

# Caracol Community Rural Electrification Program Contract No. AID-521-A-12-00005 Final Report



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## Acronyms and Abbreviations

CCEP	Caracol Community Electrification Program
CIP	Caracol Industrial Park
EdH	Electricité d'Haiti
EKAM	A USAID/Haiti housing development project in Caracol commune
ESD	ESD Engineering SARL, construction firm for the CIP Power Plant
IADB	Inter-American Development Bank
kW	Kilowatt
kWh	Kilowatt-hour
MOU	Memorandum of Understanding
MTPTEC	Ministère des Travaux Publics, Transport, Energie et Communications
MW	Megawatt
NPP	USAID/Haiti's North Park Power Plant Project
NRECA	NRECA International Ltd.
PPSELD	Pilot Project for Sustainable Electricity Distribution
PREPSEL	Projet des Réductions des Pertes dans le Secteur Electrique
RFQ	Request for Quotations
USAID	U.S. Agency for International Development

## I. Introduction

**a. Report Purpose.** This is the final report to USAID/Haiti for the Caracol Community Electrification Program (CCEP), which was implemented in Caracol Commune, Northeast Department of Haiti, from January 17, 2012 to June 30, 2014 by NRECA International Ltd. (NRECA). The CCEP program was jointly funded by USAID/Haiti and NRECA through USAID Cooperative Agreement No. AID-521-A-12-00005.

The cooperative agreement states that the program final report shall include "a description of the cumulative results achieved, final data compared to baseline data, for all indicators included in the monitoring and evaluation plan; an assessment of the impact of the program, disaggregated by geographic region (development corridor) and type of investment (business or social), summary of problems/obstacles encountered during the implementation, and how those obstacles were addressed and overcome if appropriate, a summary of lessons learned, and any particularly important success stories."

**b. Background to Program Initiation.** As part of the response of the international community to the devastating earthquake that struck Haiti in January 2010, the U.S. Government, the Government of Haiti, the Inter-American Development Bank, and private investors agreed to co-sponsor construction of the Caracol Industrial Park (CIP) in Caracol Commune, Northeast Department, Haiti. Caracol is located within an area designated by USAID/Haiti as one of several "development corridors" which are the focus of targeted investments meant to spark economic growth. The northern development corridor includes the area between Ouanaminthe on the border with the Dominican Republic, stretching westwards to Limbe (to the west of Cap Haitien). SAE Trading Company, a Korean garment manufacturing firm, agreed to become the anchor industry in the new industrial park. Estimates of the number of jobs to be created in the industrial park ranged as high as 20,000, with associated economic development to benefit more than 100,000 Haitians. Through the North Park Power Plant Project, USAID/Haiti sponsored the design and construction of a 10MW power plant, and interim provision of electric service to industrial park tenants, by an engineering firm called ESD Engineering S.R.L. (ESD).

NRECA was one of the first organizations to respond to the January 2010 earthquake, providing a team of engineers to support the managers of Electricité d'Haiti (EdH) in assessing damage to power grids, prioritizing immediate repairs to restore power, and coordinating the utilization and deployment of electric sector personnel from multiple nations responding to the disaster. NRECA subsequently provided a senior engineer in the EdH Technical Department to support EdH management to reduce losses, expand power service, and introduce efficiencies in fuel purchase procedures. This work was supported by the World Bank in 2010-2011 through the *Projet des Réductions des Pertes dans le Secteur Electrique (PREPSEL)*. NRECA had also supported, in the prior decade, construction of a rural power system in Pignon, North Department, in a project that included development of a community-based service provider operating under the authorization granted by EdH to the Pignon local government.

Figure 1: CCEP community meeting in Caracol commune



**c. CCEP and the Transition to PPSELD.** NRECA proposed to USAID/Haiti to construct a distribution grid to extend electric service to residential communities immediately adjacent to the Caracol Industrial Park. USAID/Haiti awarded a cooperative agreement to NRECA in January 2012 for the Caracol Community Electrification Program, to engage in a fast track design, procurement, construction and training project to provide electric service to 1800 customers in Caracol commune. The original cooperative agreement was intended to be completed by April 2013, but was modified to add program duration and funding to connect more communities within Caracol commune. The final program duration was for 29 months, from January 2012 to June 2014.

**Figure 2: Caracol street in February 2012, before electrification**



During CCEP program implementation, USAID/Haiti planned for the establishment of a new electric utility, to initially serve customers in the CIP and in communities in Caracol commune, with service extended later to other nearby communes. USAID/Haiti signaled its intentions regarding the Pilot Project for Sustainable Electricity Distribution (PPSELD) in a notice issued on July 16, 2012. The PPSELD project was started in May 2013, also implemented by NRECA. One of the first tasks of the PPSELD project was a transition from the interim provision of electric service through the CCEP program and through the North Park Power Plant Project implemented by ESD. As that transition was implemented, elements of the CCEP program were gradually transferred to the PPSELD utility, such that CCEP became a construction-only program. This transition is discussed further in the program activities section below.

## II. Program Result

The intended result of the CCEP program was: “Increased access to electric service for 1800 customers in the area around the North Industrial Park in Haiti”. (The term "North Industrial Park" refers to the CIP). The CCEP M&E tables are attached in Annex 2.

