Case study summary
TECNOSOL, Nicaragua

2010 Ashden Award

TECNOSOL's 2010 Ashden Award recognises its success in providing the benefits of solar-powered electricity throughout rural Nicaragua.

In Nicaragua, 75% of the rural population has no access to grid electricity. TECNOSOL was set up to provide renewable energy alternatives, using solar power and other technologies. It supplies households, schools, hospitals and businesses.

- TECNOSOL sources, installs and maintains renewable energy technologies, as well as training technicians and customers. Majority of work is in solar photovoltaics (PV).
- PV solar home systems (SHS) range from 25 Wp to 200 Wp, with an average size of 60 Wp, and provide power for lights and small appliances.
- PV systems are also used to power refrigerators, freezers, electric fences, and water pumps. Other products include solar water heaters, wind and pico-hydro.
- A 100 Wp SHS costs about US$865, equivalent to buying kerosene for lighting for about three years. Some customers use loans from micro finance institutions to help pay for systems.
- By January 2010, TECNOSOL had sold 40,000 SHS systems, benefitting about 240,000 people, and over 1,000 other systems.
- Greenhouse gas emissions cut by about 26,000 tonnes/year CO_2.
- Families have safer brighter lighting with reduced indoor air pollution, and opportunities for study and entertainment; farms can use electric fencing and water pumps.
- Health centres can offer 24 hour services and run vaccine refrigerators; schools can use computers with internet access.
- Shop keepers and entrepreneurs earn extra income from staying open later, and solar freezers allow them to sell cold drinks and ice.

TECNOSOL is a business, set up by Vladimir Delagneau in 1998. It sells solar PV products through its network of branches throughout Nicaragua, and is starting to work in neighbouring countries. The company has 75 employees and an annual turnover of US$3.1 million.

Nicaragua statistics 2006/7
(UNDP/WRI)

GDP: US$1,228/year per person

CO_2 emission: 0.8 tonnes/year per person

80% of people live on less than US$2/day

46% of people lack grid electricity

Location

"I used to cut only as much meat as I could sell in one day. Now I can keep a stock of cut meat in the freezer. I used to throw away $100 worth of meat a week. I pay $150 a month for the loan."
Jose Feliciano Angulo, butcher in Rama.

Satisfied customer, butcher Jose Feliciano Angulo.

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Background

In Nicaragua, the 54% of the population who have grid electricity live mainly in towns and cities, while 75% of rural households remain without electric power. Most rural people use candles and kerosene for lighting, which makes homework, income generating activities, and emergency health care difficult after dark. There is limited access to refrigeration and computers.

TECNOSOL was set up to provide the benefits of electricity to off-grid Nicaraguan households, schools and hospitals, and businesses, using solar power and other renewable technologies

The organisation

Vladimir Delagneau set up Tecnosolucion (TECNOSOL) in 1998 as a company selling solar photovoltaic (PV) systems. It now has a head office with 17 regional branches strategically covering the whole of Nicaragua, allowing it to reach the most remote rural areas. The range of products and solutions has also increased to include solar thermal, wind and hydro. In 2009 TECNOSOL had 75 employees and an annual turnover of US$3.1 million. Between 2005 and 2009, the average growth of the company was about 40% a year, with a peak of 70% in 2007. The credit crisis in 2009 meant that growth was severely limited in that year. However, business has begun to pick up again in 2010.

Over half of TECNOSOL's income comes from customers that are private households or shop owners, another 20% comes from NGOs and 25% from government institutions. This gives TECNOSOL a strong standing in the market, as it does not rely on a single type of customer.

The technology

How does it work?

The main activity of TECNOSOL is the supply and installation of solar PV systems in rural areas, mostly solar home systems (SHS). An SHS consists of a PV module, which generates electricity from sunlight; a rechargeable battery, which stores electricity so that it can be used during both day and night; a charge controller, which prevents the battery from being over-charged or over-discharged; lights; wiring and fixtures. Both compact fluorescent and LED lights are used. Systems range from 25 Wp to 200 Wp, with an average size of 60Wp.

SHS are used to light homes, schools, businesses and health clinics. TECNOSOL also supplies phone chargers, TVs, DVD systems, sound systems and radios according to customer requirements and what they can afford. The solar PV systems are also used to power refrigerators and freezers for shops, health clinics and bars, as well as electrical fencing for livestock and homes. Other products include solar water pumps, solar thermal, wind and pico-hydro systems. Solar water pumps are also installed for agriculture and to supply potable water to villages.

Benefits

Shopkeepers benefit from PV lighting which means they can stay open for three hours longer in the evening, and earn more by using a solar freezer.

One shopkeeper found that she saved about US$5 per day with a solar freezer compared to running a kerosene refrigerator, and a further US$10 per week from not having to travel to the nearest town (3½ hours drive away) to collect ice. Her income had also increased by about US$40 per day from having a freezer and lights so that she could stay open longer in the evening.

A butcher said he used to throw away US$100 worth of meat each week, but now he can put left over cut meat in his solar-powered freezer at the end of each day. Buying the freezer cost him US$5,000, with the loan paid back in monthly instalments of US$150.

Solar light in school in Lagartello.

"We are very grateful for Tecnosol's help for providing light. There are about 100 installations in the area. The first clients have almost paid off their loans. Technosol is concerned for the whole community, even though it is in a remote area. Visitors to the town congratulate us on the lights"
Angela del Carmen Toledo, mayor's delegate in Rama

How much does it cost and how do users pay?

