An analysis of the off-grid lighting market in Rwanda: sales, distribution and marketing

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Abbreviations

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<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>EARP</td>
<td>Energy Access Rollout Project</td>
</tr>
<tr>
<td>ESME</td>
<td>Energy SME Project</td>
</tr>
<tr>
<td>EWSA</td>
<td>Energy Water and Sanitation Authority</td>
</tr>
<tr>
<td>GVEP</td>
<td>Global Village Energy Partnership</td>
</tr>
<tr>
<td>LED</td>
<td>Light-emitting Diode</td>
</tr>
<tr>
<td>PV</td>
<td>photovoltaic</td>
</tr>
<tr>
<td>RWF</td>
<td>Rwandan Franc</td>
</tr>
<tr>
<td>SEDP</td>
<td>Sustainable Energy Development Project</td>
</tr>
<tr>
<td>SHS</td>
<td>Solar Home System</td>
</tr>
<tr>
<td>SPL</td>
<td>Solar Portable Lantern</td>
</tr>
<tr>
<td>US$</td>
<td>United States Dollar</td>
</tr>
<tr>
<td>W</td>
<td>Watt</td>
</tr>
</tbody>
</table>
Executive Summary

This market assessment provides an overview of the off-grid lighting market in Rwanda at the end of 2011. Ten companies active in supplying low-cost lighting solutions were interviewed on their products and sales data, their distribution channels and marketing activities. It also gives insights in product availability and affordability with a focus on off-the-shelf lighting products.

Key findings and conclusions

- Despite ambitious government electrification programmes, more than 1 million households will likely still require off-grid electricity by 2020. Nevertheless, sales of solar products are currently still very low with lantern sales of around 1,000 and system sales of a few hundred per month amongst all distributors.

- Survey results show that average off-grid household energy expenditures in Rwanda are around RWF 500 or US$0.80 per week. Expenditures for households expressing an interest in solar products were found to be slightly higher at around RWF600-675 or US$0.95-1.10. These costs can be reduced by around 65% with the use of a solar lantern that also provides phone charging.

- The nature of the companies engaged in the market varies widely from highly specialised start-ups with international backing to broader retailers that deal with solar products as a side business. Annual turnovers for solar products range between US$15,000 and US$1 million with institutional installations and government tenders contributing the bulk of revenue for these companies.

- 80% of the absolute sales by volume are portable lanterns with two specialised companies dominating the market. But lantern sales alone contribute only 50% of revenues for the overall market. Other products such as small off-the-shelf systems contribute disproportionatley to revenue. Dealer margins for lighting kits are around US$60, whereas lanterns only create margins of around US$5 for most companies.

- Most companies sell from their premises with four having affiliated dealers or agents. However, around 80% of sales are achieved through active door-to-door marketing and distribution by entrepreneurs and agents. Companies using door-to-door sales actively on average achieve 75% higher turnover on products below US$100 compared to companies that do not actively market their products.

- Rural dealer networks and agents are expensive and marketing expenditures by the most successful companies are currently only sustained through grant funding from donors and social investors. Market growth is currently largely driven by this donor funded promotional activity.
Chapter 1: Introduction

In November 2011, 10 companies that are actively selling and promoting off-grid lighting products were interviewed as part of a baseline assessment of the off-grid lighting market in Rwanda. This report summarises the findings of this research and provides an overview of the current status of the market, the key players and their products.

The study provides insights into the structure of the market, the promotional strategies currently employed by the active companies in the market, their routes to market, and the challenges encountered by these businesses as they seek to increase sales. The report also describes the kinds of products currently available in Rwanda, the segmentation of the market between smaller and larger products and the geography of sales. It also looks at how marketing has influenced sales and what lessons can be learned for the future.

1.1 Scope

This study collected information from all of the major companies currently selling off-grid lighting solutions in Rwanda on market size and structure, on the type and brands of products stocked, their sales volumes, revenues and margins. It gives also an overview of availability and affordability of solar products in Rwanda.

**Off-the-shelf lighting products**

The report is focused on off-the-shelf consumer products as compared to larger traditional Solar Home Systems (SHS) or institutional installations, both of which require more technical knowhow on the part of installer to ensure proper sizing of the system and assembling of the different components (battery, charge controller, inverter etc.) into a functioning system. Off-the-shelf products which already combine these components allow a ‘plug and play’ type of installation and have become increasingly available in sub-Saharan Africa.

The report assesses the degree to which these small systems and lanterns are contributing to the overall market, both in terms of volume sales and their contribution to companies' turnover and profit. Different market players focus on different segments or combinations of segments so business models vary significantly. The study looks at these different models and their key drivers.

**Distribution and Marketing**

The majority of the overall potential demand lies in areas outside of Kigali and to reach scale in operations and sales, the products need to be distributed through a network of retailers accompanied with awareness and promotional activities by the firms. The report looks at the various ways companies have dealt with this and the current challenges in managing and financing the distribution chain.
The Government of Rwanda has a highly ambitious plan to electrify 50% of the households with grid electricity by 2017. The number of connections will increase from 195,000 connections in 2010 to 1.2 million by 2017, which however will still leave around 1.2 million households or 6 million people in Rwanda without access to electricity. Currently no targets have been set for off-grid electrification.\textsuperscript{1} Due to good economic growth indicators, the gross national income per capita in 2011 was above US$1,100 per year.\textsuperscript{2}

Because financial assistance is given to households that cannot afford a connection, the 6 million people currently not covered in grid expansion plans are not those too poor to pay for access but those who cannot currently be economically connected to the grid. Based on the Energy Access Rollout Project (EARP), the Ministry of Infrastructure (MINFRA) estimates average costs of around US$1,200 per new connection in the next 7 years.\textsuperscript{3} This is likely to increase in the future as the strategy has been based on providing the connections with least cost first.

Therefore a potential consumer market of around 1 million households exists who require lighting and mobile phone charging services at least until 2020 and probably beyond. Not all of them will be willing or able to invest in a lantern or solar home system but many will. Even if only 25% of that market is eventually reached by suppliers of off-grid lighting solutions, this corresponds to almost a quarter of a million households with access to modern lighting.

On top of this there will be households in electrified areas unable to afford a grid connection who might buy a lantern. Given current sales levels of low cost lighting products at around 12,000 products per annum, it is clear a significant potential market exists.

Interviews with suppliers indicate that the prospect of grid electrification can be a barrier to the uptake of solar lighting products and inhibit consumers’ willingness to buy, but many households eventually realise that the grid will not reach them because they live outside of the planned area; and even in areas with grid electrification, there are households that are unable to pay for a connection. Thus the demand for solar products is increasing as household expenditure on lighting and phone charging has remained high.

\textsuperscript{1} MININFRA, 2010, 7 Years Electricity Development Strategy (2011-2017)
\textsuperscript{2} UNDP, 2011, Human Development Report
\textsuperscript{3} MININFRA, 2010, Rwanda’s National Energy Policy
2.1 Household energy expenditure in Rwanda

A survey amongst 212 rural households in the Northern Province revealed that 85% of households use kerosene, of which 46% spend less than RWF 500 (US$0.80) per week, 35% spend between RWF 500 and 1,500 (US$0.80 and US$2.50), 19% spend more – corresponding to a median expenditure of US$0.80 per week. Also, 36% of the population use candles with around 80% spending less than US$0.80 per week. Additionally, mobile phones are popular with many people not having the means to charge them. Phones users typically spend RWF 100-200 (US$0.16-0.30) per charge in most rural areas. Many households are therefore spending US$1.50-2.00 a week on their lighting and phone charging needs.

