No Grid? No Problem!

32 Practical Tips for Sustainable Off-Grid Business

Edited by Harald Schützeichel
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Preface

Sun-Connect News publishes since 2012 practice-relevant articles from renowned international authors of the off-grid business. With more than 6,500 recipients of its regular newsletter, Sun-Connect News is one of the largest information media of this young industry.

32 articles were selected for the present anthology, covering the entire spectrum of the off-grid business. The contributions do not provide a comprehensive handbook, but give suggestions, hints and tips. Some essays are also challenging, stimulate in-depth discussion or opposition. And that's how it should be because the off-grid industry is still young and cutting its own path. To this end, also the controversial discussion of different points of view is important.

Dr. Harald Schützeichel
The Market
No grid? No problem! The second Wireless-Revolution

The dream of most people who live off-the-grid is to be one day on-the-grid. The expectations from full power access are large: enough electricity for lighting, communications, entertainment, and livelihood. The connection to the grid represents the hope of a better life because full power access means that households, companies and communities have sufficient, affordable and reliable supply of all energy services and products which are needed to reduce poverty related to the lack of energy.

Sometimes governments take advantage of this high symbolic value of power grid and install, shortly before elections, at least the power poles. So they suggest: the electricity will also come to you - if you vote correctly.

Bad news

When the current flows, the reality is, however, often sobering: the connection to the grid is expensive and therefore has to be heavily subsidized in order for a household to be able to pay for the connection at all. For example, the connection to the electricity network in Kenya costs around $830. Far too expensive for many households. The price is therefore artificially subsidized by Kenyan Power to $400. Still more than what a solar home system costs – and in addition there will be monthly follow-up costs.

Once you are connected, the household budget is often merely sufficient to operate two or three lamps. But that ultimately does not matter, because the feeling to be connected to the potential for more is what really matters for people. Too bad that the power supply is very unreliable, often fails and therefore people often sit in the dark despite the grid connection.
Besides, we won’t be able to spare most people in developing countries the bitter truth that the hope for a network connection will never become a reality for them. Simply because the costs of connecting many remote regions are too high.

**Good news**

The good news for people in off-grid regions is that a technical alternative is available: full power access through solar-based off-grid solutions.

The disadvantage of this technically optimal alternative: it has the image of being only a kind of "first aid" since off-grid solar power is today predominantly marketed with small mini-systems, which consist either of mobile lamps or micro systems with 2-3 LED. This is of course better than nothing - and no household will resist taking this first help. But it is not enough to cope with the promise of the power grid that you can now (theoretically) have full power access, which allows an access to prosperity, development and a better life.

The bad thing: solar-based off-grid solutions could thoroughly provide this full power access! For the power requirements for lighting, refrigeration, entertainment, communication, economic and communal life no expensive power grid is needed. And in contrast to grid, this full power access would even be affordable without subsidies and also reliable.

Stand-alone solutions for developing countries have the image of being only a "first aid" not only for off-grid customers: also governments, investors, power companies, banks (in particular the World Bank and IFC) see the stand-alone technique more as a temporary solution. The large capital flows go to network-based technologies. At most, the micro-grid is still accepted as "little brother". And on the other hand, the fact that the few investment funds, used for stand-alone technologies, go only to micro systems (especially mobile hand lamps) and not to full power access, contributes to the stabilization of the negative image of being a "substitute".

**Full power access without the grid**

Maybe a change in this attitude that the grid or micro-grid provides the only solution for a modern power supply will come ultimately again from the technically developed countries: because in Europe solutions are increasingly being implemented to make households and businesses independent from the public power grid. Many people see in stand-alone systems, the future for a reliable and affordable energy supply in industrialized countries. The grid, with its large central power plants, is outdated technology of the 20th century. Independent, decentralized power supply units are the future.

The players in the off-grid industry in developing countries should rediscover and im-
plement with more self-confidence the wish of their customer to get full power access. For, stand-alone solar technology offers to these people, far more than the old grid power technology, the chance of affordable and sustainable full power access. That would be - after the first wireless revolution with the spread of mobile phones - the second wireless revolution!

What a signal it would be if the wireless revolution in the power supply would come from the developing countries and not from the industrialized nations!

Harald Schützeichel
Off-grid electrification: USD 136 billion market potential

The collection of reliable market data for the off-grid market is difficult, sometimes even impossible. Therefore and most frequently, the number published by the World Bank is repeated over and over, according to which 1.2 billion people live without access to energy. However, with this number the importance of the off-grid market is far from being gathered. Additional data can be found occasionally in studies and publications, though dispersed and not processed.

With the "off-grid Business Indicator" (OBIN), the Stiftung Solarenergie - Solar Energy Foundation has for the first time brought together information from different data sources and prepared them focused on their relevance for the off-grid market. Stiftung Solarenergie - Solar Energy Foundation has analyzed overall 66 countries for the off-grid Business Indicator (OBIN) regarding their potential for off-grid business. Detailed information for each country is given in the three editions, published in March 2014: OBIN Africa, OBIN South(East)Asia, OBIN America.

Off-grid Business Indicator World

The "off-grid Business Indicator World" summarizes the results of the three single editions to one global perspective. The main findings are:

1. 1.2 billion people in the surveyed 66 countries do not have access to reliable power supply, with 49% living respectively in Africa and Asia and 2% in America.
2. The surveyed countries in Asia (70.7%) and America (75.9%) are considerably higher electrified than those in Africa (21.8%).
3. Due to the larger population, the absolute number of people without access to pow-
er supply in African countries is however almost the same as in Asia (Africa 598.7 mill.; Asia 593.0 mill.).

4. The worldwide market potential alone for the replacement of kerosene lamps by simple solar lanterns is **USD 18.8 billion**.

5. The total market potential for the basic supply of off-grid households with light is **USD 136 billion**.

6. The potential of the off-grid market in Africa and Asia is almost equal (Africa USD 68.6 billion; Asia USD 64.85 billion), although Africa attracts a significant greater attention in the public perception.

7. The world’s top five off-grid markets are India, Bangladesh, Nigeria, Ethiopia and Indonesia, followed by DR Congo, Pakistan, Tanzania, Kenya and Uganda.

8. The Business Environment in 40% of African countries and 31% of Asian countries is below average or even unacceptable.

9. The most problematic factor for business in Africa is the "access to finance", closely followed by "corruption". The ratio in Asia and America is different: "corruption" is here the most problematic factor for business while "access to finance" is ranked on third position.

**Off-grid Business Indicator Africa**

- **Market potential:**
  - 68.6 billions USD for basic power supply
  - 9.2 billions USD for replacement of the more than 300 mill. kerosene lamps

- **Population off-grid and On-Grid under-serviced:**
  - 674.3 mill. = 78.2 %

- **The five biggest markets:**
  1. Nigeria
  2. Ethiopia
  3. DR Congo
  4. Tanzania
  5. Kenya

- **Best business environment:**
  - Botswana and South Africa

- **The most problematic factors for business:**
  1. Access to financing
  2. Corruption
  3. Inadequate supply of infrastructure
Off-grid Business Indicator South(East) Asia

- **Population off-grid:**
  593.0 mill. = 29.3 %

- **Market potential:**
  64.85 billions USD for basic power supply
  9.264 billions USD for replacement of the more than 300 mill. kerosene lamps

- **The five biggest markets:**
  1. India
  2. Bangladesh
  3. Indonesia
  4. Pakistan
  5. Myanmar

- **The most problematic factors for business:**
  1. Corruption
  2. Inefficient government bureaucracy
  3. Access to finance

Off-grid Business Indicator America

- **Population off-grid:**
  19.7 mill. = 19.7 %

- **Market potential:**
  2520 mill. USD for basic power supply
  363 mill. USD for replacement of the more than 300 mill. kerosene lamps

- **The five biggest markets:**
  1. Haiti
  2. Peru
  3. Guatemala
  4. Honduras
  5. Bolivia

- **The most problematic factors for business:**
  1. Corruption
  2. Inefficient government bureaucracy
  3. Access to finance

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*Harald Schützeichel*
Electricity without the grid

Around the world, approximately 1.4 billion people, or one in five, lack any access to electricity. Millions more are limited to only intermittent access. This is commonly referred to as "energy poverty." Energy poverty remains a primary barrier to improving economic growth and well-being in the world’s poorest communities. It disproportionately affects people living in rural areas, as many energy-deficient communities are located in areas that are too remote or impoverished to attract investment for centralized grid access. Now, new off-grid clean energy technology is revolutionizing electricity access in developing countries around the world.

Negative effects of energy poverty

The lack of energy access negatively affects many areas of daily life. Energy poverty has left more than 1 billion people in developing countries without access to adequate health care because the lack of electricity means health care facilities have to treat patients in the dark and cannot store medical supplies in refrigerated, sterile environments. Without the ability to store vaccines, blood, and some medicines at a constant temperature, these potentially life-saving treatments may go to waste. In India, 46 percent of the country’s health care facilities, which serve around 580 million people, operate without electricity.

In addition to the detrimental health effects, energy poverty also hinders the educational opportunities for children in many parts of the world. Electricity improves classroom lighting, can help schools stay open after dark, and provides adequate heating and cooling that can enhance students’ concentration. Half of the primary school students in developing countries attend schools without electricity. This number is even higher in sub-
Saharan Africa and South Asia, where 65 percent and 52 percent of primary schools lack access to electricity, respectively. In India, less than half of primary schools have access to electricity.

Of the approximately 120 million children attending school in India, 70 percent rely on oil or kerosene to illuminate their studies after sunset. Kerosene, the primary source of lighting in many households without electricity, has many drawbacks. It is highly flammable and can cause house fires and burns. In southern India, burns are the number two cause of childhood injuries or deaths, about half of which are caused by kerosene lamps. Kerosene also contributes to indoor air pollution, which causes asthma and other respiratory illnesses. Finally, in rural communities, kerosene is often an expensive and limited resource. Families who rely on kerosene must limit the amount of time after dark that children can study or family members can make products to sell in order to conserve fuel.

**Sustainable off-grid power supply**

Clean distributed generation is one of the best weapons to combat energy poverty. Distributed generation, such as solar panels and windmills, can provide access to electricity in communities that are disconnected from national power grids. These systems can range from a solar lantern that is able to charge a cell phone to multi-kilowatt systems on the rooftop of a house or community building. Larger microgrid systems - which can include a combination of solar panels, diesel generators, and backup batteries - can provide enough energy to power whole villages.

Although most electricity consumed globally is distributed through centralized electrical grids, this is often not an efficient option for rural communities. The vast majority of people - 84 percent - without access to energy live in rural communities, disconnected from population centers and national electric grids. The 2011 World Energy Outlook found that in 70 percent of rural areas, distributed generation was a more efficient option to achieve universal energy access than the expansion of centralized electric grids.

The United Nations launched the Sustainable Energy for All initiative in 2011, an effort to combat energy poverty through the deployment of clean energy. Although this program has leveraged new international commitments, the International Energy Agency, or IEA, projects that without additional action, 1 billion people still will not have access to electricity by 2030.

The IEA estimates that an annual cost of $30.6 billion will be required to eliminate energy poverty by 2030. In comparison, countries spent around $544 billion directly subsidizing fossil fuels in 2012 alone, much of which could have been redirected to more sustainable investments.
How to finance?

Of the required $30.6 billion annual investment, nearly $20 billion per year would be needed to fully finance microgrid and off-grid systems for rural electrification. This investment would come from a combination of public financing, international development loans and aid, and private-sector investment. Although this investment is substantial, the benefits it would yield are even more dramatic. For a total cost of $586 billion, the IEA estimates that universal rural electrification could be achieved with low-carbon, off-grid electricity by 2030, delivering 670 terawatt hours, or TWh, of new electricity generation.

As solar panels have fallen in price over the past decade, solar power has become an increasingly viable source of electricity. Although electricity from many of these systems is still more expensive than from central grids, it can be competitive when individuals lack access to that infrastructure. Solar energy is a competitive alternative to kerosene lamps and diesel generators, particularly where those resources are unsubsidized and when the health benefits are considered. This has allowed solar microgrids to become an increasingly competitive source of energy in places such as Uttar Pradesh, a rural, low-income province in India.

Since rural villages lack the capital to build new electric transmission to connect to central grids - and are too impoverished to attract government investment to fund that construction - the cost of distributed generation systems and microgrids is more appropriately compared with kerosene. In these communities, solar energy can provide a cheaper - not to mention cleaner and healthier - solution. Mera Gao Power, a microgrid firm that works in Uttar Pradesh, reports that its customers might pay 160 rupees per month to charge a cell phone at a central charging station and fuel kerosene lamps but only have to pay 100 rupees per month to access a solar microgrid for these tasks. These microgrids are also commercially competitive. They cost less than 60,000 rupees - about $1,000 - to install, and Mera Gao Power estimates that the project costs are recovered within three years.

The off-grid revolution

Distributed solar power, which does not rely on a centralized grid, has the potential to revolutionize efforts to combat energy poverty. The world has already seen how new technology not tied to traditional infrastructure can transform the developing world. In the past 15 years, cell phones, which do not require the costly infrastructure of landlines, have experienced dramatic penetration rates in developing countries, with 89.4 subscriptions per every 100 individuals, on average. In Africa, there are 63.5 mobile subscriptions per 100 people but only 1.4 landlines. This development has led to decreased isolation and improved access to medical care around the globe.
Solar power and other distributed generation can similarly improve the lives of rural communities throughout the world. By bringing clean energy to impoverished families while reducing the negative health effects of kerosene, increasing individuals’ productivity after dark, and opening up new opportunities for commerce, solar power represents a clear opportunity to combat energy poverty and enhance global development.

*Ben Bovarnick / Eliza Dach*
What is the strongest driving force for off-grid electrification?

While NGOs and social businesses are still trying to drive ahead the solar lighting of households in off-grid regions with the cheapest possible entry-level products, the same households easily buy a mobile phone from the local market. And that, despite they actually often can't afford a mobile phone according to the income statistics. How does it happen? Why does the spread of mobile phones explode while solar lighting in comparison spreads with much more difficulty?

Communication

As a general rule, five factors are crucial for the distribution of a product. The mobile phone covers all five areas ideally:

- **Product image:** the mobile phone represents a modern technology from the developed world, it is a status symbol, it means modernity.
- **Supply and demand:** people have an endless desire to interact, to stay in touch, to exchange information. The need is almost infinite.
- **Availability:** with the development of national mobile networks, first for the major urban centers and cities, the triumph of mobile phones also began in developing countries. And wherever there was network coverage, dealers directly emerged selling used or new phones.
- **Affordability:** the prices of mobile phones are affordable, costly is actually the use. Both in terms of telephone costs and because of the cost of battery charging. But people are very imaginative when it comes to cover these costs and raise the money.
• After sales service: the possibility to have a mobile phone repaired on site is very important. In fact, today there are many shops, also in remote areas, that are able to repair defective mobile phones. The procurement of spare parts is usually not a major obstacle.

Result: mobile phones clearly show: where there is a need and people can earn money, ways and people will be found to meet the demand. The advantage of the mobile phone over lighting could be that no NGO and no social business have marketed the product and thus the image was not demoted.

Lighting

In comparison, solar lighting comes off badly:

• Product image: a solar lamp is a product specifically and exclusively made for the world’s poor. No one in the developed world would seriously want to illuminate his house with such products. Therefore, the product lacks the flair of prosperity, modernity, the connection to the developed regions of the world.

