

# **The Positive Energy Store:**

*a concept for providing clean affordable energy and businesses for rural communities without further damaging the climate with particular application to communities living in the small island States.*

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## **Abstract**

Currently 1.6 billion people world wide have no access to basic energy services. Providing people with the clean, reliable and affordable energy necessary for essential needs such as clean water, health care facilities, production needs, heating and lighting to improve the social well-being and health of communities is one of today's most pressing problems. But providing such services by expanding the use of fossil fuels is not only costly for developing countries, but adds to the already overburdened concentration of greenhouse gases in the atmosphere which is causing global climate change. As part of a possible answer to providing such needs without threatening the climate, Greenpeace presented the Positive Energy Store at the WSSD in Johannesburg in 2002. The Positive Energy Store powers small businesses in remote rural areas with renewable energy. With solar panels, small wind turbines and micro-hydro, the store can generate renewable energy for local community businesses. The concept is flexible so that the store can be adapted to the needs of the area in which it is placed; training is provided so that local people can not only operate the store but also earn back their investment and manage it themselves, making it possible to preserve the store in the long term. It is believed that the concept would provide a viable proposition for many communities within the small island States. The community is involved in the project from an early stage. The range of businesses can vary: for example, a craftsman's workshop, a barber, a communications unit with phone and computer services or a business that leases out charged batteries to power people's homes. Following the WSSD the store was located in a village community in South Africa and its progress monitored. The results of this trial are presented in this paper. The initial findings from further pilot projects currently underway in Mexico and Brazil are also presented as well as proposals for how this concept can be developed and replicated not only for rural communities in large developing countries, but also for many within the Small Island States.

**KEYWORDS:** Climate change, Renewable Energy, Sustainability, poverty alleviation, off-grid communities.

## ***Introduction***

The threat of global climate change has been recognised by most governments, politicians and climate scientists. It has been rightly called the most important threat we all face today. We have reached this situation mainly due to the massive and continuing use of fossil fuels – oil, coal and gas – as a source of primary energy that, since the industrial revolution has pumped vast amounts of greenhouse gases, mainly carbon dioxide (CO<sub>2</sub>), into the atmosphere. It is the industrialised countries with their excess and profligate use of energy that bear the main responsibility for this. At the same time we have destroyed vast tracts of forests that has released billions of tonnes of carbon into the atmosphere.

This being the case there are two major actions needed: an end to deforestation; and a switch from the use of fossil fuels to renewable energy technologies as a source of primary energy together with a massive expansion of energy efficiency programmes.

At the same time as facing the threat of global climate change, there are over one billion people – two thirds of them women – who live in abject poverty, and a further two billion people living on less than \$2 a day. Poverty is a scourge on the face of humanity<sup>1</sup>. The Millennium Development Goals adopted at the UN Millennium Assembly in 2000 contain internationally agreed targets to be met by 2015, covering poverty, hunger, health, education, and environmental sustainability. And while access to energy services is certainly not the only issue, the supply of sustainable energy must be an integral part of any poverty alleviation strategy<sup>2</sup>.

Thus there are two key issues driving the need for a massive expansion of renewable energy technologies; these are global climate change and poverty alleviation.

## ***Poverty Alleviation and Renewable Energy***

Although the millennium development goals make no specific reference to energy, it is widely acknowledged that access to energy services is a crucial element in achieving these goals<sup>3</sup>; a fact recognized by the Johannesburg action plan which states that “access to energy facilitates the eradication of poverty”<sup>4</sup>.

The goal of halving poverty by 2015 will not be reached without energy to increase production, income and education, creating jobs and reducing the daily grind of collecting water and fuel for heating and cooking, which falls disproportionately upon women. Halving hunger will not come about without energy for more productive growing, harvesting, processing and marketing of food. Improving health and reducing death rates will not happen without energy for the refrigeration needed for clinics, hospitals and vaccination campaigns. The world’s greatest child killer, acute respiratory infection, will not be tackled without dealing with smoke from cooking fires in the home. Children will not study at night without light in their homes. Clean water will not be pumped or treated without energy<sup>5</sup>.

Renewable energy technologies can satisfy a wide range of energy needs both domestic and commercial. It can satisfy established needs and/or supply energy sources for new commercial enterprises that benefit whole communities.