A recent survey by the agricultural NGO Tubura confirmed the average expenditure at around RWF 500 (US$0.80) in a different area of the country than the data above through interviewing almost 1,000 potential clients on their energy use. Average expenditures for households interested in solar products were slightly higher at RWF 625-670 or US$1.00-1.10. The use of a lantern with phone charging can reduce these costs by 65%.

### Tubura Survey Results

Tubura is the brand name of the One Acre Fund in Rwanda, a NGO focused on helping farmers in a number of countries in East Africa through pre-financing farm inputs and advice to improve farm output as well as farming income by better access to markets. Using their existing loan structures and groups, Tubura is expanding their portfolio of available products.

As part of this trial, Tubura conducted a survey among a random sample of trial participants to gather data on client perceived impact of the products, client satisfaction with the products, and client use of the products. Based on a sample of 73 clients or around 50% of the total the vast majority of clients are very pleased with the product offered, in this case the Sun King Pro lantern, supplied by Great Lakes Energy.

<table>
<thead>
<tr>
<th>Question</th>
<th>Sun King Pro (n=73)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved Quality of Light (YES)</td>
<td>100%</td>
</tr>
<tr>
<td>Increased Hours of Light (YES)</td>
<td>99%</td>
</tr>
<tr>
<td>Increased Hours of Child Study (YES)</td>
<td>88%</td>
</tr>
<tr>
<td>Will Continue to Use the Product (YES)</td>
<td>100%</td>
</tr>
<tr>
<td>Would Like to Buy a Second Product of this Type (YES)</td>
<td>82%</td>
</tr>
<tr>
<td>Would Recommend this Product to Others (YES)</td>
<td>96%</td>
</tr>
</tbody>
</table>

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4 Ezgi Berber, 2011, Baseline Study for Rubagabaga Project
Preliminary M&E Results: In preparation for the trial, Tubura’s M&E team conducted surveys with 979 Tubura clients to capture data on their baseline weekly energy expenditures. Survey respondents were asked to estimate how much they normally spent per week on each of the commodities listed below. It emerges that each household is spending around US$0.80 per week for services that can be replaced by a solar product.

<table>
<thead>
<tr>
<th>Energy Use and Estimated Weekly Expenditures (n=979)</th>
<th>% Respondents who Use the Commodity</th>
<th>Average RWF per Week (All Respondents)</th>
<th>Average RWF per Week (Users Only)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kerosene</td>
<td>78%</td>
<td>137</td>
<td>176</td>
</tr>
<tr>
<td>Candles</td>
<td>6%</td>
<td>11</td>
<td>185</td>
</tr>
<tr>
<td>Light Batteries</td>
<td>74%</td>
<td>86</td>
<td>116</td>
</tr>
<tr>
<td>Radio Batteries</td>
<td>92%</td>
<td>138</td>
<td>171</td>
</tr>
<tr>
<td>Telephone Charging</td>
<td>54%</td>
<td>117</td>
<td>217</td>
</tr>
<tr>
<td>Car Battery (Charging Hub)</td>
<td>25%</td>
<td>5</td>
<td>257</td>
</tr>
<tr>
<td>Electricity</td>
<td>7%</td>
<td>36</td>
<td>476</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Perceived Weekly Impact Pre vs. Post Solar5 [As Estimated by Trial Participants]</th>
<th>Sun King Pro (n=73)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre Solar Average Weekly Expenditures (RWF)</td>
<td>674</td>
</tr>
<tr>
<td>Post Solar Average Weekly Expenditures (RWF)</td>
<td>237</td>
</tr>
<tr>
<td>Average Weekly Savings (RWF)</td>
<td>437</td>
</tr>
<tr>
<td>% Change</td>
<td>65%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Estimated Expenditures per week</th>
<th>Average RWF per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Survey Participants</td>
<td>530</td>
</tr>
<tr>
<td>Among Survey Participants Interested in Purchasing a Solar Lamp (Said yes to purchasing at least one of the 4 lamp varieties described)</td>
<td>592</td>
</tr>
</tbody>
</table>

5 Does not include earnings from cell phone charging, a major driver for impact
As can be seen from these data and the above result from a field trial of Tubura, solar products can pay for themselves in a matter of a few months. Nevertheless, challenges in affordability remain despite the falling costs of solar lanterns. The availability of funds to invest in a product is the major hurdle. In only 10 out of 30 districts in the country does the population have average expenditure of more than US$1.25 per day\(^6\) and up front costs even as low as RWF16,000 (US$25) for a basic solar lantern remain a barrier.

The solar market can be divided in several segments, which each have separate product categories and often specialized companies that target a particular segment, although some businesses participate in several market segments.

### 2.2 Lanterns

Solar lanterns are sold as an integrated system, with a panel, battery, wiring and one or two lamps. Moreover, today lanterns often have an option for cell phone charging. They are small, relatively cheap off-the-shelf products with a maximum size of around 3W. Due to the low complexity of the product (it is simple plug-and-play) there is no need for professional installation. Also, the need for after-sales service is limited as long as the product is of good quality and the client uses the system under normal circumstances.

With an average retail price of around US$30, solar lanterns are affordable to a large share of the population, including those at the bottom of the pyramid. The most popular product is also the cheapest one with a unit price of US$ 6 but not being a solar PV product it requires continuous small payments for recharge. The most expensive solar lantern costs US$70 but has an oversized panel for cloudy conditions, allows phone charging and has a bigger storage capacity.

### 2.3 Micro-systems

Micro-systems vary in size from 2.5W to around 15W. Although these small solar systems are still “off-the-shelf” products they are a bit more complex than solar lanterns, they have separate parts and involve wiring of several rooms. Mobile phone charging is always an option and more than one room can be illuminated. Additionally, small radios or energy efficient TVs can be powered by these systems. Prices for small solar systems are proportional to power output and range from US$80 to US$200.

\(^{6}\) National Institute of Statistics Rwanda, 2006, Enquête Intégrale sur les Conditions de Vie des Ménages 2005-2006 (EICV2)
2.4 Solar Home Systems

SHS are systems bigger than 15W that are sometimes sold as a whole as plug-and-play systems, but more commonly as separate components, which need to be installed by a technician. Given the large size of these systems, proper estimation of the power demand, sizing of the system components and a professional installation and maintenance is important. That is, more consumer education is necessary to ensure proper use of the product. Also, after-sales support may be necessary if one of the components (e.g. the battery) breaks down.

In addition to lighting and cell phone charging, these systems are able to power small electrical appliances such as a TV, larger ones also fridges, razors etc., in which case an inverter may be required where the appliance uses an AC current.

2.5 Institutional market

In terms of both installed capacity and turnover, the market for the off-grid electrification of institutions such as schools, health centres, churches and public sector offices, has been the largest and is likely to remain so for the foreseeable future.

