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TRANSITION MANAGEMENT CONTRACT, ELECTRICITÉ D'HAÏTI

FINAL REPORT

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Contract No. EPP-I-00-03-00008-00, Task Order 09

Final Report

Transition Management Contract, Electricité D'Haiti

Sponsor: USAID/Haiti

Contract No.: EPP-I-00-03-00008-00, Task Order 09

Order No.: EPP-I-09-00008-00

Contractor: Tetra Tech ES, Inc.

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EXECUTIVE SUMMARY

This report examines the achievements made and problems encountered throughout USAID's Transition Management Contract for Electricité D'Haiti (EDH). It also proposes potential solutions to the challenges identified.

Background on the Transmission Management Contract

In April 2011 USAID retained Tetra Tech to implement an interim management contract at EDH, which was later re-named the Transition Management Contract (TMC) and then the Operations Improvement Agreement (OIA); the Government of Haiti (GoH) signed the latter in March 2012. The OIA focused on reducing electricity losses at EDH, improving the utility's financial health, and creating "pillar of excellence" areas where electricity will be provided continuously. In August 2012, the GoH changed Tetra Tech's scope of work to emphasize technical assistance in key commercial and technical operations.

At the request of the GoH, on 25 April 2013, USAID extended the TMC contract until September 2013 and focused Tetra Tech's scope of work on technical assistance to the utility's commercial, planning and technical functions, and the procurement of loss reduction equipment and tools. On 6 December 2013, USAID again extended Tetra Tech's contract until 28 February 2014. Under this extension, only the commercial expert remained in Haiti.

The Project Context

EDH's own internal 2012-2013 Action Plan calls for: increasing 1) revenues from 4.2 billion Haitian Gourdes (HTG) in 2011-2012 to 9.1 billion HTG in 2012-2013, 2) the collection rate from 65% to 95% through the recovery of at least 900 million HTG, 3) electricity supply from 14 to 18 hours a day, 4) installed capacity by 35 MW through the rehabilitation of thermal and hydroelectric plants, and 5) the control of EDH expenses in energy purchases.

The action plan proved too ambitious to accomplish in a single fiscal year. This owed to major delays in investments for the installation of remote and radio frequency meters, among other projects. In addition, even though the State had committed to pay EDH a monthly operation and investment subsidy of US\$ 5 million, EDH was confronted with growing outstanding payments for energy in the public sector. At the end of September, 2013, the arrears of the ministries, autonomous institutions and communities were US\$ 42.7 million, and EDH was unable to pay its bills to independent power producers (EDH owes the IPPs about US\$ 65 million).

Other problems the utility faced included:

- Haiti's grid is in an advanced state of deterioration at all levels.
- Energy theft, unmetered consumption, billing errors, metering errors, technical losses, and the non-payment of bills represent about 75% of the electricity delivered to the grid.
- Information technology is in a rudimentary state.
- There is no real authority for supply and services.

The utility's situation has been exacerbated by political interference (for example, many projects with major long-term economic impacts have been imposed on EDH by the national and local governments), a dysfunctional personnel system, poor coordination among the donor community, and lack of skills in information technology.

Project Activities and Results

Technical and Planning Assistance. Tetra Tech reviewed the engineering of all new substations in Haiti; its recommendations resulted in new designs and specifications. It also made recommendations on and/or oversaw improvements in transformer maintenance and specifications, drawings for the interconnected network, the collection and digitization of information on electrical protection/coordination and power flow studies, standard operating procedures for relay settings, bottlenecks on the grid, a model to identify the real cost of producing electricity, and calculations for pricing and sizing the transmission line. It also worked with EDH to ensure that the Sonapi line was completed and provided power 24 hours a day.

Tetra Tech worked closely with EDH's technical, commercial and planning departments to develop the utility's five-year, \$588 million investment plan, which was completed in late 2013. It also mounted a key initiative to reduce electricity losses through the development of a metering plan, which was accepted by EDH. It then provided extensive technical support for the deployment of two major meter reading technology projects (remote metering for very large customers and radio frequency metering for the residential/small commercial segment).

Financial Management and Accounting. In 2011, EDH had no formal process for reviewing its financial results. In 2012, Tetra Tech built a dashboard for EDH that included key financial and business metrics, and trained EDH staff in populating/interpreting the data. As a result, EDH can now calculate and analyze key performance indicators.

Asset Management. Tetra Tech established a process for the daily collection of information on the use of vehicle fuels and made recommendations to improve the security of fuel and vehicle use at headquarters. This led to a number of improvements, and processes were put in place under a new fleet management and reporting system. Tetra Tech also reviewed EDH's procurement, inventory management, and storage processes. It then provided training in the principles of continuous inventory and materials management.

Commercial Operations. In June 2009, funded by the World Bank, EDH contracted INDRA to replace EDH's legacy billing system with a modern Customer Management System (CMS), which can enumerate customers, convert meter readings to bills, print bills, keep a statistical database on customers that can identify billing anomalies, and keep track of customer payments and arrears. However, implementation was slow and flaws remained in the system. In early 2012, the number of bills issued was far lower than expected, resulting in a significant reduction in EDH collections. Corrections were made to the system in mid-2012, and by October, the CMS was operating, but not without problems, and INDRA shut down the system over contractual issues with EDH. A maintenance contract with INDRA was signed in April 2013, but issues with the CMS continue.

In 2012, Tetra Tech prepared a new Commercial Action Plan for EDH in light of its low billing and collection rates (33% and 75.6% as of September 2012), and cash recovery index (CRI, 24.9%). Its implementation included procedures on the reading-billing-collection cycle, communications and other actions to reduce partial payments, the processing of inactive customers, improvements in the billing and collection of private customers, and training of meter readers. At the end of this exercise, EDH's billing rate had risen to 37.2%, its collection rate to 82.1%, and its CRI to 30.5%.

Under the Commercial Action Plan Tetra Tech developed for 2012-2013, EDH committed to 12 actions ranging from decreasing fraud and installing meters to increasing collections. However the actions, and often the finance needed to implement them, have experienced long delays.

A Commercial Action Plan for 2013-2014 was also prepared. Its success will also be contingent on the ministries, municipalities, and autonomous institutions paying their electricity bills and making good on their payment arrears.

Equipment and Materials Procurement. USAID's contract modification included a list of equipment to be procured. Based on this list, Tetra Tech developed specifications, and presented proposed procurements to EDH for approval. The preparation and submission of RFQ and RFP documents began in early June 2013. Procurements included meter reading systems, computer accessories and software, power distribution software, AutoCad software, photocopiers, and scanners. Additional computer equipment and software, protective equipment and field tools were identified.

Results against the OIA targets . Two periods need to be distinguished because Tetra Tech's scope of work changed. After the appointment of a new DG of EDH in August, 2012, the scope emphasized technical assistance only in key commercial and technical operations. From October 2012, the GoH no longer provided support to cover for non-payment from the communities and autonomous institutions electricity bills, which was a deviation from the baseline condition. That deviation caused the CRI and collection situation at EDH to deteriorate significantly.

- 1) From the beginning of the contract, the peak performance was achieved to the end of October, 2012 when
 - a. The CRI had reached the maximum value of 33.2%
 - a. The YTD collection figure was 5.032 billion HTG (\$ 117,023 million)
- 2) From November, 2012 to January, 2014, period during which
 - a. The CRI decreased to 25.0% at the end of January, 2014.
 - b. The YTD collection figure was 3,599 HTG (\$ 83,687 million)

These data are presented on the table on the following page. Taken together, we conclude the following:

- 1) Although the CRI target of 48% was not met, there were substantial improvements against the baseline. Period 1 showed an increase in CRI of 14.3%. The improvement by the end of Period 2 was down to 6.1%.

- 2) Increased cash (or savings) into EDH was demonstrated successfully. The \$52 million target was exceeded during Period 1, before the GoH deviation occurred.
- 3) The target for increase in the number of active customers was achieved by the end of Period 2.

Key Indicator	OIA target	May, 2011 Baseline	Oct. 2012 Period 1	Jan. 2014 Period 2
CRI (%)	48.0%	18.9%	33.2% (+14.3)	25.0% (+6.10)
YTD amount collected (\$ million)	+ \$52 M	\$61.8 M	\$117.0 M (+55.1)	\$83.68 M (+21,751)
Number of active customers	+ 60,000	181,216	204,255 (+23,039)	240,444 (+59,228)

Recommendations

Emergency Plan. This plan should address 1) strengthening EDH’s governance, 2) continuing the rehabilitation of infrastructure, 3) progressively decentralizing and empowering sectors of activity management, 4) implementing a new policy to manage the consumption of communities and autonomous customers, 5) rationalizing the utility’s structure and staff training for key jobs, and 6) implementing public-private partnerships.

Contracts. Although EDH is reluctant to undertake a management contract, if it does in the future, the contract operator would be primarily responsible for the day-to-day management of EDH and the realization of the objectives defined in its business plan. Its experts would need to be given full authority and responsibility for all decisions, including the hiring and firing of staff.

Should EDH agree to a services contract, its executive management would 1) remain responsible for coordinating the project and for the success of a performance contract signed with the State and 2) work to develop its corporate culture and organization.

Utility Technical Requirements and Network Planning. A more integrated approach should be adopted to ensure that EDH’s needs and projects are better defined.

Human Resource Availability. EDH needs an anti-corruption unit that will file criminal charges and then follow through on them with the government’s support.

Project Sustainability. On a general note, vendors for all projects should be bound under a support or maintenance contract, and provide proper training to ensure continuity.