The focus for this paper is renewable energy and in particular the application of a specific concept – the positive energy store – to satisfy some of the needs for off-grid, isolated rural communities that also contain some of the poorest people and generally have inadequate services and limited opportunities. Presented here are the results of a pilot project using the positive energy store which, with the lessons learnt, provides a strong argument for the replication of the concept for other off-grid isolated communities. While this paper reports on a project which was piloted in an off-grid community in South Africa it is believed that many of the energy problems faced by communities living in the small island developing States such as isolation, the high expense of

conventional energy imports, the need for local community development, could partly be alleviated by further development and expansion of this concept.

## ***The Positive Energy Store***

The positive energy store takes the concept of productive use containers (PUC) and uses a renewable energy and business focus to create appropriate and financially sustainable small businesses in remote rural areas to benefit rural entrepreneurs and rural consumers. The commercial foundation of the concept, with its focus on skills development and capacity building, business models and viability is designed to ensure that the store would provide a sustainable and valuable contribution to productive use and energy development.

The objective was to implement the store in a rural setting and establish viable and sustainable businesses, documenting results and lessons so as to inform future replication activities.

Greenpeace contracted an independent company, E+Co, to develop and implement the positive energy store. E+Co provides business development services and modest loans or equity investments to local enterprises that deliver affordable and clean energy and have experience in establishing renewable energy projects and businesses in many developing countries<sup>6</sup>.

In this particular case the 'store' is a standard shipping container 12m long by 2.4m wide that is divided into five sections, each housing an individual business. In other settings, the "container" could be any locally appropriate physical structure. The businesses occupy areas of between 3.6m<sup>2</sup> and 7.2m<sup>2</sup> and have their own individual serving hatch and lockable entrance.

The electricity for the store is supplied by a solar PV system but the power source can be adapted to local situations and could also use small wind turbines, micro-hydro or any hybrid combination.

The positive energy store was developed and built in South Africa and Greenpeace first presented it at the WSSD in Johannesburg in 2002. During the summit, three businesses were operating: one producing fruit juice, another offering solar powered hair-cuts and the third, a business service centre. Following the World Summit, the store was then relocated to a village community and progress monitored.

## ***Choice of Location***

The site was identified based on the following criteria:

- Limited or no access to grid electricity
- Household density of more than five households per km<sup>2</sup>
- Non-competition with existing businesses
- The site should fall under the jurisdiction of a single local government structure.

The site chosen was in the Lambani Tribe Land in the Northern Province, about 25 km west of the Kruger National Park. The surrounding area consists of 10 villages with approximately 1,000 households. The Lambani Tribe falls under the management of Chief Lambani, a progressive community leader who has given full support to the concept. The Chief assisted the project in many areas, such as site selection, ensuring security, selecting the entrepreneurs and resolving disputes. In February 2003, the container was transported to Lambani and located at a cross roads near the local church, a general dealer and the pension pay point.

Lambani is an economically depressed rural area with few income generating activities so that most of its population is employed elsewhere sending home what little money they have. The dominant economic activity is its schools. However, both the teachers and a few nurses from the local government clinic currently prefer to spend their money in a budding town about 80 km

away; others go shopping in Johannesburg, which is about six hours away. A key objective of the store now is to grow to be a community destination that captures some of this traffic.

### ***Choice of Businesses and Training***

In designing the initial business model small and micro businesses were identified from sectors that would contribute to the overall development of rural areas. These sectors included telecommunications, business services, social services and centralised energy services (e.g. charging batteries).

For implementation in Lambani, the businesses were identified from a desktop study for the WSSD and, in consultation with the Chief, the following were selected: a barber, a juicer, a business service centre, an electronic and electrical repair shop and a cell phone shop.

The next step was to identify and train the entrepreneurs. None of the entrepreneurs were required to make their own contribution into starting their businesses other than the skill he or she was bringing to the concept and their time. Fifteen hopeful entrepreneurs from various backgrounds, with differing education and experience levels participated in a two-day training programme run by E+Co, which covered basic financial, business management and marketing skills to help them in running any small business. The Chief was involved in selecting those who showed the most skill, commitment and motivation.

### ***Monitoring***

The store and its businesses have been monitored and evaluated over an 18-month period by on-site visits and phone conversations. A final-year student at WITS University spent two weeks on site providing additional basic financial management, marketing and business skills training and helped in setting up the businesses and in identifying and resolving problems. The entrepreneurs were encouraged to identify problems and seek solutions themselves, with the goal of them taking full responsibility for their businesses and so be less dependent on prescribed solutions.

