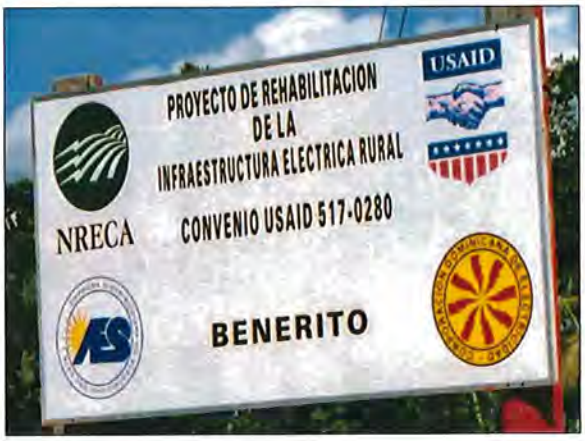
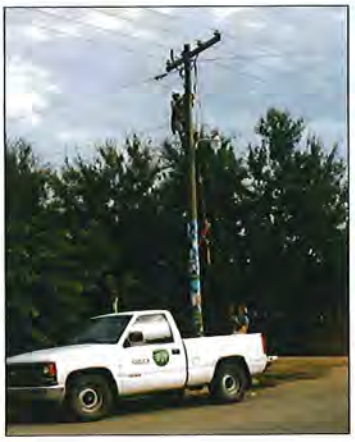




FINAL PROGRAM EVALUATION:

Rehabilitation of Rural Electric Infrastructure Damaged by Hurricane Georges

Dominican Republic

Program funded by the
U.S. Agency for International Development

Implemented by
NRECA International, Ltd.

Evaluation prepared by
Ted Weihe

November 2001

FINAL EVALUATION
Rehabilitation of Rural Electric Infrastructure Damaged by Hurricane Georges

NRECA International Ltd. carried out the Rehabilitation of Rural Electric Infrastructure in Hurricane-Affected Areas Project (REIH) from August 1999 until December 31, 2001. NRECA received $2 million in funding from USAID/Santo Domingo.

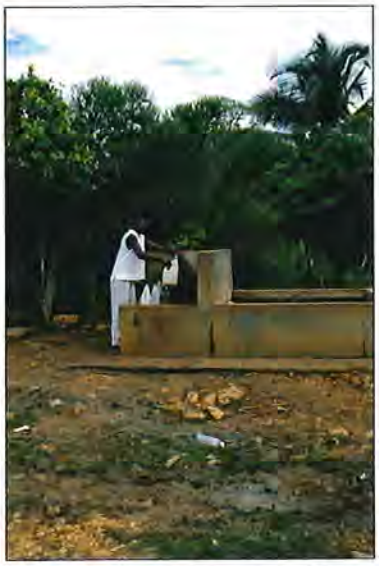
The project was part of a coordinated reconstruction program to address damage sustained by Hurricane Georges that occurred in September 1998. The hurricane most severely impacted the southeastern portion of the Dominican Republic where 115 mile an hour winds destroyed homes, businesses and the electrical grid. In the towns of Boca del Yuma and San Rafael and outlying regions, the electrical distribution was completely destroyed.

The REIH project focused on three activities to:

- Rehabilitate the basic transmission lines and distribution systems destroyed by the hurricane for businesses, homes and farms;
- Initiate economic recovery through the promotion of productive electrical uses in commercial and agricultural applications; and
- Restore community services such as schools, clinics and community water systems through grid extension, internal wiring and renewable solar panels in remote villages.

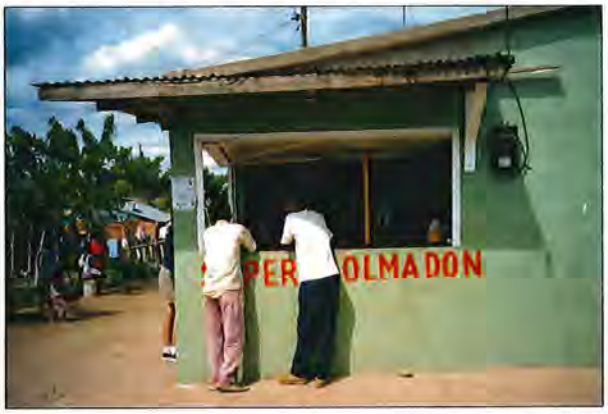
The project involved a unique collaboration with U.S.-owned AES Dominicana that purchased and operates the former state-owned distribution system in the region and the Corporación Dominicana de Electricidad (CDE), the government energy agency. AES based in Arlington, Virginia, is the largest private power and electric distribution company in the world. A major goal of the project was to put in place an innovative, low cost and efficient distribution system and work with community groups to encourage productive uses of electricity, reduce fraud and theft of electricity and increase collection rates. The project exceeded its original expectations as detailed below:

Deliverables	Results	% of Targets
2000 families with electricity restored	3,125 families 18,750 individuals	156%
2 co-ops formed to facilitate productive uses of electricity	2 co-ops established: La Sureña credit union Yuma Electric Co-op	100%
Revolving Fund for Productive uses	$50,000 in credit union to being loaned to residents	Not yet delivered (Credit Union branch office just opened)
2 Training Sessions	9 for productive uses, line safety, and cooperative organization	450%
10 Community Renewable Projects	10 Solar Systems 9 Schools 1 Clinic	100%



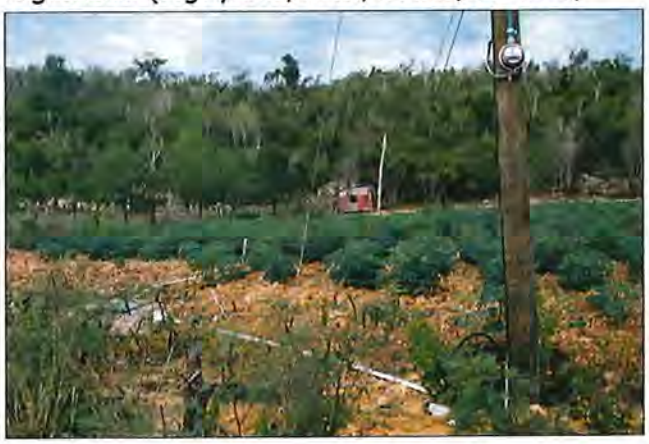
The impacts of electricity are separated into household uses, commercial, and community services. Prior to Hurricane Georges, the existing systems were poorly designed with low voltage and frequent outages that harmed or burnt out electrical motors and caused brown outs especially for remote homes, businesses and farmers at the end of the distribution line. Customers were reluctant to pay their electric bills when the service was poor. Prior to the project, most homes, businesses and community facilities received less than six hours a day in poor quality electricity.

Visits to the project sites found that the project's greatest impacts were reliable electricity for small businesses, community facilities and home uses. Also found was major economic growth with flourishing businesses and residents grateful for reliable electric service. New businesses were evidenced such as auto mechanics, car washing, restaurants and a furniture plant. In particular, micro-enterprises (e.g. small grocery shops, beauty salons) usually within or adjacent to homes were created in areas that previously had no electricity.



Electricity to schools made distant learning and adult education possible at night. Remote schools and health clinics now have solar power for lights and instructional equipment. The community well water systems were rehabilitated so that power to the pumps was shifted from small unreliable diesels to grid extensions or solar power, which provides drinking water for residents and livestock. Residents felt safer because of public lighting where small merchants clustered to provide services after dark.

With high-end markets at nearby resorts in the project area, the electrical extensions to farms resulted in the irrigation systems for fruits and vegetables (e.g. yams, corn, beans, cassava, bananas, oranges, egg plants), milking machines and small processing plants for cheese, and water pumping for cattle to produce meat. The project also provided improved electricity to restaurants and tourist facilities used by the resorts for excursions. With grid extension to un-served areas, restaurants and small shops save about half of their electrical costs compared to operating diesel generators.