Today around 80% of health centres have been electrified through the efforts of the government and various donors, for example USAID and BTC. The European Union is also financing an on-going solar electrification project that focuses on secondary schools with € 7 million. By 2017, all health centres, schools and sector offices will be electrified, either through the grid or through solar PV. This still means there is a considerable procurement market in the next five years although the number of tenders and their size have sharply declined since 2010, according to some of the companies specialised in this market segment because the big tenders on these projects have now been awarded. A report by GTZ in 2009 that focused on this market segment estimated the demand at 60kW per annum. 7

2.6 Historic comparison

Solar technology for electrification has been deployed in Rwanda at least since the 1980’s, often through support of donors and NGOs. A study for an ESMAP/World Bank project in 1991 provides an assessment of the market at that time. 8

Back then, two companies were identified in dealing with small solar products, both of which were assembling the product locally from imported parts. Sales of around 100-150 systems of 16 or 20Wp for around US$720 were reported per year and totalled 700 systems by 1991. These powered three lights and a radio. Credits for the systems were available through a large national bank but the total system cost were 2.5 times the national average annual income. The repayment time for the loan was also set at 2.5 years. Thus, these systems were only available to well off households.

7 GTZ, 2009, Target Market Analysis: The Solar Energy Market in Rwanda
8 F. Nieuwenhout, 1991, Status and potential of photovoltaic (PV) systems in Rwanda for ESMAP/DGIS
Small portable lanterns for lighting only were also available but sales are likely to have been minimal with US$190 for an imported 5W and US$360 for 11W lantern that was assembled locally with support from GTZ.

Technical problems were common and all interviewed users of the 16Wp systems reported some issues. Often these were due to the undersized panel that did not provide enough electricity to power the three 8W CFLs and the radio that were part of the installation. The problem of properly estimating the demand and sizing the system and it’s components correctly, is still an issue for systems that don’t come ‘off-the-shelf’ and as recently as 2011 training was provided to local technicians through the World Bank funded and administered Sustainable Energy Development Project (SEDP) for that purpose, which will be expanded in 2012 and 2013.

The quality and availability of products has changed drastically since and prices have dropped, mainly through advances in LED technology. In the lantern segment of the market technical problems due to over or undercharged batteries are not common anymore because manufacturers moved away from lead-acid batteries, which were a problem in earlier systems.

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9 P. Simonis (GTZ) and J.D. Ngabonziza (MINITRAPE), 1990, "Evaluation de la première phase du Projet d’éclairage par énergie solaire au milieu rural mené conjointement par l’Union des Banques Populaires et la Société CPQ"
Chapter 3: Companies engaged in the market

For this study 10 companies, which are all based in Rwanda were interviewed. Although this might not be an exclusive list (particularly on institutional installations and larger donor contracts), it captures all known major players of the commercial household segment of the market. There are other cheap products on the market but these are mainly battery powered or grid charging 'hurricane lamp' imitations, not necessarily solar products. These have not been considered in this report.

In general, sales volumes for the companies studied are small compared to the potential addressable population and the market is at a very early stage of development. Some companies exclusively focus on the distribution of solar products, whereas for others it’s a sideline of their business. Annual turnover from sales of these types of product ranges from US$15,000 to US$ 2 million per firm. The range of available products and the companies dealing with them expanded substantially over the last decade. Six of the 10 companies were incorporated in the last 4 years.

Three firms are subsidiaries of companies that are active elsewhere in the region and 7 have exclusive distribution arrangements with one or more suppliers and brands of solar products. Some of these are however just informal ‘exclusivity’ agreements that might fall, should a product manufacturer find a more attractive sales partner than under the current supply agreement. The size of the companies, both in terms of turnover and staff is still small. Only two companies have more then 10 employees. For one firm this is due to the high management and oversight requirements for their large, rural distribution network, for the other because it is much larger and deals with solar products only as a sideline.

![Number of employees and affiliated agents](Image)

**Figure 1: Number of employees and affiliated agents.** In terms of the number of employees most firms are small with less than 10 employees. However for some companies that engage in door-to-door marketing and that have a strong dealer network, these outnumber the formal staff of the company by far.
Figure 2: Turnover of companies trading solar products. The market players are very diverse in nature. Some companies are exclusively focused on solar products, even on lanterns, whereas for others solar products are very much a side-line business.

We analysed both the intensity of engagement in the off-grid lighting market as well as the product range offered. The motivation and commitment of the firms to distribute off-grid lighting solutions differs, as one might expect.

Three broad groups of companies can be distinguished. Five companies focus exclusively on the sale of off-grid lighting products to the rural population and don’t provide any other service. On the other hand, for two companies, this is just a small, almost neglected, sideline of their business. The third segment is made up of firms that, while focusing on solar, are offering a range of services and products from solar portable lanterns to large institutional installations of several kilowatts. In this group, often other electrical products or services are offered alongside, such as generators or pumps, but also biogas installations, Solar Water Heaters or agricultural machinery are available from some of the companies. Thus, while a specialisation towards a specific market segment has occurred through subsidiaries of manufacturers moving to the Rwandese market and opening specialised franchises, most firms offer a broader range of products and services.
For four companies the average sale value per product is below US$50. Thus, roughly half of the market players focus on the product segment of below US$50 with very little, if any options beyond such products. On the other end, for three companies most sales have a value of around US$1,000 or beyond. Even if a lot of marketing and effort is spent on the low cost consumer segment, these companies live off the few large institutional installations for churches, schools or health centres that they do per year.

This pattern is generally reflected in turnover. While the companies that have capable technicians to install large systems achieve turnovers of more than US$100,000, none of the firms focused on the low-cost consumer market has achieved such scale. Even those with high sales volumes don’t achieve the revenue created by a few institutional installations secured through government or NGO tenders, or through other contacts.

Three companies dominate sales of portable lanterns in Rwanda each with over 400 products sold per month, although for one company sales levels have dropped substantially in the last year.

Interestingly, the key players in the lantern market rely heavily on outside support and the current sales levels do not recover expenditures. The total social investment in form of grants or conditional loans to build up sales has exceeded US$ 2 million in over the last 2 years. An additional three companies have also taken up commercial loans but this has been restricted mainly to import financing against government contracts.
At the current stage and in the absence of donor funding, business models rely on off-grid lighting products being a side business in which the expenditures associated with the import and distribution become marginal, for example by importing and selling them together with other unrelated goods. They can be sold with little additional cost from the shop whose overhead is covered through revenue from big installations or other products. However, if the market has to rely on slow organic growth sales will likely stay at levels below 100 products per month. None of the firms without big retail networks or donor support have achieved high levels of sales.

Establishing sales outlets can help to grow sales levels to a point where the revenues cover the costs of maintaining a large distribution network, but considerable investment is needed to reach sufficient scale. One of the fast growing companies that has received substantial support expects to break even in 1.5 years and despite occasional failures, all of the interviewed companies reported steadily increasing sales, revenue growth of more than 50% and a strong confidence in the market.

Additionally, three firms are at advanced stages to capture carbon finance from the reductions in kerosene use by their clients in order to help to sustain and grow their business. These companies have applied with their country plans to the Clean Development Mechanism (CDM) but while their registration process is more advanced in Kenya, Tanzania or Uganda, the registration of projects and eventual income from carbon credits could still be some way off in Rwanda. First, the carbon savings per product are very low (around 0.05tCO$_2$ per year for a lantern), thus adding perhaps US$1 per product, according to industry sources. Therefore it is a challenge to recover investment costs in the carbon registration process.

The outlook however changes i) with scale and ii) with size of the system. If total sales of a particular company of 1 million would be recorded throughout the East Africa region, this would bring considerable long-term revenue from carbon finance if tracking systems can be efficiently organised through IT and mobile technology. Secondly, whereas savings of lanterns are low, contributions from carbon finance to micro-kits costing around US$60 that replace 4 kerosene lanterns with LEDs, can improve the financial calculations on carbon finance.
Chapter 4: Products and Pricing

4.1 Available Products

Despite the market being small, a whole range of products are available on the Rwandan solar market ranging from small lanterns of 0.3W such as the d.light product S10, to large 1kw institutional installations. Thirteen different brands are available on the market, but few brands are available in several stores. The most widely spread brand is Barefoot Power that can be found in three different companies and recently opened a distribution and service centre in Kigali in order to increase the number of retailers in the coming years. D.light, Pisat, ToughStuff and BBOXX products can each be found in two different companies, but all other products have only one distributor.

