7 Gigawatts in 2006 to over 227 Gigawatts in 2015. The graph (below) demonstrates the way this trend is heading and the dramatic increase in installed solar capacity.

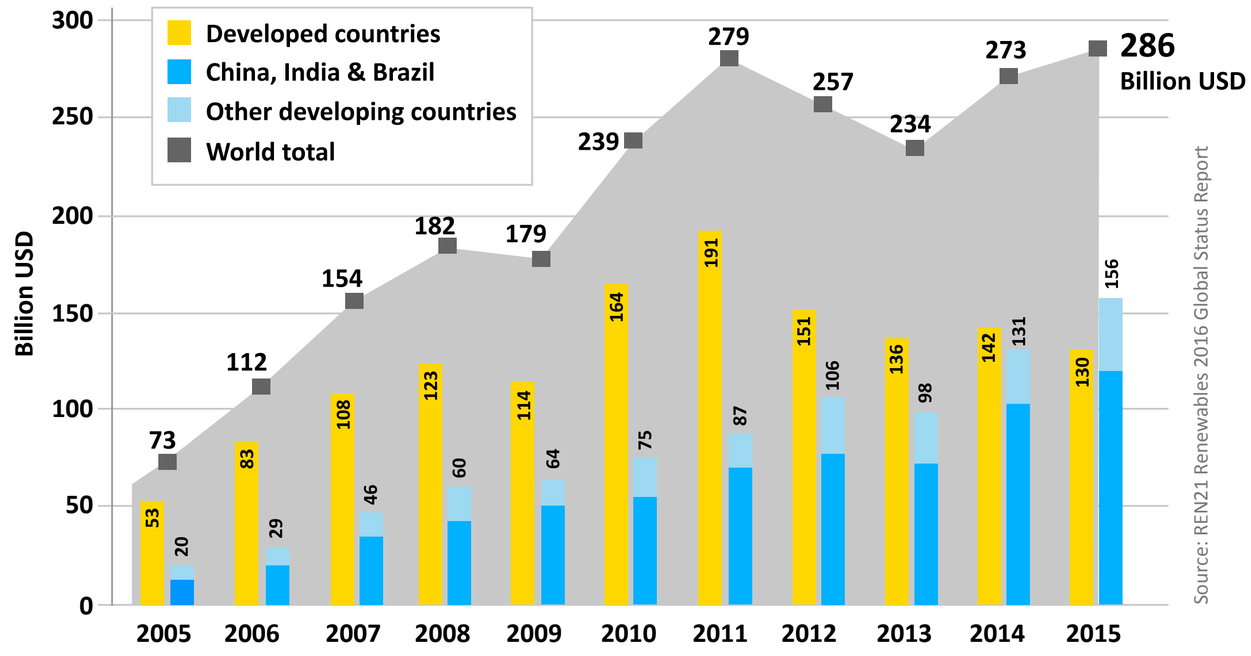
## Global installed solar capacity




Source: REN21 Renewables 2016 Global Status Report

The graph below shows where investment into renewables has been focussed over the last 10 years, with most of this historically going towards developed countries (yellow) back in 2005 but the trend finally reversed in 2015 with more investment going to developing countries (both blues) than ever before.

## Global investment in renewables




Source: REN21 Renewables 2016 Global Status Report

"SolarAid's SunnyMoney nonprofit business model acts as a market primer for companies like ours. We have found it much easier to penetrate markets where customers have already had a positive experience with solar products. We spend much less time educating customers about the benefits of solar in areas where they have worked, as they have already built trust in solar technology and there are much higher levels of demand. SunnyMoney makes it easier for us to extend our operations into rural areas where they have a presence."
Erica Mackey, COO Off-Grid Electric,
Tanzania's leading solar-as-a-service company

# From macro to micro

SolarAid's mission has always been about providing access to light and enabling solar markets in the most remote parts of Africa. We want to eradicate the kerosene lantern which is not only an expensive form of fossil fuel lighting but it also highly dangerous and toxic.

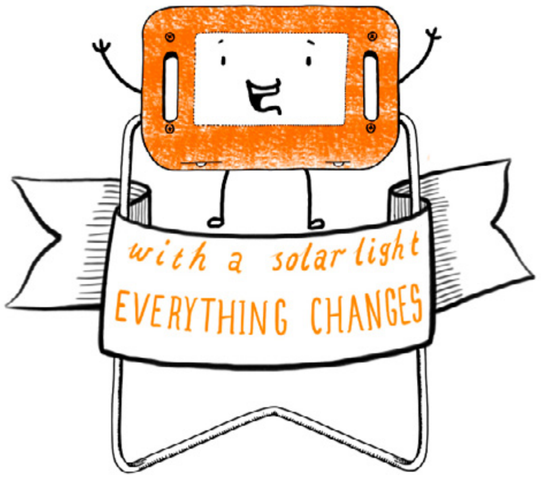
We set out to achieve our mission in any way we could, experimenting with pilot programmes with deaf and disabled people in Tanzania in 2006. We ran other experiments and pilot programmes in Malawi and Zambia in 2007. For four years we experimented with what we called 'macro solar', fitting bigger photovoltaic systems to schools and health centres. Whilst this worked well it soon became clear that most of these systems were being used to charge lights and phones, which smaller systems could support, plus servicing these systems was problematic. If the inverters tripped, causing the system to shut down, local engineers often struggled to get them back up and running meaning systems were left idle whilst we struggled to cover the costs of servicing.