Human Resource Base. EDH’s Director General has recently made significant efforts to find external funding to increase salaries and draw more applicants to key positions. If successful, this, combined with strong technical support, will improve EDH’s personnel situation.

Network Planning. Major planning efforts should be focused on preparing a realistic and prioritized network expansion plan for the next 20 to 30 years. This plan would serve as the base for prioritizing all government and donor investments, and developing investment plans.

Metering Projects. The implementation of remote metering should be pursued for large customers as well as the deployment of radio frequency metering for both commercial and residential customers.

Program and Project Managers. The Program Management Office at EDH should continue developing local project documentation and deploying tracking tools. Also, all major projects should be given funding for experienced professional project managers.

Information Technology. EDH needs 1) a comprehensive IT strategy, 2) significant investment in core IT infrastructure and systems, 3) significant investment in technology for commercial, distribution and corporate management systems, 4) capacity development of the IT staff, leadership, and organization, and 5) the development and implementation of IT operations, and standard policies and operating procedures.

ACRONYMS

AMR.....	Automatic meter reading
AST.....	Meter reader
ATCC.....	Aggregate technical commercial and collection (losses)
CIDA.....	Canadian International Development Agency
CMEP.....	Conseil de Modernisation des Entreprises Publiques
CMS.....	Customer management system
CRI.....	Cash recovery index
EDH.....	Electricité d'Haïti
ETAP.....	Electrical power systems design and analysis software
FAB.....	Previous billing system in EDH
FCS.....	Field collection system
GO.....	Gas oil (diesel)
GoH.....	Government of Haïti
HFO.....	Heavy fuel oil (mazout)
HTG.....	Haitian Gourdes
HV.....	High Voltage
IDB.....	Inter-American Development Bank
IMC.....	Interim management contract
INDRA.....	INDRA Systemas SA
IT.....	Information technology
IPP.....	Independent power producer
LV.....	Low voltage
MD.....	Managing Director
MEF.....	Ministry of Finance and Economy
MoU.....	Memorandum of understanding
MTPTC.....	Ministry of Public Works, Transport, Energy and Communications
MV.....	Medium voltage
OIA.....	Operation improvement agreement
OIC.....	Operations improvement contract
PAP.....	Port-au-Prince
PPA.....	Power purchase agreement
RF.....	Radio frequency
RMS.....	Resource management system
SOW.....	Scope of work
TA.....	Technical assistance
TMC.....	Transition management contract
USAID.....	United State Agency for International Development
WB.....	The World Bank

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INTRODUCTION

This final report on USAID's Transition Management Contract (TMC) for Electricité D'Haiti (EDH) examines the achievements made and problems encountered throughout the project's life; it also proposes potential solutions to the challenges identified.¹ In addition to describing what went wrong during the project, the report documents what went well and how similar projects can benefit from the TMC's experience.

A brief history of events in Haiti is first provided as a backdrop to a discussion of developments in the energy sector. The poorest country in the Western Hemisphere, Haiti has experienced political instability for most of its history. In May 2006, Haiti moved from a dictatorship to a democratic government. Its transition has carried with it difficulties as government actors learn to work together at the political level. Like other countries that have undergone similar transitions, Haiti's evolution can be encouraged and supported, but it cannot be forced. Developed countries sometimes (but certainly not always) have the means to react quickly to changes, and indeed, demand them. We feel that Haiti will change for the better, but most of this change will likely occur at its own pace. The major challenges it faces include:

Political interference has negatively affected EDH in a variety of ways, including the replacement of several of the company's Managing Directors after having served only brief terms. The myriad political changes and many restructurings of EDH have contributed to the loss of corporate memory and documentation. In addition, many projects with major long-term economic impacts have been imposed on EDH by the national or local governments (municipalities); often the technology to be deployed in these projects was not compatible with the rest of the system or EDH was not ready to operate and maintain it.

In addition, much of the recruiting within EDH has been conducted based on political agendas rather than technical capabilities and expertise. Political patronage has led EDH to become the prime employer (about 2,500 employees) in the Caribbean in terms of the number of employees per KWh/customer, according to Carilec data.

The over-employment of unqualified personnel is a primary contributor to the lack of accountability on the part of EDH staff, and has increased the need for capacity building to a level that cannot be readily achieved. Ensuring that people with the required expertise – or at least the right aptitude and attitude – are recruited is the only way EDH can produce adequate results in the future and ensure that the training of its personnel is effective.

A lack of donor coordination has led to a plethora of studies on the electricity sector; this has resulted in disparate investments and added complexity to EDH's functions. The 2010 earthquake brought an influx of donors and funds to Haiti, and with them, the problem of integrating a multitude of initiatives that are not necessarily in line with each other. It is not uncommon to see EDH/the Government of Haiti (GoH) launching studies to clarify previous

¹ An interim final report was submitted on 18 August 2013. In addition to updating the interim report, this final report includes detailed information on the contract's achievements and analyzes its performance.

studies. Further, when studies do not present recommendations that comport with politicians' expectations, the GoH requests new studies that are expected to meet them.

A lack of capability in information/technology management has contributed to an increased workload for EDH staff, many of whom have not yet learned to document business and technical information. EDH is moving slowly toward the use of electronic equipment and data, and is struggling with the technology. Most of the information at EDH is not available and each inquiry is basically handled as a first-time exercise. Most directors still have a problem handling normal e-mail workload (the e-mail server has only been in use for about a year). Most meeting requests, letters, etc. are still delivered by hand and signed off by the receptionist. A purchase order approval for the smallest item can take several months.

Many developed countries are trying to convince Haiti to adopt high-tech equipment without regard for the ability of EDH staff to understand, operate, support and repair it. We believe that not all technology can be implemented and that when more reliable, less technical, easier-to-maintain technology is available, it should be given serious consideration. For example, in revising its substation design philosophy under Tetra Tech's guidance, a more locally-maintainable approach was chosen; this has demonstrated good results and should better suit EDH's and Haitians' needs in the future.

The next section discusses the recent context of Haiti's electricity sector, followed by a description of the TMC and its main activities. The remaining sections present lessons learned and recommendations for the four critical areas of EDH: commercial management, technical, planning, and information technology. The TMC has been compiling lessons learned since 2011 through three years' working together with EDH staff from all across the organization, as well as many interviews with project team members and other stakeholders. They can be used as references for future projects to provide some guidance in this challenging environment.

1. THE CURRENT CONTEXT

This section describes the main factors contributing to the current situation of Haiti's electricity sector. The first is the President of the Republic's declaration of a state of emergency in August 2012, which was accompanied by the appointment of a new Managing Director of EDH.

The next major events were an announcement of a new energy policy at a September 2012 international symposium, EDH's announcement of its 2012-2013 Action Plan, and the signing of a memorandum of Understanding (MoU, *Protocole d'Accord*) among the Ministry of Finance and Economy (MEF), the Ministry of Public Works, Transport, Energy and Communications (MTPTC), and EDH. The Action Plan proved too ambitious to accomplish in a single fiscal year, mainly owing to major delays in project investments. The projects delayed included the installation of remote reading meters and the rehabilitation of the distribution network associated with the installation of radio frequency reading meters (RF meters), and the specification of other actions for which financing was not available. In addition, EDH was confronted with growing outstanding payments for energy (arrears) in the public sector (including municipalities and autonomous institutions).

Six generation plants comprise the installed generation capacity for Haiti's metropolitan zone.² Two of the largest private independent power projects (IPPs) – SOGENER and E-POWER – halted their plants' production in January and June 2013, respectively, because they were unable to buy the necessary fuel due to EDH's inability to pay for the energy supplied (EDH owes the IPPs US\$ 65 million representing approximately four months of arrears).

On 23 January 2013 the Managing Director of EDH began implementing a strategy for renegotiating the IPP contracts. In July a ministerial committee for the renegotiation of the energy purchases under IPP contracts was convened. The renegotiation is ongoing, but has become protracted, because it is not in the interests of the private sector IPPs to make concessions to EDH, especially since they are meeting contract terms and EDH is so many months in arrears in payments to IPPs for energy supplied.

1.1. Declaration of a State of Emergency

After some power outages were experienced during the *Carnaval des Fleurs*, the President of Haiti declared a state of emergency in the electricity sector on 15 August 2012. During a Council of Ministers meeting, he lamented the ineffectiveness of EDH and requested that it explain how it used the subsidies granted to it. During this meeting, the Prime Minister announced measures to be adopted within the framework of the energy sector's state of emergency. EDH's Managing Director and his deputy were removed in August 2012 and a new Managing Director was appointed.

² Carrefour (thermal plant, installed capacity 49.5 MW, available capacity 10 MW), Varreux I and Varreux II (thermal plants, installed capacity 40 MW, available capacity 35 MW), Varreux III (thermal plant, installed capacity 18 MW, available capacity 14 MW), E-Power (installed capacity 30 MW, available capacity 30 MW), and Péligre (hydroelectric plant, installed capacity 54 MW).

1.2. International Symposium on Electricity in Haiti

Following the declaration of the state of emergency, the GoH organized its first major international symposium on electricity, which took place on 20 September 2012 in Port-au-Prince. At the symposium, the Martelly-Lamothe Administration announced that its energy policy would:

- Implement a new regulatory framework
- Formalize in a “business-state” contract plan a set of annual objectives specifying mutual obligations and commitments, as well as indicators for monitoring progress
- Establish a mechanism for setting prices to reflect the true cost of electricity
- Fight against fraud
- Formalize a program to increase efficiency in the electricity sector
- Initiate a program to facilitate the extension of electricity services to rural communities.

