ENERGY SUPPLY TO RURAL COMMUNITY CENTERS

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ABSTRACT

Work Groups from Argentina, Paraguay and Uruguay integrated by renewable energy specialists and sociologists performed coordinately this technology transfer project funded by OAS, between 2001 and 2004.

The project installed at public centers energy systems using solar thermal, PV and wind energies at six isolated communities as showcases of sustainable and easy to reproduce solutions to their energy needs.

The communities were selected using the same basis. At each community, several meetings and an energy needs enquiry were performed. Finally, in a workshop, all the beneficiaries decided about the technology transfer.

The systems, carefully designed in view of the available energy resources and their future operation and maintenance, were PV systems, windmills, basin type solar stills, solar water heaters, UV and filter PV water purifiers and water pumping systems.

The experiences obtained in these communities with different cultures, located in diverse geographical zones were enriching and allowed to establish a methodology in the technological transference of renewable energy systems.

1. INTRODUCTION

The project " Energy supply to rural community centers", funded by OAS, was carried out in Argentina, Paraguay and Uruguay. The initial schedule, a three year term since 2001 to 2004, was accomplished.

Two communities on each country involved, located at isolated rural areas, received through this technology transfer project renewable energy systems that were installed at schools or other public centers. These systems would be a showcase of sustainable solutions to energy needs of people who live without a reliable supply of conventional energy and could be reproduced
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The first phase of the project was the selection of the other sites of interest in the same community as well as in others beneficiaries starting with the characterization of the communities including social, demographic and organizational issues. At each community, several meetings were held with its qualified representatives and a carefully designed enquiry mostly related to energy issues was performed

The final decision on the array of offered systems was taken in a workshop attended by all community members. Afterwards, solar and wind measurement campaigns were performed to assess the potential available at each site.

The renewable energy systems were carefully designed in view of the local resources and their future operation and maintenance. PV systems, small windmills, basin type solar stills, solar water heaters, UV and filter PV water purifiers and water pumping systems were installed with the participation of the beneficiaries. They were trained on the operation and maintenance of the equipment.

2. PURPOSES OF THE PROJECT

In the NW of Argentina, in the Chaco of Paraguay and in the rural area of Uruguay, there are isolated communities where basic needs as illumination, communications, potable water and water heating are not fulfilled and where there are scarce or non existant economic activities, due mostly to the lack of reliable conventional energy services.

These regions have abundant resources in solar and wind energy, so it is possible to supply the communities with

reliable energy services using solar thermal , solar PV or wind energy that will certainly improve their quality of life.

The purpose of the project was to transfer this technology to six isolated communities, two in each country, and install renewable energy systems at schools and public centers. These systems were carefully designed and reliable, so as to achieve the goal of supplying current energy needs of the community as well as a sustainable source in the future.

3. SELECTION OF THE COMMUNITIES

The isolated communities considered are very different among each other for a variety of reasons: nationality and ethnics, history, geographical situation, degree of isolation and socioeconomic level. Nevertheless, the methodology applied was the same for all of them.

The involvement of the community in the project, their internal organization, the fact that eventually there is already established external support, the knowledge through careful enquiries of energy needs to be satisfied with the duly priority order and the possibility of replication of the solutions adopted were the more important principles used in the selection. . The sustainability of renewable energy resources available on site and of their future use was also very important

The communities selected are far away from the electrical grid, without other available energy services and are socially and economically marginalized . Their population is small, consisting of not more than seventy families of natives in Argentina and Paraguay and of rural workers in Uruguay.

For instance, in Argentina, they are located at approximately 4000 m over sea level, with very difficult access. The topography surrounding Rodeo Colorado community is illustrated in Figure 1.

Fig. 1: Road to Rodeo Colorado, Argentina.

The enquiries performed allow to understand energy uses and availability of sources for each family and the associated cost in monetary or other terms. Also the desires and needs of energy were enquired about. All communities appraised positively the use of renewable energy.

4. TRANSFERRED RENEWABLE ENERGY SYSTEMS

Using the information obtained at the enquiry and at meetings held with representative members of each community as well as their knowledge about the energy resources available on site, the Work Groups offered an array of renewable energy systems to each community.

Fig. 2. Workshop at Yacac Vash, Paraguay

Finally, at a workshop, the decision about the equipments to be installed was taken by all community members. In some cases, this decision was different to the recommended by the qualified representatives interviewed.

The measurements obtained at the campaigns performed were employed to assess solar and wind energy potential. In some communities, the wind energy available in site was not enough to be exploited.