By way of comparison, our micro solar work, distributing small, self-contained solar lights through schools and other sales agents was taking off apace. Being portable, rechargeable, and without the need for servicing, these little solar powered devices provided light right where it was needed most, inside people's homes.

In late 2008 we established the social enterprise SunnyMoney to further our micro solar work. The main objective of SunnyMoney was, and still is, to distribute solar lights in 'last mile communities' where commercial organisations don't go because it is too hard for them to make a profit. By selling solar lights to distributors, rather than giving them away, SunnyMoney helps people establish micro businesses and earn an income whilst helping to distribute solar. Since the inception of SunnyMoney we've developed the model to maximise the impact we make. We've distributed hundreds of thousands of solar lights through head teachers of schools who, as trusted

“The work of SunnyMoney in the Lake Zone has been transformational in putting kerosene lanterns on the pathway to extinction. Placing clean lighting tangibly and affordably into the hands of young people has brilliantly turned solar from a far off dream into the start of an everyday reality for literally thousands of Tanzanian families.”
Josh Sebastian,
Tanzania Program Manager,
SNV Netherlands Development Organisation

members of their communities’, are well placed to teach children and parents about the benefits of solar power. The lights spread throughout communities, people save money they would have spent on kerosene, indoor air quality improves reducing health risks for entire families, there are fewer fires, people can work later and study longer and, more importantly than we ever imagined, solar light make it’s easy to check if there are snakes in your bed before settling down for the night!




The staff at SolarAid and SunnyMoney were keen to help more people experience the multiple positive impacts of solar lighting and worked hard to expand operations. We wanted to increase distribution until solar lights became the norm, rather than the exception.

## Breakthrough...

The main breakthrough came on the tiny little Mafia Island, off the coast of Tanzania, where the SunnyMoney team together with local partners sold 3,000 lights in just 3 days. Success did not follow immediately but the dogged determination of SunnyMoney staff and systematic evaluation of conditions on Mafia Island finally led to a discovery: sales would not take off without the support and profile of respected community networks, hence our strategy to work with head teachers.

The change in energy use for lighting in the Lake Zone of Tanzania between 2012 and 2015 was dramatic. In 2012, a baseline study by the Dutch development organisation SNV showed that only 3% of households were using solar products. Despite some awareness of solar from foundational programmes in the early 2000s, there was no market for solar products.

Three years later in 2015, SNV follow up research after SunnyMoney's work found that over 50% of households in the six regions of Mwanza, Mara, Shinyanga, Simiyu, Geita and Kagera were using solar lighting products. The Lake Zone follow up survey noted that a clear demand for solar technologies was now  prevalent, highlighting that "renewable energy options, particularly solar, are the most preferred technologies among Lake Zone households".

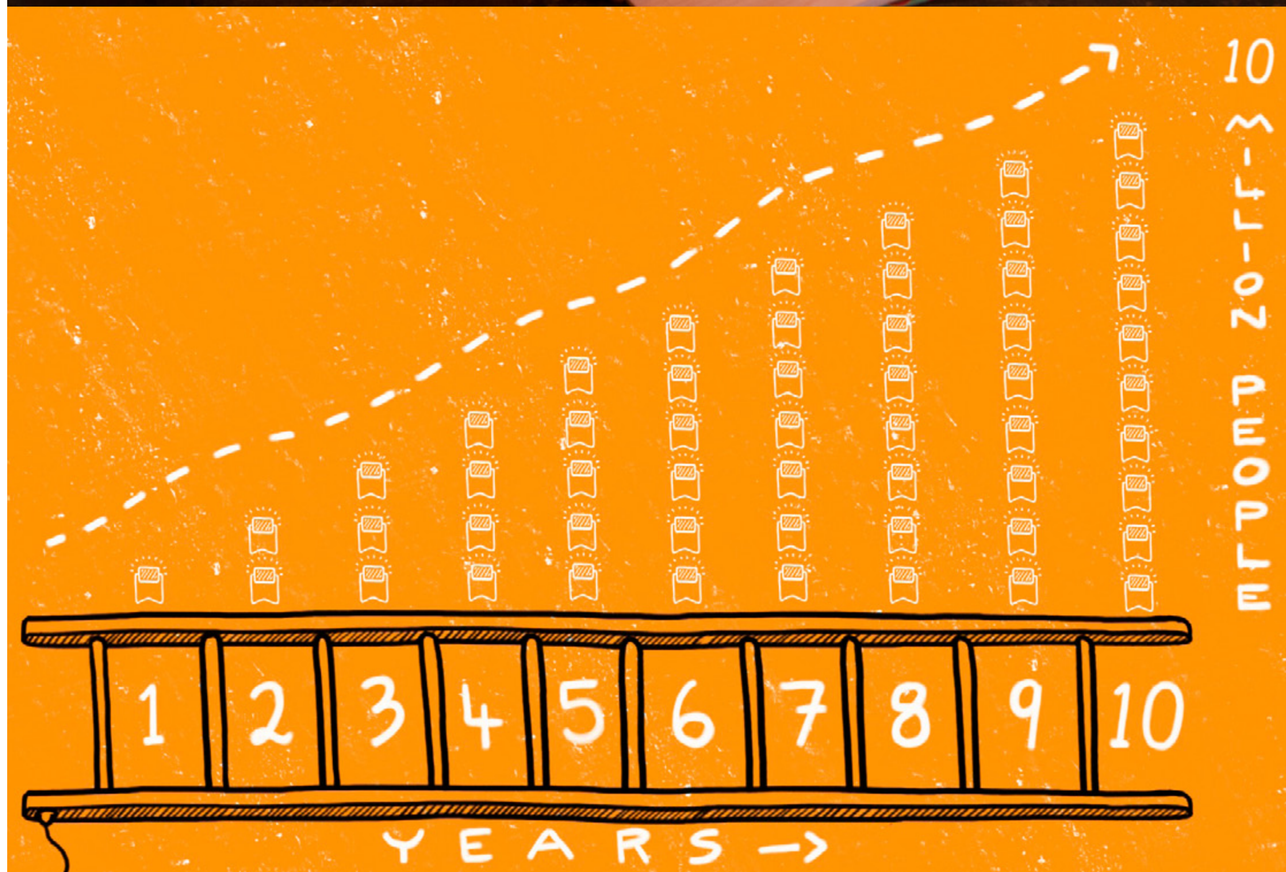
## Take off!