EDH reports to the MTPTC, which named a new “minister in waiting” for energy security, Rene Jean Jumeau. In September, he presented a \$1.7 billion action plan entitled “PADE 2013-2016.” It included:

- Installing a dispatching system in Port-au-Prince and a redundant system in Cap-Haitien
- Completing the rehabilitation of networks and stations in the metropolitan area
- Building new power stations totaling 300 MW, and producing electricity at a competitive cost
- Building a new hydroelectric power plant (Artibonite 4C) with a capacity of 30 MW
- Building two wind farms
- Constructing 10 micro-grids in rural areas, each powered by a 1 MW solar power plant
- Strengthening 100 rural schools, health centers, and police stations with 10 kW solar units with storage
- Initiating a public lighting program for urban and rural areas.

A short-term action plan for 2012-2013 was also discussed by the new Managing Director of EDH.

1.3. 2012-2013 EDH Action Plan

Approved at the 21 September 2012 EDH Board (*Conseil d’Administration*) meeting, the 2012-2013 Action Plan is a collection of proposals intended to meet the needs of every EDH department, filtered through the lens of a strategy focused on strengthening the company’s three pillars: commercialization, distribution and transmission, and generation.

- **Commercialization**

For EDH to operate independently and generate sufficient income, it must first increase its billed revenues (as a percentage of energy supplied) and also collect a far greater share of those billings. The Action Plan specifies that EDH must collect from 4.2 billion Haitian Gourdes (HTG)³ in 2011-2012 to 9.1 billion HTG in 2012-2013. To meet this goal, EDH's billing rate (kWh energy billed/energy supplied) must increase from 33% to 54%, which can be accomplished through the completion of the set-up and accurate operation of the CMS, and installation of 110,000 new residential and commercial meters and 450 remote reading meters at industrial customers' premises. The collection rate (HTG amount collected/amount billed) must increase from 65% to 95% through the recovery of at least 900 million HTG in arrears from EDH customers and the termination or re-processing of non-paying or currently inactive customers.

This objective was slated to be met by the end of the fiscal year 2012-2013. Indeed, the Action Plan described the actions EDH needed to implement to reach a 52% cash recovery index (CRI),⁴ taking into account investments for which financing was not yet available. This situation was complicated by suppliers' long delays on major projects (billing system, remote reading meters and RF meters installation), which meant that at best, EDH could only partially achieve the expected results.

- **Generation, Transmission and Distribution**

To achieve the national target of a 24/7 electricity supply, EDH must modernize, rehabilitate and enlarge its electricity network. The Action Plan targets an average increase in electricity supply from 14 to 18 hours a day.

EDH thus plans to modernize nine circuits and five substations in the metropolitan zone, and rehabilitate the Peligre transmission line and additional networks in provincial towns. It also aims to increase installed capacity by 35 MW through the rehabilitation of thermal and hydroelectric plants. The Action Plan also aims at improving the control EDH exercises over energy purchases. Unfortunately, these objectives cannot be achieved because EDH is unable to pay its IPP bills, which in 2013 (during the time EDH began seeking to renegotiate IPP contracts) finally led to IPPs shutting down their power plants on occasion. Customer dissatisfaction with the resulting outages resulted in a decreased collection rate, leading to a further downward spiral.

1.4. MoU (*Protocole d'Accord*)

The memorandum of understanding among the MEF, MTPTC and EDH was signed in October 2012. It establishes a road map for EDH's financial self-sufficiency by 2016 and identifies its priorities for the coming four years.

³ \$1.00 USD = 42.6 HTG as of 15 August 2013.

⁴ CRI = billing rate (%) times the collection rate (%).

EDH is a monopolistic, state-owned, financially autonomous electric power utility responsible for generation,⁵ transmission, distribution, and commercial services in Haiti. The MoU charges EDH with improving its structure to assure its financial sustainability between 1 October 2011 and 30 September 2016. EDH must also develop and implement a business plan to improve its technical, commercial and financial performance.

In parallel, the State committed to pay an operation and investment subsidy to EDH during the recovery period. The subsidy, in a monthly amount of 200 million HTG (US \$5 million) is fixed by the Finance Law.

In its January 2012 letter to EDH, the MEF stated that every institution of the central administration (mainly ministries) will pay its electricity bills to avoid the accumulation of arrears that EDH has faced in the past. This arrangement mandates that EDH prepare consumption forecasts to allow the State to make corresponding budget allocations. Finally, the MEF and Ministry of Interior were to support EDH in ensuring that the public and autonomous institutions pay regularly for their electricity consumption.

EDH must submit its business plan⁶ and associated budget to the Board of Directors for approval at the beginning of each fiscal year. Also, financial statements⁷ must be audited and published within three or four months after the end of the fiscal year.

EDH must also justify its use of the State subsidy and the other transfers from the MEF before the end of each fiscal year. Finally, EDH must be capable of paying the taxes it owes to the State.⁸

⁵ Generation is split between EDH and the IPPs.

⁶ In December 2012, EDH issued a call for tenders as part of its financial recovery plan. The plan includes 1) a national electricity demand forecast for 2013-2016 and beyond in a second phase, 2) a plan for generation, transmission, distribution and electrification of the metropolitan region of Port-au-Prince and the provinces for 2013-2016, 3) a business plan 2013-2016, and 4) a tariff study.

⁷ 2005-2010 financial statements for EDH were never completed by EDH, so its history was not audited.

⁸ A debt offset process is now being implemented. EDH's arrears to the GoH, including taxes that are not paid by EDH, will be compensated with the government arrears to EDH, mainly electricity consumption.

2. BACKGROUND ON THE USAID TRANSITION MANAGEMENT CONTRACT (TMC)

On 16 February 2011, the Government of Haiti, US Government, and Inter-American Development Bank signed a memorandum of understanding defining the Haiti Energy Access and Reform Initiative. The Initiative's goal for restructuring Haiti's electricity sector is to build an efficient and financially sound sector that operates within a competitive and transparent market, attracts capital, and is able to reliably and affordably satisfy current and forecast demands for electricity services.

A multi-step approach has been needed to achieve this goal. First, the GoH has begun the modernization process under the Council for Modernization of Public Enterprises (*Conseil de Modernisation des Entreprises Publiques (CMEP)*) Law.⁹ It determined that a third party should be retained to manage EDH's operations and help it address its ongoing challenges, reduce technical losses, strengthen the capacity of its managers, engineers and administrative staff, and implement systems for effective commercial operations.

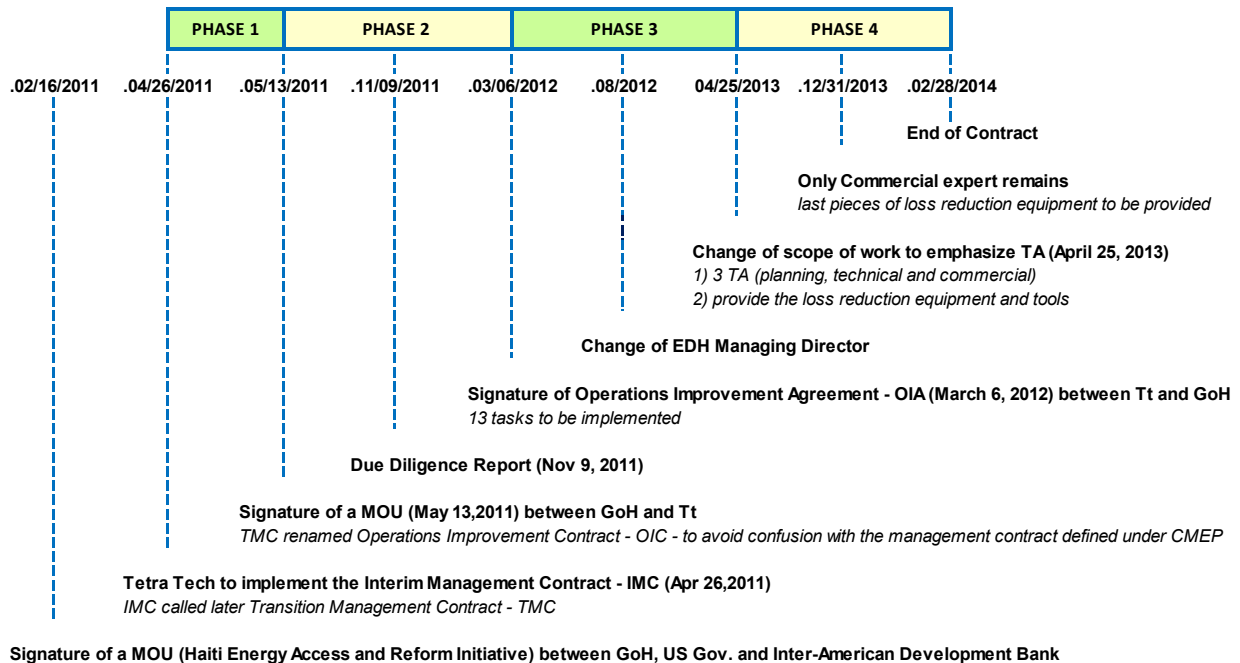
Thus, the MoU included the implementation of an interim management contract (IMC). Following a competitive process, on 26 April 2011, USAID awarded a contract to Tetra Tech to implement the IMC (it was later re-named the transition management contract or TMC). Under the TMC, Tetra Tech began working with EDH to reduce the utility's electricity losses.

