GLOWSTAR FINAL TECHNICAL REPORT

DATE

14 Aug 2003

TITLE OF PROJECT & PROJECT NUMBER	**Micro-Solar Lanterns - Development and Marketing - R6845**
ORGANISATION	**ITC Ltd**
REPORTING PERIOD	From **June 1997** To **Mar 2003**

Executive Summary

- The Glowstar lantern is now being manufactured by Sollatek UK. It is made in China before being shipped to destinations worldwide. Exact numbers manufactured so far are not known by ITC but up to June over 2,010 lanterns had been shipped to 25 different countries. Overall the project has mangaged to develop a product which the private sector has taken on, developed with their own funds and is distributing through their worldwide supply chain. The private firm is commited to the product and will continue to develop new markets for what it sees as an exciting product and a valid expansion to its product range.

- The method of developing the product using customer surveys and rapid prototypes has achieved a product which is well made, and liked by consumers, as well as delivering what they require. These techniques are therefore not only applicable in developed countries, but serve the same purpose in developing products for poorer markets.

- Working with the private sector can cause problems in availability and reliability of information, timeliness of delivery of project outputs and diluting of the pro-poor focus of the work. ITC had to continue the work on its own after the withdrawal of commercial partners at the start. This actually worked for the best as once the product was further developed the commercial partners became interested again. Handing over the product to the private sector now ensures that the product is sustainable, will continue to have a future on the worldwide market and impacts on the livelihoods of both the poor and non-poor across the globe.

- The rural mass marketing in Kenya has not yet achieved the sales numbers it set out to due to problems getting supplies of lanterns into the field and the price of the lantern not being as competitive as promised. The marketing exercise was not able to run for as long as envisaged due to delays in getting lanterns into the market. A longer marketing exercise would have seen better results. Interest from consumers was high, with over 100 people and organisations expressing an interest to buy the lantern but having no local distributor who could sell them one.

1. Goal, Purpose and outputs of the project:

Project goal

In descriptive terms, this project is designed to review recent experience of solar lanterns, develop, produce and market an affordable, reliable micro solar lantern in Kenya, meeting the needs of large numbers of poor rural people for better quality and cheaper lighting.

The goal of the project is to develop the use of renewable sources of energy. When successfully completed, this project will lead to improved access to, and efficient use of, domestic energy.

Work to date has concentrated on developing a team culture and market survey work. This will lead to a clear understanding of what characteristics of the product are necessary to satisfy the rural Kenyan customer.

Project purpose

The purpose of this project is to make improved lighting services available to large numbers of rural people in Africa.

Project outputs

Six significant outputs have been identified for this project.

1. Sales of low cost solar lanterns to satisfied customers. Achievement of this output will be measured by in enumerating the number of lanterns sold. The target is 30 thousand per year after 3 years. Evidence of repeating custom is also considered a measurable indicator.
2. Promotion of awareness of solar lantern. The level of awareness will be measured by survey work designed to gauge the customers view of the product.
3. An attractive and reliable product. This can be measured by component analysis and feedback.
4. Trained technicians and distributors. Again measured by the number of functioning lanterns in the ownership of the rural Kenyan population
5. Un-subsidised sale. The lantern product should be sold at a competitive price which truly reflects the cost of production and therefore is attractive to the private sector.
6. There should be evidence of a sustainable supply and distribution chain in Kenya. This can be measured by the number of product sales and repair outlets.

2. Summary of work

<u>Research</u>

The first stage of the work was to do detailed market research work on the current lanterns available in Kenya. The was done by a local consulting company in Nairobi called Energy Alternatives Africa, with input from ITC and IT Power. The results of this study were that the most important features needed in a lantern were as in the below table

Service characteristics	Design characteristics
The maximum price of the lantern should be no more than $75 if possible	The lantern should give a 360 degree spread of light,
The lantern should provide light for up to 4 hours each evening	The bulb enclosure should allow maximum transmission of light with minimum dispersion effects.
Customers should have access to affordable and readily available spares	The carry handle should be sturdy and comfortable.
Customers expect an overall lifetime of the lantern of 6 years	The preferred choice of bulb was a 5w CFL type
Customers expect a 12 months warranty for the product	The lamp should be portable and weigh no more than 2.5 kg.
	The lantern should be stable with a good base.