Figure 4: Availability of brands across different distributors. Manufacturers and suppliers such as d.light, Barefoot Power or BBOXX are focusing on wholesale and use various retail channels in the country, other brands are tied to particular companies acting as one entity or simply have not yet gained presence in Rwanda beyond one particular distributor.

In terms of monthly unit sales, the most popular product on the market is the Nuru Light which accounts for 45% of all monthly sales by volume. The ToughStuff brand accounts for 33% of the market while Barefoot Power’s products have a market share of 8% with the Firefly 12 and the Firefly 12 Mobile being its most popular products. Other available Barefoot Power products in Rwanda are the Powapack 5W, the Powapack Junior and the Villagekit. For Pisat Solar, the K-light is the most popular product with their SHS also available on the market.
Chapter 4: Products and Pricing

4.2 Market segmentations

The market can be divided into several categories. Firstly, there is the Solar Lantern segment. This group consists of small, relatively cheap and portable off-the-shelf products with a maximum size of 3W. The micro-kits segment holds solar products that are off-the-shelf but need installation and light more than one room. They can vary in size from 2.5W to 20W. The third category contains the SHS with more functionality. These are systems bigger than 20W that are sometimes sold as a whole as plug-and-play systems, while other SHS are build depending on requirements from separate components and need to be installed ideally by a trained and certified technician. Finally there are also the institutional installations.

Figure 5: The estimated market share per brand. Two brands are currently dominating the sales in Rwanda. However, as the market is in its infancy and new players are arriving, this picture is likely to be very volatile.

The small solar lighting solutions S10, S250, and the older Solata, offered by d.light, together comprise 3% of the market. The other products on the market, such as BBOXX, BDM, Energiebau, Sun Tech and Trony products all have relatively small shares in the market, as do the other non-brand products. Other products, such as the Sun King Pro by Greenlight Planet and the Liberty 2.5W kit by One Degree, are available on the market but not included in this chart, as there were no data available regarding their monthly sales at the time of data collection but were minimal at the time.

Almost 90% of all monthly sales are of products that have been certified by Lighting Africa. These are, specifically, the Nuru Light, and products out of the ToughStuff, Trony, d.light, and Barefoot Power ranges.
Figure 6: Sales volumes by market segment. In absolute numbers lanterns are the most widely sold products in Rwanda. Interestingly, slightly more larger and more expensive solar home systems are sold compared to micro-kits.

4.2.1 Solar Lanterns

Solar Lanterns are low-cost and thus affordable to a large share of the population, including those at the bottom of the pyramid. With an average retail price of around US$30, these products are usually most popular amongst teachers and farmers. The cheapest product in this range is also the most popular, i.e. the Nuru Light. One Nuru Light costs only US$6 but charges occur over time through the required recharge. The most expensive product is the Trony Single Lamp Kit at US$71.

From Figure 6 above it can be seen that solar lanterns make up the largest volume of products sold. They account for more than 80% of all monthly sales. The most popular products in this category, which together take up a market share of more than 80%, are the Nuru Light and the ToughStuff products with 550 and 450 monthly sales, respectively. However, back in 2010, Barefoot Power’s Firefly had a much bigger market share. While now only around 100 lanterns are being sold each month, sales used to be close to 700 per month. A quality issue lies at the base of this steep decline, as there was a 50% failure rate in a particular batch of products. Barefoot Power corrected the quality issue, but a little while later the grant that made the large distribution of these products possible ended for the distributor in question, after which no more efforts were made by the company to continue with the distribution of the Barefoot Power’s Firefly.
The Nuru Light (NL1)

- The Nuru Light is usually recharged by entrepreneurs using a specially designed pedal generator but could also be charged from the grid or with solar power. It provides 18 lumen from three 800mAh AAA NiMh batteries.
- It can be worn as a head lamp or mounted and multiple lamps can be stacked. It provides up to 28 hours of light from one charge and features four different brightness settings.
- Typical retail price: RWF 3,500
- Typical wholesale price: RWF 1,800
- 100 RWF per recharge

Sales of lanterns compared to other market segments

![Sales of lanterns compared to other market segments](image)

Figure 7: Sales of portable lanterns compared to all other products per month Sales of lanterns are far higher in volume than other products with sales of 3 companies having been above 400 per month.
Price does indeed seem to be a determining factor when buying a lantern as a lighting solution. The three most expensive products, the ASE-Solar lantern, the S250, and the Trony Single Lamp Kit, all at a price higher than US$40, together barely have a market share of 3% of volume sold. Even though the market leader Nuru Energy is the cheapest product, the second biggest market share is that of the ToughStuff products (34%). ToughStuff offer a range of products combinations - from their cheapest products that are on the lower side of the pricing curve (the phone charger at US$12 and the Lighting kit at US$21) to their Big Kit with Power Pack that at US$36 is at the more expensive side of the curve.

Given that the Rwandan solar market is relatively small and underdeveloped, not too much should be interpreted in these figures. With little customer choice in many areas, the sales of a particular product are a symptom of product availability. ToughStuff, for example, focuses on the Eastern Province and are heavily promoting their products there. As there are no other major dealers in this area this leads to monopoly like situations where consumer choice and competition is limited.

The margins reported for dealers for selling these products are rather small but can vary widely between 8 and 50%. They lie around US$4.5 per lantern sold for most of the companies, although outliers of US$15 and even US$20 were registered.
4.2.2 Small systems

The third largest segment in terms of absolute sales figures is the segment of micro-kits, which accounts for 8% of the absolute monthly sales of solar products. The micro-kits from BBOXX, Barefoot Power, and ASE all have an almost equal market share around 30%.

The products in this category have more power than the products in the Solar Lantern category and can go up to 20W. These Micro-kits offer more in terms of use and power and this is reflected in the price that can vary between US$80 and US$500. This big difference in price with the solar Lantern segment, where the average price was around US$30, means that the micro-kits capture a considerably smaller share of the overall market. The smallest product in this segment is Barefoot Power’s Powapack Junior of only 2.5W, and it is also the cheapest at US$80. This trend is seen as well with the other products; the higher the power output, the higher the price. The only exceptions to this are the Barefoot Power products. The PowaPack 5W lies in the same price range with products from other brands that have double the Watt power. Barefoot Power’s Village Kit, which is sold at an average market price of around US$400, has 10W and is almost double the price of the bigger 15W ASE Solar-15. It is no surprise then, that few sales have been recorded for the Village kit, as for the same price a small off-the-shelf SHS of 30W to 50W can be bought.