The entrepreneurs were provided with check sheets to cover the PV system and batteries to help them in ensuring that they are fully operational and maintained. They were also encouraged to design and paint their own signage.

The juicer business faced many obstacles in starting up including a lack of sufficient quantities and quality of fruit, a lack of suitable containers and the supply of competitively priced fruit juice, so it was necessary to replace the juicer. Following market research by the student, tailoring was identified as an alternative business option.

Thus the five established businesses are: a barber, a tailor, an electrical repair shop, a business services centre and a cell phone shop.

Currently the PV system is in excellent working order and has been well looked after and has not yet experienced any overloading and the shops are well maintained and tidy. The store is well positioned and is slowly developing as a central meeting point for the community.

### ***Financial Analysis***

To understand the financial dynamics, several factors need to be considered such as ownership, rent, energy supply and costs and the costs of setting up the businesses. This store has been fully financed through Greenpeace funding, but the intention was to build up the businesses to a point where they could pay for services so the store was not just a 'hand-out'. The Rand/Euro exchange rate is R8.00 = €1.00.

## Ownership of the store and energy system

The concept allows for an owner of the container and the energy system to be able to generate income by charging the businesses rent for the space and fees for electricity. Ideally, when first developing such a concept, finding a lead entrepreneur is critical. This is not the way this demonstration is operating and E+Co has assumed the role of leader and implementer, but it does provide for a useful analysis of the viability of the concept.

It was E+Co's aim over time to transfer ownership to one of the entrepreneurs. However, the reality is that the store "belongs" to the Chief as it is on his land and is recognised as such by the South African government and The House of Traditional Leaders - a statutory body. He is the only one who can appoint or employ a manager to run its affairs. The Chief could also choose to charge rent although to date he has not. He is very passionate about creating employment in his area that overrides any desire for direct cash recovery.

There was a verbal agreement that all five entrepreneurs would eventually be liable to pay rent and the cost of electricity generated from the PV system. The exact charges for rent and electricity were not discussed and no specific time was agreed upon from which the vendors would start paying, though it was generally accepted that the payments would kick-in when all businesses started proving their viability. While this is not the best approach, given the time pressures to implement this demonstration model, it was decided to sacrifice repayment agreements in order to test the operational features and potential of the store.

## Rent

The calculations are based on the assumption that both the container and PV system are entirely loan financed though this model is not, by any means, the only one available for such a project.

In order to ensure that the 'owner' could at least achieve a cash breakeven from the outset, the method of calculating the rental was based on the monthly cash requirement for which he is liable.

The calculation of the rental tariffs is based on the following assumptions:

- a) The cost of the container, i.e. the loan, includes: acquisition; conversion, including fittings and shelving; transport to the site; site preparation; and commissioning the container. This amounts to R78,082.20 (€ 9,776.02). No land value is assumed.
- b) This cost could be financed based on a term of 6 years (72 months) with an interest rate equal to the prime-lending rate (15%). In this case the monthly instalments would be R1,651.05 (€206.38) see table 1.

The rental tariff is based on the loan instalments plus any costs such as taxes, insurance and maintenance. For this area no taxes and insurance has been taken into account.

Table 1: Monthly cash requirements including an allocation for maintenance.

Description	R	€
Loan instalment	1,651.05	206.38
Rates and taxes	-	-
Maintenance	120.00	15.00
Insurance	-	-
<b>Total</b>	<b>1,771.05</b>	<b>221.38</b>

The individual shops contribute towards the monthly cash requirement according to their individual percentage use of available floor space (table 2):

Table 2: Individual shops contribution towards monthly cash requirements

<b>Business</b>	<b>Dimensions</b>	<b>Area (m<sup>2</sup>)</b>	<b>% use</b>	<b>R</b>	<b>€</b>
Energy & electrical services	3m x 1,2m	3.6	12.5%	206.38	25.80
Barber	3m x 1,2m	3.6	12.5%	206.38	25.80
Cell shop	3m x 2,4m	7.2	25.0%	412.75	51.59
Business services	3m x 2,4m	7.2	25.0%	412.75	51.59
Tailor	3m x 2,4m	7.2	25.0%	412.75	51.59
<b>Total</b>		<b>28.8</b>	<b>100.0%</b>	<b>1,651.00</b>	<b>206.38</b>

The owner's return on the "business premises" investment is shown in table 3.