Full details are available in Annex One.

Product Development

The initial plan was to work in conjunction with several existing Nairobi based companies to develop the lantern. There were problems of property rights, conflicting agendas and development versus commercial issues that meant that this partnership quickly broke down and ITC was left taking forward the whole project on its own. Initial design work on the materials was done by ITC, with the circuit board design and battery specification dealt with by sub-contractors.
Considering the technical requirements for the solar lantern and the projected production quantities, injection moulding was selected as an ideal technology for producing low cost, high quality components with the level of detail required for this product. High Density Polyethylenes and filed Polypropylenes are relatively inexpensive and robust materials which can be recycled using simple equipment.
Rapid prototypes were made locally in the UK to further the design process and the final detailed design work on the lantern was sub contracted to an industrial design firm.

By the close of 2000 work had progressed far enough to enable 40 prototypes to be made and sent to Kenya for household testing by potential customers. These prototypes were again made using rapid prototyping techniques that enabled cost effective replica injection moulding products to be supplied as fully functional products. Facilitators visited households and used questionnaires to measure customers reactions to the new lantern design. In addition, selected members from households were gathered together to form focus groups where information was collected through more informal discussions about the lanterns. The results were hugely encouraging with most people very positive about the lantern and the light it supplied. Some minor details were noted for alteration in the final product design. Full details are available in Annex two.

Commercial partnership

The project was actively looking for partners who could take the idea, and manufacture it in large enough volumes at a low enough cost. Initial interest focused

on firms in Kenya, there was little real interest. The scale of manufacturing in Kenya is relatively light and although the injection moulding could take place there, the circuit board manufacture would have to be done overseas and imported. Similarly, the technology for the batteries chosen was available in Kenya, but they were not actually being made there in the format we needed. Overall, the economy of Kenya was in such a poor state that no-one was prepared to invest a substantial amount of money in a theoretically good, but unproved product. We were then approached by one of the initial partners asking if it was possible to enter into some agreement. After evaluating all the potential partnerships that we had on offer, it was felt that Sollatek UK would offer the best possible future for producing and distributing the lantern worldwide. They would make the lantern using their existing manufacturing capability located in China which would have the advantage of producing the lantern for the lowest cost, and substantially lower than a comparable operation in either Europe of Africa. Sollatek have a reputation for quality products and spent additional time checking the quality and functionality of the lantern before it was finally placed on the market. The lantern is offered with a two year warranty, which is more than its competitors.
The lantern also had a new name, as a competition in ITDGs Energy magazine for a suitable lantern name was run. The lantern was now called the GLOWSTAR.

After the household testing the lantern generated a huge amount of interest. An international paper was presented at the World Renewable Energy conference in Brighton in July 2000 and at the Massachusetts Institute for Technology (MIT) Development by Design conference in July 2001, an independent article was written in New Scientist in July 2000, a short film was made TVE and broadcast worldwide and ITC even had a slot on a mainstream breakfast TV show in the UK to talk about the Glowstar. Interest in Kenya was also high as the country was in the middle of a national energy crisis due to a drought affecting hydro power stations. Examples of the interest shown are available in Annex 3.

Rural Mass Marketing

The next aim of the project was to develop a marketing plan with the commercial partner. Sollatek UK had links to many distributors worldwide included operating one in Kenya - Sollatek Kenya. The Glowstar lantern program aimed to develop, produce and market an affordable, reliable lantern capable of meeting the lighting needs of the rural poor in Kenya. ITC, ITDG Kenya, Sollatek Kenya and a consultant from IDE met in Nairobi to review the market research findings, set a product design criteria and discuss the marketing strategy to be adopted. IDE, an organisation with expertise in rural mass marketing, was responsible for the marketing plan and marketing work packages. Inputs for the strategy were gathered from the discussions held in Nairobi, individual meetings with persons familiar with the solar market and various reports and studies into solar activity in Kenya.