By late 2015 solar was the most desired energy source in the region, with 41% of rural respondents to the SNV survey viewing it as the most affordable and easy to use energy source, a far higher percentage than grid based electricity (17%).

Our greatest success to date came when the spread of solar lights reached a tipping point in Tanzania.

Between 2010 and mid 2015 SunnyMoney sold 905,000 solar lights in Tanzania alone, helping the market move into the mainstream, alongside other sellers of solar lights. SunnyMoney's sales of solar lights accounted for 52% of all solar light sales in Tanzania in the first half of 2014, 36% in the second half of 2014 and 44% in the first half of 2015.

From data provided to us by the International Finance Corporation we believe the transition from 'early adopters' to 'mainstream' in Tanzania took place in 2014. In several regions throughout this huge country the market took off apace and we are proud to have contributed to this catalysation. SunnyMoney was the market leader at that time and is widely credited for creating this burgeoning solar market.

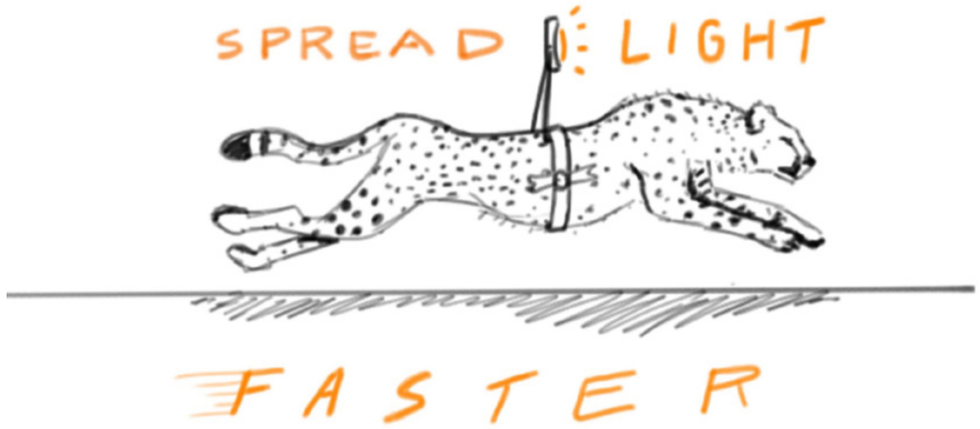


# The rise of the solar entrepreneurs

By November 2015 SunnyMoney scaled back operations and pulled out of Tanzania, having largely completed our mission of catalysing the market to a point where other social enterprises and small businesses could take over. By May 2016 we pulled out of Kenya where the micro solar market was also flourishing.

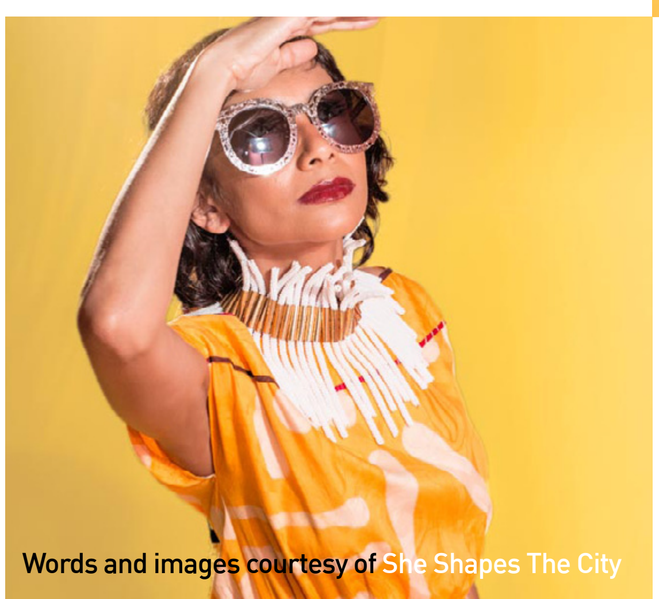
The following section highlights some of the amazing solar entrepreneurs and companies that have sprung up in Kenya and Tanzania, and demonstrates the change in the market that has taken place since we first entered these markets.