Tetra Tech's work was conducted in four phases:

Phase 1: This phase consisted of early meetings, observations, and negotiations in order to better define the work to be done. It concluded on 13 May 2011 with the signing of an MoU between the Government of Haiti and Tetra Tech. At this time, the TMC was renamed the Operations Improvement Contract (OIC) to avoid confusion with the management contract defined under CMEP. The OIC was still a memorandum of understanding at this point; it did not constitute a binding agreement between any parties.

Phase 2: During this phase, which was launched on 16 May 2011, Tetra Tech conducted a due diligence diagnostic of EDH in order to assemble enough information to complete the OIC and negotiate with the GoH. After EDH granted the Tetra Tech team access to its facilities in July 2011, Tetra Tech was able to assess more precisely the needs of the utility and began to assist it on a daily basis.

⁹ "Loi sur la Modernisation des Entreprises Publiques," *Le Moniteur*, 10 October 1996.



A due diligence report was prepared during Phase 2 to help Haiti’s stakeholders – including the GoH, EDH, and donor community – make decisions and build consensus toward an integrated approach to address the key problems EDH faces.¹⁰ It took into account, for the first time, all aspects of EDH’s seven major business functions:

- Generation, transmission, distribution, and engineering
- Commercial
- Finance
- Information technology
- Procurement and general services
- Communications
- Human resources.

The report provided major recommendations for each operating area as well as detailed, sequenced action and investment plans for improving EDH’s performance over the short term (the next two years) and more general plans for the medium term (years three through five).

Based on a local legal review of the OIC’s nomenclature, the word “contract” was found to be a problem in Haitian law as regards management of EDH, and so it was renamed the Operations Improvement Agreement (OIA). This Agreement was negotiated over a period of several months and was signed with the GoH on 6 March 2012. The OIA represents a blend of a traditional technical assistance contract and corporate governance advisory. Its structure calls for a team of utility specialists (provided by Tetra Tech) to serve as a special committee supported by the EDH Board (known as the EDH Conseil d’Administration, CdA), which has the ultimate corporate and regulatory authority over EDH. According to the OIA, the committee is to report directly to the Board and manage targeted business initiatives, including operations

¹⁰ *Due Diligence Report: EDH Operations Improvement Initiative Haiti*, Tetra Tech, 9 November 2011.

and investments, with the objective of reducing EDH's commercial losses and improving its financial performance, while providing on-the-job training for EDH counterparts.

Phase 3: After signing the OIA, the implementation phase began in April 2012, focused on reducing electricity losses at EDH, especially commercial losses, improving the utility's financial health, and creating "pillars of excellence" (such as areas where electricity will be provided continuously). Tetra Tech's work plan contained thirteen tasks designed to achieve timely and lasting loss reductions and commercial improvements at EDH. Tetra Tech was to provide data relevant to four specific performance benchmarks in its quarterly reports:

- 1) Improve the Cash Recovery Index (CRI) at EDH from the 2011 level of 22% to a target of 48% on or before the end of the term of the Agreement
- 2) Make sufficient improvements in EDH's CRI and other cost-saving recommendations to achieve a cumulative target savings of US \$52 million during the term of the Agreement
- 3) Add 60,000 active customers
- 4) Work with the GoH in identifying visible "pillars of excellence" that demonstrate to the Haitian people the tangible benefits of improvements at EDH.

Tetra Tech put in place a qualified interim management team approved by EDH to complement the Special Committee proposed in the OIA; it began to work with EDH directors and the Managing Director to implement the SOW related to the thirteen tasks in the OIA. The representation supported the following Departments at EDH: 1) technical (generation, transmission, distribution, and engineering), 2) commercial, 3) finance, 4) information technology, 5) procurement and general services, 6) communications, and 7) human resources.

The Government appointed a new Director General of EDH in August 2012. It also changed Tetra Tech's scope of work to emphasize technical assistance in key commercial and technical operations.

Phase 4: At the request of the GoH, on 25 April 2013, USAID extended the TMC contract until September 2013 and changed the scope of work to provide the critical assistance EDH needs to meet the OIA targets and to procure the loss reduction equipment/commodities needed to implement its new commercial and technical initiative in fiscal year 2012-2013.

This contract extension included a change in scope and time, and entailed two basic tasks:

- Task 1: Provide three resident technical assistance (TA) experts requested by EDH and agreed to by USAID with regard to key management positions for the Commercial, Planning, and Technical departments of EDH.
- Task 2: Procure the loss reduction equipment and tools agreed to by EDH and USAID.

On 6 December 2013, USAID again extended Tetra Tech's contract from 31 December to 28 February 2014. Under this extension, only the commercial TA expert remained in Haiti and the long lead-time items of loss reduction equipment were to arrive in Haiti and be delivered to EDH.

3. Due Diligence Report and Operation Improvement Agreement

3.1. Due Diligence Report

The diagnostic was officially launched on 16 May 2011 with the signing of an MoU between the Government of Haiti and Tetra Tech ES, Inc. The Tetra Tech team then worked for two months with their counterparts at EDH to create the best possible conditions to ensure close collaboration. This led to the formation of a number of working committees to prepare the report's conclusions and recommendations.

Tetra Tech's diagnosis of Electricité d'Haïti's operations and performance was conducted during July and August 2011. The results were intended to help Haiti's stakeholders (the GoH, EDH, the donor community, etc.) make decisions and build consensus toward an integrated approach to addressing the key issues.¹¹

The diagnostic covered, for the first time, all aspects of EDH's operations. However, under the USAID-financed OIC, Tetra Tech focused on several actions associated with reducing system losses, increasing revenues, and improving the utility's services to its customers in the short term.

Tetra Tech's report confirmed the strong deterioration of EDH's commercial performance against the findings of numerous studies published over the previous two years. The updated findings indicated that the company's commercial performance was poor as a result of high aggregate technical and commercial and collection (ATCC) losses (in total over 75%). ATCC losses include technical losses inherent in physical electric systems, commercial losses (such as meter bypass or theft), faulty meters, faulty meter reading, faulty billing system, and low cash collection rates. Weak performance was also highlighted for the other key activities of the company: generation, transmission, distribution, engineering, financial, IT, procurement and human resources.

Among the findings, the report highlighted the followings:

- Haiti's grid is in an advanced state of deterioration at all levels (generation, transmission and distribution), exacerbated by the January 2010 earthquake.
- Energy theft and unmetered consumption by electricity users explain high system losses, in addition to the non-payment of electricity bills, which represents about 75% of the electricity delivered to the grid.
- The alarming financial situation reflects the poor company's business performance; EDH cannot cover its operating expenses without the help of the government.
- Information technology (IT) is in a rudimentary state and will require significant organizational modernization.

¹¹ *EDH Operations Improvement Initiative Haiti*, Tetra Tech, 9 November 2011.

- There is no real authority for supply and services (including equipment, real estate, transportation, and inventory management).
- The Human Resources Department is currently one of several functions covered by the Administrative Department and lacks adequate management systems and procedures.
- Communication currently plays only a small role at EDH.

The report concluded that a comprehensive and coordinated effort would be needed to implement the numerous recommendations made in the report. It is also emphasized that many of the rehabilitation projects will have to be carried out concurrently, which would place tremendous pressure on EDH. All actions could be implemented through a strong project management organization staffed with trained and seasoned managers.

3.2. Overview of the Operation Improvement Agreement

The 6 March 2012 OIA represents a blend of technical assistance contract and corporate governance advisory. Its structure calls for a team of utility specialists provided by Tetra Tech to serve as a special OIA Committee supported by the EDH Board of Directors (*Conseil d'Administration*), which has the ultimate corporate and regulatory authority over EDH. According to the OIA, the Committee is to report directly to the Board and lead and manage targeted business initiatives, including operations and investments, to improve EDH's financial performance while providing on-the-job training for its staff.

Phase 3 of the TMC project for the OIA called for the initiative's implementation, focusing on reducing electricity losses at EDH, improving the utility's financial viability, and creating pillars of excellence where electricity will be provided continuously. Tetra Tech's work plan included thirteen tasks that were priorities for achieving commercial improvements at EDH as part of the Transitional Management Contract objectives:

- Task 1: Interim EDH management team
- Task 2: Change management
- Task 3 and Task 10: Technical assistance and training
- Task 4: Improve billing and revenue collection
- Task 5: Improve financial management and accounting systems
- Task 6: Customer regularization
- Task 7: Five-year investment plan
- Task 8: Metering policy and plan development
- Task 9: Data collection and analysis for CMEP
- Task 11: Asset management
- Task 12: Revenue protection
- Task 13: Review IPP contracts.

The objectives were:

- Improve the Cash Recovery Index (CRI) from the 2011 level of 22% to 48% on or before the end of the term of the Agreement.

- Make sufficient improvements in the CRI, and other cost-saving recommendations at EDH to achieve a cumulative target savings of \$52 million during the term of the Agreement.
- Add 60,000 active customers.
- Work with the GoH in identifying visible “pillars of excellence” that demonstrate to the Haitian people the tangible benefits of improvements at EDH.

Tetra Tech put in place an EDH-approved interim management team to complement the Special Committee proposed in the OIA and began working with the Managing Director and EDH Directors to implement the Scope of Work (SOW) for the thirteen tasks in the OIA.