**Table 1. CCEP Completed Projects**

Community/Project	Completion Date	Access provided for Customers
Caracol	January 2013	696
Jacquezyl	May 2013	348
EKAM	August 2013	754
Cahess	April 2014	136
Madras	May 2014	105
University-Route 6	June 2014	230
Subtotal		2269

The program result was achieved. When CCEP construction activities were completed in June 2014, the completed distribution network in Caracol commune was capable of serving 2269 potential customers.

As defined from program outset, the access target of 1800 was defined as the quantity of customers who may connect because of the CCEP construction program, not a count of actual connections. Connections are the responsibility of the customers, not CCEP. Table 1 below shows the breakdown of access numbers by CCEP construction projects. The CCEP program target was achieved despite the reduction in the number of housing units in the EKAM area, from a planned 1500 to a final total of 750.

### III. Program Activities

CCEP program implementation consisted of the tasks set out in the program workplan agreed with USAID/Haiti, modified during implementation in

**Figure 4: NRECA office and CIP Power Plant, May 2012**



accordance with the cooperative agreement modifications to expand or extend the program. The workplan tables are presented in Annex 1.

**a. Project preparation and mobilization.** The CCEP program was initiated in February 2014. NRECA immediately deployed a team to meet with USAID/Haiti in the program kick-off meeting, during which the program objectives and activities were reviewed. The NRECA team then held coordination

meetings with other stakeholders, including local authorities in Caracol commune; Government of Haiti energy sector officials and EdH managers in Port-au-Prince and in the Northeast Department, to coordinate on construction plans and standards ; and ESD managers and staff implementing the North Park Power Plant project. NRECA Engineer Simon Munnik was designated as the on-site Project Manager. All of the tasks in this group were completed in February 2012, with the exception of the Memorandum of Understanding with the Mayor of Caracol Commune. While NRECA reached an immediate verbal agreement with the Mayor and Deputy Mayors of Caracol Commune on program

**Figure 3: The benefits of electrification (1)**

*Name: Jean Max, Driver, SAE Global, Caracol Industrial Park  
Home: EKAM*

*Originally from Cap Haitien, Jean Max now lives with his wife and baby in EKAM. He is employed by SAE Global as a driver, and has enjoyed his full time job for more than 2 years. Prior to that he had temporary small jobs, but his present job has changed his life. "I was among the first group of people who found a home in the village, and I feel as comfortable as a person who is living abroad. We feel safe, we have water, and we have electricity 24 hours a day and 7 days a week."*

*Electricity has changed his life. "After a day of work, you can go home, get water, watch TV, and if you're not sleepy, you can have electrical light, you can read your book. It's as if God has offered me a maximum of well-being in my life."*

*Jean Max is also looking forward to a bright future. "In the future, we must continue with what we have achieved with electricity, so that we continue to have it, so that we can achieve more development. This would be better for us."*

objectives and timeline, a formal agreement was not concluded until nine months later. NRECA established its office inside the CIP next to the power plant, and made an arrangement with ESD to share construction camp facilities.

**b. Design.** Using satellite imagery of the Caracol project area, NRECA performed a preliminary distribution system survey and determined that the system required approximately 10 km of primary construction (23kV) and up to 40 km of secondary (240V) construction to serve the initial target population of 1800 consumers. This initial estimate of requirements was used to start an initial procurement of distribution system materials and equipment (see Materials Procurement activity below). Final design was then carried out on a project-by-project basis, with the CCEP program area divided into the seven project areas shown above in Table 1. Standard staking methodologies were used to define the final line alignments, pole locations and pole top structures, location of transformers and likely location of service drops to consumers. The information gathered through the staking process was then used to populate the bill of materials for the second procurement. The planned environmental review was initiated with a walk-through of Caracol village and the CCEP office and warehousing site, but was not completed once it became clear that the PPSELD project would include an environmental review procedure. The load forecasting and financial modeling for the interim service period was conducted making estimates from similar projects.

Figure 5: Donated digger derrick in Lombard



Figure 6: Setting a pole by hand



track procurement process in which qualified bidders were selected and requested to supply quotations for line materials, conductor, transformers, poles and lineman tools. As mentioned above, an initial estimate of requirements made on the basis of review of satellite imagery and a walk-through of the Caracol village area were used to start an initial procurement of distribution system materials and equipment, which was shipped in August 2012. The staking process then provided the necessary data for a second procurement, which was shipped in several shipments in late 2012-2013. After the addition of Jacquezyl, University, Madras and Cahess in subsequent modifications of the cooperative agreement, a third procurement was undertaken in 2013-2014.

**d. Construction.** Line construction was directly managed by NRECA to ensure that desired quality was achieved. In addition to its full time construction team, NRECA contributed the services of linemen

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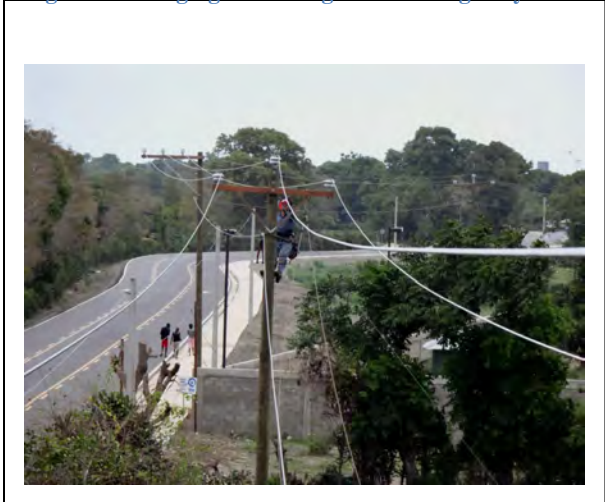
**c. Materials Procurement.** NRECA undertook a fast

Figure 7: Setting a pole on National Highway 6



volunteers whose efforts were being spread out over the construction period to assist the construction supervisor in training and mentoring the Haitian linemen. Activities included right-of-way clearing and hole digging by local community members, and later use of a digger derrick donated by a NRECA member cooperative; pole framing and setting; installation of anchors; installation and sagging of conductor; transformer testing and energization. Construction was overseen by NRECA's Project Director, Technical Manager and Project Manager.