The equipments installed were carefully designed according to the solar or wind energy potential assessed and their future operation and maintenance that will be performed by members of the community.

Some of the systems installed are innovative applications in the region, which are now available as an additional benefit of the project.

During the project activities, some of the beneficiaries participated actively. The relationship established allowed to make adjustments to the systems in order to focus more precisely on the community's specific energy needs and to fulfill more accurately their desires.

Training courses about systems operation and maintenance were provided to the communities. In some cases system manuals carefully prepared were given to the attendants.

The systems transferred and installed at each community are listed below.

Fig. 3 Training course at Paso del Parque, Uruguay

4.1 Systems transferred in Argentina

At the communities of Rodeo Colorado and San Isidro, Province of Salta:

PV systems to provide electricity to Health and Community Centers
Solar water heaters with insulated tank for public baths (showers)
Water purifiers with UV irradiation and filters at the public school, driven by PV power
Basin type solar stills at the Health Center

Also, at the community of San Isidro:

600 W Wind machine for public street lights

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Technical Staff: R. Caso, C. Fernández, H. Suligoy, A. Contreras

Fig. 4. Rodeo Colorado, Argentina. Community members working in the installation of solar water heaters.

Fig. 5. San Isidro, Argentina. Wind machine, 600 W total.

4.2 Systems transferred in Paraguay

At the community of Punta Diamante:

PV systems at school, church and social center
Solar water heaters with insulated tank at the school
Basin type solar stills
Chemical water purifier at the school

At the community of Yacac Vash:

PV systems to provide electricity for Health and Community Centers and School
600 W wind machine to provide power for public street lights
Basin type solar stills at the Health Center

Participants: M. E. de Castel, E. Enciso

Fig 6. Punta Diamante, Paraguay. Solar water heaters with insulated tank at the school

Fig 7. Yacac Vash, Paraguay. Instalation of public lighting with the colaboration of community people.

4.3 Systems transferred in Uruguay

At the community of Quebracho, Cerro Largo:

PV systems to provide electricity for Children and Families Attention Center, school and Health Center
Solar water heater with insulated tank at the Health Center
PV water pumping to replace a manual pump at the Health Center

At the community of Paso del Parque, Salto:

PV systems to provide electricity to the Community and Health Centers
Solar water heater with insulated tank at the Health Center
1kW windmill to provide communal water pumping

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Technical Staff: A. Prieto, J. Clavijo

Project Sociologists: S Álvarez, M. Ibarra

Fig. 8. Paso del Parque, Uruguay. Installation of the windmill

Fig. 9. Quebracho, Uruguay. Solar water heater system and PV system.

5. PROJECT IMPACTS AND BENEFITS

The six communities have in operation renewable energy systems selected by them that satisfied their priority energy needs. They are installed at public centers and have already certainly improved their quality of life allowing them to have illumination , communications, potable water and hot water.

These systems are also showcases that could be reproduced at other places and have introduced some innovative energy solutions to the region. This is very important at the moment due to the energy crisis in the region and the political decision of improvement of the conditions of life of rural population.

Through the training received, members of the communities are able to independently run their own energy systems, detecting failures and maintaining them, complying the commitment assumed by the community in this matter.

A positive impact in the education and public health is expected due to the electricity and water related devices provided to schools and health centers.

The participant Work Groups carried out a very interesting experience of technology development and relationship with rural isolated communities with a technology transfer of equipments of high social impact.

The relationship between these groups has positively evolved during the project completion. Its multidisciplinary character and the necessary interchange between participants that work in so different regions were enriching for everybody.

The same Work Groups involved in this project later joined two other groups from Chile and Peru and are carrying out a second project also funded by OAS, since 2004.

This new project “Sustainable energy supply to isolated rural communities to enhance productive activities” was proposed in view of the success obtained and the results of the enquiries and meetings performed in this project.

6. CONCLUSIONS

The technology transfer, specially at rural areas, requires a very deep knowledge of social conditions and the active participation of the community through the action of field sociologists. A multidisciplinary approach is pivotal to reach the necessary conditions of agreement and participation of the beneficiaries.

The transfer processes affects not only the beneficiaries but the participant Work Groups. The experiences obtained at this successful project allowed to establish a methodology to be applied at rural zones that considers technical and social aspects.

The technology transfer is more useful and welcomed by the communities if it is focused in their productive activities and not only to social assistance. This is the aim of the new project that will be carried out in 2004 to 2006.

The fact that there is a well established external support to the community by a NGO or a national program is very important for technology transfers because these organizations continue aiding them during the life term of equipments.

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