

Water And Energy Driving to Sustainable Development in Cotacajes, Bolivia



Country: Bolivia

City/region where project is based: Cotacajes Village

Population (of area where the project is based): 80 families (400 inhabitants)

Key organisations /stakeholders involved in the project: Local authorities (Secretario General, Mayor, Secretario de Relaciones, Secretario de Actas, Vocal); Local Electrification Committee (LEC); PRODENER (NGO), the Finnish Cooperation (AEA/IICA Program); women and young people.

Authors: Andrés Calizaya Terceros(PhD), David Chávez Pereira(B.Eng.), Anibal Casas Bascopé(B.Eng.), Adriana Barrón Mondaca(Lwy)

Link: www.prodenerbolivia.com

AEA Project Link: energiayambienteandina.net/fichaBolivia_1.html



Water challenge

In the Cotacajes village, people rely on water from the local river for their domestic water needs. This untreated water can pose health risks to users. Furthermore, farmers rely on traditional irrigation practices that are less productive at distributing water, and the village has little access to electricity, instead depending on candles and kerosene lamps.

Project approach

The project objective was to build a small hydropower (SHP) system to improve the quality of life for residents of the Cotacajes village. It has been implemented through the formation of a Local Electrification Committee (LEC), composed of members of the beneficiary community in which there is active female participation. This LEC organized the works for the construction of the hydropower system, through the self-construction modality, under the supervision of the NGO PRODENER, with funding from the Finnish Cooperation (AEA/IICA Program). The hydraulic cross-flow turbine of the SHP was designed and built by PRODENER and then installed in cooperation with beneficiaries.

The hydropower system generates electricity for the population of Cotacajes village, and provides a source of clean water for domestic uses. Furthermore, a micro-irrigation pumping system is powered by the SHP for local farming, as well as other productive activities as carpentry, welding, honey bee production, grain mill and rice peeling. The SHP consists of a derivation system that produces 35 kW and is equipped with a cross flow turbine for 180 l/s and 34 m of head (the height of the flow).

Currently, beneficiaries pay a fee for energy consumption at a level that is similar to the previous expense paid for the use of candles and kerosene lamps. The entire project was carried out in 1.5 years, adapting to the availability of beneficiaries' time, without harming their family support activities.

Results and links to the SDGs

The project is well linked to the Sustainable Development Goals in which hydro-energy plays an important role, as the Cotacajes hydropower system improved life quality and well-being of the beneficiary population and neighbourhoods through increased access to clean water and electricity. Specifically, the project has resulted in:

- improved health care 24 hours (better living conditions for those responsible for health, light and conservation of vaccines in the sanitary post);



- generating extra incomes to a subsistence economy (grain mill and rice milling locally, reducing the transport fee and saving time);
- improved safety, particularly at night (avoiding fires in houses and falls to the river and to irrigation channels);
- greater access to food and food security (pumping water to high lands to increase irrigation area and increasing the production of native flowers for the honey bee production);
- improved education of children and youth;
- greater participation of both genders and vulnerable groups;
- the implementation of more productive projects;
- in a short term, the implementation of a technical training centre (carpentry, welding, metal-mechanics, honey bee production, handicrafts and sewing)

SWM: Potential and barriers

Once they have completed a training program, the beneficiaries carry out the operation, maintenance and administration of the SHP. Aside from the training, the operation is fully autonomous, and an intelligent system has been installed that activates an alert system. The alert system warns both the local operator and the PRODENER technicians about possible failures, via SMS to mobile phones (Arduino by PLC controller). For example, when the amount of water in the main feed channel decreases, an alert is sent to indicate that the operator must immediately control this anomaly. Another alert can also indicate that the turbine is running over the normal speed. The local trained operator knows what to do, but for PRODENER it is also very important to know what is going on at the SHP and how the operator is solving the problems.

The community has a cell signal whose antenna also receives energy from the SHP and facilitates communication to address any problem in the operation of the turbine according to local capacities, since more complicated aspects will require specialized assistance. In the near future we expect to have an internet connection, which would enable us to assist the operators remotely, for example by videoconference or WhatsApp.