The Barefoot Power PowaPack 5W micro-kit

- This micro Solar Home System includes 4 lights of 45 lumen each, powered by a 5W solar panel and stored in a 5Ah lead acid battery
- It will power 4 lights for 12 hours can also charge a mobile phone or operate a radio
- Typical retail price: RWF 92,300 – 110,000
- Typical wholesale price: RWF 72,900 – 90,000
- Sold at Dassy Enterprise and Mucome

The margins for dealers per product sold range from US$12 to around US$150, depending on the product. The average margin per product for the dealers in this market study lies around US$60. This is considerably more than for any of the lanterns where average profit is around US$4.5. Also most products create far bigger revenue for the dealer than the products in the solar lantern segment.
The incentive to sell these systems is therefore much bigger than for lanterns. This market segment is however not yet developed with just over 100 sales per year among all brands. This segment contributes proportionally more to the revenue of the companies. Nevertheless, because the number of sales is much lower, solar lanterns still provide dealers with a bigger revenue. About half of the total revenue created in the market is coming from solar lanterns and whereas micro-kits do not account for more than 10% of the sales, they are bringing in considerable revenue for the companies.

![Market share based on revenue](image)

**Figure 9: Market share of the different segments according to revenue created.** Because the value of products in the lantern segment is lower, the contribution is only 50% to companies revenue, while they contribute 80% of sales. On the other hand, micro-kits contribute disproportionally high to revenue.

As stated before, when we look at absolute monthly sales, the products in the solar lantern segment are most in demand. But when the market shares are evaluated in terms of revenue generated by each segment for the data that is available, we see a slightly different picture. The Solar Lantern segment still holds the most important market share at 50%, but both the Micro-kits and the SHS now account for 25% of the total revenue made in the sector.10

### 4.2.3 Solar Home Systems

The second largest market share belongs to the segment of solar home systems. Their absolute monthly sales amount to 11% of the total sales in the sector measured by units sold. In this category we find both plug-and-play SHS and SHS from different components that range from 20W to 1kW. The only products available in this category of plug-and-play SHS on the Rwandan market are from the BBOXX collection, consisting of the BBOXX12 of 30W, and the BBOXX17 of 50W.

In terms of price levels, the prices increase with the size of the system. However, the average prices of Micro-kits and the low priced SHS do not differ very much and the market segments are quite fluid and not clearly defined there. This is on the one hand due to the relative high cost per Watt of Micro-kits, and on the other hand of the wide variations in sizes for SHS.

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10 Institutional sales could not be included due to lack of consistent data on sales.
The SHS available on the market in this segment range from 30W to 1kW. For SHS from different components one can expect to pay around US$8 per Watt. For the plug-and-play SHS, the prices are higher than most products in the Micro-kits, except for the Village Kit which is more expensive than the BBOXX 12 and 17. The average price for a plug-and-play SHS product is around US$420. The margins per product sold for these products are around US$ 70 per product.

**The BBOXX BB17 kit**

- Portable battery box of 17Ah that can store up to 200Wh of energy from a 50W solar panel.
- Up to 4 lights and two USB plugs to charge phones as well as the possibility to connect an inverter to power AC appliances up to 120W.
- Typical retail price: RWF 178,200
- Typical wholesale price: RWF 142,600
- Sold at BBOXX and Great Lakes Energy

![Market share Watt installed](image)

**Figure 10- Market share of the different segments according to installed Watt.**

Whereas SHS make up only around 10% of volume sales, the account for the vast majority of installed power.

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11 No data available for institutional sales and they are therefore not reflected in this figure. However, it can safely be assumed that the amount of installed Watt through institutional sales is overshadowing the sales from the smaller segments by far.
4.2.4 Institutional sales

In Rwanda, in terms of installed capacity and turnover, the solar PV market segment for the off-grid electrification of institutions such as schools, health centres, churches and public sector offices, has been the largest and is likely to remain the largest segment for the foreseeable future. On average, there are around five institutional sales a month.

Today around 80% of health centres have been electrified through the efforts of the government and various donors, for example USAID and BTC. The European Union is also financing an on-going solar electrification project that focuses on secondary schools with €7 million. In this respect it is worth pointing out that the National Energy Policy calls for the electrification, whether through the grid or through solar PV, of all health centres, schools and sector offices by 2017. This still leaves a considerable procurement market although the number of tenders and their size has declined since 2010, because some of this work has already been contracted.

### An institutional system

- Panel’s sizes are from a few hundred Watt to a few kW. A range of batteries (lead acid) and a bigger control system come with it.
- Schools or sector offices can have lighting in many rooms as well as operate IT systems. Hospitals and health centres can refrigerate vaccines.
- The price of the system varies a lot according to size and requirements but deals are usually between US$ 10,000 and 20,000.

4.3 Warranty Schemes

It appears that a standard product warranty across product lines and manufacturers of 1 year from purchase is emerging in the market and is pretty uniform amongst dealers. However, how faulty products can be exchanged differs. Products from Barefoot Power used to have a warranty of 6 month only but this has recently been changed to 1 year.

Because their products were supplied from Uganda before the establishment of a local branch and service centre, some retailers offered only a 3-month warranty to allow shipment to Uganda on time for exchange. BBOXX also only offers a warranty of 3 month but this might be changing soon.
This stresses the importance of regional representations of the manufacturers. For example, Greenlight Planet does not have a permanent presence in East Africa, therefore warranties given on a product might fall back on the distributor as there is no cost-effective way to get the faulty product to the supplier for repair. Warranty is currently given out of courtesy and in trust to the distributor that correct figures are reported.

For most distributors, the warranty can be claimed at a dealer level or at least in a representation office in the district. For the K-Light and the BBOXX product range however, customers need to come to the office in Kigali. Currently, BBOXX also does not have a physical office in Rwanda anymore, which is, however, likely to change again in the second half of 2012.
Chapter 5: Distribution

5.1 Distribution models in the different market segments

Three main distribution models can be differentiated when looking at the off-grid lighting market in Rwanda. The first one is direct sales from the premises of the company itself, the second one is sales through a dealer network, and the third one is door-to-door sales through dealers or agents that involve much more active promotion of the product. In terms of overall sales, the sales on the premises and the sales through a dealer network each account for 10% of the total sales. The door-to-door sales method generates most total sales with 80%. This is mostly due to the fact that most sales by number of products come from small lanterns, which are often sold door-to-door.

![Sales by distribution method](image)

**Figure 11: The share of monthly sales by distribution method.** Sales through door-to-door marketing using pro-active agents dominate the market but still a considerable percentage is sold over the counter at the distributors in the major cities. As lanterns dominate sales figures, this picture reflects mainly lantern sales. SHS are less sold door-to-door or through dealers but 50% from their own premises.

They do not generate high revenue though, and that is reflected in the percent of total revenue generated by each distribution model. Comparing revenue, door-to-door sales still account for most the largest share with 40%, while sales on the premises mount and through dealers account for 30% each, despite lower absolute sales volumes.
Compared to monthly sales volumes, more revenue is generated on the premises and from dealers as larger systems are sold. Taking into account that door-to-door sales and dealers require higher expenditures, it shows that sales from premises are still very important in sustaining profits.

For lanterns specifically, sales from the firms’ premises is the most common sales method, with five of the ten questioned distributors using this method. However, it is not very effective in contributing to sales. Two of the companies mainly use a dealer network for sales of their company, and two others go door-to-door.

Thus, the most popular sales method seems to be the least effective. Only 9% of all monthly lantern sales come from sales on the premises. Around 9% of the total lantern sales come from sales through a dealer network, and 82% comes from door-to-door sales. In terms of revenue, around 50% of all revenue from lantern sales comes from active door-to-door sales, while sales through a dealer network and from the companies’ premises account for around 30% and 20% respectively.

This might make a door-to-door marketing approach appear to be the most effective and profitable way for a company is to sell their products, particularly lanterns. However, revenue and profit should not be confused and it is a very costly distribution method. Currently it is only viable if marketing subsidies are given to the companies to set up a network of sales agents that go door-to-door and push sales.