**Figure 8: Stringing wire along National Highway 6**



Initial commissioning and energization of the system took place on October 22, 2012, four months ahead of schedule, to serve customers in the Lombard area immediately adjacent to the CIP main gate. The system was subsequently extended to Caracol village, Jacquozyl, along national highway 6, into the EKAM housing site, to the University, and finally in the Madras and Cahess areas. The following table describes the completed distribution system of the CCEP system as of June 2014.

**Table 2. CCEP Completed Distribution Network**

<b>Distribution Network Characteristics</b>	
Access (potential customers)	2269
Kilometers of MV line (23kV)	27.5
Kilometers of LV line (240v)	26
Number of transformers	88
Number of poles	865

**e. Commercialization.** The NRECA project team developed forms and procedures for new customer applications, billing, and service termination in the event of non-payment, using models for similar projects in other countries. The commercialization process was led by NRECA/CCEP Project Financial Manager, with support from NRECA's Utility Development Specialist, and Customer Information System Specialist. The project team also conducted numerous community meetings, outlining the proposed timing of construction and service activation, the requirements for safe house wiring, and the financial elements of the CCEP contracts. Prior to initiation of commercial service, NRECA sought guidance on the tariff schedule for this interim period of service. In the absence of any guidance, the current EdH

**Figure 9: CCEP community meeting in Caracol commune**





**Figure 10: The benefits of electrification (2)**

*Name: Pierre Alinx, Lineman  
Home: Caracol*



*“Linx” as he is known to friends and colleagues, is from Caracol, and worked with CCEP and the team as a lineman after a short stint as one in Cap Haïtien. He likes to climb, and he works hard. He remembers the time when Caracol was dark all the time.*

*Now, Linx says, “it looks different because you have good electricity...before it was dark time, now everywhere is energized in Caracol, power all night, all day. I like that.”*

*It doesn’t just look different, it IS different, he says. “The people enjoy the electricity very much. You can enjoy the nighttime, watch some TV. They can make some business. You know, sell some cold water, cold drink.”*

*Linx also has big hopes for his country. “I want all in Haïti, to be just like Caracol. Power every day, every night.”*

USAID/Haiti announced plans for the PPSELD project via a pre-solicitation notice, NRECA determined that it would not be possible to attract a professional Haitian general manager for a brief interim period in the CCEP program, and instead operated the interim utility with the current project staff prior to handover to PPSELD.

schedule of tariffs was used.

Sales of electric service were initiated in October, 2012, during a ceremonial commissioning of the distribution system in the Lombard area of Caracol commune. The rate of growth of services installations was dependent upon securing consumer contracts and proceeded in rhythm with payment of connection fees and demonstration by potential consumers that adequate house wiring materials had been safely installed. The collection rate ranged between 94% and 100% during the CCEP program.

NRECA deployed a simplified customer information system to manage the revenue cycle during this period. An arrangement was made with

**Figure 11: Caracol center energized, November 2012**



a commercial agent in Caracol town to process applications and collect payments. The CCEP commercialization process continued throughout the program period until the CCEP customers, commercial staff, and revenue cycle procedures were transitioned into the PPSELD utility from May 2013 to September 2013. All revenues during the interim period were deposited into a dedicated account, which was later transferred to the PPSELD utility.

NRECA had planned to recruit a Haitian general manager for the interim utility. However, when

As discussed in the "Obstacles/Lessons Learned" section below, NRECA and ESD, the implementor of the North Park Power Plant Project, reached agreement on a bulk power supply contract to govern provision of power to the CCEP system, but this contract was not approved by USAID, since it was made moot by the initiation of the PPSELD project.

**f. Training.**

The CCEP program entailed implementation of parallel activities in construction and provision of electric service in an interim utility. NRECA undertook training programs to build the capacity of the Haitian project staff implementing these activities, to carry out their daily functions and to prepare for transfer to the PPSELD utility.

**Figure 12: Training for children in safety around electricity in Jacquezy community**



Financial Summary section below, the value of these donations surpassed \$1 million). Each group of US volunteers bolstered the linemen training program with mentoring in safety measures and line building techniques. Each volunteer group consisted of three experienced US linemen and each training/mentoring session took place on a one-to-one basis, both in the training yard and out in the field. The mentoring relationship also allowed each volunteer to take a personal interest in the professional development of the CCEP linemen trainees.

The NRECA CCEP project team delivered the community training sessions in the uses and dangers of electricity, first in the Lombard area where energization took place first, then

**Figure 13: First time up a pole: CCEP lineman learns pole-climbing techniques**



The NRECA project team carried out a standard lineworker training program for the CCEP linemen. Training topics included pole climbing techniques, pole framing, pole setting, right of way clearing and basic safety procedures. As construction tasks evolved, the linemen training program was adapted and training sessions focused on the new skills and techniques required to successfully implement each and every construction task.