Table 3: Owner's return

	<b>Description</b>	<b>Detail</b>	<b>R</b>	<b>€</b>
	First year gross rent	12 x R1,651.05	19,812.00	2,476.50
Less:	Maintenance	12 x R 120-00	1,440.00	180.00
Less:	First year interest		11,712.33	1,464.04
Equals:	First year net rent		6,659.67	832.46
	Return on investment		8.5%	

To further improve the return on investment, the landlord could build an escalation clause into the lease agreement. With the monthly cash requirement remaining constant, such an increase will significantly improve both the cash flow and the return.

### Electricity/Energy supply

The underlying principle is that the store has its own energy source. In this case solar PV is the most practical energy supply option. The design is an integrated solar system with an array consisting of ten 55Wp modules and a 24V battery bank consisting of 1000Ah heavy-duty deep cycle batteries. The power output is 220V. The control cubicle includes a regulator, load-shed protection, isolators and earth leakage protection. High quality components, including the inverter, were sourced to ensure maximum reliability.

Wiring is internal with wires passing through conduit piping between the array, battery bank, distribution board and the output points. Each business has a single power outlet and two mounted 11W compact fluorescent lights (CFLs). The container has four external security lights, one that is active all night; the other three are motion activated.

The system includes 20% spare capacity to allow for additional business applications as well as changes in the actual businesses operating in the container. The module mounts can also accommodate additional PV panels for further power supply requirements.

The integrated system costs and monthly charges are summarized in table 4.

Table 4: Integrated system costs and monthly charges

<b>Description</b>	<b>Detail</b>	<b>Monthly (R)</b>	<b>Monthly €</b>
System cost	R102, 668.00 (€12 836.00) @ 15% over 120 mths	1,656.71	207.09
Battery bank cost	R15 210 (€1 901.00)@15% over 84 months	293.50	36.69
Recurring costs	6 batteries @ R15 210 (€1 901.00)over 84 months	181.07	22.63
Maintenance costs	1% of system cost over 12 months	102.66	12.83
<b>Total</b>		<b>2,233.94</b>	<b>279.24</b>

Such a system could be financed over a 10-year period while the batteries, given their shorter life cycle, could be funded over a 7-year period. Recurring cost payments were integrated into the total costs to ensure the entrepreneur will not have to arrange additional finance for the replacement of the battery bank. However, in November 2004, the entrepreneurs took responsibility for ensuring there would be sufficient funds to replace batteries in the future by agreeing to open a joint bank account. Each of them will start banking R71.00 per month (about €8.90) from January 2005 towards the cost of replacing the batteries. Maintenance costs are calculated at 1% of system costs.

The monthly system costs would be recouped through the sale of electricity to the businesses with the fee determined by the needs of each calculated as a percentage of the total container energy requirements (see table 5).

Table 5: Summary of fees for electricity needs

Description	Wh requirement	% requirement	R	€
Barber	341.00	23.9%	534.58	66.82
Cell shop	323.00	22.7%	506.36	63.29
Energy & electrical	121.00	8.5%	189.69	23.71
Business services	369.00	25.9%	578.47	72.31
Tailor	271.00	19.0%	424.84	53.11
<b>Total</b>	<b>1,425.00</b>	<b>100.0%</b>	<b>2,233.94</b>	<b>279.24</b>

The electricity cost has not been compared to the cost as supplied by the local grid as it is the lack of grid electricity that motivated the search for an alternative way to supply power to the 5 businesses. This alternative overcomes the lack of power and establishes 5 businesses where previously they would not have been able to exist.

## Establishing the Businesses

Each of the five businesses needed start up costs and working capital (see table 6).

The barber: R14,859.35 (€1,857.42), to buy hair clippers, chairs, a mirror and utensils.

The tailor: R6,621.00 (€827.62) for material and a sewing machine.

The business centre: R57,879.09 (€7,234.89) for a laptop computer, scanner and printer.

The electrical repair shop: R36,037.00 (€4,504.62) for a soldering iron, testing equipment and a workstation.

The cell phone shop: R43,441.00 (€5,430.12), to fund the cell phone system.

