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# Distributed Solar Energy in Brazil: Fabio Rosa's Approach to Social Entrepreneurship

*This case was prepared by Yerina Mugica under the direction of Professor Ted London, UNC's Kenan-Flagler Business School, as a basis for class discussion rather than to illustrate the effective or ineffective handling of an administrative situation.*

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# Background

## *Fabio Rosa*

Fabio Rosa has a long history of delivering electricity to low-income Brazilians. An agronomist by trade, Rosa has been developing electrical distribution solutions for over twenty years.[1] In 1983, as the secretary of agriculture for Palmares do Sul, a rural community in the southernmost Brazilian state of Rio Grande do Sul, Rosa began to recognize the importance of electricity for the residents of rural communities, when he surveyed the local people of Palmares about what they wanted. Electricity was at the top of their list, even higher than better working conditions. Armed with this basic request, Rosa began to investigate how electricity could be brought to this rural community.[2] What he found was that under the existing system, it cost approximately US$ 7,000 to bring electricity to one rural household.[3] One of Rosa's early successes has been the development of low-cost rural electrification models that improve the quality of life for the rural poor and slow urban migration.

## Past Success

In an effort to help small rural farmers increase their income, Rosa identified a new, more affordable way of distributing electricity. Working as a consultant to government organizations, Rosa helped bring affordable electricity to 42 municipalities while reducing the cost of electricity by up to 90%.

In 1983, 70% of the rural population of Rio Grande do Sul lacked electricity. The cost to bring electricity to one rural household at the time through the then state-owned electricity company was US$ 7,000. Because Brazil's electricity distribution systems were originally

[1] Pamela Hartigan, "How Big Can Small Become? Lessons from Social Entrepreneurs", The Earth Times, August 28, 2002
[2] Ashoka Website, Ashoka Fellows, Fabio Luis de Oliveira Rosa
[3] Pamela Hartigan, "How Big Can Small Become? Lessons from Social Entrepreneurs", The Earth Times, August 28, 2002

designed to serve large farms, factories, towns and cities, high transmission costs placed electric service out of the reach of 20 million rural Brazilians. This exacerbated poverty and environmental destruction and intensified rural to urban migration.

Rosa discovered existing technology that allows the cost of electrification to be dramatically reduced. However, although the general idea for this technology had been known for many decades, its design conflicted with the interests of the utility companies and had therefore not been widely developed. Rosa began to work with the professor who had developed this technology that reduces costs by simplifying the process. For example, it uses just one wire (instead of three) to distribute electricity to rural properties and substitutes some materials for those with a lower cost (e.g. wood for cement poles, steel for copper wire, and steel and zinc conductors for aluminum.) After significant time and effort, Rosa managed to get the state government to waive the electricity regulation for his experiment, which he tested with 420 households in Palmares, a rural community in Rio Grande do Sul.

The project was a huge success. They were able to provide electricity for US$ 500 per connection, more than a 90% savings over the government's original cost of US$ 7,000 per connection. In addition, the project also taught villagers improved rice farming techniques, made possible by inexpensive electrical irrigation pumps, which boosted farm incomes by 200 to 400% and caused many villagers to return to their land from the city.

After the success of this project Rosa went on to provide electricity to 25,000 low-income rural households in 42 municipalities. In 1996, the state of Sao Paulo launched a US$ 240 million project replicating this approach, providing electricity to one million people and saving the government millions of dollars.[4] This project won national and international recognition and was the model for the implementation of a large number of low-cost rural electrification

[4] Pamela Hartigan, "How Big Can Small Become? Lessons from Social Entrepreneurs", The Earth Times, August 28, 2002

programs financed by the National Bank for Economic and Social Development. Throughout the mid-1990s, Rosa worked with state electrical companies to bring electricity to hundreds of thousands of low-income people in Brazil.

After years of perseverance, Rosa had been effective in partnering with government to apply better solutions to extending the electrical grid to the rural, low-income community. However, once the electric industry was privatized in the late 1990s, the government halted these initiatives. But Fabio Rosa did not. He has continued to work on new technologies and new business strategies that could bring electricity to the masses.

