Alliance to Save Energy
WATERGY CASE STUDY
Fortaleza, Brazil

CHALLENGES

The importance of this project was emphasized by the Brazilian energy crisis in 2000 and 2001. Because over 70 percent of the energy generated in Brazil comes from hydropower, droughts and energy shortages are inextricably linked. During the energy crisis and drought of 2000 and 2001, all consumers were required to reduce energy consumption by 20 percent.

The Alliance to Save Energy has worked alongside the Companhia de Água e Esgoto do Ceara (CAGECE) in the Northeast of Brazil since 2001 in order to develop and implement measures for more efficient use of water and energy. This partnership aimed to improve the distribution of water and the access to sanitation services, while reducing operational costs and environmental impacts. The partnership was important not only for reducing energy use at CAGECE, but also for establishing an example for similar projects nationwide, since the water and sanitation sector represents some 2.3% of Brazil's energy consumption.

BACKGROUND

The design of water distribution systems are based on population projections from statistical and historical data that is projected over a 20 or 30 year planning horizon. Because of this, many systems are over-designed in the sizing of storage, treatment and distribution. This over-design carries with it energy consumption levels that are much greater than necessary to provide for adequate demand, especially for booster stations. Design criteria affect not only pumping stations, but also the sizing of pipes, capacity of reservoirs, and the construction of treatment facilities and booster stations. Water systems need to be able to expand to satisfy increasing demand, but not while sacrificing efficient use of energy.

OBJECTIVES

The focus of the partnership between the Alliance and CAGECE was to develop a methodology, providing CAGECE with the tools and the know-how to produce initiatives that result in savings and rational use of energy and distributed water. As the work progressed, it became clear that the model being created would be useful to other water and sanitation companies in Brazil looking for ways to increase efficiency.

Key Results

- Energy saved: 88 GWh over 4 years
- Households newly connected to water while water consumption remained constant: 88,000
- $2.5 million saved pr year with investment of $1.1 million.
- Standardization of operational procedures and reliability of operational data
- Ability to act in real time with the system control devices.

APPROACH

An automation system in water distribution systems is allowing operators to obtain strategic data to control equipment in real time. The automation of the water supply system in the Fortaleza Metropolitan Region, managed by CAGECE and supported by USAID and the Alliance to Save Energy, allows for correction of deficiencies in the system, particularly those that are caused by over-design.

Along with the continuous efforts by CAGECE, Alliance actions in 2002 included:

- Establishing a baseline of energy consumed and water distributed for CAGECE.
- Implementing efficiency measures that led to a reduction in operational energy consumption .
- Developing a financing proposal with the Government of Brazil Fight Against Electricity Waste Program (PROCEL) in order to implement energy efficiency projects with CAGECE's operations crew. The technical

support provided by the Alliance resulted in the development of energy efficiency projects, cost/benefit analysis, and specifications of equipment that could be financed .

- Arranging for R$5 million in financing for energy efficiency projects to CAGECE. These projects included automation of operations, rewinding and replacement of motors, maximizing existing pump systems efficiency, and increasing storage capacity to allow the shutdown of pumps during peak hours.
- Creating an operations procedures manual to serve as a reference for daily performance to operations crews and CAGECE management.

Automation at CAGECE

As part of the undertaken energy efficiency program, CAGECE established an Operational Control Center for the water supply system of Metropolitan Fortaleza. The objectives of the automation of the water supply system of Fortaleza were to:

- Optimize operations to reduce energy costs;
- Improve system management by centralizing control;
- Speed up recognition of and response times to maintenance needs using sensors and by acting through controlling devices;
- Generate system diagnostics using historical records of operational data.

RESULTS

Over four years, CAGECE saved 88 GWh of energy, improving efficiency each year. Before CAGECE instituted their energy efficiency program, they provided access to 442,400 households. Four years later, the utility provided 88,000 new connections over the original baseline, while decreasing total energy consumption and costs and maintaining water consumption levels. Four years of official data show savings of over US$2.5 million with an initial investment by CAGECE of only US $1.1 million (R$3 million).

As a result of this 127 percent return on investment after 4 years, CAGECE was initially approved for financing by the Energy Efficiency Fund of PROCEL to work with the World Bank to implement further efficiency measures. The Alliance helped develop five projects, including replacing motors with high performance motors, maximizing pumping efficiency, suspending pumping during peak hours, and increasing capacity of the current pumping stations and specifications relating to energy efficiency.

If implemented these projects would add a savings of 7 million kWh per year, with a total investment of US$2 million (R$5.4 million) by PROCEL and the World Bank. The cost/benefit analysis predicts a payback period of 3.5 years. However, the financing opportunity was lost because funds were obligated to pass through the state energy utility in Ceará (COELCE) and the legal departments of COELCE and CAGECE could not come to an agreement.

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