Table 6: Costs of establishing the businesses

	Barber	Tailor	Business service centre	Electrical repair shop	Cell Phone Shop	Total
<b>Cost (R)</b>	14859.35	6621.00	57879.09	36037.00	43441.00	<b>158 837.44</b>
<b>Cost (€)</b>	1857.42	827.63	7234.89	4504.63	5430.13	<b>19 854.70</b>

Therefore the total cost is R354,797.00 (€44,349.00) which amounts to R70,959.40 (€8,869.8) per business (see table 7). Simply stated, all five businesses have benefited from a subsidy of €8 869 per business.

Table 7: Cost of establishing the Positive Energy Store in Lambani

	Rand	Euros
Total Cost of Container	R78 082.00	€9776.00
Total Cost of PV System	R117 878.00	€14 734.00
Total cost of Starting Businesses	R158 837.00	€19 854.00
Total Cost	R 354 797.00	€44 349.00
Total Cost per Business	R 70 959.40	€ 8 869.80

## **Financial Performance/Results**

The viability of any business is dependent not only on the ability to make a profit but also to pay rent, electricity and other municipal or tribal authority obligations. Measured on a “full cost basis”, including the rent and cost of electricity the five businesses are not performing. However, they are all covering the running costs of their enterprises and producing a ‘gross profit’ exclusive of rent and electricity, (table 8). Each entrepreneur is taking a salary of between R100.00 to R300.00 (about €12.5 to €37.50) per month, which feeds an average family of seven and pays for school fees and school uniforms. This, combined with the social benefits they are delivering to the community, is producing a sustainable and socially beneficial investment.

### **Individual Businesses:**

**1. The Barber:** Initially the target market accounted only for cutting men’s hair but this was found to be very limiting as men only wanted a short hair cut, costing R7.00 (€0.87) per cut. But when the services and products were offered to women that increased the customer pool and improved his average price per customer as a styled hair treatment costs R15.00 (€1.88). With the increased sale of hair care products the entrepreneur was able to improve his turnover.

However, one of the services offered by a hair stylist is hair drying, which draws a large amount of power from the PV system and pushed the barber over his allotted power threshold. A possible solution would be to increase the container’s power threshold by additional solar panels.

The average monthly turnover is R284.00 (€35.50), which is relatively consistent indicating that a customer base has developed. The barber has successfully implemented his business, has established a regular clientele and is able to manage his business and keep adequate records. It is felt that, overtime the business will grow through word of mouth and by continuing to offer a good service at a reasonable price.

**2. The Tailor:** This is the most successful business, with an average monthly turnover of R1,080.00 (€135) and a net profit, excluding electricity and rent, of approximately R515.70 (€64.46) per month. He has made further investments by buying a second hand over-locker to assist him with stitching his clothes which will improve the quality and, hence, his turnover.

The original space provided for the tailor was that which had been allocated to the juicer that proved too small. However, following negotiation with the electronic repair entrepreneur, they swapped shops.

Future plans include designing and making his own clothes and meeting the demand for school uniforms created at the beginning of every year. These uniforms can be sold in larger volumes and for a higher price, thereby improving his turnover.

The main reasons for success are the commitment and enthusiasm of the tailor and the market’s need for his services.

**3. Business Service Centre:** This business brings 21<sup>st</sup> century technology to the Lambani rural community. While on paper we may see the immediate benefit of such a business, there were many difficulties during start-up as the community took a while to see any benefits. Initially the Business Services Centre's turnover did not exceed R300.00 (€37.50) per month and the entrepreneur was losing heart.

Faced with the possibility of failure, the entrepreneur (with E+Co) refocused the business from one reliant on walk in trade, to one that marketed itself by directly approaching other businesses, contractors, schools and the local council to offer services such as typing, printing, copying, assisting with administration and providing computer training. This refocusing enabled the average monthly turnover to increase to R1,061.20 (€132.65), producing a monthly net profit of R687.40 (€85.92).

The entrepreneur has registered with the local Umsobomvu (Zulu for 'rising dawn') Youth Fund (a government skills development and employment creation fund) that allows him to assist other entrepreneurs with preparing their business plans. These plans are then submitted to the fund. His remuneration, based on acceptance of the business plan by the fund to finance the proposed project, is R7,000.00 (€875) per accepted business plan. Currently he is assisting two entrepreneurs from the local community.

