

INSIDE

Batteries: Key to RAPS Success

page 1

RAPS: Lifestyle & Environmental Benefits

page 2

Project Funding Sought

page 4



ILZRO RAPS *peru*

A Quarterly newsletter of ILZRO RAPS Peru

volume 2, number 1

New 'maintenance-free' batteries hold key to RAPS success

Leading-edge Australian battery technology has been chosen for use in an international project to bring sustainable power to remote Peruvian villages.

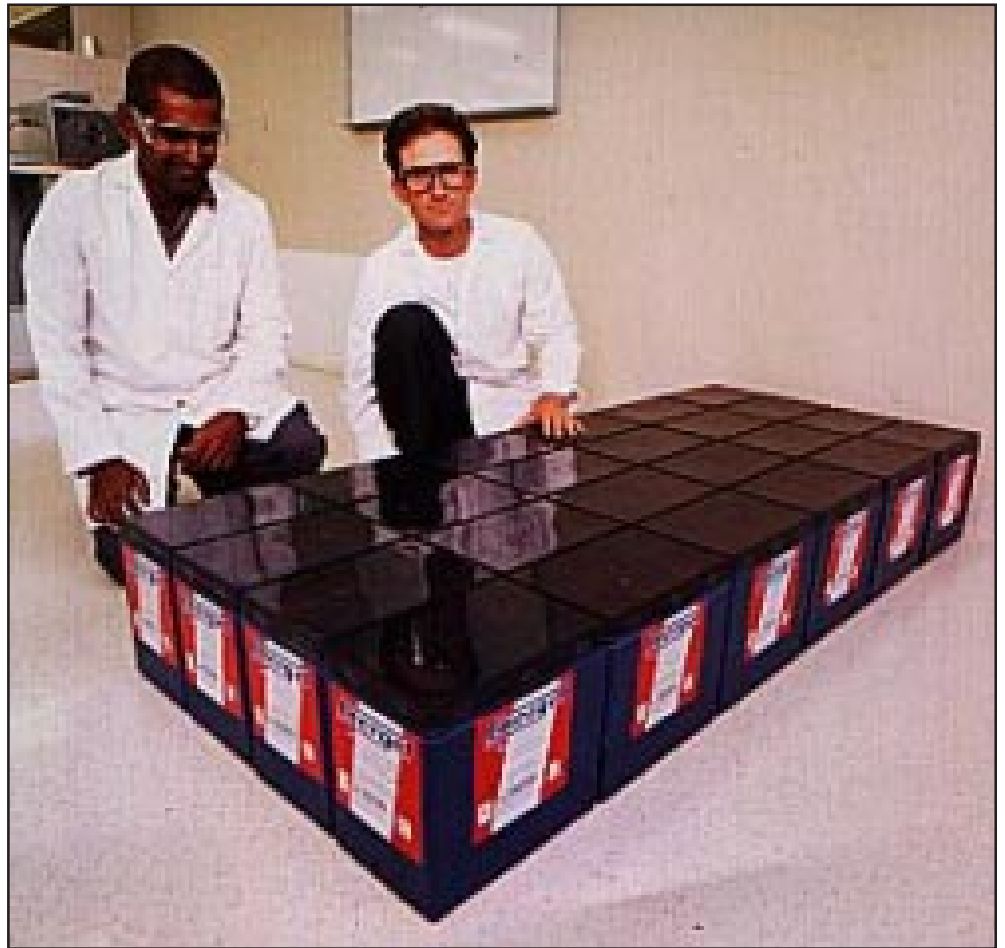
Banks of novel gel batteries developed by Australia's CSIRO and Battery Energy South Pacific (BESP) will provide storage for the local power supply system.

The International Lead Zinc Research Organization (ILZRO) and the Solar Energy Industries Association (SEIA) instigated the project in 1997 following the signing of a Memorandum of Understanding with the Peruvian government.

The understanding committed the parties to provide electricity in a cost-effective and environmentally sound way. A Remote Area Power Supply (RAPS) system using a combination of solar panels with battery energy storage and back-up diesel generators is one of those ways. The first RAPS installations will occur in the villages of Indiana and Padre Cocha.

