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Program Encourages Use Of Renewable Energies In Mexico

A growing number of people in Mexico are using renewable energy technology to irrigate their land, light their houses, pump well water, and otherwise improve their lives, thanks to a Sandia National Laboratories cooperative program. Sandia is a Department of Energy (DOE) national security lab. Over the past four years Sandia's Mexico Renewable Energy Program, in partnership with Mexican state and federal organizations and international environmental groups, has sponsored nearly 200 photovoltaic (solar) and wind energy projects in eight Mexican states. One example of a Sandia-sponsored project is a photovoltaic water pumping system installed for Marcos Alvarez, a cattle rancher in the desert of Baja California, Mexico.

Every year Alvarez faced a dilemma that cost him many thousands of pesos and the loss of some of his herd. During the hot, dry spring months he would be forced to buy expensive feed for his cattle, and his ranch hands would spend extra hours each day ensuring the cattle had sufficient water. This spring, however, he had new grass coming up, water automatically flowing into troughs and an emergency supply of silage ready to feed his cattle produced from grass grown on his ranch.

The change was due to the photovoltaic water pumping system that Alvarez installed with help from Sandia and FIRCO (Fideicomiso de Riesgo Compartido), a federal agency under the Mexican secretary of agriculture that encourages the use of advanced technologies to increase agricultural production. "The idea is to integrate the photovoltaic system into the design of a small desert cattle ranch that each year faces a critical shortage of feed during the driest season," says John Strachan of Sandia's Mexico Renewable Energy Program. "Alvarez now has a system designed to pump enough water for his cattle during that critical period and an excess of water during the balance of the year to grow and store fodder."

200 projects in eight Mexican states The goals of the Renewable Energy Program are to increase the use of renewable energy technologies in Mexico, thereby expanding markets for US industry and combating global climate change, especially greenhouse gas emissions. Tremendous opportunities exist in Mexico for growth in the use of renewable energy technologies. According to some estimates, more than five million Mexicans do not have access to grid electricity in 88,000 villages, while more than 100,000 rural communities are in need of potable drinking water. More than 600,000 rural ranches need water for livestock or irrigation. Given Mexico's abundant solar and wind resources, these rural needs represent a potential market for renewable energy technologies of more than \$1 billion.

Sandia's Role

Sandia's role in the projects is to provide training and technical assistance, initiate renewable energy pilot projects that could be easily replicated by area residents, and help pay for a portion of the pilot project costs. Since 1994 Sandia has received \$10 million to operate the program, including nearly \$6 million from the Mexico Office of the U.S. Agency for International Development and \$4 million from DOE.

The choice of a partner to co-sponsor renewable energy projects in Mexico with Sandia depends on the state where the projects are located. For example, Sandia partnered with FIRCO in Sonora, Baja California Sur, San Luis Potosi, Oaxaca, Chiapas and Quintana Roo. In Chihuahua, projects have been implemented by a consortium of 18 state and

federal organizations, called the Chihuahua Renewable Energy Working Group. In yet another model, Sandia works with a group of international organizations concerned about nature: The Nature Conservancy, World Wildlife Fund and Conservation International. The renewable energy projects are tools for the management of reserves and sustainable development of 'buffer communities,' those that border ecologically sensitive areas.

"The conservation organizations support projects using solar and wind energy to generate electricity in hotels and ranger stations in reserves," says Charlie Hanley, manager of the Mexican program. "These are generally areas where a gas-powered generator could potentially harm the environment." Most program activities focus on implementing water-pumping systems, such as the one used by Alvarez. For most of these projects, government programs provide 50 percent of the cost of a pilot project, while the users -- people like Alvarez -- pay for 25 percent. Sandia's share is 25 percent. Cost of photovoltaic pumping systems range from \$2,000 to \$12,000 depending on the depth of the well, the amount of water needed, and the amount of sunlight the site receives.

Potential Projects

Potential projects are initially identified by the Mexican partners. Sandia then helps select a pilot project based on its feasibility and offers technical assistance. The Sandians train locals who want a similar project on their property, develop system requirements, provide technical review of bids, and evaluate and monitor the projects following their installation. "We work closely with local suppliers of renewable energy equipment to make sure that systems meet customers' needs and that they get a good product," Hanley says.

Since the inception of the renewable energy program in 1994, 200 renewable energy systems have been installed in eight Mexican states, providing energy to more than 9,000 people and indirectly benefiting almost 50,000 more. While most use photovoltaic energy, several projects demonstrated wind energy for water pumping and electricity generation. Hanley says Sandia's Mexico Renewable Energy Program is effective because it is a team effort using the diverse expertise of many Sandia engineers, as well as the services of other technical groups, including New Mexico State University; Winrock International, an international agricultural development nonprofit organization; and Enersol Associates, a nonprofit organization that promotes the use of photovoltaic energy.

The National Renewable Energy Laboratory in Golden, Colo., also is a partner in the program, providing technical support related to developing wind projects and assessing solar and wind resources. "Together we are helping our neighbors to the south use the plentiful renewable energy resources to improve their lives," Hanley says. Sandia is a multiprogram DOE laboratory, operated by a subsidiary of Lockheed Martin Corp. With main facilities in Albuquerque, N.M., and Livermore, Calif., Sandia has major research and development responsibilities in national security, energy, and environmental technologies and economic competitiveness.

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