• Supply and demand: the demand for solar lighting is undoubtedly present. Nevertheless, the desire for a SHS with fixed lamps is much greater than the demand for mobile flashlights. If it has to be solar energy, then it should at least look like the light in the houses of the developed regions of the world. But unfortunately, people usually get at the most solar flashlights.

• Availability: a wide choice of different models, as there is for mobile phones is still not in sight for solar light. Today, off-grid households as a rule can be happy, when a solar energy company or a NGO gets lost in their region and gives away or sells a single model. The customer preference still plays a minor role here.

• Affordability is almost exclusively achieved by reducing the application possibilities in daily life. In the opinion that poor people are also destitute, mostly small lamps are still offered. This supports the fatal image of solar energy as a technology for the poor - and it does not cover in any way the actual needs. Too few companies step up efforts to offer customer financing for larger solar power systems.

• After sales service: maintenance and service are often still an unsolved problem. Where can you replace a battery (provided that the lamp is not a disposable product, in which you can not replace the battery at all)? Who repairs if the lamp is defective? Or rather just throw away because it is so cheap?

Result: as long as solar lighting is marketed on the usual way as yet and with the image of a product for the poor, we have to live with the fact that it will further go forward relatively slow.
Entertainment

The biggest competitor of light is the entertainment in form of television. There are regions in Africa, where it is difficult to sell a solar light, if at the same time you do not offer a TV - or at least a tablet.

The advantages of solar TV:

- Product image: excellent. Even better than the mobile phone.
- Demand: at least as great as in communication. The entertainment industry is one of the world’s top-selling businesses.
- Availability: non-existent. NGOs and social businesses have no place for entertainment in their concept and normal companies offer only diesel generators for power supply. Relatively expensive and unreliable.
- Affordability: a financing option, as it is well known in the developed world for consumer products, makes the TV affordable for more and more households.
- After sales service: no problem for the TV, but for the solar system that must operate the device.

Result: of course the TV is not going to be so quickly a mass product like the mobile phone, but the experience in many countries already shows today: companies that have a TV in their product range and offer financing cannot save themselves from orders. And if not a television, then at least a tablet.

Prognosis

The prognosis is certainly not too far-fetched that the importance of solar light as a catalyst for rural electrification will probably pale in comparison to television and tablet. The consumer electronics has the right image, it is not primarily marketed under social-ecological points of view and, above all, it generates an immense demand. Happy are the solar companies that rely not only on solar light!

Harald Schützeichel
Independency from grid: the power revolution for developed and developing countries

When it comes to electric power generation and distribution, in developed countries we are used to this basic model. Large power plants produce electricity. From these sites, relying on a complex network of power lines, electricity is delivered to customers, be it industrial plants, offices or individual homes. The fuel used for generation can be coal, gas, nuclear or hydro. More recently we have developed wind, solar and biomass.

A new model

Well, in the not so distant future, this complex architecture founded on several large sources of generation from which transmission lines deliver electricity to the end users may become obsolete. A recent Wallstreet Journal story opens a window on a possible and completely different future, a future that can soon become reality, assuming that technologies keep improving and costs keep going down.

Simply stated, soon enough we shall be able to have our miniature power plant at home, no longer relying on electricity coming to us through a grid, care of the local utility company. We are clearly not there yet. But we may get there soon, probably sooner than we think.

Miniature solar power plants in your own home

In America we have plenty of power generation. Going forward, the new shale gas boom guarantees that there will be plenty of gas-fired power plants. Still, at the same time,
solar power generation, while still relying on subsidies and tax brakes, is becoming more efficient, its cost are going down. According to industry and many experts, we will soon get to a point in which it will be cheaper for individual users to install their own domestic solar power plant (based on solar panels that generate electricity) rather than pay a monthly bill to the utility.

A revolution

When we get to that tipping point, this will signal the beginning of a revolution that will have a number of large and important consequences. The first one will be the growth of the solar panels industry and of all the services associated with it. The second one will be that individual households as well as industrial plants, office complexes and commercial centers will be energy independent. The third one will be that most of the complex national and regional regulations that have been created to manage power generation and distribution will essentially become obsolete. The fourth one will be the death of the large power plants, along with the death of all the industries that support them: think of coal mining, storage and transportation, for instance.

More broadly, locally produced affordable power will improve basic economic conditions. Households will no longer have to pay electricity bills that include the cost of maintaining an expensive grid. Overall, affordable energy will be a boost for many energy intensive industries.

Biggest impact in developing countries

But, while this technological innovation will radically change the economies of developed countries, the biggest transformation will occur in emerging markets. Indeed, tens of thousands of rural communities in Africa, India and elsewhere that currently have no electricity will no longer have to wait for governments to invest in power generation and transmission so that electricity will come to them. They will be able to produce their own, on site, without any recurring fuel costs. This will be a real revolution. Sunlight is free.

No development without power

It is a painful reality that without power these villages are essentially cut off from any meaningful economic progress. If you think about it, there is no hope for real development without electricity. Not much is possible without it. At dark, almost everything has to stop. People cannot read at night. Besides, medical facilities cannot store medications. Shops
cannot refrigerate food. You cannot have workshops or small factories. Power tools cannot be used. And forget about basic amenities like street lights, cinemas, bars and restaurants.

But if, indeed, on the basis of the experience in more developed countries, local communities in emerging economies will be able to install affordable solar power generation on site, electricity would create an incredibly important short cut to development.

Right now the key obstacle for any plan to bring power to emerging countries, especially to isolated, off the grid communities within them, is the large capital cost of building power plants, plus the cost of fuel and the high cost of constructing transmission lines.

Well, if truly cost-effective solar power can be deployed at the village level, no need to focus on huge investments in large-scale power generation and distribution.

Hundreds of millions will step into modernity

Look, I am not even remotely suggesting that all this is happening right now. But it looks as if it is just beginning to happen. As technology keeps getting better and costs keep going down, it should become realistic to think of business models that will allow scaling up affordable renewable energy solutions for the hundreds of millions of Indians who have no power. Likewise, even city dwellers in Pakistan, Nigeria or Zambia who are used to frequent power cuts due to unreliable supplies will have a chance to break off from the grid and finally have their own uninterrupted power supply.

It is impossible to have basic development without the support of reliable and affordable electricity. Until now not much has been done to create adequate electricity generation in many poor countries because of the very high cost of this effort. If new solar technologies will radically change the model, while bringing down cost for individual users, then a huge barrier to development will also come down.

And life will change for hundreds of millions around the planet.

*Paolo von Schirach*
The "we know what the poor need" attitude

Meet Doña Maria. She is a mother, housewife, agricultural worker and shop-keeper, who lives with her two daughters in a rural community, located approximately 30 kilometres from Nicaragua’s capital city, Managua. Until recently, she was one of 1.4 billion people on this planet without access to electricity.

That was until Doña Maria participated in a programme that provided her family with a solar home system (SHS). The SHS means that Doña Maria has electric lighting - she no longer suffers the polluting kerosene lamp or strains her eyes with the low luminescence of a candle. Doña Maria can power a limited number of small devices - which means she does not have to travel to the nearest grid-connected town to recharge her mobile phone.

I highlight Maria’s story to discuss the realities of using such a system, while also considering what this tells us about the international energy community’s responsiveness to the needs of the global energy-poor.

The energy community’s responsiveness to the needs

SHSs and other solar lighting technologies provide modest amounts of electricity to several million people like Doña Maria across the developing world; small scale solar energy systems have emerged as keystone technologies in international efforts to address energy poverty. So too in Nicaragua, the SHS has become the technology of choice for off-grid areas, stimulated by the World Bank’s Renewable Energy for Rural Zones initiative.

It is hardly surprising that SHSs have penetrated rural energy mixes globally. They promise a great deal. SHSs are climate-friendly, deliver cost effective electricity (compared to expensive grid extensions), and are ostensibly suited to the electricity needs of ‘typical’
rural households - which render them highly attractive to donors striving towards ‘sustainable energy for all’.

But how much of a voice do these households have in the global roll-out of such technological interventions? Previous experience with initiatives such as the improved cookstove suggests that a lot remains to be done in terms of engaging with how people actually define their energy needs, wants and priorities.

Meeting energy needs requires more than technology

For the international community, an important task is to define minimum electricity needs, so that progress made towards energisation targets can be monitored. Definitions of basic access thresholds vary from organisation to organisation; take for example the IEA, which estimates 250 kWh per rural household, per year. This translates into 2 compact fluorescent lamps, a floor fan, and a radio for 5 hours per day - or as Roger Pielke Jr. calculates - approximately 2.2% of the energy used by the average American.

This raises some concerns. Firstly, regarding energy equity - or the startling gap between per capita energy consumption in the developed and developing world. Secondly, that minimum access thresholds imply homogeneity amongst off-grid householders, when in reality, energy needs will vary according to factors such as gender, culture or climate. The simplification of energy needs into kilowatt hours implies that a technological fix is required - this is where technologies such as the SHS step in. Research into the realities of life in off-grid regions has shown that meeting energy needs requires much more than just technology.

Despite living within close proximity to electricity distribution poles, the grid will unlikely ever reach Doña Maria’s community. Approached by an NGO offering long-term micro-credit to purchase a SHS, she undertook an interest-free loan for the system, agreeing to pay US $11 per month for the next six years.

Doña Maria feels at ease with her SHS. With electric lighting she can easily spot dangerous spiders and snakes, she can read the Bible, and help her daughters with homework - this, all during the hours of darkness. Previously she would have simply gone to bed at nightfall. One problem Doña Maria has with the system however, is its limited capacity. Her 50Wp SHS is not powerful enough to operate her rusting refrigerator, and so she fills it with ice - purchased from a nearby grid-connected town - to store and cool bottled drinks, which are sold to local workers.

"Of course, I’d like to switch to a system that powers a refrigerator" she tells me, "so that I don’t have to buy ice every other day". Don’t get me wrong - Doña Maria is happy with her SHS. However, she tells me that what she needs is to be able to generate an income. Being able to power a refrigerator requires "at least 10 panels" however, which would prove to be prohibitively expensive for Doña Maria’s family. Echoing other studies,
the SHS in Doña Maria’s house - while contributing quality of life benefits - has not helped to improve her income levels.

**Guilty of the ‘we know what the poor need’ attitude**

This is one of the many stories I heard while interviewing users of SHS in Nicaragua that illustrated to me the not-so-straightforward nature of ‘needs’ in the context of electricity access. As the scholar Arturo Escobar notes, "most often, the interpretation of people’s needs is taken as unproblematic, although it can easily be shown otherwise".

The international community working towards ‘energy for all’ is at times guilty of the ‘we know what the poor need’ attitude - which has implications for the types of energies (and quantities of energy) that are championed to tackle the injustice of global energy poverty. Experience suggests that technologies are often not adapted to specific local contexts and the needs and skills of users.

One case from Bangladesh brings into sharp relief the harmful implications of interventions that are technologically-led or make assumptions about users. While it was assumed that SHS would lighten workloads and translate into educational benefits, an unintended consequence of introducing night-time solar lighting was to extend women’s working days - applying a further burden to their ‘already-tired’ bodies.

For me, these stories raise important questions, pertinent to this project on research responsiveness and public needs. For instance, how might we begin to unpack the meaning of ‘needs’? Who has the power to define ‘needs’? What do we mean by ‘public’ (i.e. international vs. national publics, or the importance of gender)? Finally - and very specifically - what types of research might help the international community to respond to the enormous challenge of providing ‘energy for all’?

_Danielle Gent_
Why solar lanterns cannot fulfill the aspirations of the world’s energy poor

I’m a pretty big fan of cash transfers. I’ve become convinced that cash is an efficient immediate way to help the poor and very often a better alternative than other standard development interventions like training or building schools. Cash transfers may even be catalytic, giving poor people a floor to invest in business, their children’s health and education, and some breathing space to pursue higher value activities.

Yet I would never argue that cash transfers are a replacement for economic growth or industrialization or a steady income. Countries want to transform their economies and people will always aspire to be wealthier than what cash transfers can ever reasonably provide. It’s great that cash may enable poor people to eat more protein or afford a better roof, but ultimately their ambitions are surely higher than to rise just above the bare minimum. More importantly, while a bit of regular cash may be helpful in giving people a leg up to escape poverty; it can never replace the dignity or value of a job. Simply put, cash transfers are a useful innovation, but they aren’t a modern economy that can on their own fulfill the aspirations of the world’s poor.

Solar lamps are useful, but not sufficient

That’s how I think of solar lamps too. Solar lamps are probably an efficient immediate way to help the energy poor and very often a better alternative than other standard interventions like fuel subsidies or waiting for a power plant to be built. Solar lamps may even be catalytic, allowing energy poor students to study at night and helping entrepreneurs figure out new business models to deliver greater energy services.

Yet I would never argue that solar lamps are a replacement for real access to modern
energy. Countries want to transform their economies and people will always aspire to use more energy than what a solar lamp can currently reasonably provide. It’s great to be able to turn on a light or charge your mobile phone, but people also want to have a refrigerator, a stove, maybe even one day an air conditioner. And modern economies need high volumes of reliable affordable energy. More importantly, while a bit of low cost light may be helpful in giving people a leg up to escape energy poverty, it can never replace the utility or value of a modern energy system. Simply put, solar lamps are a useful innovation, but they aren’t a modern energy system that can on their own fulfill the aspirations of the world’s energy poor.

_Todd Moss_
How consumer values drive purchases.
Seven key lessons learned from market

Suppliers of solar lighting solutions need to create demand for their products among individuals and communities in the developing world in order to achieve the desire goal of displacing kerosene lighting and alleviating poverty. Despite many new products and extensive outreach activities, progress towards widespread adoption has been slow. Why? Most of the effort directed at this issue seems to be focused on addressing the issue as a problem to be solved rather than engaging people to achieve customer satisfaction from purchasing a product. In my opinion, individuals at the bottom of the pyramid (BoP), even those living in poverty, deserve the dignity of being treated as consumers, rather than as beneficiaries of problem mitigation.

From, my experience in India, I have seen that marketing strategies which seek to aggressively consumerize BoP customers have been extremely successful, particularly in ways which are not only related to the lowest cost available. Therefore, any entrepreneur looking to make an impact with solar lighting can find great lessons from consumer-centric product sales already reaching their target markets.

Within the social enterprise space, "consumerism" may often be viewed as a negative behavioral driver. However, it remains a powerful motivator, as all human beings seek to obtain some form of comfort, connectedness, information, and entertainment. The best model for how consumerism may be harnessed to achieve transformative impact is the explosive growth worldwide in the use of mobile phones. Hundreds of millions of users among BoP in India are proof that consumers will spend money on products they want without subsidies or giveaways. Suppliers of solar solutions may realize greater success if they respect the following rules about consumers:
1. Consumers pay for direct and apparent value

Indian villagers, just like American middle class consumers, often have a tough time understanding the value of conceptual appeals on issues such as preventative health benefits and projected future financial savings through avoided costs. The value of such matters if kerosene is replaced by solar is only tangibly realized over time, so demand for that value lags the provision of the benefit. In contrast, products with immediately direct and apparent appeal, including phones and televisions, are in huge demand among low-income consumers. Even items such as soft drinks, with no health benefits and no functional value, appeal to consumer demand for comfort in a direct way that BoP consumer’s value. Solar solutions must show capability to power something of apparent and immediate value to consumers. However, lighting alone, regardless of technical or aesthetic design, is not sufficient because...