A summary of project impacts are detailed below:

Productive Uses and Community Services

Microenterprises and SMEs

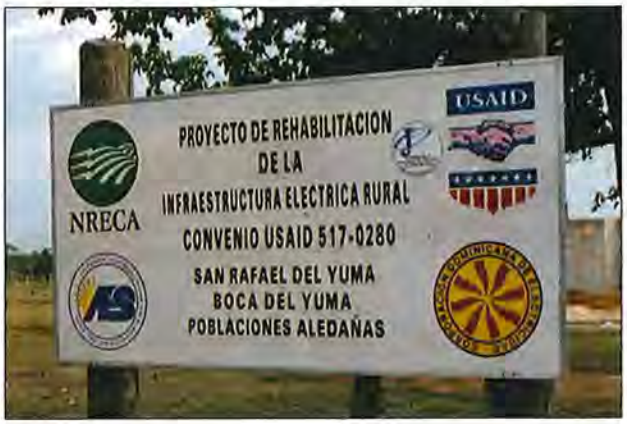
Small Stores (Colmados) lights and refrigeration	350
Tailor and Beauty Shops	15
Cold storage for fish (1 large, 4 small)	5
Agricultural water pumps for irrigation systems	4
Mechanical Repair shops	3
Cable system TV installations for cable	2
Forage choppers for cattle	2
Furniture factory	1
Tourist restaurant	1
CPG pumping station	1
Large supermarket	1
Cheese making factory	1

Community Facilities

Street Lights	156
Elementary schools (9 solar, 6 grid)	15
Drinking water systems (pumps) (4 solar, 9 grid)	13
Health clinics (4 grid, 1 solar)	5
Hospital (25 beds)	1
High schools (grid, lights, and computer lab)	1

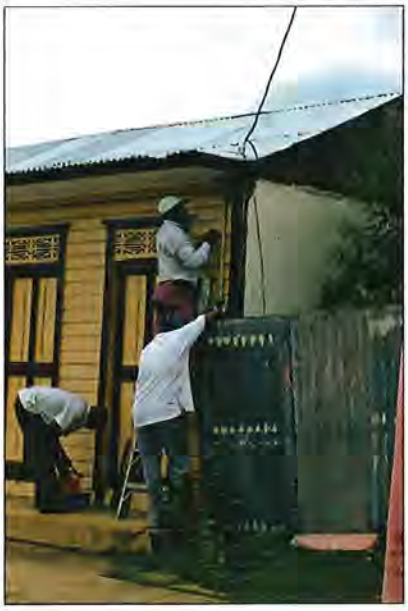
Homes

Homes electrified	2175



The electric service to Boca del Yuma and San Rafael was rebuilt and energized in less than 90 days. These town systems are technical models for the best quality service in the country. NRECA introduced low-cost, efficient line design and construction. Based on U.S. rural electric standards, the project utilized conductors, pole spacing and transformer sizing that allows for low cost expansion of the system to outlying communities and farms adjacent to the project areas.

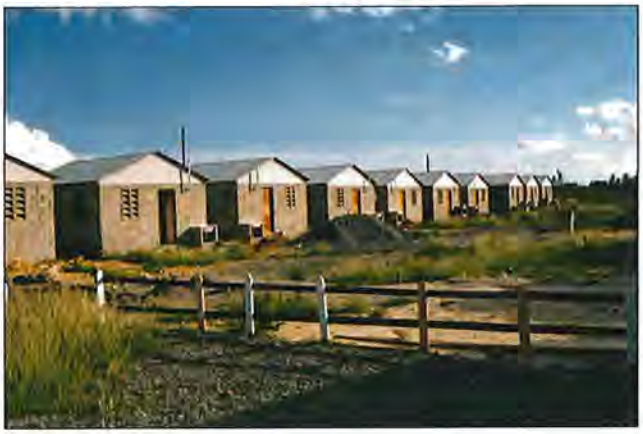
Technical losses in the two towns were reduced from 36 to 3 percent, which represents increased revenue to AES of $9,900 per month. Individual metering helps prevent theft and encourages conservation. The new system is the first in the Dominican Republic to achieve U.S. standards for voltage levels. In Boca del Yuma on the coast, the system is the first to use electrical systems that are resistant to salt water damage through its corrosion resistant anchors, stainless steel cables, guidelines and transformers. The system also utilizes U.S. wooden poles (compared to less wind resistant concrete poles) and construction (six foot holes) that are designed to withstand 115 mile an hour winds, another first in the country.