The main aim of the marketing plan was to extend the current distribution network for the Glowstar beyond the towns only. Mass marketing in rural markets requires concentrated grassroots promotion, backed by a village level product delivery system. Therefore to extend the penetration of the delivery system of the solar lanterns and also leverage local word of mouth promotion it is envisaged to create a cadre of village level Sales Agents (SAs) who would operate on commission basis. These SAs could be either school teachers, SHS technicians etc. who are based at the village level and stock, promote and sell the Glowstar as a part time business. With an expansion of sales volume, full time sales agents may develop. The SAs would increase the customer price of a lantern by around 5 -10%. However this

would be more than off set by the following advantages accorded by the SA network:

The marketing in Kenya started in January 2003 and 5 rural sales agents were trained and recruited in April 2003. Delays in the lanterns being produced by Sollatek UK and project deadlines meant that the marketing could only last three months. These initial months were beset with logistical problems which were slowly sorted out but had a large impact on the results. In a marketing period of 9 months as envisaged, these problems would have had a much smaller impact on the overall results. The rural marketing period is now over but Sollatek Kenya is interested in using these agents to boost sales of lanterns and other products, especially at peak sales times such as harvest season and Christmas. In summary, the figures for organisation contacted by the Sales Agents to stimulate interest in the project over the 3 months they were active were

	Contacts	Demos
Embu	42	15
Meru	47	12
Nyeri	60	20
Nakuru	23	
Kisii	41	10
Totals	213	57

The numbers of sales actually achieved by the Sales Agents were quite low, with 12 standard and 39 plus lanterns sold through the marketing activity. 40 of these were in Nairobi, so only 11 lanterns were sold in rural areas. This was primarily due to stock shortages at distributors in the regions and potential sales figures where customers had indicated a desire for the Sales Agents to source stock so a sale could be made were as follows

	Standard	Plus
Meru	6	9
Embu	2	24
Nyeri	17	
Nakuru	64	
Kisii	20	
Total	142	

Full details of the marketing strategy are available in Annex 4.

In conjunction with this activity, the clubs of Rotary International Great Britain and Ireland chosen the Glowstar lantern as one of their good causes to support. Starting in Oct 2000 and continuing until 2002, individual Rotary clubs raised enough money to donate 232 lanterns through ITDGs East Africa office to poor rural and urban communities in Kenya. These lanterns were donated to community run organisations and institutions with the added benefit that they served as demonstration lanterns to assist the marketing activities ongoing in Kenya.
A further boost to the Glowstar was to come through the Engineering Councils Environment Award. The Glowstar was entered into the awards and emerged as the winner of the overall Environment Award for Engineers 2001. This again secured further publicity and entry into the European Environment Awards 2002.

A final paper on the whole process was presented to Design and Manufacture for sustainable Development Conference in Cambridge in 2003 to disseminate the knowledge generated during this 70 month project.

Exit Strategy

The lantern project funded by DFID ended in March 2003, but this is just the beginning of the life of the product. Sollatek now have ownership of the product and are pursuing higher sales both in Kenya and worldwide through various marketing strategies, including reaching out to the rural market more. Glowstars are being made in ever increasing numbers by Sollatek UK in China for shipping worldwide. So far they have been sold in over 25 countries across the world and this looks set to increase as production is speeded up. Sollatek UK manufactures the lanterns in China and up to June 03 had sold 2,010 lanterns from its stock to dealers and distributors worldwide. Annex 5 is the current brochure produced by Sollatek UK about the product. They have a dedicated website at www.glowstar.net for the product and have plans for online ordering.

3. Overall results of findings obtained by the project:

Research and Product Development

The method of developing the product using customer surveys and rapid prototypes has achieved a product which is well made, and liked by consumers, as well as delivering what they require. These techniques are therfore not only applicable in developed countries, but serve the same purpose in developing products for poorer markets.