## STA – IDEAAS

Through his work in developing rural electrification solutions, Fabio Rosa had founded both a for-profit corporation, Agroelectric System of Appropriate Technology (STA) and a not-for-profit organization, the Institute for Development of Natural Energy and Sustainability (IDEAAS). Both STA and IDEAAS have been working to bring electricity and community development to rural Brazil since the mid 1980s.

### *STA*

In addition to being the home of a rural distributed energy initiative dubbed the Sun Shines for All, STA also performs the manufacturing and assembly of some of the components used by The Sun Shines for All. This includes fluorescent lighting fixtures that are less expensive than those currently on the market.

### *IDEAAS*

IDEAAS is a non-profit organization founded in 1997 to develop and demonstrate models of self-sustainable development for low-income rural populations. IDEAAS focuses on the use of high-efficiency and low-cost technologies in the fields of renewable energy and agricultural science to meet the needs of low-income markets. IDEAAS has successfully

implemented project initiatives in the fields of rural electrification, the employment of energy for sustainable rural development, income generation and renewable energy models. The organization and its founder, Fabio Rosa have received a number of awards for their work including three Tech Museum of Innovation Awards and an Ashoka/McKinsey Social Entrepreneur award in 2000.

## Brazil's Rural Energy Market

There are approximately 25 million people in Brazil (about 5 million families) that do not have access to electricity.[5] In the southern state of Rio Grande do Sul approximately 150,000 people remain isolated from the electric power networks. There are no plans in place to provide these people with access to conventional electrical services.[6]

Prior to the 1990s the Brazilian government launched a number of initiatives to expand the electric grid and provide power to people in rural areas. However, the 1990s marked a period of extensive deregulation in the country. As a result of this trend, in the late 1990s Brazil's electric utilities were privatized.

While the government had not only served existing clients but had also sought to increase access to electricity and create new clients through its efforts to extend the grid to rural areas, the privatized corporations focused only on servicing locations with existing grids. In effect the privatized electricity industry took over responsibility for providing electricity to existing on-grid customers but did not take responsibility for providing electricity to the 25 million Brazilians that reside in off-grid locations. The utility companies had little experience working with working with low-income rural markets, and saw no incentives to provide electricity to rural off-grid communities. They preferred to serve the existing on-grid cities, which they saw as more

[5] David Bornstein, "Fabio Rosa: Making the Sun Shine for All", Changemakers Journal, May 2003
[6] "Utilizing the Market for Environmental Changes", Changemakers Journal, March 2001

profitable than pursuing low-cost rural electrification. As such, with the government out of the equation and corporations focused on maintaining the status quo, efforts to expand the grid came to a virtual end.

## Origins of The Sun Shines for All Initiative – a bottom of the pyramid (BOP) business

Faced with this new reality, Rosa began to explore new business models that could serve the needs of the millions of potential customers that had been left without access to electricity. Through STA, Rosa had spent years delivering solar energy to Brazil's rural population. Now Rosa was looking for a way to expand the reach of solar energy as an alternative to on-grid electricity.

Rosa began by conducting a market research study. He and his colleagues spent eight months surveying 77 families in six rural municipalities in Rio Grande do Sul. They found that almost 70% of the families interviewed spent at least US$ 11/ month on non-renewable energy sources, such as kerosene, candles, batteries and liquid petroleum gas. Rosa knew that he could lease his solar energy service for close to the same cost as people were spending on inferior, non-renewable energy sources. Since this information confirmed that Rosa could develop a viable business model, he moved to do just that.

Based on these preliminary findings, Rosa moved forward and with assistance from Ashoka-McKinsey began analyzing the market, risks and competition, as well as developing a market plan, including a ten-year pro forma income and cash flow statement. The business plan that ensued was dubbed The Sun Shines For All (TSSFA) project.

TSSFA developed a basic photovoltaic solar home system that could be rented for US$ 10/month plus an initial installation fee, a little more than people were already spending on non-renewable forms of energy.

## The Sun Shines for All Business Model

TSSFA's business model is to provide customers with what they need and want – the services that electricity provides. Instead of simply selling solar panels, batteries or other input products, TSSFA leases a complete package that provide customers with the service of electricity. Solar home kit, as TSSFA calls them, include the hardware needed to generate energy, while also providing the installation service and products that use the electricity generated by the solar home system, such as lighting and electrical outlets. All of the tangible inputs are owned by STA and only the service provided by these materials are leased to customers. This parallels the on-grid electrical system, where customers do not own the power lines, or other power generating components. Instead, customers pay a monthly fee for the privilege of having access to electricity. STA's unique business model is registered as intellectual property with the Brazil's National Industrial Property Rights Institution (Instituto Nacional de Propriedade Industrial). See Exhibit 3 for an overview of the business model.