To assure the quality of the system and service to the community, NRECA helped create the Cooperative Electra La Yuma, founded on September 28, 2001. NRECA provided initial office space and basic office supplies; and trained the board of directors in the functions of the cooperative and role of board of directors. The cooperative will become a collection and billing center for AES, with meter reading and services including connections and disconnections, meter verification, grounding and internal wiring. The cooperative will save residents from having to travel 35 miles round trip to pay their bills, gain or discontinue services and make complaints. The cooperative can become a means to help prevent electrical theft and maintain high-level service.

NRECA also worked with the La Sureña Credit Union, who recently opened up a branch office in San Rafael. With the closing of the only two bank offices in town, the credit union provides the only financial services in the town and nearby area. NRECA donated $5,500 to furnish the offices including a computer and placed a $50,000 revolving fund in the credit union to support productive loans. As of November 2001, the branch office has been open for 40 days, has 68 members with total deposits of $20,000 and provided four loans: one to remodel a bakery, two for fertilizer and seeds, and a personal loan.

In addition to the project deliverables, NRECA initiated a remarkable initiative that electrified 400 homes, businesses and farms in and around the village of Benerito, including 164 new homes for very low-income residents. This effort took extraordinary collaboration and overcame many obstacles.



Benerito had been by-passed when the transmission line was constructed between La Romana and Higuey because it was too costly to put in a substation and illegal to connect to a nearby private power distribution system. At a town meeting in San Rafael, representatives of the women's association asked NRECA to help them. NRECA discussed with AES the possibility of constructing a substation but funds were not available at an estimated cost of $680,000.

At the same time, families in the village of Padre Nuestro near Bayahibe needed to be relocated because they lived on top of the aquifer and were contaminating the water supply for local hotels and resorts. These mostly hotel laborers had constructed a shantytown from corrugated roofs that came off the hotels from the hurricane. Working with a sister cooperative development organization, the Cooperative Housing Foundation (CHF), NRECA got an agreement from local officials to build new homes near Benerito in the project area. The Hotel Association of Bayahibe acquired and donated the land, and CHF agreed to build the houses. NRECA put out a request to its members for a donated transformer substation and Socorro Electric Cooperative of New Mexico responded that they had one in surplus. The transformers were shipped to and rehabilitated in Texas and sent to Dominican Republic. Land for the substation was donated by the Central Romana sugar cane processing company.

While the transforms were in transit, NRECA built the distribution grid for Benerito and CHF began construction of the new homes. CDE, the government energy agency, donated key equipment for the substation including switches, lightning arrestors, metering equipment, and conductor and line construction hardware. AES provided the poles and held educational meetings with local residents to explain and establish billing and collection procedures. The town of San Rafael donated several streetlights that NRECA installed. For construction of the substation, Socorro Electric Cooperative donated the time and services of their technical engineer who helped with installation. The total donations were $211,409, not counting volunteer time.

The project resulted in the purchasing of $502,539 in U.S. transformers, lines, poles, equipment and regulators from companies such as Coopers, North Pacific and ERMICO. AES contributed over a half million dollars in meters and metering materials, power lines, conductors, poles and other equipment as well as $70,000 in labor. NRECA provided 18 lineman volunteers for construction of the electric systems, valued at over $29,000. In addition to the substation, NRECA members from Minnesota and Wyoming donated three vehicles: two cherry pickers and a line truck. Counterpart contributions reached nearly $1 million or 50% of the total project costs. Many of the NRECA volunteers

had never traveled overseas and their experiences were life changing in that they were able to participate in setting lines and poles by hand, like earlier American rural electric pioneers.

On September 29, 2001, the electrical system in Benerito was dedicated by the U.S. Ambassador and USAID representative, Ms Janice Jacobs and Elena Brineman respectively as well as many other dignitaries. Three TV and four radio stations as well as print media covered the event.

In conclusion, the project achieved extraordinary results, far beyond the original proposal. It helped create a groundbreaking relationship between NRECA and AES that can be a model for many developing countries to reach less profitable and poorly served or remote towns, villages and farms through private sector collaboration. The project involved effective collaboration and coordination between government agencies, local NGOs, businesses and economic development organizations. The project also pointed out the importance of electricity for rehabilitation and to jumpstart the economy after a natural disaster.