Dr Russell Newnham, project leader in CSIRO's Novel Battery Technologies group, says the gel battery chosen for the Peru project has a superior cycle life to any other battery of its type and it is "cheaper by far."

With battery selection complete, the next step is to optimize strategies for battery



operation that will extend battery life beyond their existing capacity by reducing what is known as overcharge. The focus here will be on partial-state-of-charge operation. That is, a battery that will operate almost continuously between 20% and 80% of its fully charged capacity.

Partial-state-of-charge operation can extend battery life up to three times and removes

many of the negative effects of overcharge like corrosion and wear. It also allows the system to operate more efficiently thereby reducing fuel consumption and the associated environmental problems.

Such advances are important in making RAPS systems more cost-effective – factors that are crucial if successful implementation of this technology is to expand.

Novel Battery Design

The CSIRO-BESP battery chosen by ILZRO is unlike the typical flooded lead-acid battery found in the average car. Instead of liquid acid, the battery's acidic electrolyte is a thick, gel-like substance.

The design gives it several features that make it extremely attractive for RAPS duty.

They are virtually maintenance free, they produce negligible acid fumes and hydrogen gas, negating the need for special ventilation in the battery storage room and they are easily transported and installed as there is little risk of acid spillage.



LIFESTYLE & ECONOMIC BENEFITS

Peru registers one of the lowest average consumption rates of energy in Latin America. The government of Peru has made tremendous progress in increasing the national electrification coverage through the National Electrification Plan (NEP), but more help is needed in the remote isolated areas of the Amazon.

RAPS technology targets small communities with limited electricity service and uses the current diesel generators along with solar photovoltaic (PV) arrays and advanced energy storage batteries. The results are benefits that substantially increase service quality, provide 24 hour basic electricity, and expand opportunities for productive, economic, and educational activities in higher populated areas. Thus, the proposed project expects to contribute to the development of rural areas by providing electricity and the potential to develop income generation activities with the available energy for the inhabitants of these remote communities.

ENVIRONMENTAL BENEFITS

In addition to these lifestyle and economic benefits, there are also major environmental benefits. One of the major objectives in deploying the hybrid RAPS systems is that diesel genset run time will be shortened, even though 24 hour electricity will be provided. This, in turn, will result in the reduction of the emissions of the many pollutants that are inherent in diesel operation. These include oxides of nitrogen, total organic compounds-hydrocarbons, carbon monoxide, smoke and particulate matter, and sulfur oxides. These

Lifestyle and environmental benefits of a RAPS program

pollutants are associated with adverse human health consequences as well as having negative effects on the environment. Also, the more the diesels are used the more likely oil spills will occur both in the vicinity of the engines, and also during transportation of diesel fuels and lubricating oils. These factors are important, especially in environmentally sensitive areas of the Amazon rainforest, where the RAPS systems will be installed.

GLOBAL WARMING

Diesel emissions contain large quantities of carbon dioxide. Carbon dioxide is, of course, the major “greenhouse gas” which is thought to contribute to global warming. While global warming is still a controversial issue, alarms have been raised and governments around the world have agreed that “the balance of evidence suggests a discernable human influence on global climate.” In 1997, the Kyoto Protocol on climate change was agreed to by many countries, and as of this time, 84 countries, including Peru, have signed the Protocol. The objective of the Kyoto Protocol is to reduce the emissions of greenhouse gases and, consequently, the impact of these gases on climate change. Among the agreed steps to be taken by signatory countries is to “Implement and/or further elaborate policies and measures in accordance with its national circumstances, such as: (iv) Promotion, research, development and increased use of new renewable forms of energy, of carbon dioxide sequestration technologies and of advanced and innovative environmentally sound technologies.” Clearly, RAPS meets that requirement. Greenhouse gas reduction is therefore, a major benefit of RAPS.