For small systems, the door-to-door sales method is not used. Sales on the premises and sales by a dealer are both equally popular with 3 companies using each of them respectively. Sales through a network of dealers, however, generate more sales. 68% of all sales of small systems come through a dealer network. This is not surprising as small systems are commonly most popular in rural areas. In terms of revenue we see a similar pattern with 80% of all revenues coming from sales through the dealer network.
Most companies in our survey that sell SHS sell them from the premises. The door-to-door sales method does not generate a lot of sales, with only 10% of the total sales of SHS, while the dealer network from one company generates 45% of the total sales, as much as the sales from the premises from 4 other companies. Surprisingly, in terms of revenue, sales through the dealer network only account for 10%, while door-to-door sales accounts for 40% and sales from the premises adds up to 50% of the total revenue from sales of SHS. The reason behind this is that the sales from dealers have been smaller SHS (30-50W) with a smaller price and revenue per system, while the systems sold on the premises have been much larger (50-100W). Even though only 10% of the total sales of SHS have been through a door-to-door sales network, they account for 40% of the revenue because the systems sold in this method have been relatively big (200-1,000W). As for small systems, we thus see that having a dealer network is a very effective way of distributing SHS in terms of sales numbers, but as this is mostly used for smaller systems that are most popular in rural areas, this method is less interesting in terms of revenue.

For institutional sales, dealer networks are not used. This is hardly surprising, as institutional buyers are usually not based in the regions where dealers are present and would want the advice and installation from the specialist. This is why sales on the premises are the most commonly used method with around 95% of all institutional sales made this way. All 4 of the distributors who make institutional sales do it from their premises. One of them also goes door-to-door to market the products and make sales, and this accounts for 5% of all sales.

Out of all the companies that took part in this market research, 7 of them make wholesale sales, but only 3 look for it actively. Some of this wholesale is for other countries, namely DRC and Burundi. Those who look for it actively do so by going to trade fairs, visiting supermarket chains and by going through the country identifying potential retailers.

5.1.1 Dealer networks

Even though dealer network only accounts for 10% of the total sales, it does generate 30% of revenue for the companies. Also, half of the companies taking part in this market study actively make efforts to find dealers to sell their products.

To sell solar products a certain degree of technical and commercial knowledge is required. To attain this, 80% of the companies train their dealer network. The 20% that does not provide training does this because they feel their product, mostly solar lanterns, is so easy to use it requires little of no technical training. For those who do provide training, there is a large variation between the trainings. For some, this can be a 30-minute training for each product, for others it's a four-day training spread over a month.
To stimulate the activities of dealers, several companies offer credit arrangements to the dealers they work with. If credit arrangements are made with dealers it’s mostly on lanterns. In total, five out of the ten companies used to give credit to their dealers but two have stopped these arrangements on a regular basis. They offer a month of supplier credit before full payment is required and two companies consider giving credit arrangements only in the form of a payment delay of 2 weeks, with partial advance payment and only in exceptional cases for good performing dealers. Credit is more likely in wholesale deals to other established retailers but unlikely for the dealers in rural areas with low sales and little collateral or trust.

However, these are the intermediaries in the distribution chain that are most dependent on financing as their ability to pay upfront is very limited. Credit is also given by the suppliers themselves and not through financial institutions. Nuru Energy used to have an arrangement with a micro-finance institution but due to the change in the business model, under which the pedal generator remains property of Nuru Energy, no credit from a third party is required anymore.

When we compare the average turnover on solar products with the average turnover for companies that use a dealer network, we find that, even though sales through dealer networks account for 30% of all revenue, companies that use a dealer network have on average a much lower turnover than companies who do not use a dealer network. The reason for this is that the most profitable products that have a high share in the turnover are large and often institutional installations. For these types of installations, dealers are hardly ever used. Dealers are mostly used for solar lanterns and small systems. When we look at the average turnover on solar products <US$100 we see that companies that use a dealer network have an average turnover that is around 35% higher than the turnover of companies without a dealer network, showing that dealer networks can increase sales.

5.1.2 Door-to-door sales

The most effective distribution method in terms of absolute sales and generated revenue, door-to-door sales, is only actively used by three of the companies, all of which have a modest turnover. Only one company uses its own employees to go directly to the clients, while others have sales agents or use their dealer network.

Two additional companies were previously working with the door-to-door distribution method. One of them tried the “business in a bag” model. They stopped working with this model as it was found unreliable, did not create the income for the agent as expected and customers preferred a traditional shopkeeper to return to for questions. Another business worked with a women’s co-operative, where the women received 6 lanterns for free that they could sell through door-to-door marketing. The money made from those sales they could be use to buy more lanterns from the company. Seventy-five women were trained this way, but as this distribution network is not actively supported anymore, it is unknown how many women are currently still active.
Pro-active door-to-door distribution is mostly used for solar lanterns and indeed leads to increased sales. The turnover for small solar products under US$100 of companies that currently use the door-to-door distribution method is on average around 75% higher than the turnover for companies that use neither dealer networks nor door-to-door distribution. They also make 30% more turnover than companies using a dealer network without using door-to-door marketing activities. On the other hand, costs for door-to-door marketing can be higher than for traditional shopkeepers and as mentioned above, only companies with access to donor funding are using it currently at scale.

5.2 Product availability

In terms of country coverage, the highest turnovers are found in the capital. This comes as no surprise as all but one of the companies operating headquarters are based in Kigali. However, the most sales are found in the regions, as are most of the dealers. This is logical as dealer networks are most useful to reach the rural areas.

![Geographical spread of revenue in the off-grid lighting market](image)

**Figure 13: Geographical spread of revenue in the off-grid lighting market.** By far most turnover is generated in Kigali itself, while some districts are currently not covered.

The highest selling items are lanterns, and this is why we see that most sales are outside of the capital as lanterns are mostly sold in rural areas. The sales are highest in the eastern region, due to the focus of one company on this region.
Figure 14: Geographical spread of sales across the country. Due to the high sales of two leading brands in the lantern segment that focus on particular areas of the country, most sales are recorded in the Eastern Province and particularly in Bugesera District.

In the north we find that there are a rather low number of sales and dealers, but a high turnover. This indicates that there is a small amount of high profit sales that do not depend on a dealer network, most likely from SHS and institutional sales. The most active distributor in that region does not have a dealer network and sales are from the premised only.

When a company uses a dealer network or sales agents to go door to door, they use a very large number of them, indicating that they most likely have a wide geographical spread. Having a large dealer network is very costly, however, and most companies using this sales method have received significant grant funding to set up their network.
Figure 15: Geographical spread of dealers across the country. Most dealers are located in Bugesera District, followed by the Eastern Province as a whole and Nyamasheke District.
Chapter 6: Marketing and promotion

The companies’ expenditures on marketing, promotion and their dealer network show huge discrepancies in what companies are willing or able to afford. Apart from 3 companies, the distributors spend less than US$2,000 per year. However, in 2011 three companies each spent in excess of US$40,000 per year, although one of them has fully halted their activities due to a lack of funding.

Interestingly, almost all expenditures on marketing are targeted to the lanterns and the small sector of the market. This is however hardly surprising. The most active companies in this market are concentrated on this product segment, have international experience and have been able to raise considerable funding, often from public sources to finance their promotion campaigns. One of the companies with high sales is spending US$80,000 per year on entrepreneur recruitment and training as well as marketing activities - far above their yearly turnover. Indeed, 3 companies spent more on marketing than their revenue. This is possible through the large grant and commercial start-up funding that the international companies have been able to access.