## Mission

The mission of the for-profit venture, dubbed The Sun Shines for All (TSSFA) is to provide affordable energy solutions to the portion of Brazil's population that does not have access to electricity. That is, Brazilians primarily in rural, off-grid communities.

## Overview

Fabio Rosa figured out early on that the rural poor are not interested in buying solar panels. What they are interested in is having access to the conveniences that electricity provides, such as effective and safe lighting at night and the ability to listen to the radio or heat shower water. Based on this understanding, in 2001, Rosa began exploring a new business model to provide Brazil's rural people with what they needed – energy services, not just solar energy. To that end

TSSFA developed a leasing structure whereby customers pay a monthly fee for the use of cost-effective solar energy packages. This not only fits with the traditional way people pay for energy, it also saves its customers from paying the 50% sales tax that would be required if they were to purchase the systems instead of rent them.[7] Through a rental system, TSSFA can reach more customers, more quickly.

## *Pilot Project*

Once the market assessment was completed and the business plan developed, the next step was to conduct a pilot launch before launching the full venture. In fact even before the pilot was launched, Fabio Rosa and his staff conducted a pre-launch pilot of 3 installations. Through this pre-launch pilot, they learned the importance of keeping the battery in a sealed, tamper-evident container. Since STA remains the owners of the batteries and is responsible for their servicing, it is in STA's best interest to ensure that the customer does not tamper with the batteries. As a result, STA now delivers the batteries in a clear plastic tamper-proof container. In addition, STA also delivers a small ceramic saint with each of its solar kits. In a predominately Catholic country, this serves as a personalized incentive for people to regard the battery with due respect. While these measures increase the cost of the unit slightly, they ensure lower maintenance and battery replacement in the medium and long term.

Although TSSFA is currently in the pilot phase of its project, it has already seen some positive results. As of July 21, 2003, it had installed 32 solar systems and had 9 more installations scheduled, for a total of 41 by the end of July 2003. On average, each installation takes under two hours, however this time can be significantly increased by the travel time required to reach the installation sight. TSSFA began year 1 of its operations in May 2004.

7 David Bornstein, "Fabio Rosa: Making the Sun Shine for All", Changemakers Journal, May 2003

## *Marketing*

### Target Market

TSSFA is currently focusing its efforts on the low-income region of Encruzilhada do Sul. Located two hours (by car) south of Porto Alegre, 25% of the population (approximately 1,000 rural households)of this municipality lacks access to electricity. See Exhibit 1 for a map of Brazil. After the successful completion of the pilot program, TSSFAs plans to target an area comprised of 9 municipalities within the state of Rio Grande do Sul, where about 150,000 households lack access to electricity.

### Product / Pricing

TSSFA's product mix and pricing strategy was developed based on an assessment of what its target market is currently spending on non-renewable energy sources. The basic kit (Kit 1) includes four fluorescent lights (one for each room of a small rural home) and a 12-volt electrical outlet, all the necessary wiring, a battery and panel, as well as a free battery change after three years of service. It is leased for US$ 10/month, but does not include the installation fee of US$ 150, which can either be paid upfront or financed throughout the first twelve months of the lease. Kits 2 and 3 rent for US$ 16 and US$ 24 respectively and come with more lights, outlets and wattage. The outlets and wattage provided by Kit 1 can support a small radio in addition to the lighting system. Kit 2 can support a small television, radio and water pump. While Kit 3 can support these items, plus a cell phone battery charger (cell phones are often used for income generation in low-income areas).

TSSFA customers sign a three-year service contract but can end the contract at anytime by paying the cost of un-installation. Being able to get out of the contract at any time is especially important for customers that believe that the grid may eventually be extended to their

neighborhood. Changing the battery at the end of the first three years of service increases the likelihood that the customer will renew the service.

