



Photo: ENISER/ITDG

Transporting milk from the farms to the chilling tank.

## Clean energy for chilling milk

Carol Herrera and Saúl Ramírez

Rosa Salazar and her five children live in El Punre, a little village situated at 3000 metres altitude in Cajamarca, one of the most important milk-producing areas of Peru. As with most remote villages in the Cajamarca highlands, community services such as electricity, piped water and a sewage system are not available in El Punre. Farmers in this area keep cattle for milking and also maintain small plots where they grow crops for their own consumption.

The Salazar family has been working in the milk chilling business for seven years. Around 200 dairy farmers from the surrounding areas bring their milk to the Salazar's farm, where it is stored in a milk chilling tank until it can be collected by INCALAC – one of the most important milk enterprises which collect and process the milk in the Cajamarca region.

Although the business was started in 1998 with the advice of INCALAC managers, they encountered a number of difficulties very soon after starting operations. They purchased a diesel engine in Cajamarca to power the chilling tank, which has a total capacity of 6900 litres. Very quickly, it became obvious that this engine was very expensive to operate. The engine consumed 30 litres of diesel per day, costing around US\$600 per month. Transporting the diesel fuel to the farm was expensive, labour consuming and difficult, especially during the rainy season when road conditions deteriorate. The diesel engine also required frequent maintenance and repairs.

### Tapping a local energy source

In 2001, after three years of struggling to meet the operational costs of their diesel engine, Rosa and her oldest son Javier became aware of the existence of a project of the *Intermediate Technology Development Group* (ITDG) in Peru to promote small hydroelectric power plants as an energy alternative for isolated areas. The project offered both technical and financial assistance for the instalment of small-scale hydropower turbines.

As there was a water spring near their house which fed into a small river, the Salazar's thought the construction of a small hydro scheme could provide a good source of alternative energy for their chilling tank. They contacted the ITDG project, and after a number of visits to evaluate their situation, project staff agreed that it would be technically and financially feasible to install a small hydro turbine on their property. The power generated by the small hydro turbine would be sufficient to chill the milk and also to provide electricity for other uses. The total cost would be US\$28 000, sixty percent of which was available in the form of a loan from a revolving fund credit scheme set up by the project. The remaining forty percent had to be invested by the Salazar's. The project advised Rosa and Javier to sell their diesel engine and use the money to go ahead with the hydro project.

By mid 2003, the 30 kW hydro plant had been constructed, a small electricity grid was installed and the Salazars were also trained in the operation, maintenance and management of the plant. The small hydropower plant now provides all the

electricity for the milk chilling unit, and there is still a considerable amount of additional power available for other activities. The plant supplies electricity to ten neighbouring families and a school situated close to the Salazar family. It also powers a battery charging unit that is now used by sixty families living in the neighbouring village of Quinamayo and its surroundings. Before the existence of the hydropower plant, these families had to travel long distances to charge their batteries, which are used for providing electricity to their houses. To take advantage of the additional power available, Rosa Salazar also bought a small mill, connected it to the hydro-power plant and started offering milling services to the community. Rosa operates the mill, while her son Antonio is in charge of the battery loading service and the overall operation and maintenance of the hydropower plant.

Thanks to the electricity generated by the small hydro plant, the neighbouring families have also been able to buy televisions and radios. Through these information media the farmers are getting better access to information about issues that affect their lives, for example on education and health. They are also kept informed about regional and national news, which motivates them to participate in community meetings. Javier acts as a leader of the community and his neighbours support him and feel represented. They have become an active and organized social group, involving themselves in regular debates; and their administration capacity has notably increased.

### Hydropower at the service of the community

The initiative of the Salazar family has made it possible to start tapping a local, renewable energy source, and the small hydropower plant owned and operated by the Salazars will help meet the energy needs of the local community for years to come.



Photo: ENISER/ITDG

**The milk from two hundred small dairy farms is collected and stored in the chilling tank.**

With the help of the project, the Salazars were able to make a sizeable initial investment that will be cost effective in the medium term. Taking into account only the US\$600 per month that would otherwise be spent on fuel for the diesel engine, the total investment costs for the hydropower plant will be repaid in less than four years. However, there are a number of other direct and indirect financial benefits for the Salazars and the surrounding community.

The reliability of the energy supply has improved. Electricity provided by the diesel engine was irregular, due to the need for regular maintenance and frequent repairs. There was always a risk that the quality of the stored milk would decrease, leading to lower prices paid by INCALAC – or even that it would go sour and have to be thrown away. The electricity supply is now much more reliable and the quality of the milk has improved. As a result, the income of the dairy farmers in the area has increased.

For the surrounding community, there are many benefits. Seventy families now have access to clean energy generated by the micro hydro plant: the houses of 10 families are connected to the small electricity grid, and an additional 60 families use the hydro-energy for charging their batteries. These families have significantly reduced the use of kerosene lamps, leading to a substantial reduction in indoor pollution by kerosene fumes, and a reduction in respiratory diseases among mothers and children. It has become easier for children to do their school homework, because they no longer have irritated and teary eyes.

The local elementary school is also connected to the electricity grid. One of the advantages for the school is that they are now able to keep vaccines refrigerated and to participate in government vaccination programmes.

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**Milking time.**