2. …consumers will pay now only for what they do not wish to put off to a later time

Consider this true scenario that I witnessed: The daughter of a worker at a factory in India (urban poor) dropped his mobile phone into a bucket of water. His first reaction was to dismantle the phone as best as possible in hopes of drying everything out. When the phone no longer worked anyway, he scraped together enough money to buy a replacement phone the next day. Would the same happen with a solar lantern if it was broken, or would the customer return to a conventional light source for an extended or indefinite period of time until it was convenient to secure a replacement solar lantern? Although kerosene lighting is dirty, dangerous, and poor in quality, it is always available to stand in for the customer in place of a solar lighting option. Product developers absolutely must incorporate features which cannot be immediately substituted by kerosene.

3. Consumers make purchases in response to "selling" rather than "educating"

While non-profits may engage in education, enterprises must focus on selling. Who "educated" anyone on the value of mobile phones, which are often used by illiterate consumers? The best solar lanterns aren't nearly as complicated as the most basic menus on a mobile phone. If the value proposition of the product is apparent, consumer nature will drive people to buy. Otherwise, if the consumer is not willing to learn how to adopt a product, they will not be fully convinced to make a purchase. The consumer will find a way to become educated after deciding to make a purchase based on the immediately apparent value.
4. Consumers WANT to spend money

The barrier to sales is not the price. BoP consumers can and do spend money. In India, many low-income consumers do not have access to banking services and often participate in communal savings pools called ‘chit funds’ in order to enforce minimal savings behaviors. However, each member of the pool has the option to draw from the collective funds in turn for primarily discretionary spending of a sizable amount. Considering that many solar lighting options are available in India at or below the price of a standard feature phone, enterprises must recognize that individuals and families are silently indicating that they do not recognize a comparable value proposition for lighting solutions despite their ability to afford the purchase.

5. Consumers want lifestyle products

Most solar lighting solutions, particularly portable retail varieties, take the form of a lantern or a task-light. While this emphasizes functionality and utility, most use cases for BoP consumers take place in the home. Just like any other consumer, low-income Indians in rural or urban communities value aesthetics as well as utility and prefer items which look like they belong in a home rather than items which look like tools or some type of equipment. Products which have incorporated basic plastic shades on hanging light fixtures have generated strongly positive responses in very-low-income communities relative to high quality lighting in the form of lanterns.

6. Consumers do not want to compromise on quality

If they plan to spend money, a consumer desires some certainty that it will not be wasted. BoP consumers deserve to be sold real quality and they make their preferences known based on their experiences. In India, products labeled as being made in China are often suspected, perhaps unfairly, of being cheap in quality. A low income cook working in a city, having come from a village, had received a free smartphone from an acquaintance of mine but was disappointed that it was a generic Chinese model and was suspicious of its quality. Why shouldn’t BoP consumers demand recognizable quality? The mobile phones they purchase have many sensitive electronic components and last for many months if not a few years under conditions of aggressive handling. Shouldn’t a solar lighting solution last as long or longer?
7. Consumers want transformational products which are marketed directly to them

BoP consumers do not need to be reminded of the pyramid itself. No marketing efforts should be spent on referencing their status as being poor. Aspirational messages about net positive outcomes always have more appeal than messages about rectifying negative conditions such as economic and energy poverty.

Relatively privileged consumers in the developed world would not respond to marketing pitches that convey an implicit message such as "You are 1000x poorer than an oil sheikh, so you should buy basketball shoes from Nike." In the same way, social enterprises should avoid trying to convince consumers to buy products based on the implicit message, "You are 1000x poorer than a Nike customer, so you should buy this solar lantern." Solutions should not be offered as "products for the poor" but rather as aspirational products offered at an appropriately affordable price for the consumer.

To build lifetime customers among target markets, suppliers should define their transformational products as accessible, yet fresh, dynamic, and different rather than emphasizing existing conditions and orthodox modes of living. ‘Rags to riches’ sells in India because of the visualization of the riches rather than presenting a mirror to the rags.

Looking ahead...

India, along with many other developing nations, has a primarily young and growing population that is hungry to carve out comfortable lives in an increasingly crowded world. Engaging individuals and communities as consumers is not only best for solar solution providers to drive product sales, but also imperative when considering that if developing world populations double by 2050, we cannot allow kerosene usage to double as well.

Vincent Kapur
Don't confuse what people supposedly need with what they actually want!

A plea for more customer focus

There is a direct line from missionaries over colonial masters to development aid volunteers and the "social business idea". All have in common that they want to help other people by imposing them their own vision of a better life:

- the missionary sees himself as a savior in the religious field
- the colonial master acts as a representative of a superior culture
- the development aid volunteer wants to realize his vision of poverty alleviation, recently in association with "social businesses" and "social impact investors"

In the field of off-grid electrification, the latter leads to that a legion of designers are constantly developing new portable solar lights, but the people at the base of the economic pyramid often want very different things: for example, a television or a fan. The problem: what low-income people want and are willing to buy, is not always what is being offered and delivered. This is mainly due to the fact that the so-called "social businesses" still act too much with a NGO attitude: low-income people are seen as beneficiaries, not as a customer. This attitude is of course necessary because only this way the so-called "social impact investors" can be persuaded to invest their money.

The nowadays worldwide propagated idea of "social business" and the "impact investments" will though change nothing essential to the living conditions of low-income people, as long as it is the developed countries and social investors themselves who define what is meant by social impact and how it is measured. That way, you will at best soon become a missionary of your own ideas to improve the world.
Mobile phones are booming - precisely because they are not a social business!

Is it not strange that in the end always such products or ideas that meet the needs of the people prevail? Mobile phones are spreading rapidly in developing countries - perhaps precisely because they are not sold as "social business"? And to the consternation of many "social impact businesses", today low-income people sometimes abdicate a bed rather than a TV. Mobile solar lights remain dead stock if they do not have mobile phone charging function - although the developed world actually consider the elimination of kerosene lamps to be the most important.

Customers not beneficiaries

If we want to change something in the living conditions of the people at the base of the economic pyramid, then we must finally take them seriously as a customer and not as beneficiaries of our ideas to alleviate poverty. Many are doing this already with great success: besides the manufacturers of mobile phone devices, there are also the major oil companies. Their revenue from the sale of kerosene to the so-called "poorest of the poor" ranges a high double-digit billion - with tendency to rise.

Therefore, today we do not need "social businesses" but “for-profit enterprises with social orientation inside”.

Harald Schützeichel
Poor people are not impecunious!

Why statistics about kerosene prices have no relevance for sale of solar energy

The widespread and recognized method of establishing whether and to what extent people in rural areas are able to purchase solar products is the comparison with the existing costs for kerosene. This method satisfies Western project planners, controllers and investors, but it has one great disadvantage: It is unsuitable. At this point we can ignore whether the established figures are actually correct. Much more important is the fact that this method does not take into consideration the most decisive element for the development and evaluation of a market: The presence of a need and the motivation to buy which results from this need.

Comparison with mobile phone market

A comparison with another product might help to make this clearer. If we look at the statistics to find out how much money the people in rural areas spend on traditional methods of transmitting news (post or word of mouth), you would hardly say they have enough capital for purchasing and using a mobile phone. Conversely, this should mean that there is no market for mobile phones.

The fact is, however, that today in even the remotest corners of Africa a mobile phone will be bought as soon as the signal is strong enough. On the other hand, the statistics "prove" that the people there cannot possibly afford to buy one!

The objection that this comparison is not valid because the alternatives (the post or word of mouth) are no alternatives to the mobile phone is not correct. The alternative to solar light - the kerosene lamp - is also no real alternative because instead of offering an
effective light it produces just smoke and illnesses. From the point of view of need and the resulting motivation to purchase, solar technology has the same power of persuasion as the mobile phone in comparison to the post.

This means that statistics concerning expenditure on kerosene and batteries in rural areas may provide us with some interesting data, but they are irrelevant when determining whether there is a market for solar products or not. The answer to this question is to be found elsewhere.

**Why people buy a solar product? It changes the whole life!**

In developed countries a need for many products has to be suggested by advertising. In the case of solar technology it is the complete opposite: There is no need for advertising because the need - and the purchasing power - are already there.

But where does the money, the purchasing power to buy solar products, come from? The possibilities are as varied as the people themselves: It may come from simply saving, from efforts to find additional sources of income or the numerous possibilities of redeploying one's own personal financial budget.

A prerequisite is, however, that the required solar product is available for purchase. Here are two examples from practical experience.

**Example 1**

When farmers have brought in the harvest and sold it on the market, they have a large sum of money in their pockets. As there are no products which one could acquire locally, the money is frequently used in the following way: The money needed for daily life until the next harvest is put to one side. The men go into the next biggest town and squander the rest or buy what they consider to be useful and happens to be available. The possibility we created to purchase solar products with the harvest money fundamentally changed the consumer behavior of these farmers. Instead of using the money for pleasure, it was invested in solar light, solar televisions, solar refrigerators and other solar-powered products. Smaller products were paid for in cash and larger objects acquired by taking advantage of financing facilities. According to the statistics, however, this should not have been possible...

**Example 2**

A tailor living in one rural village had a great wish. He wanted to be able to replace his dilapidated hut with a more stable one made of mud one day. The solar light enabled him not only to work longer, but, above all, more efficiently because in the evening it was less
hot and he could concentrate better. On account of his higher income he lives today in a new sturdy mud hut. His next wish is to buy a small solar refrigerator to keep his food fresh in.

**Beyond all statistics: Poor people are not impecunious**

It is important to recognize that the people in rural areas are not only in a position to pay for solar products, but are also willing to. The reason is a motivation which is typical for markets worldwide: The feeling that it is necessary to own a product because it would change one's life for the better.

The advantages of solar light compared with the kerosene lamp are as great as those of the mobile phone in comparison with word of mouth communication. Accordingly, as soon as solar light becomes available, the need for the product sparks the effort to own it.

The time has come for in "developed world" to readjust our images of the rural regions and the people who live there so that they correspond with reality.

*Harald Schützeichel*
Business Strategies
The five big "A" of the off-grid electrification

Awareness

Many people misconceive the possibilities and limits of a sustainable energy supply with solar energy. Customers in off-grid regions can be most easily convinced by a good example: A solar home system, installed in an off-grid household, persuades users usually within a short time - and also arouses the demand for other devices, of which the TV is usually the first.

But awareness must also be raised in developed countries because for many investors and donors developing countries consist of people who have no financial means. But "arm" does not mean "destitute", and the rapid spread of mobile phones is an impressive example: where there is a need, products will also be purchased, if someone delivers them.

Availability

But even when you know, as inhabitant of an off-grid region, what is possible with solar energy, a new problem comes quickly: where are the products available? Most solar companies have their office in the capital and expect the customers to come to them. It would be however necessary to build a distribution network, as it already exists for many other products, from soft drinks to beer to mobile phones and clothes. Nevertheless, this requires two things from local businesses: long-term corporate thinking and sufficient financial resources. Both together can be found only rarely, and actually only a handful of companies really try to build a truly professional distribution network in rural areas. Examples include Orb and OnEnergy in India or SunTransfer and Mobisol in East Africa.
Affordability

The acquisition costs of solar products are often too high for the customers to pay in cash. This is in Africa and Asia not different than in Europe or the United States with solar systems. While in the latter continents, however, usually a bank makes a loan available, people in developing countries are generally cut off from this financial option. Most manufacturers solve the problem by creating new ones: either they reduce the product quality as required for the product to be affordable (but for this reason it only works a short time) or the products are reduced to mobile micro-devices (and the goal of an effective energy supply is given up).

The only reasonable option, the sale on installments, requires of course a good management as well as the appropriate technology, which actively supports the payment by installments. Then, such a payment technology, in combination with a rural distribution network, makes also quality products affordable. It is a welcome development of recent years, that now more and more companies offer such possibilities of hire purchase (usually incorrectly referred to as “pay-as-you-go”).

After sales

For a professional after sales service, customer relationships do not end with the conclusion of a transaction, but are maintained for a product’s entire duration of use. Unfortunately, solar companies, especially in developing countries, grant after sales service much too little importance. This is fatal, as substantial deficits in after sales service are currently one of the reasons for solar products’ negative image among large portions of the population in rural regions. Poor after sales management is, notably, not compensated for by other positive factors, such as first-class quality. Service realized after sales is decisive in a product’s success or failure and in customer satisfaction.

All-Round

Many solar products only concentrate on the obvious primary need for solar energy: replacing kerosene lamps. The advantages are apparent: fast tangible results which are easy to measure and relatively cheap to achieve. The real potential of solar energy, i.e. to achieve sustainable economic and social development is, however, not being exploited by a long way. On the contrary: If there is no local after sales service, these entry level products can soon damage the reputation of solar technology. The biggest challenge for the future will be to meet the demand of the people at the bottom of the income pyramid with a truly professional all-round supply of energy and appliances (fan, TV, tablet, shaver, cook stoves, etc.). Only then a really substantial change of the living conditions can be expected.

Harald Schützeichel
The new phase in rural electrification: Holistic, hybrid, customer oriented

Who closely follows the current developments in the field of rural electrification observes very encouraging signs that this subject has evolved from the past focus on micro solar products. Thus, this indicates the beginning of a third phase:

1st Phase: simple aid projects

Until about 2008, rural electrification generally consisted of few aid projects, carried out mostly by NGOs, sometimes also by the World Bank or GIZ. As successful as they were in a particular case, so little were they able to initiate a sustainable development. On the other hand, such a development was not even intended. It was often already enough to conclude the project in order to skip to the next one. The results are today many solar systems in Africa and Asia that were installed with much enthusiasm, but for which maintenance and service no one is responsible. These "solar cadavers" are found today in all developing countries as an example of a well-intentioned but misguided development aid.

2nd Phase: Product focus on solar lanterns

From around 2008, it follows a phase in which rural electrification is considered unilaterally from the product side:

- Investors are found to invest in the production of small solar lanterns.
- Solar projects now focus unilaterally on the replacement of kerosene lamps.
• Initiatives such as "Lighting Africa" supported this focus on small products and contributed to the spread of such small devices.

The incontestable advantage of this development phase is above all to see that rural electrification became the focus of international conferences and it became more and more clear that the subject "Rural Electrification" was not only a topic for NGOs, but also that here a huge economic market was growing.

Unfortunately, by all the euphoria, they forgot that the distribution of small solar lanterns has nothing to do with rural development or rural electrification, which provides full power access. Very soon it also became clear that not the development and production were the bottleneck road, but the financing of a rural network for maintenance and service.

3rd Phase: customer oriented, holistic, hybrid

*Customer oriented*

The first two phases of rural electrification must fail because they ignore the most important principle of all financial sustainable development: the focus on customer needs. As long as the interest of donors, investors, or the ideas of engineers are at the forefront, it’s not about the needs of the BoP people. For this, a focus on the real needs of people is required. And for that, surprisingly, the product itself is of secondary importance. Much more decisive are:

1. Permanent presence of qualified technicians in rural areas
2. Reliable and fast maintenance / after sales-service
3. Trustful and longterm customer relationship

*Holistic*

Today, the awareness, that the focus shouldn’t be on one sector only, like e.g. on products, but that a holistic approach is needed if you really want to induce a sustainable improvement of the living and incomes situation of rural population, is catching on among many organizations and companies.

The real challenge lies in uniting the many individual aspects and developing a holistic approach:
Business Strategies

It is not enough to one must also ...