While this represents the current product mix, Rosa is continually searching for more cost effective ways to deliver the same quality services. For example, instead of importing florescent lighting fixtures made in China, he is developing equally efficient light fixtures in-house and therefore saving on the cost of inputs. Rosa has plans to offer a wide-range of products that will be compatible with the 12V system at affordable prices, including water heaters, small televisions and radios.

## Promotion / Placement

TSSFA originally began promoting its services throughout the local community by holding information sessions. This was a fairly effective strategy except for one unanticipated result. Once the local electric utility learned that STA was offering distributed solar energy to off-grid communities, the electric company would announce to the community that it was planning on extending the grid to their area. Although, the electric company periodically makes this claim and has yet to follow through on any of these promises, and despite the fact that after making these announcements no such grid extension plans have been observed, these announcements served to discourage some people from signing up for the distributed solar energy system. These people have instead chosen to wait for grid extension.

TSSFA has reacted to this electric company strategy in two ways. First, TSSFA guarantees that if the electric grid is in fact extended to cover a home that has installed its distributed solar energy service, the customer has the right to end its contract and will not be charged an un-installation fee (which is normally charged if the customer decides to uninstall its solar energy system otherwise.) Second, TSSFA has stopped using the town meeting approach

to promote its services. Instead it relies more heavily on radio ads, local stores, local champions and the very important word-of-mouth.

### *Supply Chain*

As much as possible, materials are sourced from within Brazil. This not only benefits the local economy but also tends to keep costs down and decrease the effect of currency risk on the company. Batteries, lighting fixtures and other components of the solar energy kit are sourced from Brazil. However, the solar panels are sourced primarily from the US.

The solar system installations are outsourced to a local electrician. After interviewing every electrician in Encruzilhada, Rosa elected to partner with Dariel Ferras Soares, who founded his own electrical shop six years earlier. Selected for his strong reputation and ability to act as a local champion for the distributed solar energy system, Soares began by promoting the solar systems through his existing electric store location. Soares receives about R$ 90 – R$ 100 (US$ 30.73 – US$ 34.15) for each installation he performs, about 2-3 hours of work. He also receives income from periodic maintenance calls.[8]

Based on the success of the pilot launch, Soares is opening a new store front specifically for the promotion of the solar system, and its associated products, including lighting, radios, small television sets, water heaters and more. This is critical because the solar energy systems only support 12V appliances which are not the most common type in Brazil. As such, it is important for STA and Soares to ensure that its customers have access to a wide-range of products that can be powered by 12V.

The new storefront will also have an electronic bill pay kiosk that will allow customers to pay their monthly bill at the store. This service currently exists at other local shops including a

[8] David Bornstein, "Fabio Rosa: Making the Sun Shine for All", Changemakers Journal, May 2003

pharmacy and a bank in Encruzilhada. A small fee of R$ 0.70 (US$ 0.24)[9] per payment will be charged for this service (same as the fee charged for this service at other locations), which will go to the store owner to help recover the cost of the system.[10] See Exhibit 2 for a diagram of the supply chain.

## *Human Resources*

TSSFA maintains a lean organization. It has a small office of core staff that include: Rodrigo Quadros who manages local communications and development strategies and verifies installation quality (among other roles) and Maria Inez Velho, a social psychologist who conducts market research studies. The installation and maintenance of the solar panels is outsourced to Dariel Ferras Soares, a local electrician who was carefully selected, while quality control of these installations is maintained in-house.

## *Financing*

Solar Development Foundation (SDF), a Washington, DC based non-profit that provides initial funding to companies with high growth and profit potential that provide photovoltaic and other energy sources to off grid rural areas in developing countries, has provided TSSFA with in-kind grants including consulting services. In addition, TSSFA received an initial grant of US$ 60,000 and a combination of soft and commercial loans, with a commitment for an additional US$ 50,000 of financing. STA also contributed US$ 45,000 of it own funds for TSSFA research and development.[11]

SDF has also provided a conditional loan, whereby if TSSFA finds an investor, the conditional loan will become debt. However, if TSSFA does not find an investor, it will not be required to pay back the loan. This loan was used to fund the market research and business plan

[9] Based on exchange rate of 1 USD:0.81 EUR, February 4, 2004. Source: http://finance.yahoo.com/m5?a=1&s=USD&t=EUR
[10] Interview with Fabio Rosa, July 18, 2003
[11] David Bornstein, "Fabio Rosa: Making the Sun Shine for All", Changemakers Journal, May 2003

phase of TSSFA project. SDF has also provided a traditional loan for the purchase of solar panels. This arrangement reduces risk to TSSFA because its solar panels act as collateral for the loan and as the other loans are conditional, there is no repayment risk.