The NRECA International Foundation involvement in Caracol was an important element in the CCEP training program. Volunteers and equipment donations from thirty-three NRECA members and NRECA International supported the CCEP program throughout the construction phase. (As noted in the

**Figure 14: CCEP community meeting in Caracol commune**



subsequently in each new area of the service territory prior to energization.

NRECA provided training to the CCEP interim utility personnel in revenue cycle management, accounting and financial control, and use of the customer information system.

**g. Monitoring, Evaluation and Reporting.**

M&E and reporting activities were initiated from the outset of program implementation. NRECA prepared a program workplan, branding strategy, and M&E plan that were delivered to USAID/Haiti on March 15, 2012. Subsequently, quarterly progress reports were submitted to USAID/Haiti along with quarterly financial reports. Once CCEP began providing

**Figure 16: Connecting a customer in Caracol commune**



**Figure 15: Building line in Caracol commune**



commercial electric service in the program area, USAID/Haiti requested that the quarterly progress reports be modified to include reports on number of customers, value of energy sold in gourdes and in kilowatt hours, collection rates, etc. The NRECA team provided these reports in tabularized format; an example from July 2013 is provided in Annex 4 to demonstrate the types of information that was reported.

The CCEP M&E plan contains three indicators.

*Outcome Indicator 1.0:* In addition to the access provided through the construction of the distribution network, the CCEP program also provided interim service provision to customers in Caracol commune pending the initiation of the PPSELD utility.

Outcome Indicator 1.0 tracked the number of customers connected to the new electric distribution network, multiplied by four. This multiplier was used, rather than a higher number of average household size in Haiti utilized in other projects, because some of the electric service customers are small commercial establishments rather than households. Outcome indicator 1.0 is a USAID standard indicator and can be used for reporting beneficiaries of increase access to modern energy services due to USAID assistance. As of the end of June 2014, a total of 1473 customers in Caracol commune had paid their connection fee and were connected to the distribution network.

*Output Indicator 1.0:* This indicator tracks the number of Haitian staff of the CCEP interim utility who were trained in electric utility

**Figure 17: Meter installation**



**Figure 18: The benefits of electrification (3)**

*Name: Isaac Wesnel, CCEP Customer Service Supervisor  
Home: Caracol*



*Isaac worked as the customer service supervisor for CCEP and he remembers when everyone in Caracol lived by candlelight at night, and also the day the lights came on.*

*“The road was very crowded because the people were expressing their feelings, how they were happy about electricity. They were happy. Because at night, there used to be problems like thieves, and trouble makers used to give problems in the community. And because of the power, it’s like we were the savior that came in and brought changes to the community.”*

*And with reliable electricity, more people have come to Caracol to help with the local economy. “We have people who live in the United States who bring business. People who live in the community also have started their own business.”*

management, accounting, customer information system and other business systems. Outcome Indicator 1.0 was a standard USAID indicator at the time of program initiation, intended to track the number of beneficiaries of training programs in energy-related business systems. CCEP provided the training to 4 individuals – one less than the target, due to the decision not to hire a general manager for the interim utility pending initiation of the PPSELD project.

*Output Indicator 2.0:* This indicator tracks the number of Haitian staff of the CCEP interim utility who were trained in lineworker procedures, skills and safety measures. All of the trainees benefitted from structured training in the CCEP warehouse/yard area, as well as mentoring by NRECA staff and NRECA member cooperatives' volunteers, while building and maintaining the CCEP distribution network. The target of 4 trained was accomplished.

## **IV. Obstacles Encountered and Lessons Learned**

### ***a. High collection rates can be achieved in Haiti.***

The CCEP program demonstrated that it is possible to achieve high collection rates and a culture of payment discipline for electric service in Haiti. The CCEP program achieved collection rates above 95% throughout the implementation period. This was an important achievement in Haiti, where billing and collection by the national utility EdH has been extremely low and electricity theft is common. The key factors in this achievement were (i) the connection with the community, through which the NRECA team treated customers as electric cooperative members are treated in the U.S., and (ii) the strict adherence to disconnection procedures in the event of non-payment.

***b. Linked infrastructure projects require close coordination.***

One of the two key assumptions in the CCEP cooperative agreement, essential to meeting the CCEP access target, was stated as follows: "The generation capacity sponsored by the North Park Power Plant Project will be installed and operational on schedule".

The importance of this assumption was noted in the cooperative agreement because the CCEP program was dependent on other infrastructure projects to achieve the power supply (successful implementation of the CIP power plant construction project) and electricity demand (successful implementation of the Caracol EKAM project to complete 1500 housing units) inherent in the CCEP program target of access for 1800 potential customers.

The North Park Power Plant project completed construction and energization of the CIP power plant in sufficient time to achieve energization of the CCEP distribution network by October, 2012. Achieving this objective was facilitated by the fact that NRECA and ESD worked in collaboration to ensure sound engineering and installation of the connection of the CCEP distribution network to the CIP power plant. NRECA's Project Director and ESD's CEO were both first-responders to the Port-au-Prince earthquake disaster in January 2010, and were able to build on their positive relationship to quickly define relationships and resolve issues associated with powering the CCEP distribution network from the CIP power plant.