Back when we started very few people really knew what solar power was but now both micro and macro solar projects contribute to a growing solar industry. There are so many great examples of local entrepreneurs working in the solar industries of Kenya and Tanzania we could not hope to cover them all in this report, so the following is simply a selection of some of the most inspiring people and companies we have heard of and which inspire us to continue our work in other markets.




Teddy Nalubega, a solar scholar, is on a mission to train female solar technicians right across Kenya. She runs a multitude of renewable energy programs and has helped set up WISE (Women In Sustainable Energy and Entrepreneurship) to support women in the sector.

Judith Ahenda is a successful "solar preneur", heading a solar business which spans three shops, five villages and employs a growing number of employees. Judith was selected to take part in an entrepreneurial cook stove project and soon diversified to selling solar lanterns. About a week after her solar training she sold her first lantern, three months later she had paid off her initial loan and her business took off.

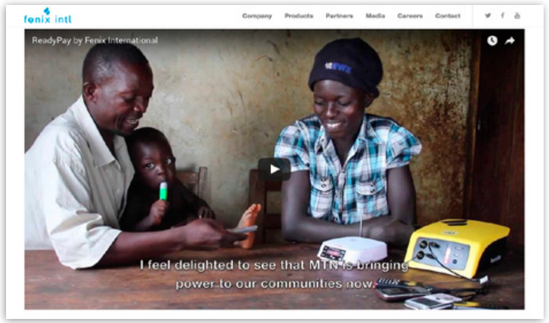


Words and images courtesy of She Shapes The City

Khilna Dodhia develops power plants which serve renewable energy to Kenya's national grid. The CEO of Kenergy Renewables, her flagship project is a solar power grid in Laikipia, approximately 2 to 3 hours North West of Nairobi. When completed the project will cover around 300 acres. The energy produced will serve the equivalent of 200 thousand rural households per year.

# ‘Pay-as-you-go’ solar

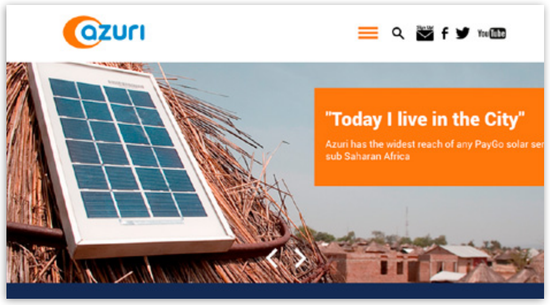
Fenix International, is a San Francisco-based startup that offers a system called ReadyPay to East Africans. It’s both a kit and a banking plan combined. To access the energy, users make a small payment (as little as $0.39 per day) via mobile phone to unlock the battery and use the electricity generated by the solar panel.

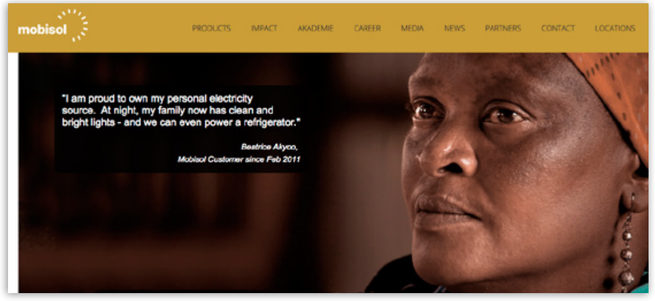




The social enterprise d.light provides distributed solar energy solutions for households and small businesses. Since 2008 d.light has sold more than twelve million solar light and power products in 62 countries.

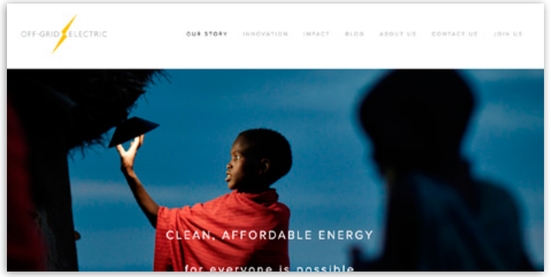
Azuri Technologies uses mobile technology to turn a development challenge into a business challenge through its Azuri solar home systems, which allow users to pay for solar power on a pay-as-you-go basis, in 12 African countries including Kenya.



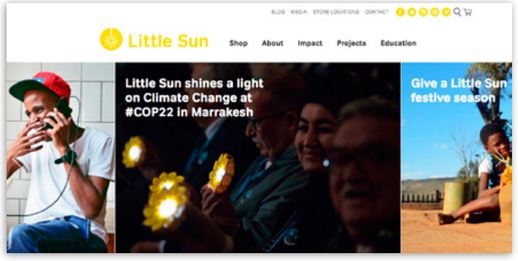

Mobisol combines solar energy with an affordable payment plan via mobile phone, customer service and innovative remote monitoring technology. The Berlin-based company offers customers quality solar home systems.

Off Grid Electric, based in Tanzania, provides pre-paid solar energy at affordable prices to people living off the grid. To date, they have installed over 100,000 of its units in Tanzania and Rwanda. They claim their partnership with the President of Tanzania will help them reach one million homes and create 15,000 jobs locally. The Tanzanian national government has also announced its One Million Solar Homes initiative.