Rosa takes a very pragmatic approach to financing. He does not ask for more funds than are needed to complete the next phase of a project. For example, Rosa requested only enough funds to get through the initial market research and business plan development phase. Once that phase was completed successfully, Rosa took on additional funding to support the pilot project. Further, Rosa is careful not to take on debt that he cannot repay. He accepts commercial loans only if he has the collateral to support them, as in the case of the traditional loans backed by the solar panels. [12]

# Program Results – Triple Bottom Line

## *Financial Projections*

TSSFA estimates that it will reach breakeven at the end of year four with 6,000 customers. Projected sales for the first four years of operation are as follows.

| | **Year 1** | **Year 2** | **Year 3** | **Year 4** |
|---|---|---|---|---|
| **Total Number of Kits Leased** | 1,000 | 1,500 | 1,740 | 1,880 |
| **Accumulated Number of Kits** | 1,000 | 2,500 | 4,360 | 6,100 |

Source: STA Projected Cash Flow Report

A conservative estimate is that each electrician that TSSFA works with can complete an average of two installations a day (more if the installations are within close proximity of each other). That amounts to ten installations per week or just over four hundred installations per year (adjusting for holidays and vacation time). As such, in year one of operations, TSSFA expects to partner with at least two additional electricians.

[12] Interview with Fabio Rosa, July 18, 2003

## *Social Impact*

Electric power helps improve quality of life, offers opportunity for income generation and helps reduce the massive exodus to Brazil's largest cities. With access to electricity people are more likely to stay in their local village instead of migrating to overcrowded cities or shantytowns. Further, solar powered electricity eliminates the need for dangerous and unhealthy lighting products such as kerosene and candles, and having access to electricity inspires people to continue to improve their homes and their communities. For example, after leasing a solar home system from TSSFA, a retired couple has started the installation of a toilet and their two grown children who live in their own small homes on either side of their parents have decided to stay in the village for the time being. Before they had access to electricity, both children had planned to move to the city.

## *Environmental Impact*

STA estimates that providing solar energy to 12,900 families (approximately 52,000 people) would save 9 million liters of kerosene, 4.6 million kilos of liquefied petroleum gas, 46.4 million wax candles, 9.3 million radio batteries and 23.2 million liters of diesel fuel. This adds up to a reduction in carbon emissions and therefore a reduced impact on global warming.

In addition, disposal issues are mitigated by the fact that all items are leased not purchased, keeping responsibility for appropriate disposal at the end of the product's life cycle within the firm which is more capable of managing proper disposal/ recycling than are individuals customers.

Further, solar energy promotes the use of basic electronic fences thereby supporting natural managed grazing techniques, another service provided by STA. This replaces the need for toxic pesticides, further augmenting the environmental benefit of solar energy.

## Challenges

TSSFA faces a number of challenges as it grows towards meeting its goal of breakeven within four years and profitability thereafter. First, in order to achieve this target, TSSFA will have to find the right people to lead new areas. Much of its success to date has been based on Rosa and his small team's strong ability to oversee and manage each aspect of the project. When TSSFA expands to serving nine municipalities, it will have to develop a more decentralized system. As such, the success of the project will depend on the reliability of the people with whom it works.

Although electric companies have demonstrated little interest in the rural, off-grid, low-income communities, if it does choose to extend the grid to TSSFA's target regions, this could negatively impact TSSFA's business prospects. The electric company in Encruzilhada initially reacted to TSSFA promotions by promising to extend the grid to this long forgotten area. While, there is no indication that the electric company plans to follow through on this promise, it is unclear how the electric companies will react as TSSFA begins to gain market share in off-grid areas. This uncertainty poses a challenge for TSSFA since they remain minute compared to the large, powerful electric utilities.

## Key Lessons

Throughout TSSFA's development, it has demonstrated the importance of understanding the local market, community and politics. By understanding the intricacies of the local market, TSSFA has been able to forge effective alliances with key stakeholders including the mayor of Encruzilhada, who has offered to help Rosa navigate any political obstacles and provided Rosa with the names of all families in the municipality that do not have electricity. This level of understanding about how the community works – who has influence – and the ability to build effective relationships in the community will be critical to the success of TSSFA.

