

## ENERGY FOR LIFE - BEST PRACTICE AWARD 2011

*System / Location*

*Photovoltaic systems, wind turbine, bio digester / Bolivia*



In The Framework of the JELARE Project, the pilot project “Technology transfer and knowledge for rural electrification with renewable energy” was established. The aim of the pilot project was to create a new model for technology transfer and knowledge in education, training and research on renewable energy. The Demonstration Center of Renewable Energy Technologies integrates all systems used in the national context for the supply of heat and electricity to rural communities. The systems are integrated in the Educational Industrial Farm of the Peasant Academic Unit of Batallas. The centre allows you to see these systems in operation and to appreciate their productive uses that can convert them into tools for rural development.

### Planning/Installation

Energética, Cochabamba, Bolivia  
www.energetica.org.bo

### Donation/Support

Bundesministerium für wirtschaftliche  
Zusammenarbeit BMZ (75%), privat donor  
(25%)

### Operator

The people themselves

### PROJECT DATA SHEET

Year the installation started operating	April 2011 (Official Inauguration)
Type of system	Photovoltaic system for household use; solar dryer; efficient wood stove; photovoltaic water pumping system; solar thermal system; photovoltaic system for refrigeration; wind energy for electrification system (wind turbine); bioenergy systems (biogas digester); demonstration photovoltaic systems for Training.
Type of energy produced	Electricity, Gas, Heat, Cold, Biofuel
Location	Batallas is the third municipal section of the province of Los Andes in the Department of La Paz, Bolivia
Geographical position	16°17'07.58" S, 68°33'03.29"W elevation 3839m above sea level
Size of installation	PV Domestic - 1 room; PV refrigeration - 1 refrigerator 150 litres; PV water pump - 1 pump 13 litres/min; Wind turbine - 2 rooms; Solar thermal - 200 litres; Biodigester - 95 m <sup>3</sup> .
Power of installation	PV + wind turbine - 675W; Solar thermal - 1680 W; Biodigester - 3 m <sup>3</sup> of gas /day
Use of energy produced	Lighting, radio, television, charger for cell phones; Refrigeration, Irrigation; hot water ; Gas for cooking
Quantity of energy produced per day	PV + wind turbine - 1775 Wh; Thermo solar - 8400 Wh; Biodigester - 3 m <sup>3</sup> /day
Type of financing	Grant
Source of financing	Program ALFA III of the European Union
system investment cost	PV Domestic = 800 US\$; PV refrigeration = 3500 US\$; PV water pump = 1500 US\$; Wind turbine = 1600 US\$; Solar thermal = 1500 US\$; Biodigester
System cost per watt	PV Domestic = 14,5 US\$; PV refrigeration = 32 US\$; PV water pump = 14 US\$; Wind turbine = 4 US\$; Solar thermal = 1 US\$
Income generated from installation	PV + wind turbine = savings 105 US\$ per year Solar thermal = 306 \$US per year
Maintenance cost per year	PV Domestic = 20 US\$; PV refrigeration = 40 US\$ PV water pump = 40 US\$; Wind turbine = 30 US\$; Solar thermal = 20 US\$
CO2 reduction per year	PV Domestic = 70 kg; PV refrigeration = 140 kg; PV water pump = 140 kg; Wind turbine = 100 kg; Solar thermal = 2150 kg
Number of beneficiaries	-
Presence of renewable energy country programme	PV Domestic = yes; PV refrigeration = yes; PV water pump = yes; Wind turbine = No; Solar thermal = No



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#### LEGAL FRAMEWORK

In the articles 73, supported by Article 79 the Environmental law in Bolivia (Law 1333 (27-Apr-1992), enables and supports the design and implementation of projects and actions that show support for the sustainability policy consideration that is raised by the government.

In that vein the Bolivian law supports the use and exploitation of RE resources. The creation of a "Demonstration Center of RE Technologies" for use in university education and other pedagogical degrees has a strong foundation in Articles 81, 82 and 85. ART. 86: The State will prioritize and implement scientific and technological research actions in the fields of biotechnology, agro-ecology and conservation of genetic resources, energy use, environmental quality control and knowledge of the country's ecosystems.

ART. 90: The State, through its competent agencies, will establish mechanisms to promote incentives for those public and / or private activities in industrial protection, agricultural, mining, forestry and other measures, incorporating technologies and processes aimed at achieving environmental protection and sustainable development.

#### FEASIBILITY, SUSTAINABILITY AND REPLICABILITY

The project generates tangible impacts: first, training was conducted for a hundred people from all social classes and academic levels. These in turn apply these technologies to their communities or places where they live. The Demonstration Center is constantly visited by university students and their teachers, thus contributing to the creation of specialized professionals in the area of renewable energy. Moreover, people from rural communities, municipal technicians, teachers, and others were also capacitated. The project demonstrates the productive uses of RE systems, with the systems used in the production of vegetables, cheese and meat.

The main objective of the project is for it to be multiplier, as it is used to train professionals in RE that can then disseminate these technologies to help contribute to rural development and to train other actors such as municipal experts and people from the communities, each time reaching more people giving them access to clean energy and to make productive use of the systems. The project is financially sustainable through a maintenance fund that receives income generated from the savings from electricity and LPG and from voluntary contributions from students and other training participants.

Institutionally, sustainability is ensured because the donor makes, as a donation, the transfer of all equipment to the Peasant Academic Unit of Batallas that belongs to the Bolivian Catholic University. The university, in turn, is responsible for maintaining the equipment from an institutional perspective. In the same way it meets the legal and even more so the environmental requirements.

#### SOCIAL IMPACTS

Benefits can be described on three levels: Universities, Urban population and Rural Population.

The social benefits at the university level are: The Demonstration Center of RE Technologies promotes education and research in RE in the Peasant Academic Community of Batallas, in the Bolivian Catholic University and in other universities of the country. The social benefits at urban population level: The urban population benefits through training activities on RE. We work with various institutions in this regard.

The social benefits at rural population level: The rural population also benefits through training and information dissemination activities and for the multiplier effects they have. Some 15 people have directly benefited from initial training, the second training programme for people from rural communities will be held with 25 participants. Training for municipal technicians in June will include 35 participants, who in turn will use that knowledge (on maintenance of PV systems) in their communities, thereby indirectly benefiting the inhabitants of these municipalities.

#### FINANCING AND FINANCIAL IMPACT

The project has been implemented with financing from the project JELARE, included in the programme Alpha III of the European Union. Its sustainability is ensured through an agreement between the Bolivian Catholic University and the Peasant Academic Unit of Batallas, which guarantee its future financing through a maintenance fund with on-going income.

The scheme behind the maintenance fund for the continued funding of the project has been jointly prepared by the project team JELARE of the Bolivian Catholic University and the Peasant Academic Unit. The two institutions mentioned are participants in the financial management of the operation of the project.

#### ADDED VALUE

The added value on environmental issues occurs mainly through the multiplier effects that the project has on environmental education and on the diffusion of clean technologies in rural areas. In the training programmes carried out for rural communities, the programme is especially trying to reach women, thus promoting gender equality. Through the training component for people with low income and low education, the programme aims for equal opportunities for those traditionally disadvantaged actors. In this context, the programme works naturally with individuals of indigenous origin and contributes to the recognition of their rights. Finally, the project has been implemented to provide an innovative solution for education, training and research on renewable energy.

