

Ferreyros S.A.A. to Play Key Role in ILZRO RAPS Peru Project

Since 1996, FERREYROS S.A.A. has been the Peruvian representative of SOLAREX, the world-wide leader in the production of photovoltaic modules. Ferreyros has adopted the strategy of promoting the use of photovoltaic modules in Peru, by providing specialized technical advice to its clients and by providing specialized training to its technicians and engineers in charge of project execution for clients in both the public and private sectors.

In 1997, FERREYROS executed its first photovoltaic installation project when it won the bid of the Health Ministry for the implementation of 50 refrigeration systems at health posts located in the rural areas of the Amazon, the mountains and the coast of Peru. This project allowed FERREYROS to quickly position itself in the emerging market of photovoltaic systems. With the support of the prestigious name of Solarex, Ferreyros soon took its place as the lead supplier corporation of photovoltaic systems for the rural areas of Peru with a market participation of 60%.

To date FERREYROS has executed photovoltaic system projects in the following areas:

- Refrigeration for vaccines
- Lighting for health posts and rural schools
- Solar Home Systems
- Telecommunications
- Pumping of Drinkable Water
- Public Lighting

FERREYROS offers this wide range of experience to its clients through its network of branches throughout the country.

In this new millenium, the position of our strategic partner SOLAREX has been strengthened with the merging of BP SOLAR and BP SOLAREX, to create the largest world corporation today producing solar modules and executing photovoltaic system projects.

In this new context, the implementation of the ILZRO RAPS PERU pilot project constitutes a new challenge for

FERREYROS and its subsidiary in the Amazon region, ORVISA, as it will satisfy the need to provide 24 hour electricity to medium size communities located in remote areas of the Peruvian Amazon. This will require a new technology which combines photovoltaic systems, batteries, and diesel generators, not presently available to these remote areas.

In this way, Ferreyros, which is also the leading supplier of diesel generators in Peru, with over 40 years experience in the Peruvian market, provides the RAPS Project with expertise in installing and maintaining diesel generators in the Amazon Region as well as a qualified staff with experience in executing photovoltaic projects in remote areas. Thus, Ferreyros provides the technical expertise and a highly qualified and diverse work team to face the innovative challenges that the RAPS project will engender.

This past July, under the direction of Douglas Danley, engineer and President of Orion Energy Corp., the Prime Contractor of the RAPS Project, the engineers of ORVISA in coordination with the engineers of SIMA-IQUITOS worked on defining the details for assembling and the installing the RAPS system in two remote villages along the Amazon. The design of the system includes:

- Diesel generator
- Photovoltaic modules
- Highly efficient and reliable inverters and chargers
- Extended-life batteries and appropriate technical characteristics to support fast loads and deep cycles of discharge

In addition to providing high quality components, Ferreyros will also undertake a preventive maintenance program involving the monitoring of key functions and parameters for the correct operation of the RAPS systems.



Please address questions or comments to: Dr. Rosalind Volpe, International Lead Zinc Research Organization, Inc., P.O. Box 12036, Research Triangle Park, NC 27709, USA Tel: 919.361.4647 (ext. 3023) or email: rvolpe@ilzro.org

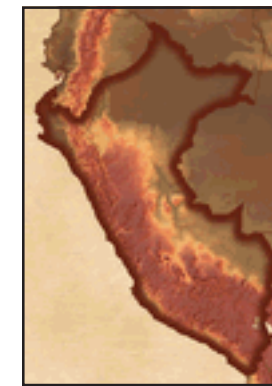
OR Mr. Marcos Alegre General Manager, ILZRO RAPS Peru J + Guzman y Valle 1408, Chacra Rios Norte, Lima 5, Peru Tel: 511.425.7206 or email:marcale@terra.com.pe

INSIDE

Recent News
page 2

Remote Monitoring as a System
Maintenance Tool
page 2-3

Ferreyros S.A.A to Play Key Role in ILZRO
RAPS Peru Project
page 4



ILZRO RAPS peru

A Quarterly newsletter of ILZRO RAPS Peru

November, 2000

RAPS Equipment Layout Finalized at Indiana and Padre Cocha



Final site selection and layout of the PV array and equipment shelters was finalized after a site visit to Indiana and Padre Cocha this past June. In Indiana, the site is just east of an existing generator house along the main street of the community. The site faces about 15 degrees west of due north.

The arrays will be set up as eight rows of modules, arranged in side-by-side groups of four rows. The battery and electronics shelters

will support three of the western rows. The fourth western row and all four eastern rows will utilize a standard ground mount. All modules will be tilted at 15 degrees towards the equator (north).

At Padre Cocha, the site is just east of the new generator house on a hill in the north central part of the community. The site faces about 15 degrees east of due north, and slopes downward towards the north.

The arrays will be set up as four rows of modules. The battery and electronics shelters will support two of the rows. The third and fourth rows will utilize a standard ground mount. All modules will be tilted at 15 degrees towards the equator (north). The drawing above is an artist's rendition of a 'typical' hybrid RAPS system, and, while similar, is not an exact replica of the systems proposed for Indiana or Padre Cocha.