***c. EKAM delays required CCEP flexibility.***

The second, related key assumption in the CCEP cooperative agreement was stated as follows: "The construction of the first 1500 USAID-funded units in the Caracol EKAM complex proceeds on schedule and allows for installation of services to all 1500 units during the period July 2012 – December 2012." Unfortunately, the EKAM project suffered numerous delays and reductions in the planned number of housing units, falling from 1500 planned units to 750 units finally

**Figure 19: The benefits of electrification (4)**

*Name: Jean Mirvil, Headmaster of the EKAM school  
Home: Caracol*



*Jean Mirvil describes himself as "one of those Haitians who lived abroad and decided to come home to give a hand." He was a principal in a school in the Bronx, NY, and came back to Haiti to bring Haitian students in the northeast of Caracol a sense of leadership, self-esteem, and at the same time, give them the necessary academic skills to move forward.*

*"We now can also provide technology-based programs to all our youngsters, and use 35 laptops on a regular basis. We also have equipment in our kitchen to help these children in the cafeteria and they are being run by electricity. Our water pump is also run by electricity and to really meet the needs of this building we have 20 classrooms and average 30 students per class. It's a great help to really accomplish what we need to do here."*

*The school is also an anchor for the EKAM community. Jean Mirvil's passion to make a better life for the children and their families.*

constructed. The reduction in the number of housing units was overcome by extending the distribution network to other areas of Caracol commune. Perhaps more importantly, there were numerous changes over time in the plans for the EKAM housing project. The layout of the EKAM site changed, as did the intentions of the project planners with regard to the location of the electric power distribution network within the site, the plan for installation of streetlights, and the plan for house wiring as it affected the locations of service drops. Each of these shifts in plans by the EKAM project were handled by the NRECA CCEP team, though they caused delays and used up valuable implementation time.

Figure 20: EKAM connected



The lesson learned from this experience is the value to USAID of the cooperative agreement instrument in carrying out electrification programs. If the CCEP program had been implemented through a contract, then each change at EKAM would have required change orders in the NRECA contract. Because CCEP was implemented through a cooperative agreement, NRECA and USAID had the flexibility to adjust program plans appropriately.

***d. Fast-track design and procurement worked, but procurement delays were still an obstacle.***

NRECA set out to implement a fast-track design and procurement program for the Caracol distribution system, and indeed the method used for initial estimation of requirements went well. However, the timelines for material procurement, delivery, and customs clearance were much longer than anticipated. Future programs would benefit with a steady pipeline of material after the initial procurement.

## V. Financial Summary

The CCEP program was jointly supported by USAID/Haiti and NRECA. Originally estimated to cost \$1,917,851, the program was expanded in September 2012 to add line extensions to the village of Jacquezyl and to the university, raising the budget total to \$2,491,416. As implemented, the program reached a total expenditure of \$3,377,219, due to the larger than planned cost share by NRECA.

Annex 2 includes a table showing the cooperative agreement term and budget as it was modified during implementation.

Table 1 below presents expenditures in the CCEP program by USAID fiscal year. The rate of expenditure was on track throughout program implementation.

**Table 1. Expenditures by Fiscal Year**

<b>From</b>	<b>To</b>	<b>Federal Share</b>	<b>Recipient Share</b>	<b>Total</b>
Feb-2012	Sep-2012	\$ 681,462	\$ 20,000	\$ 701,462
Oct-2012	Sep-2013	1,270,151	159,933	1,430,084
Oct-2013	Jun-2014	403,195	842,478	1,245,673
<b>Total</b>		<b>\$ 2,354,808</b>	<b>\$ 1,022,411</b>	<b>\$ 3,377,219</b>

Table 2 below presents a breakdown of the NRECA cost share during the CCEP program. The original planned cost share was \$90,088, or 4.7% of the program total. For cooperative agreement modification no. 2, the NRECA cost share was increased to \$137,608, or 5.5% of the program total. As implemented, the NRECA cost reached 29% of the program total. The large NRECA cost share was due to the vigorous response by NRECA's U.S. member cooperatives providing volunteers to support the CCEP program, reaching more than 5,000 hours of time donated to the project by line workers, mechanics, and other volunteers. In addition, NRECA donated line materials and equipment that fit the CCEP distribution network, from NRECA's warehouse in the Dominican Republic. These materials will be utilized by the CCEP successor utility (currently called PPSELD) for line extensions and new service drops over the next few years.

**Table 2. Breakdown of NRECA Cost Share**

<b>Recipient Share:</b>	<b>Amount/Value</b>
Volunteers (5,014.5 hours)	\$ 303,720
Four (4) Utility Bucket Trucks	62,000
Pole Trailer	1,875
Line Materials & Equipment	654,816
<b>Total</b>	<b>\$ 1,022,411</b>