<table>
<thead>
<tr>
<th>Action</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>sell solar lamps</td>
<td>set up a rural network to provide maintenance and service.</td>
</tr>
<tr>
<td>train solar technicians</td>
<td>make start-up capital available so the people can set up their own solar business.</td>
</tr>
<tr>
<td>offer solar products</td>
<td>enable the people to purchase them by means of financing possibilities.</td>
</tr>
<tr>
<td>replace kerosene lamps</td>
<td>consider how the entire demand for energy for households, businesses and communes can be met in a rational way.</td>
</tr>
<tr>
<td>install solar systems</td>
<td>advise the user how to use the technology sensibly and show them the additional possibilities which it opens up to them.</td>
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Like previously Grameen Shakti in Bangladesh or the Stiftung Solarenergie - Solar Energy Foundation in Ethiopia, nowadays more and more companies and organizations think about how a holistic approach can be carried out. For, it is much more difficult to implement and requires far more patience and commitment than the distribution of solar lanterns. This new phase of development has its own characteristics:

- Solar training centers emerge, which also want to offer support in business start-up after successful completion of the exam.
- Solar-home-systems are increasingly equipped with an intelligent technology that actively supports the micro-finance. The pioneers were here Afrisol in Morocco (since 2001) and the Stiftung Solarenergie - Solar Energy Foundation in Ethiopia (since 2004).
- New producers are emerging, that offer bigger solar-home-systems and sell them together with a clever financing with rapid success.
- In many countries, first attempts for a rural service network arise successfully: whether as franchise system, as informally bound network of small craft businesses or as independent power stations.
- The range of products is increasingly no longer limited to "lighting", but is geared to the entire energy demand.

**Hybrid**

Neither purely profit-oriented (even if they are socially-oriented), nor purely non-profit organizations financed by donations can guarantee complete sustainability. For-profit enterprises cannot ensure social sustainability and non-profit organizations cannot guarantee financial sustainability.

Both sources of human motivation - the desire to help on the one side and the wish to
make a profit on the other - must be linked. And this not only applies to development aid! Isolated from one another, both positions can become dangerous if they are pursued to the extreme. The extreme profit-oriented approaches as well as pure "do-goodism" have clearly shown this in the past. The hybrid approach prevents the dangerous one-sidedness behind both of these motives.

**Solar-Federation**

Since several years the "Solar-Federation" is implementing this holistic, hybrid, customer oriented approach. The network consists of:

- **Stiftung Solarenergie** (non-profit)
  - Awareness creation
  - Training
  - Pilot projects
  - Community projects

- **SunTransfer** (for-profit)
  - Sourcing
  - Local distribution
  - Installation and maintenance
  - Customer service

- **Sun-Connect cooperative** (for-profit)
  - Financing for working capital
  - End user financing

The entities have different duties inside the network:

More: www.solar-federation.org

**Conclusion**

The new phase (holistic, hybrid, customer oriented) is much more than before about sustainability and sustainable development in rural areas. The new phase of development is urgently needed because the old phase has visibly reached its limits. New players will appear and provide a new impulse to rural electrification. And maybe it will be possible with the new phase also to finally provide the people in rural areas with comprehensive access to energy, which comprehends all areas of life. And so start up a real social and economic development, worthy of the name.

*Harald Schützeichel*
Burn your business plan! Tips for a sustainable solar business

To build an enterprise is like an adventure travel: as soon as you start your trip forget all detailed plans - but don’t lose track of your goal and vision!

What makes an entrepreneur an entrepreneur? First and foremost, the fact that he has a business idea, which he pursues with commitment and perseverance. This idea (some say vision) is the prerequisite and basis. Everything else are tools: marketing strategies, distribution channels, technology and business plans.

The implementation of the business idea is a complex process that requires the entrepreneur’s creativity and flexibility. During the process, methods and tools change constantly. Sometimes so much that it sometimes appears, when viewed from the outside, as if a clear line is lacking. But this is definitely given as long as the entrepreneur doesn’t lose track of the target, his vision.

Of course, a thorough planning is part of every business establishment. And of course it may be helpful to make a business plan. But who sets off on the rocky road of a company creation, should above all not lose the track of the goal. And this also includes the sovereignty and flexibility of throwing overboard a few hours before valid plan. Starting a business is like a jungle crossing: at the beginning, you see in the distance the target you want to achieve. Obviously, you have to give thought to water ration, equipment, paths, food procurement. But in the moment, when you set forth and enter the jungle, you must be able to forget the plan. Then only one thing is certain: the reality of the jungle is completely different than the one planned and considered. Therefore, if you keep strictly to the plan, you will inevitably go under.

A good entrepreneur implements no business plan, but his business idea. Many successful companies have even been established completely without a formal business plan. The worth of a business plan is, if any, the thinking process that will be thereby set in motion. It has a positive value - also for yourself - if you manage to bring down your sorted
thoughts to paper. Therewith, your own vision will become more concrete, more tangible. But: a business plan is already outdated at the moment it comes out of the printer! If you don’t keep this in mind, what was well-meant will slightly go into reverse: questions of detail will excessively come to the fore so that at the end you won’t see anymore the wood for the trees.

Worst of all are the forecasts over many years requested by many banks and investors. The entrepreneur shall provide information on how sales, profits or financing will develop over several years. Such a request may sound more reasonable than it actually is. Günter Faltin, professor at the University of Berlin, describes in a comparison why this is so:

„Imagine you should forecast the 57th minute of a football match. Absolute nonsense, you say? So please consider the following. A football game takes place in a relatively simple and stable configuration: the playing field is clearly defined. On both sides eleven players. The rules are known beforehand and do not change during the course of the game either. In contrast, how does the configuration, that a start-up company faces, looks like? The playing field is not clearly defined. It is linked in a not clearly definable way to parallel playing fields. What about the number of players? Answer: it changes constantly. Actually, completely new teams come along during the game, new start-ups as well as established players with new products. Others give up during the game and take leave. Even the rules change. A big discount store enters the market, someone offers its product or service on the internet or the advance of technology changes suddenly the products and the market. One could therefore argue that it is much easier to predict the phases of a football game than the situations into which a start-up gets.” (Günter Faltin, Kopf schlägt Kapital, Munich, 2011).

What remains is the awareness: those who implement their business plan have little chance of setting up a sustainable business. For the entrepreneur, business plans are just a mental exercise. He burns them right away - at most keeps a copy which he presents to banks and investors because these need for their decision, the illusion of a precisely predictable business development.

Harald Schützeichel
Projectitis is curable!

Those organizations who are concerned with solar energy in developing countries, both state and non-state aid organizations, usually work on a project basis. Isolated projects are planned, money is announced and awarded, and projects realized, and ultimately celebrated as successes in press releases.

Most probably, the project team has even worked with great dedication and did a good job but what is the situation just one year after the conclusion of many solar projects? Do the systems still work? Does the project trigger social or economic development? Was it possible to initiate local solar businesses that work long-term for solar energy and are increasingly independent of subsidies?

Often, precisely the opposite is the case: it is not possible to establish a viable and sustainable infrastructure, for instance a robust business model. This has dire consequences: much money is burned. Committed people are left frustrated behind. And the wheel has to be reinvented all over again.

Of course, from a budgetary point of view, projects have a great advantage for financial backers: they are limited in terms of time and location, their content is manageable, they do not demand commitment to longer term engagement, and therefore do not place a permanent burden on budgets. Projects can be planned well and documented quickly in a way that creates effective public exposure.

However, by now it should be clear that this method does not allow for the development of permanent solutions to rural energy problems. The situation must be thought through anew! It is not possible that most money issued is project-related. We have to begin to think more on a long-term basis and in a business-like way: also as private and state aid organizations, non-profit and for-profit oriented.

Nevertheless, those who pursue this approach must learn to deal with two things. For
one, long-term development cannot be planned. Obstacles constantly arise that make short-term changes necessary. Flexibility is a key requirement, as is the ability to deal with things that cannot be planned. For another, one has to be prepared for a long and often difficult path that is far less effective in terms of public exposure than the realization of an isolated project. The fundamental difference of course is that projects have a clear definite end. Corporate and social development in contrast does not have, once triggered, a defined and previously schedulable end.

A successful example of a process and development thinking in the solar off-grid electrification was provided of all organizations by the World Bank. In Bangladesh, the World Bank has not implemented selective short-term projects, but it has very successfully over 10 years initiated an entrepreneurial and economic development in the long term. With resounding success: today, Bangladesh has a local solar industry and is the world's leading country in the off-grid electrification.

Thus Bangladesh provides impressive evidence: Projectitis is curable!

Harald Schützeichel
Good news: the hype of solar lanterns seems to come to an end!

Today, I received once again an e-mail, in which a "social entrepreneur" advertises his new solar lamp for the replacement of kerosene lamps. And not just any lamp but a "Breakthrough Solar Powered Lamp". The link leads to a video that shows the usual pictures: black people using a kerosene lamp in dim light; enthusiastic whites showing how good the new solar light is (which they themselves certainly do not use) and explaining how black people can improve their income with it; then radiant black people using the solar lamp. At the end, a white explaining how black people can live in future.

Apart from the fact that this video mercilessly reveals how the thinking of earlier centuries (missionaries, colonial officials) still lives on today in some "social entrepreneur", and apart from the fact that the solar lamp announced with much ado is neither new nor "breakthrough": Why do so many well-meaning people in Europe and the U.S. still believe to be able to overcome the energy poverty in developing countries with solar lamps? Why do people care so little about real electrification of off-grid regions?

Pretextual arguments for solar lanterns

The so-often-heard argument that people living off-grid would need first to become familiar with the modern solar technology, where to solar lamps would be an ideal entry-level product, is ultimately just an excuse. After all, the same people, that supposedly need to be introduced with difficulty to solar technology, learn without trouble dealing with the modern technology of a cell phone.

Also the argument that these people belong after all to the "poorest of the poor" and could only afford a flashlight, is demonstrably false: poor does not mean destitute! No theoretical statistics are needed here to serve as proof, but a glance at a country that for
years wittingly relies on electrification of households with solar home systems (SHS): Bangladesh. The country is undoubtedly one of the poorest in the world, but it is simultaneously the country where nearly 60,000 solar home systems are installed per month (!). And just by those people who supposedly cannot afford it because they are among the "poorest of the poor". In Bangladesh, people can definitely afford it because the purchase is made possible by an attractive financing offer.

The success of rural electrification in Bangladesh raises questions: why is this approach consistently being ignored by the international "off-grid community"? Why is it a success message when an organization in Africa replaces 1 million kerosene lamps by flashlights, while hardly anyone notices that in Bangladesh 2.5 million households have a real power supply from SHS? Why is the success of the solar industry in Bangladesh widely being ignored, which mainly manufactures the deployed components (batteries, panel, inverter, LED lamps) in the country itself instead of importing them from Chinese, European or U.S. manufacturers? Or is ironically this independence of the solar market of Bangladesh exactly the reason for the worldwide ignorance of this success?

And why is IFC planning in a strangely superfluous action, now in Bangladesh to promote the use of (mostly imported) mobile solar lamps as a means of rural electrification? This is undoubtedly a step backwards for the population and the solar industry of Bangladesh.

The capability of solar lamps and the customer voice

In order not to be misunderstood: of course, mobile solar lamps have their function - like any flashlight - as a complement to the house electrification or as a mobile lamp on the go. But mobile lamps cannot offer what is actually important for the 1.2 billion people without electricity: ensuring a reliable and clean power supply for the entire needs of a household and small business. For this purpose, solar home systems are required in different sizes - and Bangladesh shows us ways on how it can succeed.

Fortunately, however, the final customer decides (if he has the choice). And he demands now throughout Africa and Asia with increasing pressure a professional power supply; he rightly demands a supply that offers more than one or two light sources, he expects a supply that provides enough electricity for lighting, TV, fan and other products for his house.

The industry is responding slowly to customer needs

In fact, today the number of companies, that embraces the customers’ needs for a comprehensive power supply, is increasing:
• Producers like Niwa, Barefoot or Orb now offer solar home systems, which are able to cover the entire electricity needs of a household or small business.

• Distribution companies such as Onergy, SunTransfer or Bboxx are setting up in African and Asian countries local networks of service stations to offer to their customers a reliable maintenance and an attractive customer finance in addition to proper installation.

All these are, of course, only baby steps compared to what is already being implemented in Bangladesh alone by one of the local solar companies: Rahimafrooz Renewable Energy, for example, installs in cooperation with its Rural Services Foundation (for profit!) more than 10,000 solar home systems per month, and that with components "Made in Bangladesh"! In the approximately 500 rural service centers of this company, 3,000 employees offer installation, maintenance and installment loans to the customers. Every month anew, year after year - and hardly noticed by the "off-grid community" concerned with solar lamps.

The time of obsession with mobile lamps is coming to an end - and that's a good thing. And the time of ignoring Bangladesh should also come to an end. We should start to learn from the experience of this country.

*Harald Schützeichel*
Four lessons Pakistan's off-grid solar market can teach the world

When it comes to the off-grid solar market, the South Asian countries you normally hear about are India and Bangladesh. One is home to the largest potential market in the world; the other is home to the world's most successful and booming market to date.

But the elephant in the room, the potential off-grid solar leader you never hear about, is Pakistan. We've heard rumblings of off-grid solar companies eyeing this market for some time, so we sat down to talk with Jeremy Higgs of EcoEnergy to find out the latest on this pivotal country's off-grid solar prospects.

Before we delve into the market, it's important to understand the context in which these companies operate. That energy situation can be summed up in one word: crisis.

As Carl Pope pointed out, Pakistan really has two energy problems: 1) most of the rural population still has no access to the grid, and 2) the population that does have access to the grid is struggling with power cuts and supply shortages caused by climate disruption-induced drought. This ultimately affects the use of hydropower while the skyrocketing prices of oil further reduce affordability of the existing supply.

In fact, 36 percent of Pakistan's electricity comes from oil, an outdated and incredibly costly form of electricity production. This means that throughout Pakistan, nearly 40 percent of the population -- an estimated 65 million people -- lack access to electricity, which is an enormous potential market for off-grid solar services. The problem, of course, is that the Pakistani government's response to their energy crisis has been painfully familiar, with a focus on large scale supply and grid extension.

And while grid supply and grid shortages need to be addressed, what makes no sense is for Pakistan to start building new coal-burning power plants to supply their energy. Any new plants that are built will be designed to be powered with imported coal, which Pakistan can't afford. In fact, the government of Pakistan just released a new tariff schedule for
coal-burning electricity -- which is evidently the 'most expensive coal tariff in the world.' That's why some experts predict that a coal bubble is brewing.

It's in the midst of this energy crisis, and confused response by the Pakistani government, that EcoEnergy is seeking a different path. They're trying a progressive new approach -- putting solar power directly in the hands of the people. And the lessons they've learned have implications far beyond Pakistan's borders.

**Lesson 1: Giving away solar leads to market spoilage**

EcoEnergy is one of only a handful of off-grid energy companies in a market dominated by large non-governmental organizations (NGOs) and foundations. They started operations in response to the Sindh Province floods of 2010. Like many other organizations, EcoEnergy initially began as an NGO, giving away solar lanterns for free. And like many before them, they received a lot of negative feedback about the quality of their product and concerns over long-term sustainability. In response, EcoEnergy quickly pivoted into a hybrid social enterprise by aiming to use a market approach -- which is a reflection of the general transition this market has seen over the past decade.

The products that EcoEnergy sells now are not the same low-quality products that were given away for free. Today, EcoEnergy sells high-quality portable solar powered lights -- like those from d.light -- and they are continuing to experiment with different business models to find the best organizational structure.

