

WorldWater & Power:

Using Solar Energy to Solve Water and Power Problems in Developing Countries

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Introduction

Solar energy can be used to provide electricity for lighting and to power pumps and other equipment, and has been used effectively in developing countries. Case studies of some such uses are presented herein and the use of solar energy to power water purification equipment is discussed.

Background

Solar systems are clean and quiet, and need less maintenance than the die-sel generators often used in remote areas where grid electric power is not available. Using non-polluting solar systems in developing countries has value beyond its immediate objective of providing water or power. Thomas B. Johansson, Professor of energy systems analysis, Director of the International Institute for Industrial Environmental Economics (IIIEE) at the University of Lund, Sweden and former Director of the Energy and Atmosphere Programme of the United Nations Development Programme, was quoted in an Associated Press article as saying, "If you try to help (poor countries) develop, and in the process destroy the environment, you haven't helped them."

Quentin T. Kelly, Founder, Chairman and Chief Executive Officer of WorldWater & Power, became interested in and concerned about water shortages and their effect on human life during a 1984 trip to Sudan. At that time, there were about 100,000 refugees from

Ethiopia in the desert and many were dying from lack of potable water.

Unpolluted groundwater was less than 30 feet below the surface, but no fuel was available to extract it and pumps operated by hand or animals could not provide the volume of water needed for the vast number of people. Believing that there must be a way to harness the power of the sun to operate the pumps, he founded WorldWater & Power that year, working with engineers and scientists from Princeton University.

Since then, the company's solar systems have helped to solve water and power problems in more than 20 countries. The following are examples of such installations.

Tanzania—The company designed and constructed the first fresh water system for the main slaughterhouse in Dar es Salaam, Tanzania. A series of tanks on the slaughterhouse roof provides storage and water pressure for nighttime and cloudy day use. The local community participated in the construction, instilling a sense of pride and dedication for the project. Another aspect of the project was the design and installation of *water points* where community residents can purchase clean water, maximizing long-term profits for local community water boards.

East Africa—East Africa Ltd., a WorldWater & Power subsidiary, offers a wide range of power and water resource services from generating energy to locating, pumping, purifying, storing and recycling water. Development activities have included preparation of production well

specifications for bid documents, design of large capacity production wells, design and implementation of test and production well drilling programs, borehole logging services, performance of aquifer pumping tests and analysis of the test data, and provision of drilling equipment and well supplies. Services related to pumping included solar-power pumping systems, high-efficiency conventional pumps and water storage and distribution. In addition, World Water & Power provided exploratory services such as satellite imagery and air photo interpretation, local and regional assessment of sustained groundwater availability, test drilling and pumping tests. Supplementary services such as ground and surface water interaction studies, hydrogeochemistry studies, recharge assessment and design of artificial recharge systems. Well field maintenance and rehabilitation and well head protection were also available.

Ethiopia—In 1998, the firm shipped a solar water pump to Addis Ababa to demonstrate the technology developed in the U.S., that uses solar power to pump large volumes of water more cost efficiently than other methods. The pump is still in use at the Gefersa Dam water supply facility.

Pakistan—WW&P worked with the Cholistan Development Authority in rural Pakistan, to get emergency relief to people and livestock in the drought-stricken Cholistan Desert by installing AquaMax™ solar-driven pumping systems for irrigation and community use.

Haiti—In the village of Cap Hatien in northern Haiti, the Missionaries of the Poor and their hospital, shelter and rectory are benefitting from solar technology. The missionary brothers are using AquaMax™

to pump water from a 180-foot well into a 51,000-gallon tank that supplies water for more than 1,000 people. The solar array, installed in 1999, is a roof-mounted panel system that runs the pumping system and charges a set of back-up batteries that provide light and power to the mission at night.

The problem of polluted water

In many parts of the developing world throughout Africa, Asia and South America, villagers spend many hours a