- Assistance to EDH’s Managing Director:
 - A Tetra Tech team member assisted the Managing Director in its daily operations.
 - A Tetra Tech team member, acting as OIA Committee Chairman, was to assist the EDH Managing Director in the GoH reporting process and corporate practices, which were expected to be monitored by CMEP.

- Tetra Tech experts were distributed to support key departments of EDH:
 - An expert supported the Commercial Department’s director in implementing new procedures, reporting processes and new commercial action plans, in addition to a *directeur délégué* financed through the World Bank.
 - An expert supported the Technical Department’s director in making improvements and reporting on power generation utilization, quality of service and forecasts.
 - An expert supported the Human Resources Division of the Administrative Department. Another member was added to assist the procurement, IT and logistic divisions.
 - A project manager from Tetra Tech was appointed to assist the Planning Department in addition to a World Bank-financed *directeur délégué* until his contract finished in July 2012.
 - The Finance Department was supported by a *directeur délégué* financed through the World Bank. Tetra Tech appointed team members to assist in analyzing EDH’s financial performance and improving processes.

4. INTERIM EDH MANAGEMENT TEAM AND CHANGE OF MANAGEMENT

Tetra Tech's activities under Tasks 1 and 2 of the OIA included assistance to EDH's Executive Committee, the preparation of a new EDH action plan, and making recommendations to EDH's new Managing Director on improvements at the utility.

4.1. EDH Executive Committee

The EDH Executive Committee effectively met on a weekly basis during the second quarter of 2012, with cooperation from Tetra Tech.

Resolutions were adopted on major items; their implementation was the responsibility of the Managing Director (MD) and/or EDH directors. With Tetra Tech's assistance, there was a significant improvement in monitoring the implementation of the agreed Action Plan as well as in the consistency of recording meetings. Tetra Tech followed up on the actions required by the Executive Committee, such as:

- Implementation and weekly updates of the investment projects financed by the GoH.
- Coordination of the EDH employee pension fund (a decision was made to audit its management). This task was completed in March 2012.
- A specific commission for EDH procurement was put in place under the control of the MD and directives were given to the Planning Director to make this Commission operational.
- The 2012-2013 EDH budget was elaborated. Statements were prepared and submitted to the executive committee meeting. Although the budget was completed six months behind schedule, it did meet the MEF's deadline.
- The staff census process was monitored and recommendations made to the Administrative Director by mid-2012. Tetra Tech submitted a final report on the management of EDH employees in June 2012. A redeployment of the staff was proposed, including standardization, processing of disability cases, and regularization of retired staff. A new Administrative Director was appointed in late 2013.
- A dashboard was prepared for the EDH Executive Committee so it could identify and analyze the values of the financial performance indicators.

4.2. EDH Board

The selection process for the EDH Board of Directors took an entire quarter, and the GoH nominated Board members on 19 July 2012. The six members of the Board were selected from the Ministry of Public Works, Transport, Energy and Communications (MTPTC), Ministry of Finance and Economy (MEF), Ministry of Justice, and Ministry of Planning and External Cooperation in addition to the two members appointed from the socio-professional association and union.

In the meantime, the MTPTC requested that the EDH Managing Director attend weekly meetings on EDH activities in order to report to the Prime Minister on more regular basis.

Tetra Tech attended a forum with representatives of the Presidential Office, ministries, donors and the EDH MD to discuss the power sector objectives in Haiti. Tetra Tech assisted the MD in his presentation to the forum.

4.3. Change of Managing Director

The President of Haiti decreed a state of emergency for the energy sector on 15 August 2012 and mandated quick solutions to the crisis. The Prime Minister then announced the measures to be adopted within the framework of the state of emergency.

The EDH Managing Director and his deputy were then dismissed. The former was replaced by a member of the Presidential Office staff and the deputy was replaced by a long standing member of the EDH Board, who represented trade unions. A new EDH Action Plan was also prepared to meet the GoH objectives.

The new MD required that the agreement on Tetra Tech's services take a new direction. She requested changes to Tetra Tech's management structure at EDH as well as reporting processes. Tetra Tech was informed that EDH would no longer require assistance in the area of communications. The MD noted that the Finance Director and its *directeur délégué* had her full confidence and requested that no further advisory work in finance would be conducted by Tetra Tech. She also noted that the position of OIA Chairman was no longer required by EDH.

In October 2012 the Managing Director defined new objectives for the Tetra Tech team, mainly suggesting more actionable deliverables. The three main positions that were put in place during this period were the Commercial Director, Technical Director and Planning Director.

Furthermore, in January 2013, the Managing Director made an official request to USAID to extend Tetra Tech's services until the end of the current fiscal year (September 2013) for the commercial, technical and planning director advisory positions.

Tetra Tech held numerous meetings with EDH directors and staff from all departments in order to develop a presentation on the EDH Managing Director's vision and to support the necessary improvements in EDH. The Executive Committee also recommended organizational changes to improve EDH's financial performance and productivity. Job descriptions were reviewed, skills of staff evaluated in each department, and a human resources management plan was prepared.

EDH directors identified shortfalls to be addressed. The main issue was a lack of control of overtime and monitoring of working hours, as well as a lack of enforcement of human resources policies and guidelines at all levels of the company.

The following recommendations were made:

- Improvements associated with measurable indicators:
 - Meet EDH performance metrics as indicated in the 2011/2012 budget
 - Generation: improve the performance and availability of generation plants and the specific consumption of thermal power plants
 - Transmission and distribution: decrease technical losses, undistributed energy and outage durations
 - Commercial: increase the CRI, billing and collection rates; increase the number of active customers and reduce inactive customers; and decrease the number of bills with zero consumption, average time to install a new meter, and average time to edit a bill after a new connection
 - Administrative: Compare overtime rates to the wages and decrease average monthly fuel consumption
 - Shorten deadlines for response to requests from other departments.

- Optimization, productivity and assessment:
 - Assess performance monthly based on a model survey questionnaire
 - Implement projects based on the availability of staff
 - Improve the amount of finance available
 - Strengthen EDH's financial viability.

- Reputation of the business:
 - Improve the confidence of partners and the corporate image
 - Increase the number of customers and energy supplied
 - Ensure timely implementation of projects financed by the GoH and others.

With the August 2012 change in managing directors, decision-making power was refocused and the MD's participation in the planning for these decisions became less important.

5. TECHNICAL (ENGINEERING) AND PLANNING ASSISTANCE

5.1. Technical Assistance and Training

The project's assistance and capacity building activities to the EDH Technical Department for power generation, transmission, distribution, and engineering largely fell under Tasks 3 and 10 of the OIA.

- **Power Plants and Substations**

Haiti's generation system consists of the Peligre hydroelectric plant, 7 micro-hydroelectric plants, and 23 thermal generation plants, with a total installed capacity of 298 MW. The interconnected system in Port-au-Prince has about 225 MW of installed capacity. Five of the generation plants are independent power projects (IPPs) with an installed capacity of 103 MW. Three plants are privately managed under a tripartite agreement; they have an installed capacity of 61.2 MW. The others are owned by EDH, which also manages the plants.

In addition, some Haitian towns and villages have back-up generation units that are not directly under formal EDH management or control. The 34 units, which have a total installed capacity of 83 MW, are distributed throughout the country.

While 225 MW are installed in the metropolitan zone and surrounding areas, the peak load cannot be met. EDH supplies electricity to Port-au-Prince from six generation plants:

- The Peligre hydroelectric plant, with an installed capacity of 54 MW, is operated by EDH and has an available capacity of 36 MW. This plant is critical for the stability of the interconnected network and its lack of availability (due to accumulation of sediment) has severe impacts on the system.
- The Carrefour thermal generation plant is operated by EDH and has an installed capacity of 49.5 MW.
- The Varreux I and Varreux II thermal generation plants belong to EDH. They have been partly rehabilitated and are operated by the private company Sogener. These plants' targeted installed capacity is 40 MW and their available capacity is 35 MW.
- The Varreux III thermal generation plant is owned and operated by Sogener. It has an installed capacity of 18 MW and an available capacity of 14 MW. Like Varreux I and II, it lacks contractual net energy metering points.
- The privately owned plant, E-Power, has an installed capacity of 30 MW and an available capacity of 30 MW.

Following its general inspection of most of Haiti's power plants and substations, and discussions with operations and maintenance personnel, Tetra Tech reviewed the engineering of all new substations in Haiti and shared its recommendations with EDH and its donors and contractors. It recommended that the new substations be kept as simple as possible, using pole-mounted re-closers with bypass switches instead of switchgear-type equipment located in buildings. This would improve the substations' reliability, serviceability, safety, ease of replacement and operation. Providing similar equipment throughout the network would also simplify spare parts and training requirements. The recommendations were well received and a new design and specifications were implemented to address the new requirements.

During the first phase of power transformer testing for the new substations, Tetra Tech revised the testing protocol with the contractor. The test results were verified along with the results of gas-in-oil chromatography analysis, standard oil analysis, and the furan analysis to determine the remaining life of EDH's transformers. In addition, new testing requirements were identified.

This testing exercise also identified the need for further investigation and inspection of the internal tap changers along with other protective equipment. Tap changer maintenance will be required to make improvements to the utility's transformers. Tetra Tech made recommendations on transformer maintenance, identified equipment in need of maintenance, and developed sample work lists. A bid was requested from a specialized firm present in Haiti to provide the corrective maintenance needed to ensure transformer reliability and protection, and for the operation of voltage regulators. The company's offer was presented to EDH with a recommendation to move forward.