## Other companies have sprung up developing and distributing their own solar lights and other ways for people to access clean renewable energy:

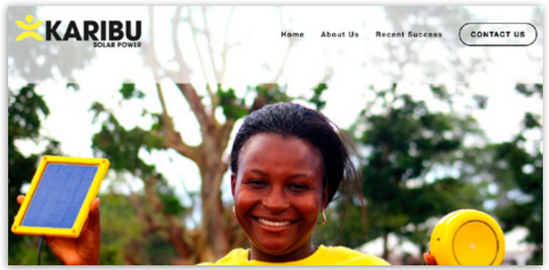
Greenlight Planet was founded in 2007 and manufactures the superb SunKing range of solar products. SolarAid are a proud customer of Greenlight Planet and have distributed hundreds of thousands of Sunkings throughout Africa.

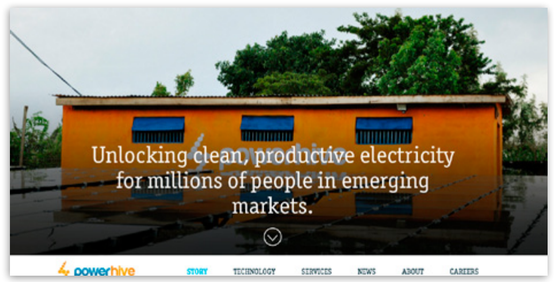

Little Sun was launched in July 2012 at London’s Tate Modern and has distributed over 500,000 Little Sun lamps worldwide. They distribute in 10 African countries, including in Zimbabwe, Ethiopia, Kenya, Senegal, and Ghana.

ARED’s Mobile Solar Kiosks charge up to a dozen phones whilst also offering mobile money transfer services, mobile phone sales and call credit recharge. They have kiosks in Rwanda and Burundi.

Karibu Solar Power designs, manufactures and distributes a solar pay-as-you-go "business in a box" kit in Tanzania. It sells this kit to entre-preneurs who then earn income from selling recharges to other people. Karibu Solar aim to bring solar lighting and affordable mobile phone charging to 1 million Africans within the next five years.

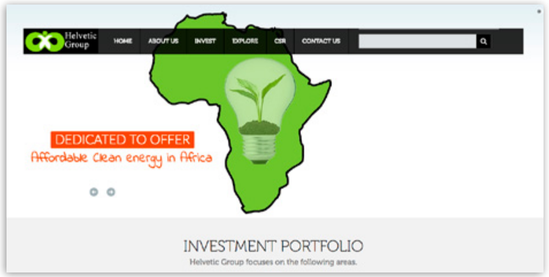



In 2015, Powerhive became the first private company in Kenya's history to receive a utility concession to generate, distribute, and sell electricity to the Kenyan public. After successfully testing its solar micro-grids in four remote villages, Powerhive plans to roll out electricity to over 200,000 homes in Kenya.



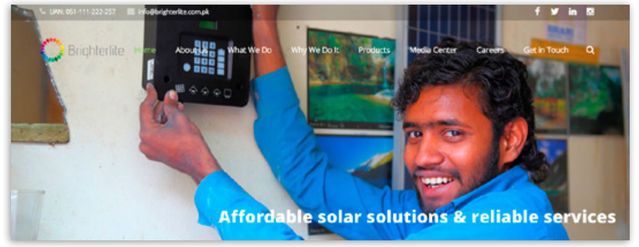


Watly is a completely new innovation, created by an Italian-Spanish start-up of the same name, which resembles a futuristic space capsule. Its mission is to provide electricity, clean water, and Internet services that could transform lives and economies across Africa.




Helvetic Solar Contractors (HSC) has installed more than 6,000 small rooftop solar systems in Tanzania and four other East African countries – Kenya, Uganda, Rwanda and Burundi.

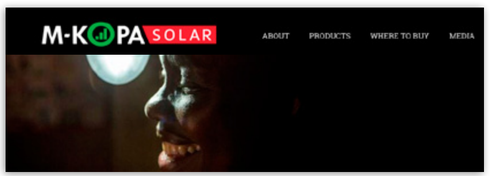
Brighterlite are bringing clean and renewable energy to rural homes in Kenya, Pakistan and Myanmar.




**Solar lights are just the starting point, the 'bottom rung' of the energy ladder. SolarAid has always believed that, if enough people have access to solar lights, a market for larger systems will evolve. The number of companies now offering solar home systems in Africa, where there were none in 2006, proves this is becoming a reality:**

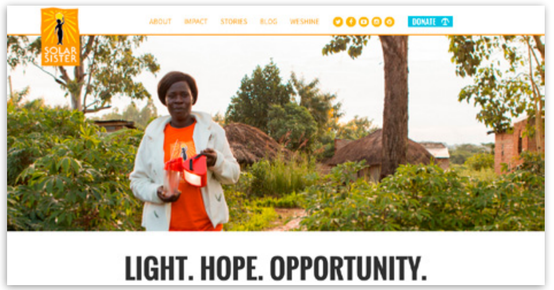

Barefoot Power is focussed on Kenya and Tanzania, providing affordable lighting and phone charging products specifically for low income populations that do not have access to electricity.

SolarNow offers a range of high-quality solar home systems and electrical appliances that are designed to fit the needs of rural house-holds and small entrepreneurs in Uganda.


M KOPA has connected more than 330,000 homes in Kenya,Tanzania and Uganda to solar power with over 500 new homes being added every day.