This business has excellent growth prospects. The entrepreneur's future plans include offering internet access and email facilities to the local community as well as participating in the local tendering process and more business plan writing.

**4. The Electronic and Electrical repair shop:** The intention of this shop was to provide services, such as repairing televisions, radios and music centres and, possibly at a later stage, maintaining solar home systems. Part of the original concept was that this shop could have represented the electricity service business and therefore would be able to charge for the electricity used.

However the performance of the entrepreneur was disappointing with a lack of commitment to the business. There are several possible explanations:

- 1) the entrepreneur was only identified late and did not attend the two day training course;
- 2) the entrepreneur may not have the technical ability to render the services;
- 3) the need within the community may not be sufficient to sustain the business.

Following some extensive training focussed on record keeping, financial management and marketing the entrepreneur appears to be increasing his activities and spending more time at the business. During the last visit the entrepreneur produced his records, showing an improvement.

This highlights an important fact: the entrepreneur is the driving force behind any start-up business. The entrepreneur needs commitment and motivation as well as training to make a business succeed.

The shop has become a distribution point for government condoms, signifying the growing importance of the store as a community destination.

**5. Cell Phone Shop:** The cell phone shop was a late starter mainly due to the area not having the correct cell phone signal. Once the signal was installed, the shop was started in May 2004 and has been running since then.

The cell phone shop provides a public cellular communication service and the sale of related products such as pre-paid vouchers and accessories. The training for the entrepreneur focused on cash flow management as without cash, the business cannot purchase airtime.

Currently the entrepreneur deposits R3,000.00 (€375) per month with a local bank. Once the funds are cleared the entrepreneur is credited with R4,500.00 (€562.50) of airtime, which can then be sold. The airtime is then sold at a fixed rate leaving the entrepreneur with a gross profit of R1,500.00 (€187.50).

This business was the only one that could pay rent and electricity though this, of course, significantly reduced the profit from R1500 to R580.89.

The cell shop is a major draw for the store and now that it is up and running it has become a regular stop for the local residents, which has increased traffic throughout the businesses, which is likely to have a positive impact on them all.

### Summary:

The five businesses were established with the contract funding provided by Greenpeace. In an ideal situation, these start-up costs would either be funded either through a loan to the business, with some contribution from the entrepreneur and/or some mix of grant and loan.

Table 8: Summary Analysis of Individual Businesses<sup>1</sup>

		Barber	Tailor	Business service centre	Electronic and Electrical Repair shop	Cell Phone Shop
Average monthly income	R	284.0	1080.0	1061.2	476.4	4500.0
	€	35.5	135	132.65	59.55	562.5
Average Monthly Expenses Ex Rent and Elec.	R	77.60	564.30	373.8	222.9	3000.0
	€	9.7	70.54	46.73	27.86	375.0
<b>Gross Profit Ex Rent and Elec.</b>	<b>R</b>	<b>207.30</b>	<b>515.70</b>	<b>687.40</b>	<b>253.50</b>	<b>1500.0</b>
	<b>€</b>	<b>25.91</b>	<b>64.46</b>	<b>85.93</b>	<b>31.69</b>	<b>187.5</b>
Rent (table x)	R	206.38	412.75	358.75	412.75	412.75
	€	25.8	51.59	44.84	51.59	51.59
Elec. (table x)	R	534.58	424.84	578.47	189.69	506.36
	€	66.82	53.11	73.31	23.71	63.30
<b>Net Profit after Rent and Elec.</b>	<b>R</b>	<b>-533.56</b>	<b>-321.89</b>	<b>-219.72</b>	<b>-348.94</b>	<b>580.89</b>
	<b>€</b>	<b>-66.7</b>	<b>-40.24</b>	<b>-27.47</b>	<b>-43.62</b>	<b>72.61</b>
<b>Assume 50% R payment rent/elec.</b>	<b>R</b>	<b>-163.18</b>	<b>96.9</b>	<b>218.79</b>	<b>47.72</b>	<b>1040.44</b>
	<b>€</b>	<b>-20.40</b>	<b>12.11</b>	<b>27.35</b>	<b>5.97</b>	<b>130.06</b>

<sup>1</sup> The costs of E+Co services to the businesses and the initial working capital amounts for business start-up are not included in the financial analysis.