**Lesson 2: Pay as you go finance is the future**

After trying free distribution, EcoEnergy started selling products through retailers, but they quickly realized that their products were too expensive and that they would need to restructure payments to match customer cash flow and expenditure on lighting products. This naturally led to the extension of consumer financing, which unlocked affordability for their target market. Customers now pay a monthly fee to EcoEnergy in order to pay off their lantern over time.

This essentially acts a "manual" version of popular pay-as-you-go solutions in which similar solar devices with circuitry enable customers to make discrete payments. In addition to their "manual" approach, EcoEnergy is also starting to experiment with similar payment-enabled devices through support from the GSM Association MECS Fund.
Lesson 3: Word of mouth marketing is key

Then came the real game changer: instead of just focusing on retailers, EcoEnergy started using their own existing customers as brand ambassadors to spread the word about their product. As the graph below shows, this led to skyrocketing sales. The sharp drop after the peak is a result of several factors, including the fact that farming communities in Pakistan tend to have less disposable income at certain times of the year -- February, March, and April -- and the fact that EcoEnergy faced challenges with payment collection in one district. They have since recuperated by focusing on payment collection, not sales, in that particular district, which has lowered the overall sales rates.

Lesson 4: Market information is scarce

Despite these initial successes, challenges still exist. The customers EcoEnergy works with tend to have unpredictable, seasonal income and are not always able to reliably make payment deadlines. Field staff have to balance sales and payment collection, and they aren’t always able to effectively do so.

To continue addressing these challenges, EcoEnergy is gathering information about marketing, effective sales tactics, demographic information, and statistics on kerosene, torch, and solar use. Additionally, EcoEnergy is looking at a range of products, including Greenlight Planet lights with Angaza-designed technology and BBOX systems with their new "SMART" technology as well as working to partner with microfinance institutions for alternative means of financing.

In sum, EcoEnergy reflects a number of hard-learned lessons for this nascent market -- lessons that are no doubt being learned by companies and organizations the world over. But if EcoEnergy is able to build and grow a company in such a challenging setting, it says a lot about the robust future off-grid solar companies have in store.

Justin Guay
Sun-Connect eG: a new cooperative to finance off-grid energy

The distribution of solar energy in off-grid regions fails nowadays mostly due to the high acquisition costs. But through the payment in installments people are easily able to purchase a Solar Home System. With the money that is already today being spent for energy needs (candles, kerosene, batteries), the loan can be paid back. Depending on the household’s size and income a rural family in Kenya for example spends between 5 and 20 US-Dollars per month for kerosene, batteries and candles. This money is now used to pay back the Solar Home System. The Stiftung Solarenergie - Solar Energy Foundation has proven this exemplary with its ‘Revolving Fund’ in rural Ethiopia, in one of the poorest regions worldwide. Once the Solar Home System is paid off, a family produces self-sufficiently the energy it requires and does not have to spend money on its daily energy demand anymore.

But very often, local solar entrepreneurs in developing countries have challenges to even import Solar Home Systems. Because they do not receive sufficient loans from banks and investors with acceptable conditions. Also so-called "Social Impact Funds" in Europe and in the U.S.A. are rarely willing to give these solar entrepreneurs a loan with acceptable conditions.

This double funding gap considerably handicaps it to overcome energy related poverty in developing countries.

Sun-Connect eG is closing this double gap: Sun-Connect eG delivers high quality Solar Home Systems to chosen partner organizations in developing countries. Sun-Connect eG grant their partners a supplier credit and enables them thereby to offer rural households the payment of the Solar Home Systems through an installment credit.
Initiated by Stiftung Solarenergie - Solar Energy Foundation

Sun-Connect eG was initiated by the Stiftung Solarenergie - Solar Energy Foundation - which has been active in rural electrification in Africa and Asia since ten years now.

Especially the ‘Revolving Fund’ developed by the Stiftung Solarenergie is an important base for the activities of Sun-Connect eG: The financing model, implemented for the first time in 2008, allows households to buy a Solar Home System through an installment purchase model. The idea is simple: With the money that is already being spent today for monthly energy needs, the cost of the Solar Home System can be paid back in installments. Over a period of several years the money flows back into the Revolving Fund and is then available again to finance the next Solar Home Systems.

Maintenance and service are free in the first years. Afterwards, there is the option for a customer to close a maintenance contract for a fee with the local service center. In this way our projects serve at the same time as a sustainable development measure for the local business.

The Stiftung Solarenergie has received several international awards for its outstanding work: The Ashden Award, the One World Award and twice the Energy Globe Award - just to mention a few. Sun-Connect eG and the Stiftung Solarenergie collaborate closely. The cooperative continues in the economic field, what the foundation has initiated since 2004 with donations and still supports through training and pilot projects.

Working with local partner companies

In order to foster local economies, Sun-Connect eG collaborates closely with local partner organizations. These are mainly small and medium solar enterprises which show a sustainable commitment in their activities. Important elements are:

- Set up of a network of rural service centers for installation, maintenance, service and end user finance.
- Customer oriented approach: Beside customer consulting, sales and installation, maintenance and service have to be reliably guaranteed.
- Only use of skilled staff in close cooperation with Stiftung Solarenergie - Solar Energy Foundation.

Sun-Connect eG continuously monitors if partner organizations can fulfill this standard: Are the partner organizations committed to social responsibility? Do they offer their customers services they need? Can Sun-Connect eG support them in this process more effectively?

Sun-Connect eG offers more than just funding of products: Together with the Stiftung Solarenergie partner organizations are advised, coached and trained. In addition, the part-
ner organizations exchange experiences among themselves globally and share know-how. A strong competence network is the result.

Three stories about the impact

Kenya

Roseline Melubo (35) is a teacher at the Nukutani Primary School in Loitokitok (Kenya). The town is directly located at the border to Tanzania, at the foot of Mt. Kilimanjaro. Her husband is a trucker for a Korean company in Mombasa and only comes home at weekends.

Roseline is a resolute woman who knows what she wants. If she took something up, she does everything to achieve it. This was also the case with the Solar Home System, which she especially desired for her three children. They also attend the primary school in Nukutani, but the candles and kerosene lamps used so far have not provided sufficient light for reading and studying in the evenings.

Hence, she ordered from SunTransfer Kenya, the Kenyan partner organization of Sun-Connect eG, a Solar Home System with four LED-Lights, which she financed with a one-year installment credit. By now, she has paid off the monthly rates without problems. They weren’t higher than the amount she had spent so far for kerosene and candles. With the new Solar Home System she can also charge her mobile phone, what facilitates the communication with her husband in Mombasa. Besides, the security at home has increased with the solar light: One of the four solar lights is fixed outside at the door. Wild animals and burglars are likewise discouraged.

Roseline is proud of her solar light - now she wants a solar TV. With the support of Sun-Connect eG she will be able to get it.

Ethiopia

Shimeles Taddese (34) has passed the further training to become a solar entrepreneur after completing his training as electrical technician, both conducted at the Ethiopian Stiftung Solarenergie - Solar Energy Foundation. For several years he led the Solar Center of the Stiftung Solarenergie in Awassa. His tasks included the installation of Solar Home Systems as well as maintenance, service and the management of installment credits.

In 2014 Shimeles became self-employed with four staff members and transformed the Solar Center - so far owned by the Stiftung Solarenergie - into an independent solar business. The tasks remain the same, but Shimeles is now himself responsible for the economic success. A very important step for the young father of a family.

Shimeles has no worry about the lack of customers. He experienced the demand for So-
lar Home Systems in the past years himself. His annual turnover is up to 200,000 Euro. His customers mainly order Solar Home Systems for light, mobile charging and TV. Shimeles' biggest concern is the financing of his stock and of the customer credits. The conditions of local banks are exorbitant for him. Hence, Shimeles focuses on the partnership with Sun-Connect eG.

**Philippines**

In Taytay on the Palawan Island (Philippines), Nene Armenton owns a small shop, called "sari-sari-store" in the Philippines. She sells canned goods, drinks, candies and other small items for the daily needs. Although her area is connected to the grid the power supply is unstable and is cut for several hours every day. Therefore she was used to close her shop already at sunset.

The solar light installed by the Philippine partner organization of Sun-Connect eG enables her now to open her shop also at night. The LED light brightly illuminates her shop during the night, when customers arrive in order to buy beverages and snacks. Her store is one of the few shops which are still open during power cuts.

She earns now on average an extra Php 400 pesos (USD 9.50) per night - an increase of about 50% in her daily revenue. This additional income is for the mother of five children a significant and much-appreciated help to ensure the survival of the family.

**How to join**

Economic activity, social responsibility and ecological sustainability do not have to be opposites. As an investing member supporting people participate at the financial success of our cooperative - and they enable social and sustainable development in the partner countries at the same time.

Investing members purchase a minimum of 10 business shares from the cooperative, which corresponds to an amount of 2,000 Euro. Beyond this minimum share, people may purchase as many additional shares as you wish. There shall be no additional funding obligation for the members.

Every member gets continuously informed about the activities of Sun-Connect eG. Once a year members can attend the general meeting of Sun-Connect eG. The general meeting also decides on the distribution of profit. Sun-Connect eG expects an annual dividend for members of approx. 3%.

More information: www.sun-connect.org

*Harald Schützeichel*
M-SOLAR: Software to manage end user credits

Evidence and experience show it is very difficult to scale access to quality solar products in sub-sahara Africa if the bottom-of-the-pyramid (BOP) lacks access to affordable and flexible financing that matches their limited and highly seasonal income streams. In Kenya, for example, an overwhelming 5 million households or 80% of the rural households in Kenya lack access to grid electricity. As a result, each rural household spends roughly US$0.60 per day on highly polluting kerosene and dry cells for lighting, translating into over US$1 billion expenditure per year nationally on such fuels which are imported.

Off-grid solar solutions remain the most ideal and cost-effective energy solutions for such households, majority poor and located in remote and sparsely populated regions. However, penetration of off-grid solar in rural Kenya is barely 2% and key barriers remain, notably market spoilage from proliferation of poor-quality products, poor distribution and service network and lack of access to affordable end user finance.

Payment convinient "as sending a text message"

To make a difference, SunTransfer Kenya has developed and deployed an innovative mobile-payment solution known as M-SOLAR©. This "pay-to-own" end user finance model will make buying and owning a quality solar system as simple and convenient as "sending a text message." The software can be used with the payment charge controller Sun-Control (developed by SunTransfer).

Once the solar system with payment charge controller Sun-Control is installed by technicians of SunTransfer Kenya, the necessary software is also loaded on site, enabling a typical client to send their money via mobile to SunTransfer Kenya. On receiving the money, M-SOLAR immediately sends back an sms (short message text) with a secret code to the cli-
ent’s mobile phone. The client in turn loads the code into their solar system enabling them to use system for the duration of the payment, typically 31 days. After this period, the client will top up the payment again via M-SOLAR. If the monthly payment is not made when due, the code system will automatically switch off the loads and only unlock when the due payment is made. However, once all the payments are made, the system will unlock permanently, giving the BOP free and clean energy over the next 20 years!

To deliver the M-SOLAR end user finance service, loads has partnered with M-PESA of Safaricom, the largest mobile money transfer network in Kenya, with over 20 million registered subscribers and widest geographical coverage nationally.

Benefits for better customer service

To the BOP end users, the M-SOLAR has delivered very many practical benefits: convenient 24-hr payment platform via mobile phones, low transaction cost as the end user does not require to travel long distance to make payment and access their credit codes, thus huge savings on travel cost and time. Moreover, clients can also check loan balances on the phones by sending a simple text message to the M-SOLAR customer service number. This service enables each customer to schedule and track their payments accordingly.

To SunTransfer Kenya, M-SOLAR has greatly improved operational efficiency, improved customer experience while growing capacity for better customer service and ability to scale.

Distribution network for local customer service

Delivery of M-SOLAR service would not have been possible without SunTransfer Kenya’s unique rural service network of Solar Centers, each equipped with 4-5 well trained solar technicians. Currently SunTransfer Kenya has a portfolio of five Solar Centers in Eastern and Nairobi regions and proposes to open 5 more centers by the end of the year.

The unique blend of M-SOLAR, a low-cost and affordable end user finance platform, and the growing network of Solar Centers strategically located in rural areas closes to our target off-grid markets, makes SunTransfer Kenya's business model well-thought out and creatively designed to effectively address the key challenges of end user finance and poor distribution channels limiting the growth of the substantial off-grid solar markets in Africa.

More information: www.suntransfer.com

Ben Kimathi / Gathu Kirubi
Crowdfunding in the energy access space

Lack of access to affordable finance perpetuates global energy poverty by limiting both the supply of, and demand for, improved energy products and services. Innovation is stifled when companies are unable to source the capital required to develop and commercialize new technologies and business models. Supply chains remain truncated when regional distributors and lastmile retailers cannot secure working capital to purchase inventory and sustain and expand their operations.

Households and businesses are unable to afford modern energy improvements when banks and microfinance institutions do not offer credit for these investments. In response to this pervasive deficit, new crowdfunding models are opening up alternative means by which energy providers and consumers can gain financial support in the absence of conventional donor funding, debt and equity investment.

What does "crowdfunding" mean?

In general terms, "crowdfunding" describes the practice of raising funds in small increments from large numbers of non-institutional sources. Typically, activity is mediated via an online platform and promoted through social media. While a handful of popular crowdfunding websites such as Kickstarter, Indiegogo and RocketHub continue to maintain market share and command considerable brand recognition, hundreds of other platforms occupy an increasingly segmented, specialized and competitive online marketplace through which over US$5 billion had been raised as of January 1, 2014.
Alternative to conventional sources of finance

The core of crowdfunding’s appeal is its potential to unlock new sources of funds for purposes that conventional sources of investment and charitable giving are generally unwilling or ill-equipped to support, or even incapable of identifying in the first place. However, in addition to realizing greater funding availability, crowdfunding usually offers important cost and flexibility advantages as well. Funds sourced through platforms from informal networks of personal contacts (“friends and family”), shared interest communities and consumers are typically less expensive and impose fewer demands and expectations on fund-seekers compared to conventional private, public or charitable sources.

It is not surprising, given these advantages, that crowdfunding has gained traction within an undercapitalized, still-emerging sector that exists to deliver low-cost, high-quality energy services to the world’s poorest, least accessible people. Although, compared with traditional investing, the amount raised via crowdfunding is still relatively small and the legal and regulatory regimes governing the sector are still being worked out, its appeal is growing. Today, within the context of the energy access economy, a number of different crowdfunding models have evolved for a variety of different purposes, including consumer, startup, working capital and project finance.

Arc Finance
The availability bias of investors.
Or: Why you shouldn't use a map of Hong Kong in Paris

When investors are confronted to an investment decision in a company in a developing country, they are often subject to a fatal incorrect evaluation: in the absence of own practical experience with the set-up of companies in developing countries, they draw on experience and assessment patterns they know. But these come usually from companies in developed countries or from other industry sectors. And this frequently yields the fatal result that investment decisions are made based on wrong pattern of decision.

Behind it are two different errors in reasoning which are long-known in psychology: first, the risk of overestimating the own experience and to think it is also applicable in completely different contexts. For example, when a successful entrepreneur in the U.S. believes that his experience is sufficient to start a business in Uganda. Instead of looking more closely, situations will quickly be sorted based on existing thinking and experience patterns.

In case of investors in the off-grid field, this error in reasoning is often exacerbated by the availability bias: the judgment is thereby significantly influenced by how available examples of similar events in human memory are. Events which we very easily remember seem to us, therefore, to be more likely than events which we can hardly remember. Researchers tested the availability effect on investors' reactions to analyst recommendation revisions and found that positive stock price reactions to recommendation upgrades are stronger when accompanied by positive stock market index returns. Similarly, research has pointed out that under the availability heuristic, humans are not reliable because they assess probabilities by overweighting current or easily recalled information instead of processing all relevant information.