## Annexes



*Annex 1. Workplan Tables.*

No.	Activities and Tasks	Task Description	Milestones	Planned Completion Date	Actual Completion Date
1.0	Project Preparation and Mobilization				
1.1	Kick-off meeting with USAID/Haiti	Program review with USAID/Haiti AO & AOR.	Meeting conducted.	23-Feb-2012	23-Feb-2012
1.2	Initial national stakeholder meetings	Program presented in meetings Government of Haiti Secretariat of Energy in MTPTEC; EdH; ESD.	Meetings conducted.	24-Feb-2012	24-Feb-2012
1.3	Initial community stakeholder meetings	Program presented in meetings with Mayor, Deputy Mayors, and Consultant for Caracol Commune; project site managers for North Park Power Plant and Caracol EKAM housing project.	Meetings conducted.	27-Feb-2012	27-Feb-2012
1.4	Agreement with community on program coordination	MOU proposed and agreed with the Caracol Commune on project participation and commitment. This activity terminated to allow for new MOU with the Commune under the PPSELD project.	MOU agreed.	20-Mar-2012	31-March-2013

No.	Activities and Tasks	Task Description	Milestones	Planned Completion Date	Actual Completion Date
2.0	Design				
2.1	Mapping and model preparation	Base map of project area generated; household, commercial, industrial and public establishments noted and georeferenced; line alignments georeferenced; GIS data readied for engineering analysis.	GIS data transferred to engineering analysis software.	30-Sept-2013	16-June-2014
2.2	Load forecasting and financial modeling	Energy use survey conducted in project area; load forecast and financial modeling for distribution utility; engineering analysis of distribution network.	Project modeling report completed.	15-Jun-2012	31-March-2013
2.3	Environmental review	This activity transitioned to the PPSELD project.	Environmental review report completed.	15-Jun-2012	31-March-2013
2.4	Staking	Project staking survey along planned line alignments; staking sheets analyzed; project materials list generated, converted to second procurement materials list.	Distribution network design completed.	31 July 2013	29-July-2013
2.5	Staking of Madras and Cahess	Project staking survey along planned line alignments; staking sheets analyzed; project materials list generated, converted to second procurement materials list.	Distribution network design completed.	30-Nov-2013	23-February-2014
3.0	Materials Procurement				

No.	Activities and Tasks	Task Description	Milestones	Planned Completion Date	Actual Completion Date
3.1	First Materials Procurement	Generate initial materials list on the basis of site visits and satellite imagery; issue RFQ for likely materials requirement; review, document and issue purchase orders; ship initial materials.	Materials procured and shipped.	16-Aug-2012	20-Aug-2012
3.2	Second Materials Procurement	Generate second materials list from staking survey; issue RFQ for additional materials if necessary; review, document and issue purchase orders; ship materials to project site.	Materials procured and shipped.	31 May 2013	16-July-2013
3.3	Third Materials Procurement	Generate initial materials list on the basis of site visits and satellite imagery; issue RFQ for likely materials requirement; review, document and issue purchase orders; ship initial materials.	Materials procured and shipped.	28-Feb-2014	16-June-2014
4.0	Construction				
4.1	Project Manager, Office and Vehicles	Recruit project manager and bring to site; procure mobile office and pickup truck and ship to site; ship donated line truck to project site.	Project Manager and vehicles on site.	10-May-2012	10-Jul-2012
4.2	Establish office and warehousing area	Arrange site for mobile office, warehousing of containers, and pole yard; establish office procedures, warehouse security.	Project office and warehouse established.	15-May-2012	20-Jun-2012
4.3	Materials receipt, clearance and warehousing	Customs clearance of materials shipments; delivery to warehouse and pole yard; secure storage on site.	Materials securely warehoused on site.	28-Jun-2012	27-Sep-2012

No.	Activities and Tasks	Task Description	Milestones	Planned Completion Date	Actual Completion Date
4.4	Select and train line crews	Recruit line workers; training by US line supervisor and lineman.	Haitian line workers trained.	02-Aug-2012	14-Sep-2012
4.5	Line construction	Construct primary (medium voltage) and secondary (low voltage) lines.	Lines constructed.	15-Sept-2013	22-Sept-2013
4.6	Service installations	Install service drops to existing customers throughout project area and to future customers within Caracol EKAM housing project area.	Services installed.	31-March-2014	30-June-2014
4.7	Commissioning	Inspection, commissioning and handover of distribution network to Caracol commune, USAID, and new utility operator.	Commissioning on March 31, 2014.	31-March-2014	30-June-2014
4.8	Additional Line construction	Construct primary (medium voltage) and secondary (low voltage) lines to serve the communities of Madras, Cahess, and the University of the North.	Lines constructed.	31-March-2014	30-June-2014
5.0	Commercialization				

No.	Activities and Tasks	Task Description	Milestones	Planned Completion Date	Actual Completion Date
5.1	Consumer contracts	Design, review and finalize consumer contracts; conduct testing of contract instrument with sample group; revise if necessary; conduct mobilization campaign for new customers in existing communities; add new customers as households arrive in Caracol EKAM.	Consumer contracts issued, with all fees paid.	30-Nov-2012	24-Oct-2012
5.2	Power supply contract	Draft, negotiate and execute power supply contract with ESD during interim management phase of North Park Power Plant; revise if necessary with USAID-selected management contractor for North Park Power Plant.	Signed power supply contract.	31-Aug-2012	Submitted to USAID/Haiti, but rendered moot by PPSELD
5.3	Identify management team	Recruit utility management team.	Utility managers on board.	08-Jun-2012	n/a
5.4	Select business systems	Identify, select, and implement simplified business systems in accounting, customer information, billing, and human resources.	Business systems operational.	05-Jul-2012	24-Oct-2012
5.5	Identify administrative commercial staff	Recruit a limited number of administrative and commercial staff for this small utility.	Utility staff on board.	02-Aug-2012	24-Oct-2012
6.0	Training				