In The News

GEF Awards Grant

The Global Environment Facility (GEF) has awarded a grant in the amount of \$747,500 to ILZRO RAPS Peru. The grant will be used to promote the adoption of renewable energy – specifically RAPS systems – in Peru as a means of addressing global climate change.

CFC Approves RAPS Plan

The Common Fund for Commodities has also acknowledged the efforts of ILZRO RAPS Peru through approval of a \$600,000 grant to aid in installation of several hybrid RAPS systems in Peru's Amazon river basin.

RAPS Seminar Planned

ILZRO RAPS Peru is organizing a seminar titled: *The Role of Renewable Energies in Providing Clean Rural Energy*. The Seminar is slated for February 12-13, 2001 in Lima, Peru. The objectives of the Seminar are:

- To provide perspectives on the use of renewable energy in the rural areas of Peru.
- To provide information on the opportunities to use the Clean Development Mechanism (CDM) in Peru.
- To provide information on the renewable energy projects in the Peruvian Amazon region.

Persons interested in more information should contact Dr. Rosalind Volpe or Mr. Marcos Alegre at the addresses given on page 4 of this newsletter.

Remote Monitoring

System maintenance is a critical element of any rural electrification plan. If a system can be properly maintained, the availability of power will be high. However, the scattered site locations and lack of skilled maintenance personnel make this a difficult challenge. It is therefore very important to make the most efficient use of the available maintenance personnel.

There are two primary methods to "stretch" the effectiveness of a maintenance crew:

- Reduce maintenance requirements
- Provide accurate information so maintenance tasks can be scheduled effectively.



Reduced Maintenance

The RAPS systems reduce maintenance requirements in three ways – use of high quality components, use of low maintenance batteries, and system design to minimize use of the generator.

The critical components such as microprocessor controllers, solid-state inverters and battery chargers have no moving parts, and are typically supplied in NEMA4/IP55 sealed enclosure to minimize the effects of the environment. In addition, all components are rated for temperatures and other operating conditions in excess of what is expected at the sites, including lightning protection and surge protection.

The batteries used gelled-electrolyte, so they are sealed against the environment and do not require regular watering. As long as they are properly charged, they are expected to last for 8 years or more, with no maintenance except for occasional cleaning of terminals.

Finally, the system design requires that the generator run for less than three hours per day. Total run time for the year is approximately 1,000 hours, which is less than a 12% duty cycle compared to a prime diesel. In addition, the engine runs at full load, so it is much cleaner, and not subject to carbonization problems of lightly loaded diesels. The primary maintenance interval is 250-500 hours, so oil changes will only be required 2-4 times per year, versus 35 or more times for a prime diesel. "Top-end overhauls" will be needed only once every two years, and the generator should run for ten years or more between major overhauls.

As A System Maintenance Tool

Remote Monitoring

A maintenance engineer with accurate information about system performance can schedule maintenance visits much more effectively than someone who relies on verbal reports from the communities. The problem is that the communities tend to be remote and scattered, often without regular communications services, so it is difficult to get this information to the right place at the right time.

To solve this problem, the RAPS project will include integral system monitoring coupled with remote satellite-based communications, and host computer communications / maintenance analysis software. The RAPS Control System will gather real time information about batteries, PV arrays, generator and energy output and then store it in local memory at fifteen minute intervals. The data can be stored for up to 14 days.

The real problem is getting this system information to those who need it the most – the maintenance engineers. Traditionally, telephone models or even cellular phones have been used to get this data to a central site, but these options are usually not available in the scattered remote sites that make up a rural electrification network.

Enter the satellite. Satellite systems typically cover larger areas of the earth with little or no ground infrastructure. There are a number of different satellite options, including INMARSAT, standard VSAT services, and various LEO and MEO services such as GlobalStar.

For the Peru RAPS project, we will be using INMARSAT Mini-M satellite terminals, which provide 2.4 kb/s data communications protocol. This is sufficient to download the entire daily data file in one to two minutes. In addition, the satellite terminal can be used as a phone, so the maintenance technician can call the home office for instructions or materials during a visit. The "host system" (operated by the maintenance contractor) will call the remote site once per day to download the previous day's data. In addition, the host system will have the capability to call the site and look at real time information, as well as to change setpoints and other system operating parameters.

In addition, Sandia National Laboratories in New Mexico, USA, has funded a program which will allow intensive monitoring of the system batteries. This new system will allow real time monitoring of voltage and temperature each twelve-volt segment of each battery string – a total of 40 monitoring points at Padre Cocha and 80 points at Indiana. This information will be used to evaluate battery performance in hybrid systems, and to develop newer, more efficient battery charging protocols. These data will be included with the normal daily transmissions.

Summary

The real time data available via the satellite-based remote monitoring system will allow more effective scheduling of maintenance personnel. These data will also be available to other users, such as the system design engineers in the US, who will use this data to evaluate system control parameters and recommend adjustments in setpoints.