At the Carrefour Feuilles project, Tetra Tech repeatedly followed up with EDH to resolve complications with the two distribution feeders. It also revised the power transformer specifications that EDH proposed, after determining that it would not be possible to use the proposed transformer for this type of application. Also, the phasing vectors were not adequate and the voltage (4.16 kV) is too low (12.47 kV was needed).

Complete specifications were prepared for a replacement dual-voltage power transformer at Carrefour Feuilles and a bid was requested for USAID to review. This transformer would have allowed EDH to convert the two circuits from 4.16 kV to 12.47 kV at a later date.

Tetra Tech coordinated with EDH and the contractor on a sub-stations project to ensure the project was kept on schedule. A number of technical issues were resolved, including transformer reallocations, shutdown coordination, relocation of equipment in yards, and commissioning review.

Tetra Tech also conducted an evaluation to identify the electrical usage of an average customer, in order to determine the number of connections per sub-station and circuit.

- **Distribution**

Haiti's distribution network consists of about 900 km of primary network lines, 1,200 km of secondary network lines, about 18,000 poles, and 4,600 transformers (of which nearly 50% are

privately owned). Thirty-five primary network line feeders power greater Port-au-Prince. Even before the January 2010 earthquake, these networks needed major rehabilitation. The earthquake only made the situation worse.

A model was built by Tetra Tech to evaluate distribution transformer load and no-load losses for the offer evaluation process, using actual utility production cost and system losses to better evaluate the economic impacts.

A model was built by Tetra Tech and training provided to EDH in selecting the proper size conductor wire for distribution with a recommendation to stop using 4/0 and smaller conductors for part of the EDH system. Tetra Tech also recommended that 477 MCM should be used for three-phase distribution line and 2/0 for neutral wires and client connections.

- **System Protection**

In preparation for carrying out a system-wide protection and coordination study to guide future investment, Tetra Tech prepared a single line diagram of the interconnected network of Port-au-Prince (PAP); data from this network were then used in preparing current (as-built) drawings of EDH installations. The single-line diagrams were then revised and approved by EDH; they are available in AutoCad files and printed copies for operation and planning, and EDH is trained in their use.

Technical information from the network survey was compiled in ETAP software by Tetra Tech and EDH working together for electrical protection/coordination and power flow studies of PAP's interconnected network. Most of the information was not available at EDH and had to be collected and/or validated at each of the installations (substations, power plants, power lines, etc.). Now, for the first time, detailed technical information on the utility has been digitized and placed in a database.

Tetra Tech used the latest information from the database to complete the protection and coordination study, and presented the report to EDH. This very detailed study (277 pages) was needed to improve the utility's performance and ensure service continuity, proper equipment, and personnel safety.

Tetra Tech also prepared written standard operating procedures for EDH relay settings and trained EDH staff on implementing them as well as testing electrical protection relays and related equipment to detect any potential safety issues. It then provided extensive field supervision and support to ensure proper implementation.

Using the ETAP software and information contained in the database, Tetra Tech was able to identify bottlenecks on the utility grid. It also identified the 69 kV line as being the system's first limit on the voltage levels for proper power flow and energy distribution. Following upgrades on the utility, such as the addition of new power generation, or modification of a power line and/or load profile, new scenarios can be run for grid analysis as long as the database is kept up to date. This was part of the contract extension through financing made available by USAID to purchase the software and IT equipment and provide proper training of EDH personnel.

- **Generation Costs**

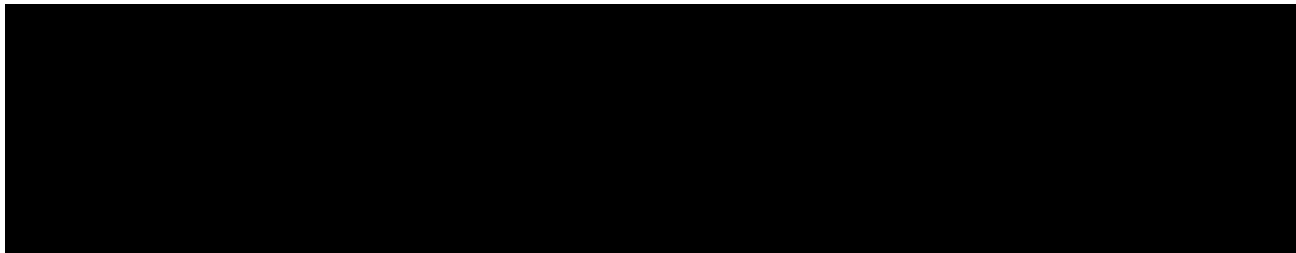
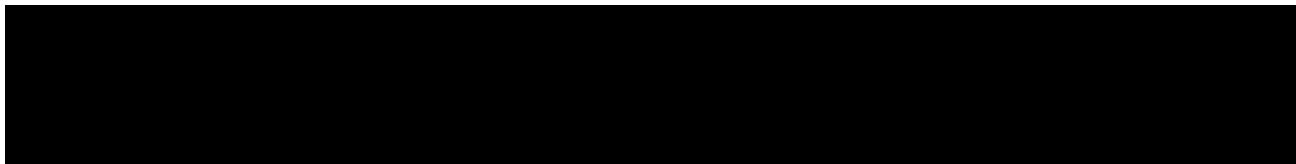
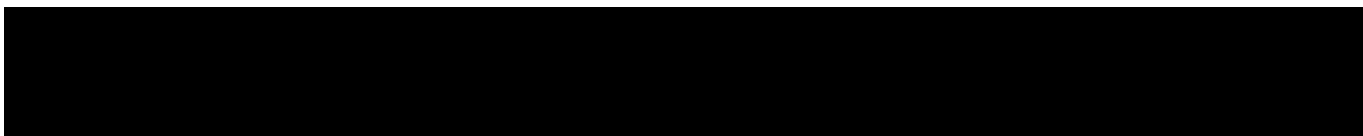
Tetra Tech provided a training model to EDH to help its staff identify the real cost of producing electricity using different technologies and fuels under different scenarios. EDH accepted this model, which was then presented to its Board and the Prime Minister. The model was well received by the Board and was used as a guideline for project reviews by the GoH and EDH.

A techno-economic model was built and presented to EDH on Carrefour’s production costs. It contained two scenarios, one for heavy fuel oil (HFO) and one for gas oil (GO, diesel) use. The model integrated the auxiliary consumption cost, maintenance cost, investment requirements to rehabilitate the HFO filtration and conditioning equipment, different fuel costs, and the HFO waste disposal cost. The model demonstrated that for an investment of \$6.2 million for the filtration and conditioning equipment, annual savings of \$22.3 million could be realized for every year the plant would operate on HFO, as compared to GO.

The fuel choice evaluation model (HFO vs. GO) for Carrefour was presented to EDH, together with Tetra Tech’s recommendation that EDH use HFO to reduce the per-unit cost of electricity delivered. However, the GoH preferred to maintain the use of GO, whose price is offered under special terms by Petro Caribe, which has a 25-year loan arrangement with the Government of Venezuela at a 1% interest rate.

- **Projects and Pillars of Excellence**

Following a meeting with the Ministre Délégué à la Sécurité Énergétique, Tetra Tech presented calculations for pricing and sizing the transmission line. The analysis indicated that the present 115 kV line was insufficient for the proposed 300 MVA in generation. It suggested that a 230 kV to 345 kV line would likely be better suited under the 20-year development scenario.



[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Support and technical expertise were provided to EDH in the following areas:

- Research was conducted on the technical requirements and technology available on the market for street lighting. Pricing, life duration, efficiency gains, and lists of distributors were presented to EDH.
- Following some major transformer issues at Canape Vert, Tetra Tech examined connection and electrical protection changes on the new transformers.

Tetra Tech also provided regular on-the-job training on the specific areas of expertise needed for the root cause analysis of explosions, other forms of damage, protection/coordination, and proper equipment specification and use.

¹² With this kind of contract, the company either takes the product (energy produced) from the supplier or pays the supplier a penalty (availability of power) if it does not use the energy.

To identify visible pillars of excellence that demonstrate the tangible benefits of improvements at EDH, Tetra Tech worked with the utility to ensure that the Sonapi line was completed and power was provided 24 hours a day, 7 days a week to the International Airport and industrial park.

Tetra Tech provided technical guidance to E-Power, which had expressed concerns about connecting the load to its generator. This project is still under revision with E-Power.

5.2. Five-year Investment Plan

Work on the investment plan was conducted under Task 7 of the OIA. In January 2013 EDH organized a workshop for Haiti's funding agencies. The aim was to coordinate these actors prioritizing projects to help improve EDH's infrastructure. Tetra Tech's commercial and technical advisors assisted EDH in preparing for the workshop and attended it at the request of EDH's Managing Director.

Following the workshop, Tetra Tech worked closely with EDH's technical, commercial and planning departments to develop the utility's five-year investment plan. The key investments recommended will improve the utility's commercial and technical performance through the distribution network's rehabilitation, power plant rehabilitation, and expansion planning. After the plan was jointly revised and reviewed by donors, the GoH, and EDH, the five-year investment plan was completed at the end of 2013.