An investment decision is always a decision with many unknowns. In such cases, people quickly revert to decision patterns by other investments. This is in principle comprehensi-
ble - only in this case, fatal because the requirements are completely different. It's as if you were in Paris and you have forgotten your city map. Casually you find in your suitcase a map of Hong Kong - and think: better any than no map at all.

This misconception is even more reinforced if the environment acts in the same way: that is, when all other investment managers as a matter of course use the map of Hong Kong, although they are in Paris. In this way, wrong decisions will be sustained by the information environment.

But how can you avoid this error of reasoning? Team up with people who think differently than you. People with very different experiences. And respect that your experience can be right and still not universally valid. Only then, you will have as investor the chance to make a meaningful substantiated decision. This is especially true for decisions to invest in a developing country. Open your eyes - and you will notice that your map has little to do with the reality.

Harald Schützeichel
Awarding of microcredits for solar products. Eight tips

The costs of purchasing solar home systems are usually too high for customers in rural areas to pay in cash. As a rule, payment through an installment plan is possible without any problem. Experiences in Asia, and also Africa are evidence of this. The Stiftung Solarenergie - Solar Energy Foundation has five years of experience with microcredits for solar products in Ethiopia. The repayment rate is one hundred percent. What has to be done to make installment plan financing so successful?

1. Integration

A successful installment plan model demands integration in a village community's social structure. It is not advisable to support isolated individual customers living in remote areas, but rather, much more sensible to link into a social network such as a village community, a church community, or the members of a cooperative. The head of such structures or other authorities should be informed and should also take part in the responsibility.

2. Contracts

Mutual rights and responsibilities - installation and maintenance of a solar system, on the one hand, and prompt repayment, on the other - must be established in a written contract. The contract must also contain possible sanctions for non-fulfillment of terms (for both parties).
3. Repayment moral

Even more important than contracts are social and moral obligations. Contracts made with customers in remote regions are difficult to legally enforce. It is thus crucial to clarify to customers, the social and moral obligations that they are entering into. Guarantors within the customer’s personal environment can also provide support, for example, informing the neighbors works as a form of social control. Customers must understand that their non-compliance with the contract will be known by third parties.

4. Keeping to rules

You must also stick by the rules! A contract is always binding for both parties involved. Therefore, the installation firm remains responsible for not only giving customers good advice and installing solar systems professionally, but also for carrying out periodic maintenance, service, and customer service as agreed upon in the contract. Poor customer service after installation is the basis for poor repayment moral.

5. Installment collection and maintenance

Periodic technical maintenance and collection of installments should be carried out in conjunction as this increases obligation for both parties. Experience with models in which technical maintenance and financing operate separately show that this often leads to considerable organizational problems.

6. After sales service

The contact persons for technical matters and installment credits must be easily reachable. When a problem arises, customers must not only be able to reach a technician without any problem, but the technician must also appear at the customer’s within the agreed-upon period. The Solar Energy Foundation’s credit customers are assured that at the latest within three workdays after reporting a problem, a technician will appear. This not only creates trust, but also increases customers’ willingness to stick by their side of the contract.

7. Intelligent solar technology

Prompt payment of installments can be supported by intelligent charge controller technology. The products used by the Solar Energy Foundation have a clock timer. After entry
of a payment, the charge controller is sent information as to how long the system should continue to operate. If the next payment is not made on time, the system turns off automatically. The system cannot be started again by the user. A code is required that is sent only when the payment has been made.

8. Credit management

Credit management should be supported by appropriate software, such as a Management-Information-System (MIS). Administration and professional supervision of tens of thousands of customers cannot be managed by long-hand or excel lists. The use of an MIS that is maintained by local technicians and management is necessary. The MIS of the Solar Energy Foundation also manages additional, important information, such as the customers' GPS data and information on maintenance work that has been carried out.

Harald Schützeichel
Going "All in" on solar finance: How IDCOL incubates a growing industry in Bangladesh

IDCOL and Solar Home Systems in Bangladesh

While demand for small-scale renewable energy is virtually infinite, a small microfinance institution or energy enterprise needs capital to meet that demand with supply. The Infrastructure Development Company Limited (IDCOL) addresses this barrier to scale in a unique and exciting way. With massive infusion of government capital, management from the private sector and a unique asset finance model using creative partnerships, IDCOL has produced a stunningly successful program.

IDCOL is a Bangladeshi Government-owned financial institution that is implementing a large scale Solar Home System (SHS) Program with support from various local NGOs, MFIs and private entities. Consonant with the Bangladesh Government’s vision of providing "access to quality electricity to all people at an affordable price by the year 2021," the program’s objective is to fulfill basic electricity needs in the rural areas of the country.

Prior to IDCOL’s entering the SHS market, its primary remit was large infrastructure finance. IDCOL managed to move into the SHS sector with incredible success: in its first ten years, IDCOL installed over 2.7 million SHS in off-grid rural areas of Bangladesh. IDCOL aims to finance six million SHS by 2016, with an estimated generation of 300 MW of electricity. The program has been acclaimed as the fastest-growing off-grid renewable energy program in the world.

As IDCOL’s Director (Investment), Nazmul Haque, characterizes it, IDCOL is "a private company that is government-owned: a public-private partnership, or PPP." The Bangladeshi government is the founder and investor, but the management is entirely from the private sector. Nazmul describes IDCOL’s initial involvement in renewable energy as "accidental and reluctant," but with World Bank impetus it developed what was thought to be
an aggressive pilot target of 50,000 SHS over five-and-a-half years. At the time, there were barely 7,000 SHSs installed in the whole country of roughly 150 million people.

**IDCOL image**

The program exceeded targets dramatically. Fifty thousand SHSs were financed within three years - two-and-a-half years ahead of schedule. A subsequent internal target was set for one million systems by 2012 - which was reached two years ahead of schedule, by 2010. A further-revised target of six million was established for 2016. As of December 2013, IDCOL had financed 2.7 million SHSs (see Figure).

These kinds of results are not achieved without massive financial commitments. IDCOL has invested over US$500 million so far, with a billion dollars likely by 2016. Twelve million people have been reached, thirty thousand direct jobs created, and US$39 million in government spending on kerosene subsidies saved. To reach these numbers, IDCOL tapped an impressive network of financers.

The program received initial loan and grant support from the World Bank (IDA) and Global Environment Facility (GEF); later on, German Technical Cooperation (GIZ), German Development Cooperation (KfW), Asian Development Bank (ADB), Islamic Development Bank (IDB), Global Partnership on Output-Based Aid (GPOBA), Japan International Cooperation Agency (JICA) and Department for International Development (DFID) came forward with additional financial assistance.

**The Financing Model**

IDCOL has developed a unique asset finance model for SHSs. It works through 47 partner organizations, or "POs," comprised of NGOs, MFIs and other private entities on a national partnership basis. IDCOL provides low-cost financing and technical capacity-building support to the POs, which interact directly with customers. Certain components are essential to its success: ownership; multi-party financial contribution; market price determination; independent selection of POs and suppliers; and indirect subsidy to the consumer.

**Ownership**

IDCOL’s beneficiaries become owners of their SHSs, buying them outright in cash or, more commonly, after completing their installment payments. This encourages proper use and maintenance and confers the long-lasting benefits of solar-generated power to the system owner. Over-utilization of the SHS is minimized by limited on capacity; the systems
typically can supply electricity for only 4 to 5 hours during the night to run a few lamps, one black and white TV, one mobile-charger, and/or one DC fan. There is a good reason for this: restricting usage diminishes demand for customer support and keeps systems running in good order. Since customers are more likely to make installments to POs on well-functioning systems, they are therefore more likely to reach the ownership stage.

**Multi-Party Financial Contribution**

An important part of IDCOL’s program is ensuring that customers as well as POs contribute to the installation costs of the SHS. To procure an SHS, a customer makes a minimum 10% down-payment to the PO, which then installs the system. The remaining cost (90%) is a loan from the PO to the customer, who repays in installments. IDCOL refinances 70-80% of this loan amount, therefore reducing the PO’s outlay to approximately 18-27% of the SHS cost. This multi-party contribution ensures strong buy-in from all stakeholders, and aligns all three parties’ common objective: prompt and consistent repayment of the loan, leading to ownership.

This arrangement incentivizes the POs to provide quality after sales service: they need to ensure customers are satisfied, so that they repay their loans. The POs have to manage funds for their contribution to the systems’ costs in order to manage further installations of SHSs and they also have to ensure a return on their equity contribution. Quality after sales service is an important component of solar financing and serves as a marketing incentive as well.

**Market Price Determination**

Many programs fail because the market is controlled, artificial or manipulated. IDCOL’s approach has been to allow market forces to determine the price of SHS. While appealing in theory, the reality is that IDCOL continually monitors the prices that customers are paying as well as the component prices, and claims to require reasonable grounds for changes in SHS prices "without ever interfering in the determination of the price" - instead seeking competition between the POs and among equipment suppliers. Each PO has relationships with multiple suppliers for various SHS components, and POs are spread across the whole country. This is meant to ensure that all customers have access to a free and competitive market, on the basis of price, value, and quality of service.
Independent Selection

Two autonomous committees select both POs and suppliers against strict criteria. IDCOL asserts that the selection committees are comprised of professional, experienced people, working in relevant areas, who are not connected to either POs or suppliers, and whose decisions are binding on IDCOL, whose only role is to provide secretarial support.

Indirect Subsidies

IDCOL believes that providing a direct subsidy to the consumer is riven with complexity and risk. An indirect process is simpler for IDCOL as well as for the POs, and gives the POs "the sense of creating value and profit." In practice, IDCOL provides a small portion of the SHS cost as a subsidy to the POs for the sale of each unit, a subsidy intended to be passed-on to the customer. This subsidy is fixed for SHSs of less than 30Wp and is, at present, 12% of the SHS cost by weighted average. It is a progressive subsidy, meaning that poorer customers buying smaller systems benefit more from the grant support than wealthier ones purchasing larger systems.

Through subsidies, low-cost financing and competition among POs, the system automatically keeps small SHS prices from inflating. Because of the subsidy, POs can often price small systems lower than their actual purchasing cost, and they reduce the selling price as much as possible because of competition with other POs. Frequently, their lowest selling price will equal the purchase price minus the subsidy, and in this way the entire subsidy is passed along to the consumer. POs can afford to do this because they get their return primarily on the difference of the interest income (12-16%) on the loan that they offer and the interest at which that money is financed: IDCOL offers 6-9% financing for 70-80% of the loan that POs provide to their customers.

For systems over 30Wp, there is no subsidy. In this case, POs often sell the systems at a price equal to or slightly higher than their actual purchasing cost from the suppliers. Again, POs get their return on these systems primarily from interest income.

IDCOL as Incubator

Probably none of these features are unique; a rent-to-own solar model isn’t either. Arc Finance partner SolarNow is using this financing mechanism in Uganda - without the benefit of a Ugandan IDCOL to help it grow. But Bangladesh is likely to be the world’s first "solar nation" - with ambitious government targets for renewable energy, pioneering energy companies such as Grameen Shakti, special susceptibility to the consequences of global warming, and a rapidly developing, large population, Bangladesh is for solar what Kenya is to m-banking: the clear leader, and a petri dish for innovation.
Market factors and technological advances have also become more favorable for solar lighting. The price of kerosene and the quality of solar products both went up while the price of photovoltaic generation has plummeted. With the kerosene subsidy gap reduced, and the subsidy to the IDCOL end consumer being reduced too, Bangladesh now has a market almost perfectly conducive to commercial, competitive small-scale solar finance. An organization such as IDCOL is arguably a necessary, but not sufficient, criterion for reaching massive scale in small-scale renewable energy access. Marrying government support and funding with private sector expertise, dynamism and respect for competition has created an environment propitious to the economies of scale that come with reaching millions. Many other countries would benefit greatly from having their own equivalent of an IDCOL - the archetype for scaling up a nascent industry.

*Arc Finance*
Customer Relations
The importance of after sales service

With after sales service, customer relationships do not end with the conclusion of a transaction, but are maintained for a product’s entire duration of use. Unfortunately, solar companies, especially in developing countries, grant after sales service much too little importance. This is fatal, as substantial deficits in after sales service are currently one of the reasons for solar products’ negative image among large portions of the population in rural regions. Poor after sales management is, notably, not compensated for by other positive factors, such as first-class quality. Service realized after sales is decisive in a product’s success or failure and in customer satisfaction.

1. Employee training

After sales service does not focus solely on a product’s technical ability to function, but also on customer satisfaction. Many employees in solar businesses are primarily technicians who are capable of selling products and installing them. They speak, think, and argue in technical categories. Customer-oriented thinking is foreign to them. They can learn it, in the best cases, through further training. Along with giving them theoretical knowledge of after sales management, practical experience in everyday life provides the best opportunity to learn customer-oriented thinking.

2. Customer training

Many people today have expectations of solar technology that are often not possible to fulfill: a simple solar lamp is meant to not only additionally charge a mobile phone, but also
supply a radio or even better yet, a small television with power. And, if possible, do so twenty-four hours a day. No one would expect that of a mobile phone, but many technical laypeople expect solar technologies to be super products. Most products used in daily life require no special explanation: their benefits and disadvantages are obvious.

With solar facilities, it is different: only very few people have been able to gather experience with this technology or have observed from others, how it works. They do not know what care the product demands or when it has reached its limits.

Thus, in addition to instructions for how to correctly charge the battery, customer training must also include how to care for and deal with the product as a whole.

3. Maintenance and repair services

Quick and reliable repair of technical deficiencies is a mark of quality for every business. A requirement for this, however, is that the employees are in a position to offer such after sales service through the availability of replacement parts. Frustration is preprogrammed when replacement parts are available in the capital only, which means that weeks pass by until they reach the customer out in the countryside. Professional personnel must be stationed close to the customers and must have available an appropriately furnished repair workshop with replacement parts. Customers must, and want to see that they are not left alone with their technical problems.

4. Customer loyalty as goal

Only when solar technology fulfills customers’ expectations day in and day out, are they satisfied with their investment. And only then can an emotional bond to the supplier gradually develop. The customer bond then turns into customer loyalty. Solar organizations that place value in good after sales management experience this loyalty emphatically. Their customers try to maintain the relationship to them even when a different supplier makes a seemingly less expensive offer. They know that they have a reliable partner with their supplier, someone who is capable of carrying out repairs and providing replacement parts.

*Harald Schützeichel*
Customer relationship: Practical tips for off-grid entrepreneurs

Solar power systems don’t come off the rack

Rural populations are familiar with most products for everyday use, such as ploughs, cookware, and radios. They do not require explanation, since their benefits and drawbacks are obvious.

Solar power systems are another story. Only a very few have actual experience with the technique, whether firsthand or indirect, and have no idea how a photovoltaic facility functions, what sort of maintenance it requires, and what its limitations are. From the customer’s point of view, the salient features of a solar power system are as follows.