Comercial Partnership

Overall the project has mangaged to develop a product which the private sector has taken on, developed with their own funds and is distributing through their worldwide supply chain. The private firm is commited to the product and will continue to develop new markets for what it sees as an exciting product and a valid expansion to its product range.

Working with the private sector can cause problems in availability and reliability of information, timeliness of delivery of project outputs and diluting of the pro-poor focus of the work. The private sector does not work to the same deadlines as development work and this needs to be taken into account in any further work with the private sector. The private sector is also very risk averse, and even when the risk is shared, as with the Glowstar product, they need to be certain they a have a reliable and marketable prodct before they will put it into the market. Working on their timescale has meant that project activities have sometimes had to be postponed for long periods until Sollatek have had given the go-ahead and logistics for the activities. Sollatek after all have far more to loose than ITDG EA, ITC or even DFID if the project is classed as a failure. Sollatek Kenya's distribution network has evolved in the last few years and is significantly different to how it was. Working with more than one distributor and importer in future would help to limit the vulnerability of the project to such changes and perhaps increase competition within the sector.

Working with the private sector does however ensure that the product is sustainable and will continue to have a future on the worldwide market and impacts on the livelihoods of both the poor and non-poor across the globe.

In Kenya, unscheduled prices increases by the importer (Sollatek Kenya) has caused price increases of over 40% which have caused problems with potential customers,

both individual and bulk orders. The significant rises mean the lantern is now virtually out of reach of the rural poor in Kenya. Increased volumes of sales may provide some decrease in price by the importer/wholesaler, but his will take time to affect be implemented. This has been reported to Sollatek Kenya, but they have their own ideas of how to price new products. Retail prices in other regions are not known, apart from in the UK where prices are up to 20% lower.

Rural Mass Marketing

The rural mass marketing in Kenya has not yet achieved the sales numbers it set out to due to problems getting supplies of lanterns into the field and the price of the lantern not being as competitive as promised. Interest from consumers has been high and this should enable the market to develop over time in Kenya.

Delivery of the lanterns to rural private sector distributors has so far been poor due to various problems in the supply chain. These include generating demand from rural suppliers, fulfilling orders on a timely basis for both urban and rural suppliers and the availability of standard discounts and credit terms for suppliers. These are being resolved by all parties and a new large order arriving in Kenya should also make the supply of lanterns less problematic.

Any exisiting supply chain in rural areas will vary widely with some distributors wary to stock an item that they see as expensive, but others seeing the product as able to generate sales and intendeding to buy several lanterns at a time. Any supply chain such as this is reliant on its sales outlets and even with increased rural marketing some disributors as not willing to risk investing in new stock items.

Working in conjunction with a Rotary fund to distribute lanterns to poor rural community centers has generated a lot of interest in the lantern which should be soon converted into extra sales of lanterns in Kenya.

Exit strategy

Boundaries have to be drawn between commercial and development objectives. Once a commercial company has control of the product, decision making and influence are lost, but commerciality of the product is focused on. Many details about decisions taken and deadlines missed after the handover of operations to Sollatek UK are not known about, but the private sector is not accountable to others and generally does not document product development processes.

4. Priority activities tasks for follow-up in order to pursue the goal:

The funds from the Rotary distribution enable ITDG East Africa to do some further work in Kenya to promote the Glowstar lantern in conjunction with Sollatek Kenya.

- Product launch in September where the lantern will be one of several new Sollatek products to be promoted.
- Sollatek Kenya are currently considering using the DMOs to continue generating sales in the coming harvest and Christmas periods on a commission basis.
- Follow up sales with new distributors who offer similar consumer products through alternative finance schemes such as credit unions and hire purchase outlets.
- Work with Sollatek UK and Sollatek Kenya to discuss ways of lowering final price of product in the marketplace and demonstrate the effect to them of higher pricing