EDH Investment Plan

Total: \$587.770 million, including \$68.807 million financed

360 km of network rehabilitation & extension and an additional 200 MW generated

Row Labels	Investissements requis	Investissements alloués	Réseau additionnel (km)	Nouvelle production (MW)	Row Labels	Investissements requis	Investissements alloués	Réseau additionnel (km)	Nouvelle production (MW)
Sud	655 172 \$	655 172 \$			Nord	36 402 641 \$	6 335 594 \$	134	
Saint Louis du Sud	655 172 \$	655 172 \$			Borgne	385 869 \$	- \$	8	
Artibonite	267 906 219 \$	10 715 518 \$	52	20	Cap Haitien	27 487 379 \$	1 376 177 \$	65	
Attalaye	862 026 \$	344 811 \$			Dondon	597 721 \$	- \$	13	
Dessalines	2 001 376 \$	621 315 \$			Grande R. du Nord	919 540 \$	- \$	15	
Drouet	3 375 000 \$	500 000 \$	-	-	Lavictoire	335 172 \$	- \$	7	
Ennery	1 434 483 \$	1 149 425 \$			Pignon	1 780 958 \$	1 457 587 \$	6	
Gonaïves	4 929 885 \$	4 916 976 \$	43	-	Plaisance	1 277 701 \$	- \$	20	
Gonaïves	25 185 013 \$	229 885 \$		15	Saint Michel	722 419 \$	862 026 \$		
Grande Saline	350 000 \$	- \$			Saint Raphael	2 360 265 \$	2 104 188 \$		
Liancourt	333 333 \$	- \$			Saint-Raphaël	535 616 \$	535 616 \$		
Marchand Dess.	1 221 264 \$	1 221 264 \$			Nord-Est	2 982 677 \$	745 452 \$	15	
Marmelade	952 306 \$	722 421 \$			Dérac	- \$	145 132 \$		
Mirebalais	210 000 000 \$	- \$			Ferrier	- \$	193 573 \$		
Peligre	14 313 255 \$	719 128 \$			Milot	381 604 \$	- \$		
Saint Marc	2 051 724 \$	- \$		5	Pilate	1 160 633 \$	- \$	15	
Saint Michel de l'Attalaye	689 655 \$	290 293 \$	9		Terrier-Rouge	1 193 046 \$	406 747 \$		
Verettes	206 897 \$	- \$			Trop du Nord	247 393 \$	- \$		
Centre	21 109 375 \$	7 559 205 \$	78	-	Nord-Ouest	36 394 471 \$	163 019 \$	49	15
Thomassique	923 193 \$	923 193 \$			Anse à Foleur	183 908 \$	163 019 \$	9	0
Belladere Roy Sec	195 402 \$	- \$	9		Port de Paix	19 500 000 \$	- \$		15
Carrefour Paye/Jn Denis	350 000 \$	- \$			Port des Paix	1 726 368 \$	- \$		
Cerca Carvajal	1 859 532 \$	1 088 872 \$	23		Régional Nord'ouest	14 984 195 \$	- \$	40	
Cerca la Source	919 540 \$	- \$			Ouest	152 593 719 \$	35 444 428 \$	-	1
Dechappelle	189 655 \$	- \$			Archaie	390 805 \$	390 805 \$		1
Hinche	1 379 310 \$	1 026 258 \$			Léogane	2 500 000 \$	- \$		
La Chapelle	1 793 103 \$	- \$			Petit Goâve	10 100 000 \$	- \$		
Lascahobas	2 298 851 \$	643 525 \$			Port-au-Prince	114 464 984 \$	15 415 692 \$	-	-
Maissade	1 627 206 \$	1 127 396 \$			Rivière Froide	5 500 000 \$	- \$		
Mireb. -Trianon	792 533 \$	792 533 \$			Tabarre	14 000 000 \$	14 000 000 \$	-	-
Mirebalais	6 148 854 \$	520 635 \$	23		Zone métropolitaine	5 637 931 \$	5 637 931 \$	-	-
Papaye	574 713 \$	- \$			Sud	15 549 657 \$	632 184 \$	23	
Saint Michel de l'Attalaye	365 345 \$	365 345 \$		-	Les Cayes	5 500 000 \$	- \$		
Savanette	620 690 \$	- \$			Plaisance du Sud	655 172 \$	- \$		
Thomassique	1 071 448 \$	1 071 448 \$	23		Port à Piment	689 655 \$	- \$		
EDH	21 589 567 \$	5 859 785 \$	-	-	Régional Sud	7 500 000 \$	- \$		
Central	21 589 567 \$	5 859 785 \$	-	-	Saint Louis du Sud	1 204 830 \$	632 184 \$	23	
Grand-Anse	30 857 471 \$	366 113 \$	-	15	Sud-Est	1 729 310 \$	330 427 \$	9	150
Jérémie	30 857 471 \$	- \$		15	Anse à Pitre	195 402 \$	166 946 \$	4	
Miragoâne	- \$	366 113 \$			Belle-Anse	183 908 \$	163 482 \$	5	150
					Gaillard	1 350 000 \$	- \$		

5.3. Metering Policy, Standards and Norms

Activities to develop metering policy standards and norms fell under the OIA's Task 8.

Because EDH's billable energy was not measured using identified norms, a key initiative was mounted focusing on reducing electricity losses, especially non-technical losses. The metering plan defined the metering technologies, standards and norms by market segments. It was presented to the commercial and technical departments, comments were addressed, and the document was accepted by EDH. The final plan was delivered to USAID as agreed during the 2nd quarter of 2012.

EDH's customer base was segmented by categories and types of metering to be installed on the distribution network in accordance with applicable tariffs and billing applications. It included recommendations for:

- Industrial customers with direct and indirect measurement
- Large customers supplied by the three-phase network
- Commercial customers supplied by the single-phase network
- Residential customers
- Low-consumption residential customers (i.e., shantytowns)
- Electrification of new rural and suburban areas
- Substations and power plants, including independent power producers.

The metering policy defined three new technologies for the measurement of energy:

- Remote metering
- Radio frequency (RF) metering
- Pre-paid meters.

Tetra Tech then provided technical support for the deployment of two major meter reading technology projects. The first implemented a remote metering technology for EDH's very large customers, including power plants. This project was funded by the World Bank under the PREPSEL Program. The second project deployed RF meter reading technology for the residential consumer/small commercial segment and was part of the Port-au-Prince Network Rehabilitation Program funded by the Inter-American Development Bank.

At the earliest stage of Tetra Tech's involvement, both projects were suffering from major schedule delays and cost overruns; the EDH teams also encountered serious difficulties with the equipment suppliers contracted. More important, the commissioning of remote meters installed in the power plants was an essential condition of the World Bank's \$200 million budget support to the Haitian Government.

▪ **Meters on IPP Power Plants**

The first phase of the remote reading metering project involved the installation of 16 meters at IPP power plants.¹³ Because bulk electric energy purchases at HV are by far the largest budgetary expense of EDH, the business objective was to create an invoicing validation process using EDH internal data. The target date for completion was the end of 2012, although as of early November 2012, the meters had not been delivered and the materials required (e.g., casing, wire, locks, wireless modems) had not been specified or ordered.

An alternate meter type was selected. Tetra Tech had recommended the NEXUS 1500 instead of the provided JEMSTAR, which lacked a communication option and/or substation base. The project was completed at the end of February 2013 to the satisfaction of the World Bank, allowing EDH to comply with the budgetary support conditions.

¹³ Reference: 5.4. Review of IPP contracts.

Tetra Tech assisted in preparing the technical specifications of the meters and communication network, and the implementation of the project plan. Several presentations were made to the World Bank and EDH.



Remote meter reading installed in Petit Goave



Meter assembly – direct type



Measurement transformer

Tetra Tech also designed the billing validation process, planned the activities related to remote meter installation in the remaining power plants, and specified a centralized team that was responsible for managing the energy generated versus the demand. The project was then transferred to EDH for execution and completion.

▪ **Deployment of AMR Software**

The second phase of the project involved the deployment of the AMR (advance meter reading) software that interfaced with the existing billing system and the gradual migration of 439 large customers to remote meter reading technology.

This project was a key enabler in the Commercial Plan, eliminating entirely the late issuance of invoices (which sometimes were delayed for several months) and billing errors.

Tetra Tech provided a wide range of technical services, the most important being:

- Prepared and maintained an integrated and detailed project plan including a pilot for 10 customer sites in order to assess the meter and communication networks’ performance, as well as the AMR functionalities.
- Recommended the creation of a task force composed of EDH and the key contractor and subcontractor.
- Created and implemented an installation-quality assessment audit prior to acceptance due to the poor quality of the selected subcontractor’s installations.
- Due to the stability issues observed, recommended an extended pilot of 74 customer sites prior to full deployment.
- Designed and implemented an integrated installation process (meter replacement, installation quality compliance, and software activation) and implemented key performance metrics to assess the quality of installation, the stability of the communication network, and the level of flow from the automated metrics collection to the issuance of a customer bill.

- Implemented an audit checklist to perform the AMR system functionality assessment required to close the contract with INDRA.
- Assisted EDH in preparing two contract addendums to extend the project’s end date and the material inventory.

A preliminary deployment strategy, including training requirements, tools, test sets and vehicles, was prepared and discussed with EDH. Going forward, all activity was to be undertaken by their technical teams. At that point, project accountability became the responsibility of the EDH commercial organization and the project was able to complete 74 conversions.