Figure 16: Marketing budgets of the involved companies. A few outliers are well endowed with funding for marketing, whereas most cannot spend much on promoting their products.
The companies selling larger and institutional systems do not spend much on marketing and rely on clients enquiring directly at the supplier. The institutional market is dominated by tenders and thus making marketing largely irrelevant. Also some suppliers are saying that for the larger systems the client relationship is very important and therefore intense marketing would attract more clients who might not be interested in the end or would buy from cheaper suppliers after getting advice.

At the other end of the market, including the small products and lanterns, high sales levels are important to achieving profitability. The companies with low sales and without access to grant or concessional financing are also not interested in marketing and are trying to make sure they market the products on the back of other promotion activities, for example lanterns will be promoted when technicians go out to install larger SHS or exhibitions of agricultural equipment also include products for lighting. Only international enterprises with the financial backing and the social aspect of their business that allows donor funding, are able to enlarge their promotion in order to increase sales outside of Kigali.

One firm has received a grant of around US$800,000 to kick start operations in the country and establish their distribution model based on local sales agents and door-to-door marketing. Therefore their current expenditures of US$50,000 are about 3 times as much as their turnover in 2011. Start-up costs are high and sales levels will need to grow in order to afford the expenditures associated with an expansive dealer network. Nevertheless, it is hard to imagine how sales of over 400 per month could be achieved within a few month of incorporation in Rwanda without this funding.
Another distributor also secured grants totalling US$300,000 from various funds and a concessional loan of US$800,000. This allowed them to fund the high upfront costs of their business model.

Experience shows that expenditures on marketing can be turned into larger sales but the system needs to be build sustainably. At the high point of a grant funded marketing campaign of one of the distributors in 2010, they sold more than 600 products per month, more than have since been recorded by any other company. However, this does not mean that sales levels can sustain an expensive distribution network. The funding helped to get the products out but it was essentially a supply push. The growth was too fast, and problems with the quality of the product and issues of performance management of the dealers led to a scale down of operations. It was also clear dealers had not been selected and screened carefully enough.

6.1 Marketing and promotion activities

All interviewed companies engage in marketing and spend a part of their revenue on it. In most cases this is also targeted specifically at the smaller products that would appeal to a larger number of the population.

Advertisements or interviews in the local radio stations seem to be very popular among the companies, sometimes they even get invited for free. Dassy Enterprise made good experiences with a radio talk, where listeners could call in and ask questions on the phone. Most time was spent debunking some common myths about solar power, like low quality products, with an emphasis on the economic savings. As a result, the distributor estimates that around 50 people have visited the shop. For another company a radio advertisement brought 20 people to the shop. It appears that radio talks can promote interest and awareness of the products but radio ads in the current form are unlikely to have a considerable effect on sales.

Market days and small exhibitions can help to increase awareness of the products and demonstrate their use. Seven companies engage in such activities as part of their promotions. For three, this consists of a booth at the national EXPO in Kigali that is organised on a yearly basis by the Private Sector Federation. While direct sales resulting from the participation make it worthwhile for the companies to attend and use it for networking and finding wholesalers, it is unlikely to have an impact on rural distribution. For those companies doing market fairs in rural areas, perhaps at a cost of a few hundred dollars each, it’s not yet clear if they recover costs.

Marketing through agents who directly approach customers, rather than waiting for them in a shop, can be very expensive and views among the market players on their usefulness are very diverse. Two companies with large sales use this strategy as an integral part of their marketing plan and the results might indicate that it works well, as they are selling most products on the market.
On the other hand, a company tried and found it a bad business decision, as sales would not justify the large management effort to deal with many small agents and to recover costs. The two companies mentioned earlier are fortunate enough to have some grant financing support to contribute to these outreach activities. Once agents have been recruited and trained, costs fall and revenues should continue to come in from these dealers. Very important is an effective management system based on performance, access to finance or stock, and clear incentives for agents to sell.

**Current marketing activities**

![Figure 18: Frequently cited marketing activities](chart)

When promoting their products a clear focus is put on emphasising the savings that can be made using solar products as compared to kerosene. Some companies give out leaflets or promotional material that states the average expenditures on kerosene and compares them to solar products that require higher upfront investments but will be “free” to use after.

Environmental and health benefits are also often used as promotional messages but interestingly more by the companies that don’t do much marketing in general. Although it might be widely used, there is no emphasis on this message and some companies don’t believe it to be an effective message to increase sales.
More and more the secondary uses of lighting products are an important component of any marketing. Some companies told us that they would not sell any product without the option to charge mobile phones. The network coverage in Rwanda is good as the settlement structure incentivises the companies to enable reception in most areas. However, given that around 10% of the population have access to electricity, the question of how to regularly charge your phone is important.

Small shops that charge phones take usually RWF 100 to 200 (US¢15-30) per charge. There are enterprises in remote areas using solar power to charge phones but the business model is not yet widespread.

**Frequently cited marketing messages**

<table>
<thead>
<tr>
<th>Economic Savings</th>
<th>Mobile phone charging</th>
<th>Environmental and health benefits</th>
<th>Application/Entertainment possibilities</th>
<th>Retailer Brand</th>
<th>Locations of purchase</th>
</tr>
</thead>
</table>

Figure 19: Frequently cited marketing messages. Economic savings are the main benefits pointed out in marketing material and radio ads. However, many advertisements or road-shows appear to leave out the locations where products can be purchased.

With highly improved energy efficiency and reduced prices, radios and TVs can be powered even with small systems of a few tens of Watts. This potential for entertainment and applications of the technology is clearly emphasised by the companies selling in this product range. Because most sales are still in the “lighting-only” category of products, this is not yet relevant to all market players but we assume that it will increase in importance.

Interestingly, although most promotion is still through radio or perhaps road-shows, the companies currently mentioned very little with regard to product availability when speaking about their marketing activities. Only one company specifically mentioned that the possible locations of purchase were an important bit of the promotion. Three companies engage in door-to-door marketing where the possibility to purchase is clear and most other companies do not engage much on marketing. Nevertheless, there is possible room for improvement to emphasis the availability of products.

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Four companies have tailored their promotions to the particular range of products which they offer and understand their target market well. Clearly, the market for a BBOXX product, which offers a range of possibilities to charge phones, hook up an inverter or a TV, is different from a Firefly Mobile desk lamp and thus different strategies can lead to success. However, there has been limited experience in Rwanda and apart from active campaigns by ToughStuff and Great Lakes Energy, the internal learning from marketing in Rwanda has been fairly limited and companies are still exploring the best ways to market their products to the consumer.
Chapter 7: Growth targets and challenges

The companies are at very different stages of their development and therefore vary widely in terms of their ambitions and targets. Some see targets as a distraction but others have a clear sales plan in place, partly due to grant and financing requirements as well as investor expectations.

7.1 Targets

Modest growth targets are certainly not a quality of the market players. One of the companies that is distributing solar products as a subsidiary activity has set itself a target to increase sales by 50% within a year. The specialised firms that focus purely on the off-grid lighting market are more ambitious with 3 companies aiming to quadruple monthly sales by the end of 2012. Boosted marketing activities and more innovative ideas like leasing should contribute to that increase. A fourth wants to double the turnover over the coming year with a stronger focus on the market for domestic micro-systems. The rest of the companies have not set themselves targets.