No.	Activities and Tasks	Task Description	Milestones	Planned Completion Date	Actual Completion Date
6.1	Revised from Management training to Utility training	Training in decision making, financial oversight; annual budgeting; personnel management; and collecting and reviewing key utility performance data and key ratio analysis.	Training delivered.	02 August 2012	26 October 2012
6.2	Line worker training	Line worker skills development and safety training, including hot line training.	Training delivered.	02-Aug-2012	14-Sep-2012
6.3	Community electricity safety training	Basic safety training in community meetings (minimal since electricity is well known in Haiti).	Training delivered.	30 May-2013	30 May 2013
6.4	Accounting and financial control	Basic bookkeeping functions; monthly financial reports; establishing and observing financial checks and balances.	Training delivered.	16-Aug-2012	26 October 2012
6.5	Revenue cycle management	Basic orientation to discipline of meter reading, billing, collection, and disconnection/reconnection orders.	Training delivered.	30-Aug-2012	26 October 2012
6.6	Mentoring	Continuous support to utility management and staff through the NRECA operational period.	Utility maintains high collection rate, low losses during NRECA operations.	30-Sept-2013	30-Sept-2013
7.0	Monitoring, Evaluation, Reporting				

No.	Activities and Tasks	Task Description	Milestones	Planned Completion Date	Actual Completion Date
7.1	Workplan, M&E plan, branding & marking plan	Workplan, M&E plan, branding & marking plan drafted and reviewed.	Plans approved.	29-Mar-2012	12-Dec-2012
7.2	Community meetings	Monthly meetings with commune leadership; occasional meetings with larger communities (e.g. Caracol village) and/or other associations.	Meetings conducted.	30-Sept-2013	30-Sept-2013
7.3	Quarterly Progress Review	NRECA internal process to review program progress against benchmarks; determine corrective actions; select success stories; draft quarterly progress reports.	Reviews conducted.	31-June-2014	30-June-2014
7.4	Quarterly Reports	Submit quarterly financial and progress reports.	Reports submitted.	30-June-2014	30-June-2014
7.5	Final Report Drafted, Reviewed	Drafting of final report to describe results achieved, final M&E data, summary of problems and obstacles overcome, lessons learned, and compilation of success stories.	Report drafted.	30-Sep-2014	30-Sep-2014
7.6	Final Report Delivered	Final Report delivered to USAID within 90 days of program completion.	Report delivered.	30-Sep-2014	07-Oct-2014

**Annex 2. M&E Tables.**

The NRECA Monitoring and Evaluation Plan for the CCEP program included three categories of indicators: process indicators, output indicators, and one outcome indicator. The process indicators were identical to the tasks included in the program workplan (showing in Annex 1 above). Results for the output indicators and outcome indicator are presented in the table below.

Indicator No.	Indicator Name	Indicator Definition, Description, Data Source, and Discussion	Baseline (2012)	Target (2014)	Actual (2014)
Output 1.0	Management training.	<p>Definition: Number of people receiving USG supported training in energy related business management systems.</p> <p>Description: Total number of participants in utility management basic training, and administrative training, disaggregated by gender.</p> <p>Data Source: NRECA project reports.</p> <p>Discussion: This is a USAID standard indicator. In the CCEP, while this indicator is disaggregated by gender, the target is not disaggregated because the management personnel have not yet been recruited, selected and hired. Note that the management training and the administrative and financial training envisioned in the program have been combined into this one indicator.</p>	None.	5	4
Output 2.0	Electric lineworker training.	<p>Definition: Number of people receiving USG supported training in electric line work.</p> <p>Description: Total number of participants in lineworker training, disaggregated by gender.</p> <p>Data Source: NRECA project reports.</p> <p>Discussion: While this indicator is disaggregated by gender, the target is not disaggregated because the line workers have not yet been recruited, selected and hired.</p>	None.	4	7



Indicator No.	Indicator Name	Indicator Definition, Description, Data Source, and Discussion	Baseline (2012)	Target (2013)	Actual (2014)
Outcome 1.0	Access to electric service.	<p>Definition: Number of people with increased access to modern energy services as a result of USG assistance.</p> <p>Description: Total number of customers connected to the new electric distribution network, multiplied by four. This multiplier is used, rather than a higher number of average household size in Haiti utilized in other projects, because some of the electric service customers will be small commercial establishments rather than households.</p> <p>Data Source: NRECA project reports and utility records.</p> <p>Discussion: This is a USAID standard indicator. In the CCEP, this indicator is not disaggregated by gender because it will not be directly measured; i.e. the number of people with electric service will not be directly counted in each household; therefore any gender disaggregation would be an estimate only.</p>	None.	7,200	9,076

**Annex 3. Cooperative Agreement and Modifications.** As the program was implemented, USAID/Haiti and NRECA reached agreement on several modifications to the cooperative agreement. These are listed below. This Final Report is based on the cumulative program as described in the base cooperative agreement plus all modifications.