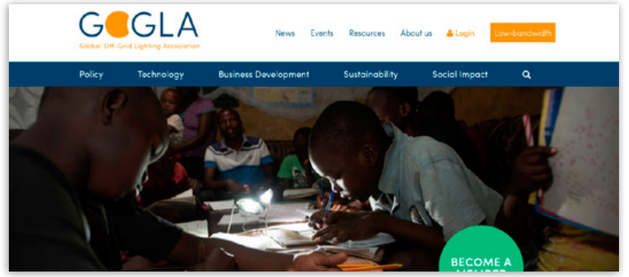
Solar Sister is another charity working to eradicate energy poverty by empowering women. They have created a deliberately woman-centered direct sales network to bring solar the most remote communi-ties in Uganda, Tanzania and Kenya.

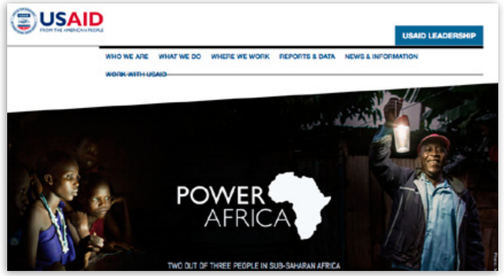


# The world wakes up to solar

When SolarAid set out on its mission, in 2006, we felt quite alone. There weren't really any other organisations with similar missions or objectives and SolarAid quickly became a leader in the field of off grid lighting. Over the last ten years, thankfully, the situation has changed and there are now numerous global programmes with specific focuses on lighting up Africa and helping the 600 million people who lack access to electricity.
The following section covers some of the main programmes which focus on delivering sustainable energy to Africa.

In 2012 the Global Off-Grid Lighting Association was created to accelerate access to energy. Based on the triple bottom line, their goal is to help scale the off-grid lighting sector and develop the market.

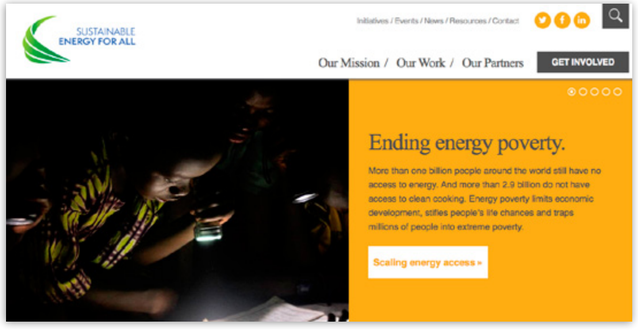


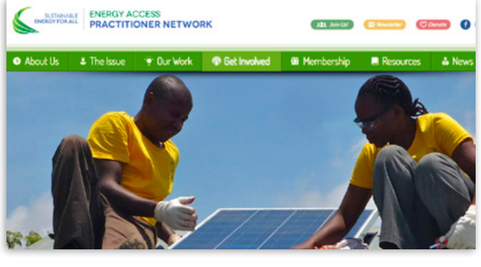




In June 2013, President Obama launched Power Africa to bring together technical and legal experts, the private sector, and governments from around the world to work in partnership to increase the number of people with access to power.

Also in 2013 The International Finance Corporation and the World Bank teamed up with GOGLA to create Lighting Global, a platform to support the sustainable growth of the international off-grid lighting market as a means of increasing energy access to people not connected to grid electricity.


In September 2011, UN Secretary-General Ban Ki-moon shared his vision for making sustainable energy for all a reality by 2030. He launched Sustainable Energy for All as a global initiative that would mobilize action from all sectors of society in support of three interlinked objectives: providing universal access to modern energy services; doubling the global rate of improvement in energy efficiency; and doubling the share of renewable energy in the global energy mix.




Later in 2011 The Energy Access Practitioner Network was established to catalyse the delivery of modern energy services, particularly decentralised electrification for rural communities. The Network now unites over 2300 members in over 170 countries.

As the small scale solar industry expands disreputable companies selling poor quality lights present a major problem by undermining people's confidence in solar power. Lighting Global tests and approves solar lights for quality assurance and holds a register of products that have met the Lighting Global Quality Standards following rigorous testing.

> "Ending poverty and ensuring sustainability are the defining challenges of our time. Energy is central to both of them"
> Jim Yong Kim, President of the World Bank Group


In February 2015 the Tanzanian government launched its One Million Solar Homes initiative to provide solar power to one million homes and health centres by 2017.

In June 2015 the Power, People, Planet: Seizing Africa's Energy and Climate Opportunities report, by Kofi Annan's Africa Progress Panel, called for a 10-fold increase in power generation to provide all Africans with access to electricity by 2030.



In September 2015 the Sustainable Development Goals, which replace the Millennium Development Goals, came into force of which Goal number 7 specifically aims to "Ensure access to affordable, reliable, sustainable, and modern energy for all" by 2030.

In May 2016 The World Bank Group launched a new initiative, 'Scaling Solar', to establish a "one-stop shop" for governments that want to attract private investors to build large-scale solar plants in sub-Saharan Africa and other regions, but lack the purchasing power of bigger emerging markets. Jim Yong Kim, President of the World Bank Group now sees energy as a key issue.