GREENHOUSE GAS EMISSIONS SAVINGS

In the Loreto region of Peru where it is the intention to eventually install the hybrid RAPS systems, there are nearly 3,000 communities without access to electricity. Approximately 130 of these communities have records of small diesel gensets that provide electricity for limited periods of time. There are 147 of these diesel gensets in current use ranging up to 500 kilowatts rating. Based on preliminary analyses of CO₂ emissions, a savings of more than 100,000 kg/day of CO₂ is estimated if the hybrid RAPS systems were used instead of the prime diesel option at 24 hours. When these 24-hour figures are extrapolated to the 20 year design life of the RAPS systems, the savings in CO₂ emissions would be nearly of 1,000,000 metric tons. Savings in additional pollutant emissions are also estimated: Nitrous Oxides 21,072,106 kg; Total Suspended Particulates 806,260 kg; Hydrocarbons 1,795,710 kg; Sulfur Dioxides 1,044,443 kg; Carbon Monoxide 29,757,479 kg. There would be significant savings in the emissions of greenhouse gases and other noxious pollutants if hybrid RAPS systems were to be successfully installed operated and replicated in rural areas of Peru



Children of Padre Cocha Welcoming ILZRO RAPS Peru Team

A saving of more than 100,000 kg/day of CO₂ is estimated if the hybrid RAPS systems were used instead of the prime diesel option at 24 hours.



ILZRO RAPS Peru submits project proposal to Global Environment Facility



ILZRO RAPS PERU has submitted a medium-sized project proposal for \$750,000 to the Global Environment Facility (GEF). GEF assists developing countries to protect the global environment in four areas: global warming, pollution of international waters, destruction of biodiversity, and depletion of the ozone layer. The GEF is jointly implemented by the United Nations Development program, The United Nations Environment Program and the World Bank. The focal area of the ILZRO RAPS project proposal to GEF is global warming with the objective of promoting the adoption of renewable energy in Peru by removing barriers and implementation costs.

Proposal submitted to DoE to support replication of RAPS in the Amazon Region of Latin America

The RAPS systems being installed in Padre Cocha and Indiana will result in economic development which will help to pay for the systems. To assure success, it will be necessary to develop a business model which will include technical validation of the systems, operations and maintenance plans, a plan for the collection of tariffs, the development of productive uses of electricity, and a plan for the technical efficiency and reliability of the project. As the program progresses, the business model will be validated for technical reliability and business viability. The funds requested from DOE will be used to validate the business model and to promote replication of the RAPS system by private investment throughout Peru and Latin America. To achieve these goals, there will be a report and analysis validating the business model, a training course in Iquitos, and development of distance learning seminars and a web-based communication and interaction program.

CSIRO submits proposal to International Greenhouse Partnerships Program



The CSIRO Energy Technology Organisation in Australia has submitted a project proposal to the International Greenhouse Partnerships (IGP) Program for \$130,000 (\$197,000 Australian dollars) to enhance RAPS system efficiency through the development of strategies for optimum charge-discharge management of the batteries. Greater efficiency will provide the following benefits: decreased use of diesel fuel, which will reduce environmental damage from exhaust gases and fuel spillage, and will also lower operating costs; improvement of the quality of life of the population; and increased economic activity in the villages. CSIRO has been invited to develop the best practice battery control strategies for the Peru RAPS facilities. The plan is to establish first a baseline battery management schedule. This schedule will then be refined to provide maximum system reliability and efficiency, with concomitant minimum greenhouse gas emissions, in accordance with field data obtained from the monitoring program organized by ILZRO RAPS Peru.

Strategic planning meeting held in Washington D.C.

On Thursday January 6, 2000, the ILZRO RAPS PERU team met to discuss the status of the RAPS project. The submission of project proposals to GEF, DOE, and IGP were discussed as well as other financial matters relating to the project itself as well as the RAPS System budget and Life Cycle. Socio-economic matters such as the Energy Efficiency Program and the Productive Activities Program were also discussed. In addition, an operating plan for the next few months of the project was outlined.

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
Marcos Alegre
Manager, ILZRO RAPS Peru
J + Guzman y Valle 1408, Chacra Rios Norte, Lima, Peru
email:marcale@telematic.edu.pe