Document	Date and purpose of modification	Term and amount
Original cooperative agreement.	February 14, 2012.	15 months, Feb 2012 to May 2013 USAID: \$1,827,763 NRECA: \$90,088 Total: \$1,917,851
Modification 1	August 8, 2012. For USAID/Haiti administrative purposes.	No change
Modification 2	September 13, 2012. Increase USAID contribution by \$527,045 and NRECA contribution by \$47,520, and add requirement to connect Jacquezyl and build separate dedicated circuit for CCEP customers.	15 months, Feb 2012 to May 2013 USAID: \$2,354,808 NRECA: \$137,608 Total: \$2,492,416
Modification 3	April 12, 2013. Extend the completion date to September 30, 2013 and re-align the budget.	20 months, Feb 2012 to Sep 2013 USAID: \$2,354,808 NRECA: \$137,608 Total: \$2,492,416
Modification 4	September 16, 2013. Extend the completion date to March 31, 2014 and re-align the budget.	26 months, Feb 2012 to Mar 2014 USAID: \$2,354,808 NRECA: \$137,608 Total: \$2,492,416
Modification 5	March 27, 2014. Extend the completion date to June 30, 2014.	29 months, Feb 2012 to Jun 2014 USAID: \$2,354,808 NRECA: \$137,608 Total: \$2,492,416

*Annex 4. Example of Monthly CCEP Utility Performance Report*



### CCEP Interim Utility Performance Summary as of 31 JULY 2013

<b>BILLING SUMMARY</b>	2012		2013						
	November	December	January	February	March	April	May	June	July
TOTAL USAGE (kWh)	1167	5282	7935	7414	10067	11309	11537	15523	20322
TOTAL # OF CUSTOMERS BILLED	27	129	205	243	290	343	374	401	425
TOTAL # OF CUSTOMERS with USAGE > 0	27	122	197	236	288	325	361	390	411
TOTAL ENERGY CHARGE (Gourdes)	8441	42766	54079	50767	67454	73543	72902	103644	135147
TOTAL BILLING (Gourdes)	12491	55075	80431	85923	109995	121727	130086	163505	204242
TOTAL PAYMENTS (Gourdes)	12472	55075	79605	81223	109837	119115	127096	161223	
<b>COLLECTION RATE</b>	<b>99.85%</b>	<b>100.00%</b>	<b>98.97%</b>	<b>94.53%</b>	<b>99.86%</b>	<b>97.85%</b>	<b>97.70%</b>	<b>98.60%</b>	
<b>USAGE SUMMARY</b>									
	2012		2013						
AVERAGE USAGE by customer type:	November	December	January	February	March	April	May	June	July
R Residential/Home Business	43	43	41	32	36	34	32	39	48
C Commercial	98	140	114	99	118	103	85	112	181
NG Non -Governmental	0	95	97	108	178	231	248	433	393
PI Public Institution	0	49	19	19	20	15	11	34	54
<b>AVERAGE USAGE (kWh/customer)</b>	<b>43</b>	<b>43</b>	<b>40</b>	<b>31</b>	<b>35</b>	<b>35</b>	<b>32</b>	<b>40</b>	<b>49</b>
AVERAGE TOTAL BILL (Gourdes/customer)	463	427	392	354	379	355	348	411	481
<b>CUSTOMER SUMMARY</b>									
	2012		2013						
	November	December	January	February	March	April	May	June	June
R Residential/Home Business	25	115	186	224	271	323	355	383	407
C Commercial	2	9	10	10	10	12	12	11	11
NG Non -Governmental	0	4	5	5	5	4	4	4	4
PI Public Institution	0	1	4	4	4	4	3	3	3
Total number of customers	27	129	205	243	290	343	374	401	425
<b>Total number of beneficiaries</b>	<b>108</b>	<b>516</b>	<b>820</b>	<b>972</b>	<b>1160</b>	<b>1372</b>	<b>1496</b>	<b>1604</b>	<b>1700</b>



**CCEP Interim Utility Performance Summary conti.**

<b><u>ELECTRICAL ENERGY RECOVERY INDEX</u></b>	2012		2013						
	November	December	January	February	March	April	May	June	July
Total Energy Usage at Retail Meters	1,167	5,282	7,935	7,414	10,067	11,309	11,537	15,523	20,322
Technical losses (estimated)	10%	14%	10%	11%	8%	7%	7%	7%	7%
Total Energy Delivered into Distribution System	1,284	6,021	8,729	8,230	10,872	12,101	12,345	16,610	21,745
Collection Efficiency	0.9985	1.0000	0.9897	0.9453	0.9986	0.9785	0.9770	0.9860	0.9800
Energy Billed that was Actually Collected (using Collection Efficiency)	1,165	5,282	7,853	7,008	10,053	11,066	11,272	16,377	21,310
<b>Energy (kWh) Recovery Index</b>	<b>90.77%</b>	<b>87.72%</b>	<b>89.97%</b>	<b>85.16%</b>	<b>92.46%</b>	<b>91.45%</b>	<b>91.31%</b>	<b>98.60%</b>	<b>98.00%</b>
(Percentage of Energy Actually Paid for and Collected, to Energy Delivered into Distribution System)	Note: July Collection Efficiency is estimated								

**CCEP Bank Account: Month end balance (gourde)**

<b><u>Bank account opened 6 November 2013</u></b>	2012		2013						
	November	December	January	February	March	April	May	June	July
Month end balance	63501.75	101504.75	225611.57	317647.04	393067.29	543727.22	642808.48	817480.46	
<b><u>ALL AMOUNTS ARE SHOWN IN GOURDE</u></b>	Note: Balance includes Bill Collections, Application Fees and Service Order Changes								