# Investment in micro solar

In our modern world, where business rules, money is often both a key indicator of change and, as the investment graph at the beginning of this report illustrates, the flow of solar capital does finally seem to be moving in favour of the developing world. Watching the investments of the old 'oil giants' is also illustrative and this year (2016) the French oil and gas company Total bought shares in both Off Grid Electric and Powerhive, two of the most interesting companies that are working to light up Africa. When these fossil fuel fed behemoths start to change their diet you can be fairly sure the tide has turned.

The vast majority of investment in the micro solar sector is profit driven but SolarAid sells lights to maximise social impact, not profit and as such we face a continual challenge. New organisations selling small scale solar obviously focus on the easiest, and most lucrative (e.g. pay-as-you-go) sectors of the market which often leaves 'last mile' users at the 'base of the pyramid' uncatered for. For this reason SolarAid continues to champion the most marginalised which exacerbates our need for funding.

# Leading the sector - Research

Between 2012 and 2015 SolarAid's Research and Impact team undertook over 30,000 research interactions - surveys, observations and interviews - developing the world's most comprehensive data on the impact of rural energy access and gaining international recognition.

By engaging solar light users, head teachers, solar agents, the public and traders across rural Africa, this data has helped establish a picture of solar light impact on income, education, health and the environment - crucial for informing poverty reduction strategies and government policy.

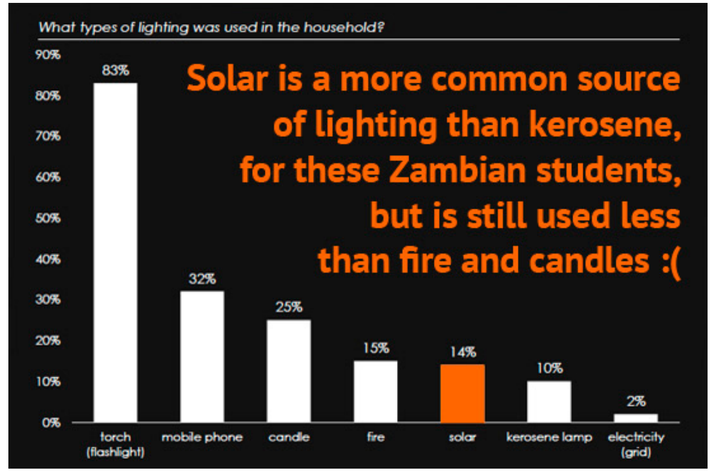
As well as providing the foundations of sector knowledge, our research has been communicated to leading institutions around the world and provides critical insights for organisations such as the World Bank, UK Department for International Development (DFID) and Global Off-Grid Lighting Association (GOGLA).

Working with partners including Stanford University, Google, Berkeley and the United Nations Capital Development Fund SolarAid's research on the impact of solar lighting in Africa has developed new insight into the effects of off-grid solar development. These insights have contributed to our learning, shaped our strategies and direction, and enabled SolarAid and the sector more broadly to engage with policy-makers, communicate with governments, and to showcase the role that solar and energy access can have on the poor with credible evidence.

# Energy access and education

In November 2016 SolarAid published a baseline study on the impact of solar lighting on education. The report was developed in partnership with Stanford University and Acumen and focuses on Zambia, featuring results from questionnaires with over 1800 students.

The research aims to measure academic performance, school attendance and how primary school students progress to secondary school, as well as uncovering changes in study patterns, use of 'free' time, and the interplay between energy access, poverty, gender, and education.




The next stage of the research is to revisit schools and conduct follow up research to identify any changes. The final results will be published in April 2017, but you can read the 'baseline summary' report.

## Some studies and collaborations:

SolarAid are managing a three year, large-scale randomised control trial into the impact of pico-solar lights on poverty alleviation. ETH Zurich are delivering the study in Kenya. Results and publication June 2016. **Funded by Google**.

SolarAid are managing a health study delivered by the University of California, Berkeley in Kenya. The study uses trackers to understand rates of exposure to pollution from kerosene lamps, to enable a larger study linking exposure to health outcomes. Results and publication June 2016. **Funded by Google.**

SolarAid are managing a study looking at the impact on education of pico-solar lights; specifically performance, attendance and dropout rates. A research team at Stanford University are delivering the study in Zambia. **Funded by Stanford and DFID.**

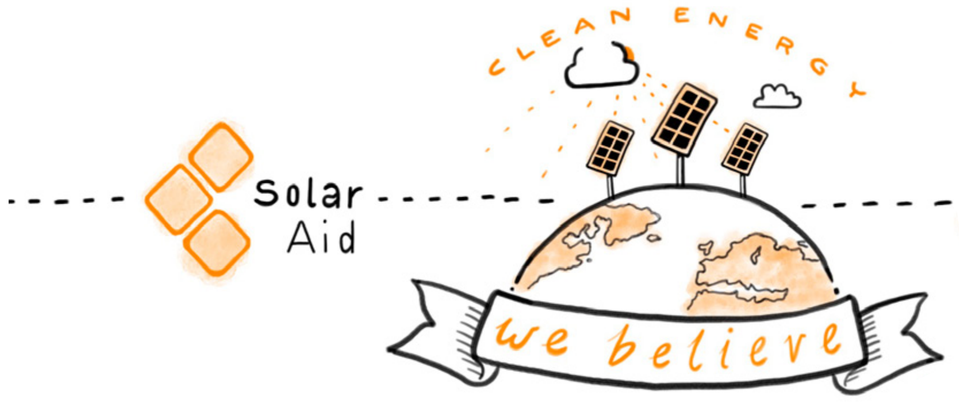
The University of Edinburgh and SolarAid are managing a three year collaborative PhD project to look at the waste, recycling and repair of solar lights in Kenya. Results in summer 2017. **Funded by Economic and Social Research Council (ESRC) and SolarAid.**

# Conclusion

SolarAid has had some amazing success over the last ten years. Our work in Tanzania and Kenya has contributed to the direct development of burgeoning solar markets in both these countries. Things have developed to the point that local social enterprises and small businesses have driven our own operations out of business, so we know we are succeeding. SolarAid doesn't aim to have an ongoing presence in Africa, we simply want to catalyse solar markets to the point that we are not needed anymore.

