



World Business Council for
Sustainable Development

Case study

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This version of the Real Microcredito case study is based on the full business school case prepared by Yerina Mugica under the direction of Professor Ted London at the Kenan-Flagler Business School, University of North Carolina.

Fabio Rosa's approach to social entrepreneurship Distributed solar energy in Brazil

There are approximately 25 million people in Brazil (about 5 million families) that do not have access to electricity. 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.

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 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 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 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.

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. 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 recognized the importance of electricity for the residents of rural communities who put electricity at the top of their list, even higher than better working conditions, as what they wanted most. Armed with this basic request, Rosa identified an existing technology that makes distributing electricity more affordable by using a single wire instead of three and substituting some materials with those that have a lower cost. Working as a consultant to government organizations, Rosa helped bring affordable electricity to 25,000 low-income rural households in 42 municipalities while reducing the cost of electricity by up to 90% from US\$ 7,000 to US\$ 500 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.

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.

STA - IDEAS

Through his work in developing rural electrification solutions, Fabio Rosa 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.

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 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.

Helping those without access to electricity

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, spending 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.

Based on these 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 what people were already spending on non-renewable forms of energy.

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. Through a rental system, TSSFA can reach more customers, more quickly.

Solar home kits, 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.



Results

Through an initial pre-launch pilot of three installations, the team learned the importance of keeping the battery in a sealed, tamper-evident container as STA remains the owners of the batteries and is responsible for their servicing. 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.

As of July 21, 2003, STA had installed 32 solar systems and had nine 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 one of its operations in May 2004.

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 (a cell phone can often be 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.

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 TSSFA relies more heavily on radio ads, local stores, local champions and the very important word-of-mouth.

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. He receives about R\$ 90 – R\$ 100 (US\$ 30.73 – US\$ 34.15) for each installation, about 2-3 hours of work. He also receives income from periodic maintenance calls.

Local shops in Encruzilhada have electronic bill pay kiosks that allow customers to pay their monthly bill. A small fee of R\$ 0.70 (US\$ 0.24) per payment is charged for this service and goes to the store owner to help recover the cost of the system.

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 its own funds for TSSFA research and development.

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 phase of TSSFA project. SDF has also provided a traditional loan for the purchase of solar panels. This arrangement reduces risk to TSSFA because the solar panels are its collateral and the other loans are conditional.

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

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
- 23.2 million liters of diesel fuel.

Throughout TSSFA's development, it has demonstrated the importance of understanding the local market, community and politics. By doing so, 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 as well as provided Rosa with the identity 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.



And those who can't afford TSSFA's services?

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 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 villagers' income levels, 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 is an integrated project for sustainable rural development, income generation, employment of renewables for domestic and productive use, biodiversity management, forestation and carbon credits. The viability studies and the development of the business plan are being carried out in partnership with AVINA (a foundation based in Switzerland), 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 and planting mahogany and other high-value woods, local residents will be able to start generating income in year seven of their forest planting initiative. By planting a diverse range of trees, the reforested area provides biodiversity.
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.

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.

Quiron 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.



IDEAAS has secured financing from AVINA and the CANOPUS Foundation for the development of its 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.

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.

The Quiron project includes the use of electric fences to support natural managed grazing techniques. This not only increases yield, 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.

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.

The Quiron project business model is based on micro-lending. Customers are provided with the means to generate income (seeds, livestock, etc.) and are required to payback 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 mitigate these risks.

About the WBCSD

The World Business Council for Sustainable Development (WBCSD) is a coalition of 165 international companies united by a shared commitment to sustainable development via the three pillars of economic growth, ecological balance and social progress. Our members are drawn from more than 35 countries and 20 major industrial sectors. We also benefit from a Global Network of 40 national and regional business councils and partner organizations involving more than 1,000 business leaders globally.

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