Another key attribute benefiting TSSFA is their perseverance and patience. TSSFA has invested significant time upfront in order to thoroughly research the market, survey potential clients and develop relationships in the local market, well before any sales are made. It spent a year in Encruzilhada talking to locals and explaining how solar energy works. People were mistrustful and resistant at first. Now that they have seen results and that TSSFA is committed to the long-term, they are starting to develop greater trust and interest in TSSFA's services.

Finally, TSSFA has demonstrated a commitment not only to providing its customers with top quality service, it has also demonstrated a culture of constant innovation. Rosa and his team are constantly looking for ways to improve their service offerings and reduce their costs. They recognize that serving the low-income market does not mean reducing costs by providing less. Rather, they seek ways to consistently provide their customers with more services, to meet more of their customers needs and to do so cost-effectively.

## Opportunities

In order to continue to reduce costs and increase efficiency, it will be important for TSSFA to stay abreast of any new technologies that can further reduce its cost of operations. For example, a solar energy initiative out of Stanford University is developing technology that uses LED lighting instead of fluorescent lights. If this is successful, the cost of distributed solar energy could drop significantly as the size of the solar panel could be greatly reduced.[13]

[13] Bill Snyder, "LED Lamps Light the Way", Stanford Graduate School of Business Top Stories, June 2003, http://www.gsb.stanford.edu/news/headlines/led_lamps.shtml

### *Venture Scalability/Transferability*

Two billion people in the world lack access to electricity. Based on current energy expenditures by this sector, it is estimated that one billion can afford solar energy today at commercial rates, as long as they are able to rent the service or pay it off over several years.[14]

## Risks

As with any leasing institution, STA is exposed to default risk. It mitigates this risk by performing a credit check before accepting a new client to ensure that they will be able to maintain their monthly payments. Further, regardless of the result of the credit check, if TSSFA staff believe that a customer is not credit worthy or does not have sufficient income to pay for the solar electric system, they will not contract with that person.

TSSFA is also exposed to currency risk because it imports its solar panels. It has tried hedging as a means of reducing this risk but has found that the fees charged were prohibitive. As such, TSSFA continues to be exposed to currency risk. However, one positive note is that the price of solar panels has dropped, helping to negate any losses that would be caused by currency fluctuations.

## Origins of the Quiron Project (a BOP not-for-profit)

While Rosa recognized that serving the 65% of the population that was already spending US$ 11 a month on non-renewable energy could be a profitable venture, he was not willing to walk away from the 35% of the population with lower incomes that could not afford these services. In order to address the needs of these people, Rosa is developing a not-for-profit business model that will specifically target this low-end of the low-income community. However, although this target market is addressed through the non-profit arm of the organization, this is not an exercise in philanthropy. Just as Henry Ford recognized that if he raised his

[14] David Bornstein, "Fabio Rosa: Making the Sun Shine for All", Changemakers Journal, May 2003

employees income level (by paying them more than minimum wage) he would be creating a market for his cars, Fabio Rosa recognizes that by developing products that increase villager's income level, he is creating a market for his solar energy systems.

Instead of simply providing solar home systems at lower rates to those that can not afford to pay TSSFA prices, Rosa is looking towards a longer-term solution – focusing on income generation. In order to address the unique needs of this target market, Rosa established a separate initiative under IDEAAS, the not-for-profit organization. The project is called Quiron. The idea is that instead of subsidizing the purchase of solar energy services for those that can not afford its cost, Rosa would leverage his solar energy services to provide income generating opportunities to those that needed it.

## The Quiron Project Business Model

The Quiron project is an integrated project for sustainable rural development, income generation, employment of renewables for domestic and productive use, biodiversity management, forestation and carbon credits. Viability studies and the development of the business plan are being carried out in partnership with AVINA (Switzerland based foundation), the Canopus Foundation (Germany) and the Horus Institute of Environmental Conservation and Development.

