

Overview of RAPS Project

**Jerome F. Cole
President, ILZRO**

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International Lead Zinc Research Organization, ILZRO, founded in 1958, is a research and development association, supported by producers and users of lead and zinc from all over the world. Currently, roughly 130 companies, associations and government entities support our approximately \$10 million R&D program. ILZRO's program covers a wide variety of product applications and environmental research. Over its four decades-long history, ILZRO has managed many research and demonstrations projects. The project that I would like to discuss today is one of the largest and most exciting in our history. We call this project Renewable Energy Systems in the Peruvian Amazon Region or RESPAR project.

Historically, rural communities with no connection to a power grid have had to rely on diesel generator set to provide electricity if they have electricity at all. Indeed, many of the Peruvian remote communities do have diesels that provide electricity for a few hours per day. But diesel generators, while relatively inexpensive, require frequent maintenance. Also, they use expensive fuel and release noxious emissions. For these reasons, the Ministry of Energy and Mines, in 1997 asked us to look at the possibility of introducing Remote Area Power Supply systems to these villages, thereby reducing diesel fuel usage and

providing 24-hour electricity. We felt that the incorporation of solar renewable energy, advanced batteries, and high quality electronic control systems with the existing diesel could do the job and also help alleviate poverty, improve lifestyle, and improve environmental conditions for not only the villages in the Amazon, but also, eventually, for the millions of people living in isolated, rural communities throughout the world.

With that as background, I would like to describe to you today the RAPS project on which we have been working in Peru. This project was initiated in July of 1997 with the signing of a Memorandum of Understanding among the Solar Energy Industries Association, the DEP of the Ministry of Energy and Mining of Peru, and ILZRO. Finally, we were joined by the regional government of Loreto, where the project will take place. The MOU committed the parties to collaborate on a project to reduce the dependence on diesel generation of electricity in villages in the Amazon region by providing RAPS systems using photovoltaic solar generation with battery energy storage. The specific benefits will include:

- the reduction of the use of diesel fuel, which will reduce current costs
- the reduction in environmental damage from diesel exhaust and fuel spillage in this environmentally sensitive area
- the provision of 24-hour electricity,
- the enhancement of the quality of life of the population
- the enhancement of economic activity in the villages

The status of the program is as follows:

1. Using data obtained from DEP/MEM, approximate energy loads for a number of Amazon villages were made.
2. A modular 150 kWh hybrid RAPS system has been designed. It incorporates state-of-the-art components, taking advantage of recently gained knowledge on extending battery life, charging and controllers. Provision will be made in the design for remote monitoring.
3. Based on site visits by the MOU signatories and by socio-economic consultant, Mr. Ron Orozco of Energia Total, final site selection was made. Six 150 kWh hybrid RAPS systems will be installed in 2 villages, with an initial 2 systems being installed in Padre Cocha and 4 systems in Indiana, both villages near Iquitos.
4. A financial plan has been developed for installing these systems and operating them for a period of two years. Overall, the total cost is estimated at approximately \$2.7 million (US). Funding commitments from the private sector, primarily ILZRO, and our Peruvian affiliate totals approximately \$620,000. I should note that the US Department of Energy, through the Sandia National Laboratory, has provided ILZRO with about \$80,000 of this total through its assistance in our engineering design work. Peruvian government entities have committed approximately \$760,000 in cash and in-kind contributions. The Global Environmental Facility has provided a grant of \$747,500 through UNDP and the Common Fund for Commodities has provided a grant of \$600,000. This makes up the \$2.7 million required for the project. I am also please the we have been

awarded a grant from the Australian International Greenhouse Partnership (IGP) a sum of A\$200,000 (about \$110,000 US) to allow laboratory simulation of the RAPS service for the batteries. This will help us select the best charging regime for optimum battery service. Included in this grant are also some funds for capacity building on CDM here in Peru, in concert with CONAM.

While the initial costs are high, we have calculated that payback will be reached in approximately 13 years on this system, which is anticipated to have a 20-year life. It is anticipated that the payback period for subsequent systems, produced in greater numbers will be considerably shorter.

5. A non-profit association has been established in Iquitos—ILZRO RAPS Peru—that will be overseeing the installation of the system and operating it for the two-year test period. It is planned that, after two years, the systems will be turned over to the Peruvian government.
6. Assuming all of this has been successful, technical assistance would be provided leading to the installation of large numbers of RAPS systems in the Amazon region of Peru and in appropriate sites in neighboring countries.

Inherent in all of our planning has been the necessity of assuring that the systems will be sustainable. To that end we have taken particular care that the new systems not only provide energy, but also will be sustainable over time. For

this to occur, the energy must enhance the productive activities of the villages where RAPS will be installed. This insistence on sustainability will not only ensure that funds will be available so that the systems can be maintained and replaced as needed, but will also help provide jobs and income in these poverty stricken areas. As part of the ILZRO RAPS Peru effort, we will be working with other NGO's and the villagers to identify appropriate productive activities that 24-hour electric power will enable them to undertake. Also important to sustainability is our planned training program on energy efficiency in the villages. Even with RAPS systems, electricity will be precious and limited. Energy efficiency training will help ensure that villagers optimize their use of electric power. Finally, during the test period, we will be preparing a business plan aimed at assuring the financial sustainability of replicate systems throughout the region. Work has begun on the project, orders for hardware have been placed and we are hopeful that the systems will be installed and operating before the end of this year.

Obviously, this project has involved a major commitment of time and money by ILZRO and our partners, Solar Energy Industries Association, and the DEP of Peru. However, we all believe that this project will give us an opportunity to do things right and to apply much of the knowledge we have gained through our previous research programs. If we are successful, it could well lead to replication throughout Peru, South America and in other regions of the world.