US$1 = NCo 21 (Cordoba) [April 2010]
TECNOSOL offers a range of solar PV systems which vary in size and cost. A 100 Wp SHS costs about US$865 (NCo 18,000). Customers must pay the full cost of the systems up front. However, most cannot afford to pay for an SHS in one payment, so TECNOSOL often links customers with local micro-finance institutions (MFIs), which offer loans to customers to purchase SHS. Some customers get credit from their local agricultural cooperative.

TECNOSOL also sells SHS to externally funded projects, such as those funded by the World Bank, Central American Development Bank and aid agencies. About 20% of the company's income is from these projects, and another 25% from similar projects funded by government institutions.

How is it manufactured, promoted and maintained?

TECNOSOL buys systems from suppliers in Europe, USA, Japan and China, depending on where it locates the best quality and price. TECNOSOL has a robust quality control system in place and always tests the equipment it orders to make sure suppliers meet international standards.

TECNOSOL staff are well-trained in the technical aspects of installation. New customers are given a poster mounted above their charge controller, which explains the regular maintenance needed to keep the system working. They are also given a user manual and instructions to contact a technician if anything goes wrong.

The company's products are marketed and promoted through the local branches. The first people to buy an SHS (often shopkeepers) in a community are asked to act as local agents, advertising the benefits of solar energy and reporting back any problems with installed systems. The local branches also promote the technology through radio programmes, posters on buses, billboards and the network of existing customers.

Solar-powered water pump in Chinantlan.

"I have 2 x 200 Wp panels to run a freezer and a 50 Wp panel to run lights and entertainment. I sell iced juices, iced water and ice cubes. I gain $15 a day from extra sales and not having to fetch the ice from the town. The kerosene lamp used to cost me $15 a month. Many people have seen the changes in my life and want a system."
Yuner Dauilo Toledo shop-keeper, Rema

Benefits

Since 1998, TECNOSOL has sold about 40,000 SHS, benefiting some 240,000 people (assuming an average of six people per household).

In addition, it has installed over 1000 other systems including PV systems for schools, health centres and shops; PV water pumpes; solar water heaters for homes and hotels; and 1 kW wind turbines and pico hydro systems.

Environmental benefits

Each SHS replaces approximately 270 litres/year of kerosene, and therefore avoids the emission of about 0.67 tonnes/year CO_2. Thus the 40,000 systems installed by TECNOSOL up to the end of 2009 are saving about 26,000 tonnes/year CO_2 in total.

Social benefits

Solar home systems reduce indoor air pollution through reduced use of kerosene lamps and also eliminate the fire risk from lamps being knocked over. Good quality light and the opportunity to use music systems and TVs make life easier and more enjoyable for people in rural areas. The sense of belonging and community life has been enhanced through activities such as watching movies, access to the internet and celebrations in the evenings.

Health centres with PV lighting are able to provide 24-hour emergency service, as well as being open for longer for consultations. Good quality light makes minor surgical procedures easier and safer. Solar-powered refrigerators for vaccines are an essential part of immunisation programmes in off-grid areas.

Education in schools and studying at night is made possible through the use of SHS, whilst access to the internet improves the quality of education for children in rural areas. Security has been improved through the use of electrical fences for homes and livestock pens.

Iced water being sold in the street in Rema. Solar panels adorn many of the buildings.

Economic and employment benefits

Customers of TECNOSOL are making savings by not buying kerosene, and also generate new income from activities made possible through solar PV. The average SHS replaces 270 litres of kerosene a year, at a cost of USD$1.27 (NCo 27) per litre. This translates to a yearly saving of USD$340 (NCo 7,100), so the cost of the SHS is paid back through savings within three years.

TECNOSOL's products also allow shop owners and entrepreneurs to increase their productivity through using solar-powered refrigerators to store meat for longer, rather than disposing of the excess at the end of each day. Shopkeepers get extra income from selling cold drinks and ice, made using solar-powered freezers. Productivity has increased as a result of irrigation using solar water pumps.

The company itself employs 75 people at its head office and 17 branches across the country. Each branch has an area manager and sometimes a depot manager as well. The managers supervise salespeople and technicians. Branch staff are often local people who have bought PV systems for themselves, so TECNOSOL is bringing employment and providing skills in rural areas.

Being able to make ice rather than travel long distances to buy it makes a huge difference to quality of life for many in remote Nicaragua.

Potential for growth and replication

TECNOSOL are already expanding their work into El Salvador and Honduras. These two new operations will begin with projects funded by the World Bank and USAID to install solar PV across different parts of Central America.

The main limit to the growth of TECNOSOL is the availability of loan finance for customers. Growth is strong in places where MFIs are operating and prepared to give loans. To address the issue of customer finance, TECNOSOL is keen to develop a business dedicated to obtaining, channelling and managing the loan funds needed by their customers. It is also working more closely with cooperatives to increase their capacity and willingness to give credit to their members for purchasing SHS.

"I have had a freezer in my shop for a year and it saves me time and money. I used to travel 100 km to buy ice and it cost me $10 a week....because of the lights I can stay open later and earn $40 more a day."
Lesbia Sebastiana Diaz shopkeeper in El Jobito, Rama.

Maritza Narvarz with her mobile which is charged by solar.

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This report is based on information provided to the Ashden Awards judges byTECNOSOL, and findings from visits by members of the judging team to see its work in Nicaragua.

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