Four of the individual businesses are not in a position to pay all their rent and electricity costs. If a 50% subsidy for these costs is applied, four businesses could pay and still have a positive cash flow. While this increases the likelihood of recouping the investment in the container and energy system, at the current time it would greatly limit the cash available for two of the four businesses and restrict growth potential. From a conventional perspective of recouping investment with appropriate interest, the store and its businesses are not financially sustainable. However the success of the store must also incorporate social, environmental and economic impacts. Furthermore, this provides useful information for the types of financing which could be applied for further replications.

## ***Lessons learnt/Discussion***

The concept of the positive energy store lies fundamentally in sustainable development – i.e. economic development using technologies that do not threaten human health and welfare or the environment locally and globally. The experiences gained in piloting this project in South Africa, as well as two further pilots currently being established in Brazil and Mexico under slightly different circumstances, are providing valuable lessons for how this concept could provide one answer to meeting some of the needs for off-grid isolated communities.

While the businesses are operating and paying their basic costs for supplies and salaries, the dynamics and demographics of rural Lambani greatly influence the level of financial success. Some of these dynamics are the level of education and sophistication; the availability of skilled, semi-skilled or 'trainable' potential entrepreneurs; local tribal laws and norms; and, above all the availability of disposable income in the area. Clearly these are dynamics that exist in many isolated off-grid communities.

## **Financial Lessons**

On a purely financial basis, the businesses' performance fell short of the goals laid out in the individual business plans in that the full costs of the container, energy source, and individual business infrastructure (about €8,875 per business), as well as the cost of the business development services provided by E+Co, are not being repaid. At best, 50% of the cost (excluding E+Co services) could be recouped over six to ten years. But the businesses have been running for only 18 months, with inexperienced entrepreneurs, in an economically depressed environment, offering relatively advanced services to a rural community. Thus far, they are surviving and operating. To measure the true success of the businesses one should not only review their ability to pay for the services provided by the store but also the value of their impact on the community and the individual entrepreneur.

Coupled with the entrepreneur's personal attributes should be a commitment to the success of the venture. This commitment should include both in-kind services (e.g. "sweat equity") and where possible, a financial investment thus creating an element of risk sharing between the financier and entrepreneur. But the level of risk, while presenting a challenge, should not be so daunting as to be demoralising. Hence a combination of different financing mechanisms could be envisaged with mixes of grant and loan, the size of each dependent on the prospective success of the business. This is not just reliant on the motivation of individuals, but also on the demographics of the area (which provides the market) and the type of business or service. Hence under different economic circumstances or combined with development aid funding, the concept can succeed. An area with a higher population density than that in Lambani potentially has a better chance of earning more and hence could be expected to pay back a loan, but with the population density experienced then the project would be successful with more of a grant than a loan.

Although written agreements on rent and power supply costs were sacrificed at the time to get the store running as a demonstration, the terms and conditions of both the rent and electricity payments should be mutually agreed to, in writing, at the beginning of the process. This should also include costs of maintenance and it is important that the entrepreneurs understand and

make provisions for these expenses. The setting up of financial provision for future expenses such as battery replacement costs by the entrepreneurs is a good example of how this can be done.

## **Top Down v Bottom Up**

For implementation in Lambani, there was no rigorous assessment of the communities' needs and the businesses were identified from a desktop study for the WSSD and transferred to the area. This was one important reason for the difficulty in starting the businesses, as the ideas did not emanate from the entrepreneurs themselves, but at the suggestion of E+Co and the process of developing the positive energy store. Enterprises driven and created by entrepreneurs themselves are more likely to be successful than a business idea fostered by any external source. In other words technologies should not be just 'planted' in a community but the community should be involved from the outset. The support and help of the community leader, in this case the Chief, was vital in ensuring the establishment and success of the store.

It is telling that the most successful business was one that arose out of market research in the area not from the desktop study. In other words, it provided a service need for the community. Thus a key lesson is that the businesses provide the types of services that satisfy the needs or demands of a particular community, though it should be acknowledged that some community needs might only be identified as such once the technology for power has been supplied. Therefore, thorough market research is needed prior to establishing the store which will assist in identifying viable opportunities and provide the entrepreneurs and developers with an understanding of the markets that exist for certain products and services. The market research also needs to incorporate an understanding of local and/or tribal laws in relation to the 'ownership' of the store as, ideally an entrepreneur should take the lead and become the owner of the store allowing the management to become the responsibility of the owner. These responsibilities could include collecting of rent, electricity payments and maintenance.