While we expect increased competition over the coming years between the market players, each of them is also becoming more aware of the niche they can serve best. Thus, the cited opportunities, which they identified, cover a broad spectrum.

Dassy Enterprise are geographically focused on the Northern Province and want to focus on areas that have recently been electrified but where many can’t afford a connection or are just a little too far to receive a connection. Two companies hope to get larger international organisations and NGOs to procure large quantities of lanterns. Also other related products at the side provide a business opportunity, such as Solar Water Heaters, which are now subsidised by the government, or TVs that can be powered by a small solar system.

7.2 Barriers to growth

In order to achieve these high goals, a range of challenges need to be overcome, all of which are well known but some may be more profound in Rwanda than in other markets.
Affordability/consumer finance
Managing/financing distribution
Sourcing stock/ import/ transport
Awareness/promotion
Financing stock
Quality of products

Figure 20: Frequently cited barriers to growth. Affordability of the products is still a major concern amongst the companies in the market, together with financing the distribution chain and importing stock.

High prices of the products, low affordability and challenges to provide financing solutions to the consumers are most frequently cited as being barriers. Indeed, products are more expensive then in larger and more accessible markets like Kenya or Tanzania, partly due to taxes and higher transport costs, partly due to lower scale of the operations and thus increasing the necessary margin per product. Additionally, the mean income per household is lower in Rwanda then in other markets, making the products more difficult for consumers to afford. Interestingly, the affordability concerns are mainly voiced in the lower price segment of the market (e.g. lanterns), whereas for solar home systems the price tag seems to lose its importance for reaching the customer.

Next to high prices and affordability concerns, low awareness and lack of funding for promotional activities have also been concerns, although not quite as many mentioned them as challenges. The seasonal income of farmers who are a large part of the population adds to the challenge. One company said that 80% or more of the attendants at a marketing fair would consider buying the product but would need time to gain trust in the product. More awareness and exposure to the products can lower the barrier of entry for new products or firms. Getting the products closer to the client is an often-voiced aim of the companies but at the same time listed as a challenge they find hard to overcome, as it requires substantial human resources and funding.

Transport is also a headache for many importers as very few are importing full containers but get them in small quantities from Kampala or Nairobi where the distributor will also add a margin to the sales price. Due to bad roads from the main ports in Mombasa or Dar es Salaam, import costs are mostly between US$1-6 per product or around 7-12% of the products value.
Financing their dealers to allow them to purchase more stock is still a barrier that the companies have struggled to fully address. One company had a relationship with the financing institution but the loan assessment and other managerial issues led to the decision to change the business model, in which less upfront financing from the dealer is required. While currently three companies give credit to retailers, none of the companies that have a large dealer network or sales agents give credit or only in exceptional circumstances. One firm that did this in the past but had difficulties in repayment because the dealers did not sell as many products as intended in the given timeframe, leading to cash flow problems for the firm. Managing a network of 100+ agents or targeting a network of 500 entrepreneurs is a challenge. Managing contracts and payments as well as providing training to the affiliated retailers requires sophisticated managerial systems, which the large companies have been able to test elsewhere in the region or over some years in Rwanda.

Smaller players might not be able to manage such complex operations and may decide instead to become affiliated with an importer/wholesaler in the country. Whereas suppliers often give credit for larger wholesale deals, small dealers and agents do not have that option. They need the purchasing power to stock products and the lack of this capacity limits overall sales of the distributor.

Interestingly, only two companies cited import financing for stock as a problem. The explanation might be twofold, because first, companies that don’t have large sales volumes or turnover per month and can purchase the products from Uganda or Kenya every few month with available capital. Secondly, the large sellers have completed their capitalisation before starting the operations and are well endowed with upfront capital. If the market grows, however, this could become a larger challenge then it is currently.

The quality of products appears not to be a major concern anymore. While some distributors had products with high failure rates one or two years back this seems to have been tackled by the manufacturers because the three distributors that were unsatisfied with certain products in the past did not voice this as a barrier of importance. Partially they have moved to different products, partially the manufacturer has improved the product. The only firm that mentioned quality being an issue for the scale up of the company is focusing on the institutional and SHS market where a larger range of suppliers exist and no easily understandable and enforced quality standards or labels such as Lighting Africa certification are available.
In 2009 the Russian Federation provided US$30 million to support energy enterprises in sub-Saharan Africa. The objective of the Energy SME Trust Fund, which is administered by the World Bank, is to provide additional financing and technical assistance to Small and Medium Enterprises (SMEs) in selected countries in sub-Saharan Africa. It aims to foster local private sector entrepreneurship and investment in the provision of energy services in remote, un-served and under-served regions in Sub-Saharan Africa and to increase access to reliable, sustainable and affordable modern energy services. For the preparation and implementation of the activities, the World Bank is collaborating with GVEP (Global Village Energy Partnership) who directly support the enterprises in order to access this funding.

Rwanda is one of the countries selected for support under the ESME Trust Fund. This support in the form of grant funding, which supplements the existing Sustainable Energy Development Project (SEDP), will be used to: a) provide funding to private developers for micro-hydropower projects and associated mini-grid networks; b) build capacity aimed at strengthening the quality of the local pico-hydro sector through business training and technical assistance and c) provide grants to local businesses to support marketing and the development of a dealer network for low-cost off-grid lighting solutions in rural areas. The Energy Water and Sanitation Authority (EWSA) is implementing the project with assistance from GVEP, whereby GVEP will provide in-kind support in the pre-investment phase to micro-hydro developers and assist suppliers of off-grid lighting products.

Grants for marketing off-grid lighting solutions

The ESME Project in Rwanda will provide small grants to local businesses to support the development of retail networks for off-grid lighting products in rural areas and to scale-up their marketing and awareness campaigns.

The project aims to promote the private sector to engage in rural markets for off-grid lighting solutions as well as building consumer awareness and trust. It provides grants to local businesses to support the development of a dealer network for low cost lighting solutions in rural areas. Low-cost solar products are proving popular in East Africa and are affordable by large numbers of people. As this report has shown, there is a significant potential market in Rwanda that remains undeveloped. Nevertheless, the few companies currently dealing in these products are small and have limited cash flow. Building consumer awareness and trust, and creating and training networks of local resellers is time consuming and expensive but an important element to build up volume sales.
The social, health and environmental benefits, which accrue from replacing kerosene lanterns with solar PV alternatives, justify the use of public funds to assist businesses in their marketing activities. Most manufacturers or distributors do not have a marketing budget or for those who have, the costs of informing and educating customers are prohibitive. Door-to-door or direct marketing is often seen as most effective but the logistics involved are expensive.

The aim of the intervention is to allow enterprises dealing in those products to conduct marketing activities at a large enough scale to have substantial impact and help them to reach a consumer base high enough to operate financially sustainably and independent from government and donor funding in the future. Support is expected to be phased-out by the end of the ESME Project by achieving economies of scale and lower import and transaction costs to get a product sold in the rural market.
This market assessment provides an overview of the off-grid lighting market in Rwanda at the end of 2011. Ten active companies in supplying low-cost lighting solutions were interviewed on their products and sales data, their distribution channels and marketing activities as part of a baseline assessment of the off-grid lighting market in Rwanda.

This report summarises the findings of this research and provides an overview of the current status of the market, the key players and their products. It also gives insights in product availability and affordability with a focus on off-the-shelf lighting products.

The report also describes the kinds of products currently available in Rwanda, the segmentation of the market between smaller and larger products and the geography of sales.