- Photovoltaic facilities supply clean and reliable electricity for lighting, and thus replace smoke-producing kerosene lamps. This means in turn a radical change in the customer’s everyday life.
- Customers must initially be taught the benefits and uses of this new technology.
- A solar power facility is a long-term investment. Although it is expensive to procure, its maintenance costs are low, and it can last as long as 30 years. On the other hand, a solar power system requires regular maintenance if it is to function properly throughout its lifespan.
- Since customers typically have very little experience with solar power systems, they require particular care during and beyond the installation period.
- Customer service must also comprise special user training, including basic maintenance of the facility and a chance to practice the necessary activities.
- As a rule, customers do not know exactly how much electrical power they need, which is why solar power technicians must calculate and record this requirement before begin to size and install a facility.
Because replacement parts for a solar power system (such as batteries, lamps, modules, and converters) are not for sale in all hardware stores, the operation of a facility requires specialized replacement-part management. Solar technicians must be aware of these features so as to ensure that

- they install the appropriate facility;
- the customer is satisfied over the long term;
- they can count on a solid and growing customer base.

A. Common errors

The most common errors made by those implementing solar power projects and installing solar power systems in off-grid areas:

1. Improper sizing of system
   Possible reasons:
   - insufficient care taken when calculating loads to be connected
   - faulty calculation by solar power technician
   - worst-case scenario not taken into account for rainy season

2. Lack of maintenance
   Possible reasons:
   - no one shown how to care for and maintain a solar power system, or indeed told that care and maintenance are necessary at all
   - no one made responsible for the system’s technical operation

3. Use of low-quality products
   Possible reasons:
   - cost-saving measure
   - solar power technician interested in short-term profit
   - ignorance
4. Faulty or minimal briefing of users by solar power technician
   • result: faulty or improper use causes more rapid wear and tear or defects
   • This in turn leads to customer dissatisfaction and negative publicity for solar energy and the solar power technician in question.

5. No after-sale service
   Possible reasons:
   • solar-power technician only interested in short-term profit
   • lack of customer awareness

B. What can be done?
   The answer is simple: Learn from past mistakes!
   The three top criteria for lasting success with solar technology are
   • customer awareness
   • quality
   • after-sale service

   When selling a solar power system, therefore, a technician must pay attention to the following:

1. Customer awareness
   • Listen to customers and try to understand their needs or unspoken desires.
   • Clearly explain to customers the benefits and drawbacks of a solar power system.
   • Indicate to customers the conditions necessary for a solar power system to function properly.
   • Inform customers of guarantee, service and maintenance features.
   • Provide customers with some form of security. It is advisable to sign a contract with each customer setting out which solar power system he or she has purchased, its price and any conditions. If an existing template is used for such an agreement, the solar power technician should review it to make certain it contains all key information.
2. Quality: perform technically correct and professional work

- In addition to all loads to be connected to the system, appropriate sizing also takes into account the worst-case scenario, involving reduced sunlight during the rainy season.
- When choosing components, go for quality. This is the only way to ensure a system’s longevity, and thus customer satisfaction.
- Inform customers about energy-saving devices (such as radios, TVs, and refrigerators), which use less power and are thus more cost-effective.
- Ensure professional installation of the system in your customer’s residence.
- Show customers how to use their solar power system and explain servicing he or she can do without aid (such as frequent cleaning of solar module). A ‘passport’ can be quite useful, containing technical data on the solar power system and detailing proper use and care.

3. Good after-sale service

The work isn’t done once a system has been installed! Regular house calls are needed to monitor proper operation of the facility. It may be a good idea to draw up a maintenance agreement with customers, setting out details and establishing a fair price for servicing.

After-sale service also includes noting down all information pertaining to operation of the system and documenting any maintenance and repair work that has been done.

Harald Schützeichel
Non-replaceable batteries in solar lamps: planned obsolescence?

In Europe, the question of the planned obsolescence in electronic products is being increasingly discussed. The term "planned obsolescence" describes the deliberate reduction of the service life of a device in order to force the customers to a new purchase at the earliest possible. The focus is increasingly on the batteries. And some of the experiences should also apply to solar lanterns.

New purchase instead of battery replacement

Batteries are essential for most electronic products, whether smartphone, tablet, MP3 player or an electric toothbrush. Indeed, they are being increasingly fitted, glued and soldered into the device. A simple replacement at the end of the product life is not possible. Some manufacturers do not even offer a replacement, but request directly to purchase a new device.

The fixed installation of the battery is usually justified by safety aspects, especially in the modern lithium-polymer batteries. However, many consumer advocates assume that the manufacturers are using the fixed installed batteries mainly because the battery last on average between one and three years depending on use and treatment. If a battery is not replaceable, the customer must throw away the device and buy a new one.

Here the statement from a seller of a German electronics store to a customer: "Of course the batteries are built-in in all electrical appliances to an amount of approx. 150 euros; otherwise it does not pay off anymore. You can send the device and then the battery will be replaced, but this will be more expensive than a new one."

The example from Apple shows that things can be different: Apple had refused to ena-
ble a battery replacement for the first iPods (MP3 players). The customer should rather buy a new device. However, the U.S. government stepped in and forced the concern to offer a battery replacement program.

**Solar lamps with fixed battery damage the potential industry and customers**

Also, some of the solar lamps on the market today do not have replaceable batteries, including devices that have obtained the certificate of "Lighting Africa".

Solar products are mainly valued for their long-life cycle and hereupon tested for certificates: the solar panel operates at least 20 years, the LED should hold 50,000 hours, and from the housing some stability is expected. By so much durability, it can not be that a single component leads to product replacement after a few years. Why do we need then panels for 20 years or LEDs with 50,000 hours lifetime?

A non-replaceable battery for solar lamps carries two dangers:

- It easily discredits the industry, when neither the longevity of the products, nor the reliable disposal of pollutants (battery) are dully taken in charge. A fatal reputation for an industry that competes against diesel generators and kerosene lamps using its "ecological" attribute.
- In addition, it is annoying for off-grid customers because they are constantly compelled to buy a new product. And this by companies that actually arise with the pretence of acting as "social business" - or at least to act in the interest of the people at the BOP.

**To outsmart manufacturers**

Here, the advice of a European consumer protector: "Consumers are however not helpless at the mercy of these 'product strategies' from performance-oriented companies. Basically everyone decides at purchase, if he approves such strategy, and eventually chooses an alternative product that offers a replaceable battery."

That sounds good - for developed countries. For here there is brand and product diversity. But many of the people in off-grid regions can still only dream of getting an alternative to the devices that imposes them a complete new purchase after a few years.

**What to do?**

1. The issue of a replaceable battery or a manufacturer’s replacement concept com-
2. Product certificates, such as the certificate of Lighting Africa, must take the battery replacement or a functioning replacement program of the manufacturer as a criterion. In a replacement program, the question how the batteries are disposed of must also be answered.

Harald Schützeichel
Customer's trust: The real gold of a rural solar business

The value of any company lies in the strength of the relationship to its customers. Even though this principle is more than obvious, it is also more than evident that solar energy companies in developing countries often act completely different: in order to make a fast deal, cheap products from China are being sold. Still on the pretext that people in rural areas are poor and cannot afford expensive products. The set-up of a customer service doesn’t take place; it is not the goal. On the contrary, the marketing manager of a well-known manufacturer of solar lamps stresses: "We want to see the customers only once. We sell off the shelf, for only then we can achieve great sales figures."

Dangerous principle: Selling off the shelf

Selling off the shelf is certainly a principle that fascinates financial investors and "social funds". It guarantees quick high sales figures - and thereby an apparent fast company's success, at least on paper.

What fascinates financial investors and "social funds" is unfortunately not suitable for building-up a solid company. More than that: a sustainable social impact cannot be achieved this way.

Who wants to build a stable and healthy company will rather follow a different goal, which can be described like this: do not try to sell one product to as many customers as possible. Instead, try to sell as many products as possible to one customer - over a long time and across different product lines. To achieve this goal, we need a strong and sustainable customer relationship - this is just the opposite of "selling off the shelf".
Customer Relations

Customer trust: the gold of a company

A long-term customer relationship is not based solely on the quality of the products sold, but even more on the quality of service and customer trust in the reliability of the company. Trust needs to grow - and it grows just after the first sale process:

- when a product doesn’t work and needs to be repaired,
- when the customer requires a re-training in the use of a product,
- when the customer wishes to exchange or replace products,
- when the customer wants to buy advanced products and needs thereto support.

Experiences have shown that precisely the people in rural areas of developing countries reward these services with loyalty and trust. A solar product doesn’t need to be cheap in the first place - because the customers know very well: who buys cheap, pays twice. While this may be good for the business of the solar energy company, this is bad for the people in rural areas.

Customer surveys show repeatedly that in first place the customer proximity influences the buying decision: who has a service station close to the customer is more trusted than someone who operates out from the capital. But it is also an attitude, an approach of the entrepreneur, which turns the purely physical proximity into a real tangible one.

Required: a strong entrepreneurial personality

It requires a strong entrepreneurial personality to resist the temptations of the apparently rapid success of a selling off the shelf. And it requires a strong corporate culture, when all employees look after the customer needs, and when the customers’ wishes are their top priority.

But only a strong corporate culture built on customer trust is able to have sustainable success. A customer relationship of trust is the basis for sustainable economic success for every solar company in off-grid regions.

Harald Schützeichel
Dealing with solar products: 5 tips for user training

Dust, heat, and improper treatment afflict solar products. In places where external conditions are extreme, solar facilities and equipment require particular care. Certain products can be adapted technically to meet these demands, others cannot, or only at extremely high additional costs. Careful treatment and maintenance is therefore demanded, which, unfortunately, too many users are far too little aware of.

1. New frontiers
For most people in rural areas, solar technology is an entirely new technology. Also, the discrepancy to other technologies is often quite great. The clearest example is certainly the difference between a traditional kerosene lamp and a modern LED lamp. The purchase of a solar facility is expensive and often linked with a microcredit. Thus, a careful and clear introduction to the product becomes that much more important. Printed instructions do not really help much. Since most people have some experience with standard technical equipment, such as radios, tape recorders, and mobile phones, that is a possible starting point for training.

2. Balance
Solar energy is based on a natural resource. In solar technology, natural factors, such as changing radiation, must be taken into consideration, while, on the other hand, nature regulates the length of use of attached lamps and other equipment. The sun does not shine with the same duration or intensity every day, and during the rainy period, it some-
times lacks the power to entirely recharge the energy used. Knowledge of this balance of electricity consumption and recharging is important for the optimal use of a solar system. According to experience, users quickly discover an optimal mix. Nonetheless, they must be informed about it beforehand.

3. Care

Every piece of technical equipment requires cautious and constant care for long-term, optimal functioning. Unfortunately, many users have no understanding of this. Whether due to a lack of experience or simply a lack of concern, many use equipment until it breaks. Then, it is either repaired or thrown away. Often, it is difficult to mediate to them that an equipment’s lifetime is significantly lengthened through care and maintenance. Sometimes a service contract with the user helps to guarantee such care. However, the assumption here is that the solar firm also has technicians in rural areas. Should this not be the case, it would be helpful to show users at least how a module can be cleaned, or a LED lamp freed of dust and soot.

4. Diligence

With sufficient quality, solar technology itself (module, battery, charger, cable, LED) can be manufactured robustly enough for use in rural regions. For Solar Home Systems (SHS), battery and charger are carefully stored in a stable box; and nowadays, modern solar lamps, such as the ST2 by SunTransfer, have high standards with regard to water, dust, and shock resistance (IP65). Yet this does not apply to a lot of instruments that are run with SHS, such as TVs, refrigerators, DVD and media players. Also, such equipment cannot be manufactured with a standard IP65. It is neither economical nor sensible to equip a television with high shock resistance. Users in rural regions do not require any special configuration, but they must be better instructed by installation firms about proper treatment of solar technology and modern technical equipment.

5. Exchange of ideas

With its famous Tupperware parties, the eponymous U. S. plastic kitchenware manufacturer successfully paved a way that might also be interesting for solar technology: at these parties, (mainly) women meet to exchange their experiences and ideas about use of the products. The idea came about because plastic containers were, at the time, a new technology. Transferred to solar technology, that means: not only the use of Solar Home Systems, but also experiences in dealing with mobile solar lamps could be discussed at such
meetings. In the Philippines, this is successfully practiced, whereby in addition, a competition is called every so often for the most intelligent and best ideas for the use of solar products. And quite a few manufacturers would be surprised to learn of all the things their small, mobile solar lamps are used for. Such meetings have the advantage that the users mutually support one another and exchange tips for taking care of minor problems - and solar companies have the opportunity to point out the proper way of dealing with the products based on concrete examples.

*Harald Schützeichel*
User Forums: A powerful and innovative tool for connecting with rural end users

In a village on the island of Mindoro in the Philippines, a 42-year-old farmer named Susana used to contend with bats that would eat the fruits right off the branches of her trees at night. She acquired a solar lamp for her husband, who used it to patrol their property and scare the bats away. The change was swift and dramatic: after just one harvest season, the couple earned enough extra income to buy a second-hand motorcycle. Now, Susana and her husband can transport their fruits to town without needing to wait for public transportation, saving time and money as well as making life more convenient.

Susana’s story is among the many extraordinary testimonials of the life-changing impact of solar energy on rural Philippine households. She was a participant in a recent Solar User Forum (SUF), an innovative end user training module designed and implemented by Stiftung Solarenergie (StS) Philippines and Hybrid Social Solutions (HSSi) in her community.

At the core of the SUF is an interactive training of solar lamp users that facilitates knowledge-sharing on best practices and the collection of product design feedback, user data and proof of impact. It is structured as a half-day conference of end users (each ideally with 2-3 months of experience using SunTransfer products) and local community partners, facilitated by the staff of StS Philippines and HSSi.

The SUF begins with a brief essay-writing contest, which invites participants to answer two simple questions: "How have you used your solar lamp?" and "How has your solar lamp changed your life?" The responses are used to stimulate a moderated group discussion on the positive benefits of solar energy as well as on any concerns or problems that users have experienced with the technology. The most compelling stories are recognized and the best essay authors are invited to testify to the group and share their insights with their peers.
User training is conducted in through the format of games. In one game, participants compete to identify the different parts and functions of a solar lamp. In another, they work in groups to enumerate as many different ways of maximizing the life of their unit as they can within a specified time limit. The winning team is awarded a prize at the end of the event. Conducting end user training in this manner facilitates group interaction and fosters peer-to-peer learning. Participants maintain focus and retain new information for longer because the experience is fun and memorable.

Running in parallel with the essay contest, testimonials and user training games is a solar lamp clinic. SUF participants are invited to bring their solar lamps to the event so that any technical problems can be instantly addressed by the HSSI Area Manager. End users who submit their problem units to the staff at the beginning of the SUF may pick up their repaired units by the end of the same event provided that they undergo a brief re-training on proper usage and maintenance practices. The rapid response to users’ concerns builds trust in the brand and ensures that loan repayments on the products are not compromised.

Taken as a holistic module, the SUF offers a number of benefits for key stakeholders. Users get the chance to learn from how to maximize use of their solar lamp and secure immediate assistance in resolving any technical issues. The partner organization observes the impact of its services on beneficiaries and collects feedback for service improvement. SunTransfer, StS Philippines and HSSI also gain an opportunity to collect user feedback for future product and service development.

Indeed, the impact of the SUF extends beyond the event itself. Dissemination of users’ stories raises awareness on the realities of off-grid life, and their testimonials confirm the viability of rural solar energy applications. Empowerment-related goals are also furthered, as users who practice best solar lamp use and maintenance practices are recognized by their peers as experts to be emulated, and participants feel that their voices are heard and their concerns are addressed. Lastly, the SUF strengthens relationships between community members and partner organizations, as well as among HSSI, StS Philippines, distribution partners and community partners. The shared experience of the SUF lays the foundation for building a strong and vibrant community of rural solar energy users.