The goal of the project is to increase the income of the rural poor through the use of decentralized renewable energy and appropriate micro-technologies. The project also provides income-generating solutions that protect against environmental degradation through conservation and reforestation. The project will:

1. Provide solar powered energy to rural households
2. Implement grazing management with electric fencing (powered by the solar energy system) to increase the yield of dairy and meat production with water buffalo,

resulting in increased income. In previous projects, this grazing management model has increased animal production from 100-200%.

3. Implement profitable nature conservation strategies. IDEAAS has developed a detailed reforestation and forest management scheme that will generate income for rural inhabitants. By applying sustainable forestry techniques, local residents will be able to start generating income in year 7 of their forest planting initiative. Biodiversity will be reinforced through the planting of a wide range of trees. Through sustainable forestry, these trees, which include mahogany and other high valued woods, will provide a significant income stream starting in the seventh year of planting the trees.
4. Be replicable. The Quiron project is intended to be a pilot. Once the pilot phase is completed, IDEAAS plans to replicate the model on a larger scale within Brazil.[15]

## *Marketing*

### Market Research

The Quiron initiative began by conducting extensive market studies, analyzing not only demographic information, but also more sociological considerations such as migration patterns and existing income-generating activities within the community. Great care was taken to thoroughly understand the project's target market. This research led to the creation of income-generating products and services that are appropriate for and can be smoothly integrated into the lifestyle of its customers.

[15] Quiron Project presentation, http://www.canopusfund.org/quiron.html

## Products

The following table describes the income-generating scheme that makes up the Quiron product mix.

| Activity | Income Source | Time required before income generation begins | Yearly income amount |
|---|---|---|---|
| Livestock – IDEAAS provides each client with 5 buffalos | Selling buffalo milk | Begins almost instantly | $576 |
| Grape wine vineyard – IDEAAS provides each client with the seeds and other resources to begin planting | Selling grapes to local winery (IDEAAS is working with local wineries to ensure that the owners will buy grapes from his clients). | 3 years | TBD |
| Sustainable forestry – IDEAAS provides each client with 15 seedlings of various types of trees. | Selling certified sustainable forest products | 7 years for the fastest growing trees, 40 years for the slowest growing trees. The market price of the wood is directly proportional to the time it takes to grow the tree. | $27,000 starting in year 7 |

Source: Interview with Fabio Rosa, July 18, 2003

## Pricing

As described previously, a key feature of this plan is not to subsidize the cost of solar energy for those that can not currently afford it. Instead, the object is to create opportunities to raise family income levels to the point that they can afford to pay market price for distributed solar energy and other essential products and services.

## Placement

Quiron's customers are located in the same rural villages as TSSFA customers. As such, the distribution model will be similar for both business models. This is a key part of the business model which closely integrates the non-profit services with the for-profit business, recognizing that in order for a community to work effectively, the needs of both levels (those that can

currently afford US$ 10/month and those who can not) of low-income residents must be addressed.

### *Financing*

IDEAAS has secured financing from the AVINA Foundation and the CANOPUS Foundation for the development of it business plan. IDEAAS is seeking an additional US$ 80,000 to support market test implementation for five rural farms. In addition, after these two stages are successfully completed, investment will be sought for the next phase – implementation for 750 families. IDEAAS estimates that it will need an investment of US$ 1.5 million and will provide a return on investment of four percent a year after four years.

## Program Results – Triple Bottom Line

### *Financial Projections*

While it is too early to assess the financial results of this venture, the success of Rosa's past initiatives combined with his meticulous planning process and strong understanding of local market conditions are reasons for optimism.

### *Social Results*

If successful, the Quiron project will provide significant value to the local community and economy. By providing people with the tools to improve their income level and living conditions, the Quiron project aims high on social impact.

### *Environmental Impact*

The Quiron project includes the use of electronic fences to support natural managed grazing techniques. This not only increases yields, it also replaces the need for toxic pesticides. Also built into the Quiron project is the implementation of sustainable forestry, which has the dual benefit of generating income and reviving the area's plant biodiversity.

## Challenges

The Quiron project is in an early stage of development. It faces the same challenges that all start-ups are confronted with. One of its greatest challenges will be simply to raise the necessary funds to move forward with the project.