There are still many countries, and hundreds of millions of people, that need our help before we can say we achieved our vision of "a world where everyone has affordable, clean, renewable power". The Africa Progress Power Report predicts that "Between 2015 and 2040, the population of Sub-Saharan Africa is expected to increase by 81% (755 million). Electricity generation will have to almost double by 2040 to maintain per capita provision" so there is still a huge challenge ahead but, hopefully, if we can get more solar lights to 'last-mile' users at the 'base of the pyramid', we will catalyse more markets and, one day, SolarAid might not be needed anymore.

The last 10 years have been a roller coaster for SolarAid. Like all charities, we have had our ups and downs, successes and failures and have learned some valuable lessons. None of this, however, would have been even vaguely possible if it was not for our generous supporters. You know who you are and we thank you all from the bottom of our hearts.





# Introducing the world's most affordable solar light

Recognising that the up-front cost was the main barrier to switching to solar we have developed a brand new solar light. Our aim was to produce a tough, durable, and reliable product to sell for just $5 - making it the world's most affordable solar light.

In September 2016 we piloted the first batch of this new light, called "The SunnyMoney" or SM100. The first 10,000 lights your donations helped us produce generated huge interest because suddenly the price of a small solar light had halved. Solar light sellers were telling us immediately that many more families are able to buy their first solar light.

The new solar light was developed by Yingli Green Energy Europe, with the support of inventid, a UK industrial design agency. The SM100 provides more than 5 hours of constant bright light and can be used as a traditional desk light, a head lamp or hung on the wall. The SM100 will retail for £10 in the UK, providing SolarAid with the funds to distribute two more SM100 lights in Africa for every one that is bought in the UK.

Visit www.solar-aid.org/shop to buy your own SM100


www.Solar-Aid.org
info@solar-aid.org
+44(0) 20 7278 0400

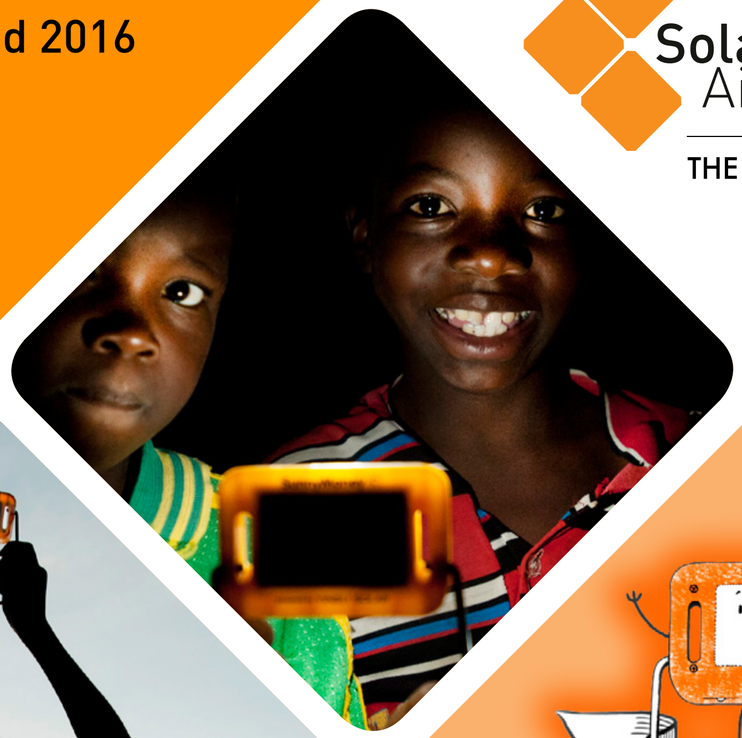


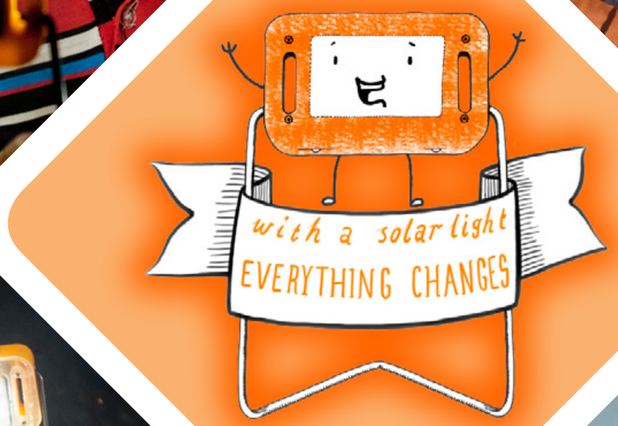
sunny money™

SolarAid 10

THE POWER OF TEN





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