Jeff Leopando
Impact
How to scale impact? Which impact? And how to measure?

Earlier this year Endeavor Insight, the research arm of Endeavor, cited evidence indicating that when faced with tradeoffs between social and financial goals, entrepreneurs who lead social enterprises should prioritize financial goals. Linda Rottenberg, CEO of Endeavor, posting on the Harvard Business Review, came to some pretty punchy conclusions. "If you want to scale impact," the headline booms, "put financial results first... [and] when tradeoffs must be made, prioritize financial goals over social ones to maximize the long-term sustainability of the business." This is such an important question, perhaps the most important question facing the impact investing space, and I’d suggest we need be wary of such broad conclusions. As a sector we still have so much to learn about how we define, create and scale social impact.

Financial goals and social-return

There is little denying that in order to achieve sustainability and growth a company must have sound finances - without that, they won’t be around to serve their customers. And so the logic seems clear: efficiency is key to having a strong company; having a strong company is key to greater scale, and scale is key to impact. Or, on the flip side, a company that’s bankrupt won’t have long-term social return.

But that financial sustainability is critical does not mean ipso facto that prioritizing it when there are tradeoffs is always right. Just because financial goals are good for long-term sustainability does not mean the converse holds i.e. that prioritizing social goals will undermine impact. Specifically the conclusion that I have most difficulty with is that "those who prioritized financial goals over social goals were much more likely to experience high rates of growth and have greater social impact." It is a pretty bullish ‘and.’
Which impact - and how to measure?

The whole question hinges on one’s definition of impact. If impact equates to scale, say jobs created, then it is little surprise that you’d find financially well-run businesses deliver bigger impact. The assessment is biased by using a narrow, output-based metric as your sole barometer for impact, one for which financial discipline will have a high degree of causality. It is an illusionist’s trick of sorts: finance equals scale, scale equals impact, and hey, presto, finance equals scaled impact.

Before going on I’d like to be clear that using operational scale metrics as output indicators of impact is no bad thing, and Endeavor themselves list some pretty interesting metrics on their impact dashboard. This is a good approach and is widely available to the industry. Indeed it is exactly what Acumen Fund does. We have been a field-builder in this approach and are proud of that work. For instance, Acumen played a central role in establishing the Impact Reporting and Investment Standards (IRIS), we helped found the Aspen Network for Development Entrepreneurs (ANDE) and the Global Impact Investing Initiative Network (GIIN), and, in partnership with Google and Salesforce, we created the PULSE software platform for metrics collection. Acumen has been using Pulse to collect IRIS metrics across our global portfolio for the last five years, and as of last month more than 94% of Acumen’s active investments submitted monthly performance metrics. Some achievement. (I say this unabashedly since all these achievements came before I joined Acumen earlier this year).

Outputs are only proxies for impact

However, it is important to acknowledge that there are limits to what we can know about impact using techniques dominated by data on outputs, and I think we should still be modest in our conclusion. Output-based, scale-based metrics are an outstanding way to give confidence about whether one is having impact. But when one wants to get to conclusions about what are the best ways to maximize impact, and where there are and aren’t tradeoffs, we need a less blunt instrument. Outputs are, after all, only proxies for impact. It is only when they are coupled with high-quality research on the linkages between the output and the outcome that one can have higher confidence about what social impact has been made and why.

We have been clear in articulating our position on this, for instance in the Stanford Social Innovation Review article highlighting both the strengths and weaknesses of the approaches we have championed; and avoiding leading to sweeping conclusions, especially when there is still much to discover about the art of the possible in terms of how we measure and maximize social impact.
The tricky part

Consider, for example, an entrepreneur managing their business well enough to stay in business and be cashflow positive. Imagine further that this entrepreneur is focused not just on market penetration but on the depth of the impact of each and every product sold. Might they not deliver greater aggregate social impact, even in cases where that comes at the cost of maximizing growth? For example their prioritization of social impact might mean providing or facilitating access to other complementary services - not necessarily core to their business - that help maximize the overall impact they make (and, incidentally, grant funders might themselves be interested in supporting delivery of these services); they might treat the people that work for them, as well as their customers, with dignity and respect potentially trading off some efficiency for greater equity or long-term customer loyalty; and they might go to great lengths to fully understand their impact and tweak the product over time to maximize impact - as opposed to scaling a product that is beneficial to the poor but could be made even more so with financing or subsidy or ancillary services.

It is also worth asking what the conclusions reached by Endeavor would mean for an entrepreneur’s decision-making when faced with marketing decisions to target the extreme poor. My suspicion is that a financially maximizing social enterprise would, for example, prioritize going to scale serving those just above the poverty line in Zambia rather than those below it in DR Congo.

But the poorest will almost certainly have a higher marginal return from the use of any given product - a first solar lantern certainly means more to poorer family with no reliable energy than one or two solar lanterns would mean for a relatively wealthier household with some access to the electrical grid. Surely this is higher social impact, and might come at the expense of scale or financial maximization. The tricky part is walking this fine line while ensuring that you are building a company that will be there to serve its customers in the long-run.

MFI: sometimes increasing than decreasing poverty

When considering the conclusions reached by Endeavor, I worry that there are parallels to the kind of analysis that may have adversely affected the microfinance industry. For a time, presumed wisdom suggested you need only to look at repayment rates of MFI’s (akin to looking at financial performance or scale) and you would be sure that all the developmental good stuff was happening. A few years on and that notion is being challenged, and worse still, evidence suggesting we perhaps know less than we ought to about the pro-poor impact of microfinance and that microlending may in some instances have increased rather than decreased poverty. In that context Grameen Foundation’s Progress out of Poverty Index has emerged as an ingenious tool to help the industry check that they were reaching the people it originally intended and widely purported to reach. Some of its early
application has shown surprising data that MFI’s weren’t having the social impact they had thought or hoped.

It is great to see Endeavor asking such questions, and one day we might indeed conclude that they were right. I’d welcome such a day, since that would make the job of maximizing impact a more straightforward task: a singular maximization problem with finance at his heart. My hunch is that the challenge is far more complex, especially when we start considering some of the knottier social issues such as the value of dignity and empowerment, or even when we stop to consider that who you serve is almost as important as the service you deliver in determining impact.

Understand the depth as well as the breadth of impact

In our work at Acumen, we are pleased with how far we have come, but we remain committed to doing more to understand the depth as well as the breadth of our impact. This is hard work, but with initiatives such as a recent Randomized Control Trial we’ve kicked off to better measure the impact of Western Seed hybrid seeds, and by piloting improved capture of income data for our customers using mobile phones, we are experimenting with new techniques that will allow us to continue to build on our work to understand impact. If we want to know what scales impact, there is still more to learn.

Tom Adams
Does off-grid solar energy really only have positive impacts?

At first glance, the answer is clear: in off-grid areas of developing countries, kerosene lamps are generally used for "lighting". They hardly produce light, but very much harmful smoke. Also the combustion of fossil fuels is used, producing substantial CO2.

Therefore and not without reason, the simple message of off-grid NGOs and companies is: solar energy brings sufficient and clean light, and thus helps to reduce both the health damage of eyes and lungs as well as to reduce the burden of CO2 on the environment. In addition, many social impacts are achieved. A seemingly simple and "good" solution for the replacement of the "bad" kerosene lamps.

But is that really true? Some aspects that can easily tarnish the positive image:

Environmental impact?

Recycling/Disposal

The praise on the major environmental impacts from solar products should not be sung so loud - at least not as long as the off-grid industry can show a viable and reliable approach to recycling and disposal. After all, millions of batteries are scattered today in rural regions. The fact that these are rechargeable and therefore their end of life will be reached only after a few years, only defers the problem to the future - in the hope that today no one will bring the subject up. The "devil-may-care" principle.

In fact, today only a few manufacturers, NGOs or distributors are able to provide a solution for the battery disposal. As long as this does not happen, we will ultimately replace one devil (kerosene) by another (battery waste).

And what about the disposal of plastic waste (housing)? Some solar lamps even have
batteries that are not replaceable. It is highly likely that in this case both the housing and the battery will simply be thrown away. A time bomb of environmentally hazardous waste is being created.

What can be done? Two of many possible approaches:

1. In tenders, besides the price, the question whether a disposal concept can be offered by the distributor and/or manufacturer should also play a role.

2. Organizations and other opinion leaders (World Bank) have to quickly put the issue on the agenda for the development of appropriate standards and rules.

Environmental standards in the production

If you offer an environmentally friendly product, it must actually have consequences on the production. It usually takes place today in China and India. Which are here the environmental conditions of the suppliers of our solar lamp producers? What environmental impacts are actually produced during the production in a factory somewhere in the interior of China? And: do we really want to know this at all?

But we should be careful: with the increasing success of off-grid products, also critics will be called upon and will strike this sensitive nerve. The damage to the industry’s image could be considerable.

What can we do? For example, the introduction of an eco-label would be possible for off-grid products. Not only should the materials used for the product be evaluated, but also their production and disposal possibility.

**Health impact?**

The light from a solar lamp is indeed smoke-free - but is it also really bright so that eye injuries may be prevented? After all, the eye and the eyesight will be also damaged by working or reading with insufficient light. It is not without reason that there are in Europe numerous regulations on adequate lighting for different workplaces and activities. For developing countries, these rules do not apply. And often the solar lamps you will find today have a brightness of only 20-25 lumens, which is clearly not enough for reading. Is it sufficient to say that after all the even worse kerosene light has been replaced by an equally inadequate, but smoke-free solar light?

What to do? We finally need quality standards to ensure that, even in off-grid regions, for a specific activity a specific light will be supplied to prevent health problems. The current quality standards, such as those from Lighting Africa, don’t refer this at all.
Social impact?

Socially acceptable production

The textile industry has a bad image, since the inadequate production conditions were progressively known, at present especially in Bangladesh. But how do the production facilities of the suppliers of off-grid solar products actually look like? What is the use to publicly measure a social impact in Africa if this was achieved through child labour and poor working conditions in the production?

Here, too, a quality label, which includes social standards in the production, would be useful.

Losers of the off-grid technology

Any positive development brings with it losers. This is also the case with the replacement of kerosene lamps by solar energy. For, quite a few people live today from the sale of kerosene. It won’t so easily cost the job of the retailer in the capital, but what about the person who sells the kerosene at the marketplace in a rural village, and thus generates a modest living? This person will be unemployed in the future if the village is supplied with solar energy. Undoubtedly a negative social impact.

What to do? If in off-grid projects great importance is attached to sustainability (and rightly), it must however be thought more comprehensively than it usually is today. Again, it is important not to solve a social problem, by creating a new one. In the case of the kerosene seller, the project would have to consider whether and how he can be incorporated into the new energy supply.

Conclusion

The examples cited here do not gather comprehensively the problem of negative social, environmental and health impacts and can’t offer a ready-made solution. But we have to accept that social, health and environmental impacts clearly require an additional evaluation perspective to the today’s standpoint. A clean technology such as solar energy should also bring a clean production and implementation about. Only then, we can in good conscience talk of a clean, environmentally and socially sustainable energy supply.

Harald Schützeichel
Business for a social good? How many CSR projects don’t have sustainable impact

Many of us would have seen this: A top corporate showing great images of how they have donated health products, solar lamps and other worthy things to the poor. The pictures generally show happy faces of "beneficiaries". The corporate leaders, shareholders, and employees feel good that they are doing good for society. But, is this really doing justice to the whole paradigm of Corporate Social Responsibility? For a company it makes sense to show "visible" social impact in the short term to shareholders, employees, and customers. As a result, most CSR money goes into doling out short-term freebies to seemingly vulnerable people. In addition, CSR is owned by communications and public relations to publicise these donations to show that the corporate has a heart too.

There is enough evidence, generated by grants of billions of rupees under CSR programmes for the last few decades, that short-term grants rarely have a positive social impact unless in extreme situations such as natural disasters.

For example, one of the well-known corporates donated solar lamps to 200 families in a village. They clicked smiling photos that were used to promote a benevolent image of the firm. But, did the donation create the desired impact?

At first, the 200 beneficiaries were happy and started using the solar lamps for daily purposes such as reading and going to farms at night. But, in a few months the solar lamps stopped working due to technical problems. The beneficiaries did not bother to get the lamp repaired as after sales service was unavailable in their village and they did not value the gifted lamp enough to take the effort to repair it. So, they went back to their old way of using kerosene lamps. Also, due to the donations, the value of solar lamp went down in surrounding villages that did not receive the donations.

So, how exactly should CSR funds be utilised to ensure maximum social impact? Firstly,
there is a need to understand that these are funds. Therefore, CSR funds need to be man-
aged by proficient investment managers, rather than by PR teams.

Secondly, these are funds that have a 100 per cent risk exposure and no potential eco-
nomic upside for the corporate. Hence, these funds can be utilised to cover risk for pro-
jects that are potentially very impactful in the long-run, but extremely risky.

One example is that instead of donating unaffordable solar lamps to few hundred bene-
ficiaries, why can’t this money be used to develop an affordable solar lamp that can then
be bought by billions of people? The potential impact is huge, but there is a risk of failure
as well. But, then, CSR money is already written off the books, so the risk should not con-
cern the corporate.

The second example is that startups have great potential for developing innovative sus-
tainable solutions for social problems. But, Indian startups have few sources of debt work-
ing capital to grow their operations.

Why not use the CSR funds to guarantee a line of credit for such high-impact startups?

It’s time that the corporate leaders consider making CSR part of their business model
and use the funds in a high impact manner, and governments to take steps to put in more
effective regulations to ensure that companies create social good.

_Nishant Banore_
Social impact meets environmental responsibility

As the market for solar lighting and solar home systems expands and more families use solar-powered products, there's a question we need to be asking: how much is this trend actually contributing to environmental protection? In other words, how socially responsible is it to export products that only partially comply with environmental protection standards to countries that lack basic recycling infrastructure? And how will that affect local communities in the long run? To be sure, solar lighting and solar home systems help protect the environment as they generate and consume energy in a more sustainable manner. However, despite the apparent benefits, some of those products contain materials that can have negative effects on the environment.

How can manufacturers change that situation?

The first step is to look into some basic environmental standards such as RoHS (Restriction of Hazardous Substances Directive 2002/95/EC) and RoHS2 (Restriction of Hazardous Substances Directive 2011/65/EU). Those directives apply to products such as lamps and consumer electronics. For batteries, the Battery Directive 2006/66/EC gives clear thresholds for acceptable chemical compounds. More importantly, it lays out the recycling process required for a permission to import hazardous batteries such as lead acid varieties. Another guideline is REACH (EC 1907/2006), which lists over 140 Substances of Very High Concern (SVHC) as identified by the European Chemicals Agency (ECHA).

While each manufacturer should make an effort to comply with RoHS, the battery directive and REACH, we could make more manufacturers aware of the standards by promoting them through industry associations like GOGLA or incorporating the standards into industry certification systems such as Lighting Global's LA-QTM.
We need to do more than adopt existing standards

Manufacturers should voluntarily refrain from using hazardous glues, lead, composite materials, toxic paints/prints and phthalate PVC cables in their products. Another major step we can take is to choose batteries with the least toxic materials and longest life span. This is a simple management decision that can make a huge difference.

While western consumers may throw away fully functional products when they find new alternatives that look more attractive, many developing countries tend to have a vibrant repair culture and secondhand market for various products - something manufacturers of products aimed at African and South Asian countries should keep in mind when they develop new products.

_Tiel Attar_
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