## Key Lessons

The Quiron project is still in its pilot phase and will require funding to move to the next step. However, there are still some lessons that can be extracted from the initial approach taken with the Quiron project. Key factors that will contribute to the success of the Quiron project include:

- Thorough market research including socio-economic data in addition to traditional demographics in order to understand the income generating schemes that will be compatible with the local communities' current activities;
- Strong attention to detail and focus on quality;
- Innovative thinking to help develop creative solutions.

## Risks

One area of risk that is inherent in the Quiron project's reliance on agriculture and livestock is the risk of natural disasters and plant/animal diseases. Any disaster resulting in widespread loss of livestock, vineyards and forests would severely threaten the success of this business.

In addition, the Quiron project business model includes a microlending component. Customers are provided with the means to generate income (seeds, livestock, etc.) and are required to pay back those inputs once these products provide income. As with any other enterprise that extends credit, the Quiron project is exposed to credit risk. However, through

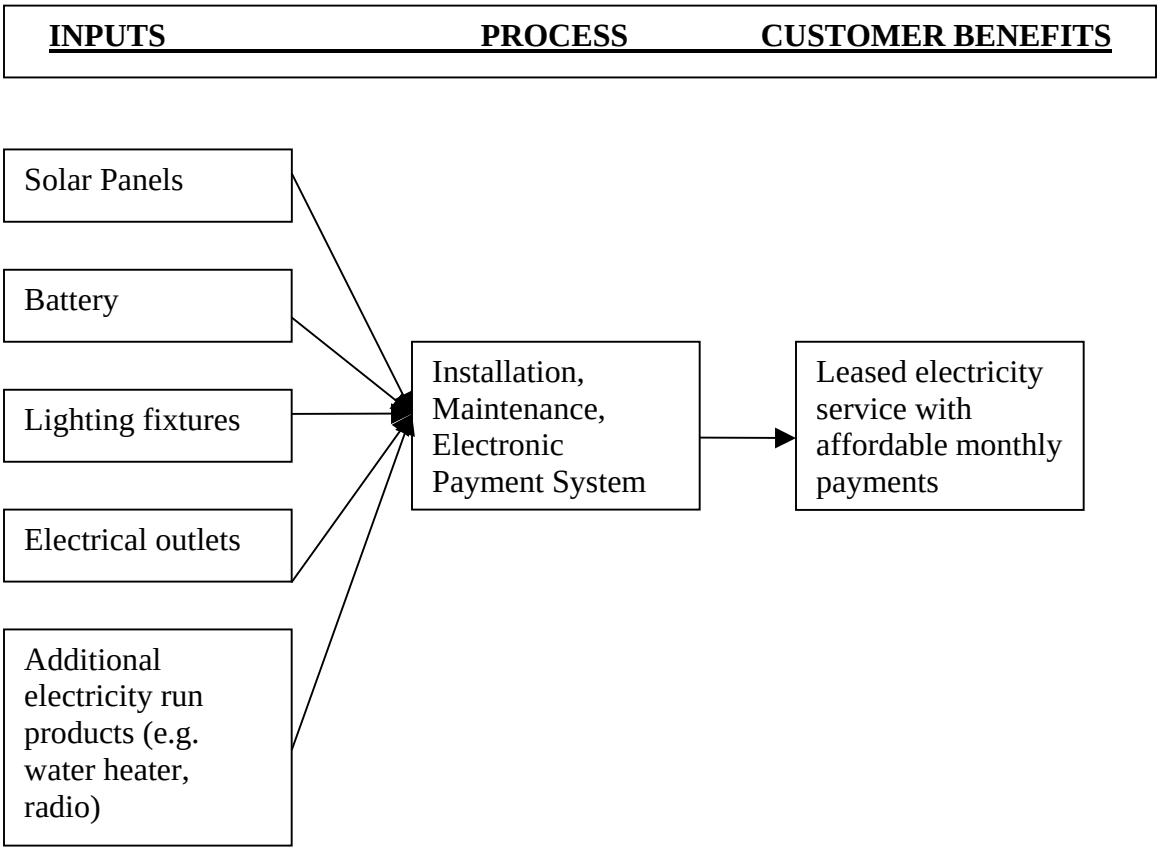
formal credit checks as well as more informal verification of customer integrity, IDEAAS can and does mitigate these risks.

# Exhibit 1

## *Map of Brazil*

# Exhibit 2

## *Supply Chain Process*



# Exhibit 3

## *Distributed Energy Business Model*