Examples of similar approaches have proved successful. The Intermediate Technology Development Group (ITDG) used a micro-hydro power house in Nepal, which houses a number of small enterprises for services to the community (milling, welding, husking, etc)<sup>7</sup>.

There are a number of potential renewable energy power supply solutions such as wind, solar, micro hydro and biogas that could be used to power a positive energy store and the businesses. It requires professional support to verify the viability of potential power sources, as it is important that proposed businesses should not be limited by the absence of a particular technology. In Lambani, the Chief wants to build a second container because, for example, the barber's working space is stifling the business. It is possible that, funds permitting, a structure of bricks and mortar could be built adjacent to the container to accommodate not only the barber but also other services deemed essential to the community.

## **Training**

The training programme in this particular case was somewhat limited due to a language problem as well as a low level of literacy and mathematical skills among the participants. Clearly such training needs should be identified early in the project development and should be comprehensive yet simple, and use practical examples from everyday life. The basic subjects should include financial management, specifically cash flow management, marketing and business management.

The entrepreneur is key to the success of any new venture. Ideally the entrepreneur should have basic education, basic business knowledge, money management skills, motivation and a willingness to learn. In Lambani E+Co's enterprise development services played a major role in training and advising the vendors. It is essential therefore that all future projects should include an adequate allowance for such services as this will build a solid foundation for the sustainability of the businesses.

## **Site Selection**

The site should be located in an area that has the economic capacity to sustain the businesses; the container should be placed in a central economically active business area/meeting point. But there needs to be adequate time taken as working in a rural setting, often with semi skilled entrepreneurs and slow moving government organisations can result in a lengthy implementation process.

## **Business Mix**

The store is a versatile micro or small business premise in that it can house several businesses or a single business unit. If multiple businesses are established then they must be complementary and can add value to each other.

However, traditional business premises should not be excluded when considering possible business premises. The situation in Brazil is that there is already a local business established which is extracting oil from nuts for natural cosmetics and making cookies with the dough. Currently a diesel generator powers the industrial kitchen and the power is such that, when squeezing the nuts, everything else has to be switched off. So, while the store in this situation is not going to fully replace the current conventional sources it will supply all the needs for the office so that the nuts can be squeezed without having to divert power supplies.

## **Conclusions**

Through the development of this project much was learned that will be valuable to replication attempts, specifically regarding the critical need for site-specific market research and entrepreneur skills training. Additionally, the limitations of solar powered electricity for some businesses (e.g. the barber and his need for hair dryers) should inform future efforts in the design of energy power supplies.

When considering the typical rural business environment and socio-economic conditions that exist in rural areas the positive energy store represents affordable, easily adaptable and relatively safe premises for start-up businesses. The approach of combining enterprise development and power delivery is clearly an approach that works in different contexts using different power sources and supplying the services that each community needs.

In terms of social returns and lessons learned for the future, the Lambani “experiment” has succeeded. Over time the store has developed into a vibrant community gathering spot where a radio could be heard, a cell phone can be charged and services received. The surrounding community now benefits due its convenience, accessibility and advanced service. People no longer have to travel long distances to make telephone calls, buy and repair clothing, have their radios repaired or have a haircut.

However, the store’s greatest impact has been on the entrepreneurs themselves. The five jobs that have been created has given them self-respect in that they are producing income to pay salaries sufficient to feed a family of seven and meet school and uniform fees and meet the running costs of the business, (exclusive of rent and electricity costs). And all the entrepreneurs are planning for their future and that of their business. In addition, the businesses are providing significant social impacts to the Lambani area, including job and income generation, community pride, a community gathering place and linkage with the outside world. The store has positively impacted on the community and will do so for years to come.

Finally, there is an urgent need to change conventional ideas about energy and development that are often themselves responsible for fostering the energy-poverty nexus because they assume that simply increasing the *supply of energy* will lead to an improvement in the macro-economy, whose benefits will eventually reach the poor. Instead of attempting to improve the *level of energy services* available to people in poverty to enhance their quality of life, policymakers are

locked into modes of governance that focus on increasing the supply of fuels or electricity<sup>8</sup>. Financial institutes and export credit agencies, largely based in the OECD countries are also locked into outmoded policies in their energy sectors. Such policies are in vital need of change if the necessary expansion of renewable energy generally is to be realized.

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