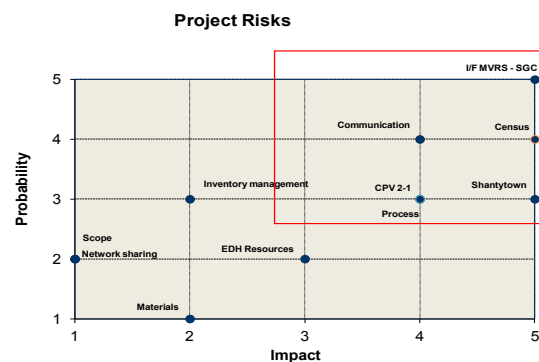
▪ Radio Frequency Metering Project

This project originally proposed the rehabilitation of 3 distribution feeders in the Port-au-Prince area, a census of 50,000 customers’ physical connections, and the replacement of over 32,000 meters. The project was to be managed by an engineering company (SNC Lavalin) associated with a local electric company (ECEM) and a counterpart in EDH that was responsible for coordinating all internal activities. Within the original project scope, 40,000 regular meters had been purchased. With the acceptance of the Metering Plan, EDH decided to purchase radio frequency meters, although at that time, neither the handheld units nor application software required to read and transmit energy metrics to the billing system were purchased

Tetra Tech provided technical support to EDH’s commercial and planning organizations, as well as their project coordinator for the RF project. The main tasks were to deploy meter reading capabilities with an interface to the billing system and to manage project risks.

The project faced severe risks due to late delivery by the engineering company. Also, one of EDH’s primary objectives was to lessen the impacts of a delayed implementation, as this project was one of the key enablers of the commercial plan to improve the CRI.

Tetra Tech also provided training and project management support to the EDH project coordinator.



Faced with inventory issues, Tetra Tech ensured the coordination of the materials’ (meters, cables, poles, etc.) relocation to an EDH site in Port-au-Prince, assessed the inventory and reconciled it with the purchase orders, and identified several discrepancies. A final report was prepared and reviewed with EDH and the IDB.

The equipment requirements for the handheld units and software for the radio frequency meters were included in the loss reduction equipment and tools funded by USAID. Tetra Tech presented the proposed procurements to EDH for approval. The list of RFQs and RFPs, along with the items to be procured, was approved at a coordination meeting. The preparation and submission of RFQ and RFP documents began in early June 2013. The project was completed at

the end of February 2014 with EDH's installation of more than 300 meters and the production-ready field collection system (FCS).

5.4. Review of the IPP Contracts

▪ Inventory of IPP Contracts

Under Task 13 of the OIA, Tetra Tech collected from the GoH and EDH all IPP power purchase agreements (PPAs) and their signed amendments, and tables of payments to date. It then analyzed these documents' conditions and terms, and classified them according to cost, duration, terms and technical issues.

All aspects of the PPAs managed by the Office of the EDH Deputy Planning Director were also analyzed. The aspects reviewed included contracts related to commercial operation, renewal, amendments, contractual power, operating power, fuel contracts, fuel operations, specific fuel consumption, number of hours operation, required monthly operation, maintenance program, payment, deferred payment contract, letter of guarantee, provision of handover, power increase at the connection point meter, and electronic metering at the delivery point. The first recommendation made to EDH was to seek the harmonization of the different terms of the contracts.

The latest bills from Sogener were also requested to verify whether the revised agreement with the company was considered in the invoicing. Abnormalities in the agreement were identified. Based on Tetra Tech's recommendations, the EDH Managing Director held an urgent meeting with Sogener on 24 March 2012.

The meeting focused on: 1) converting Varreux Groups I and II to burn HFO instead of GO, 2) reducing the amount paid for plants operated by Sogener (EDH should only pay for the energy Sogener produces), 3) the specificity of the Varreux III, 4) tracking substantial reductions in take-or-pay contracts, and 5) harmonizing contracts for improved management.

Those attending agreed on several points, including a reduction of US\$ 0.03 per kWh in Sogener's generation when generation exceeds 22 MWh per month and conversion to HFO fuel. Draft minutes of the meeting were prepared and distributed for approval by all meeting participants. A number of changes were requested by Tetra Tech to avoid any ambiguities in definition. However, the record of the minutes was never signed despite numerous reminders. The US\$ 0.03 per kWh reduction was confirmed in a 26 March letter from the President of Sogener.

The analysis of the Haytrac and E-Power contracts was finalized and presented to EDH's Managing Director in September 2012.

Following a decision of the EDH Executive Committee in May 2012, the Deputy Director for Planning was appointed to lead a team to conclude the agreement with Sogener. Tetra Tech was part of the committee, but the final document identifying abnormalities in the invoicing

and contract conditions was not reviewed. No resolutions were reached, despite several meetings.

- **Implementation and Support to EDH**

Among the 16 available remote meters, 6 were installed and tested at IPP facilities (Sogener, Haytrac Les Cayes and Haytrac, and the Petit Goave generation plants). Technical problems were encountered with some of the equipment and two meters needed repair. In addition, EDH and the IPPs noted contradictory manual meter readings. For Sogener, all the reading information was not made at a single point and the consumption of the auxiliaries could not be clearly defined.

A model contract for the purchase of electricity was presented to EDH and Tetra Tech continued to support the utility in reducing IPP costs by making recommendations on operational costs based on international good practice.

EDH received support from the Inter-American Development Bank through an international legal consultant who presented findings on the Sogener and other IPP contracts. An action plan was prepared to negotiate the costs of all IPPs in January 2013. The negotiations are ongoing and are being kept confidential until an agreement is reached.

6. FINANCIAL MANAGEMENT AND ACCOUNTING SYSTEM

6.1. Financial Reporting (Task 7)

In 2011, EDH's financial reporting was limited to cash flow reviews. The budget analysis consisted of examining deviations from the budget without any formal analysis of root causes, trends or correlations to other business results (commercial, technical, human resources, etc.). There was thus no formal process for reviewing financial results within the organization.

Financial reporting and analysis became the highest priority. During the first half of 2012, Tetra Tech began building a dashboard for EDH that included key financial and business metrics. The following activities were conducted:

- Gathering and analyzing existing reports
- Interviewing EDH personnel and identifying current information flows and processes, and existing business and financial metrics
- Identifying existing internal control processes
- Proposing an action plan to the EDH Managing Director.

Based on a review of EDH's finance and accounting process, Tetra Tech concluded that the situation places the company in a position where it was unable to finance its growth, much less maintenance works:

- EDH's financial situation is characterized by bills that are due immediately, but it does not have the assets available to pay them. Thus, the utility has been forced to suspend payments to suppliers for several years (including IPPs).
- Owing to insufficient cash flow, EDH has been unable to make the investments needed to ensure service continuity keep the electric network in working order.
- EDH lacks the financial means to make good on its current liabilities (defaults on loans, debts to suppliers).
- EDH appears to possess the skills required to provide good basic accounting information but the financial statements it produced did not meet financial reporting standards.
- EDH has not prepared financial statements or been subject to audit for the past 10 years.

6.2. Data Collection, Dashboard and Analysis for CMEP (Task 9)

Because the CMEP was not providing EDH with the type of data the utility needed, Tetra Tech assisted EDH in calculating key performance indicators during Phase 3. At the request of the Managing Director, a dashboard was developed to collect KPI figures.

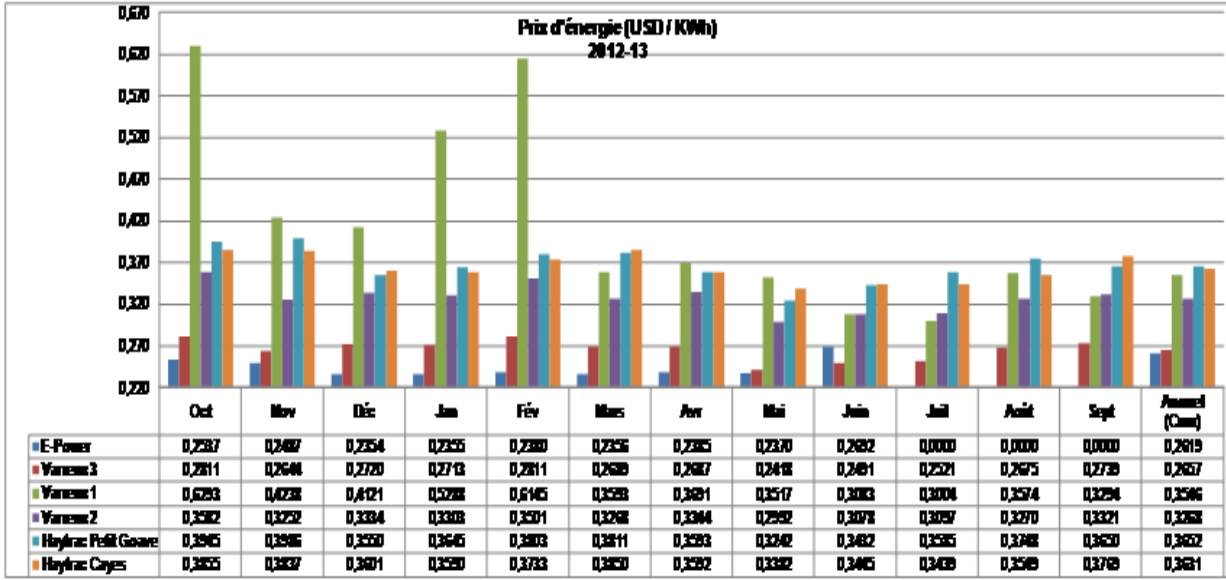
Overall, EDH lacked data on current performance and its financial and operational metrics were often inaccurate, late or simply not available. As a result, the utility did not employ a fact-based decision process; nor did it conduct detailed analyses to identify issues or take appropriate

corrective actions. There was one exception: the CRI and its related billing and collection rates were evaluated by Tetra Tech as part of its commercial technical assistance.

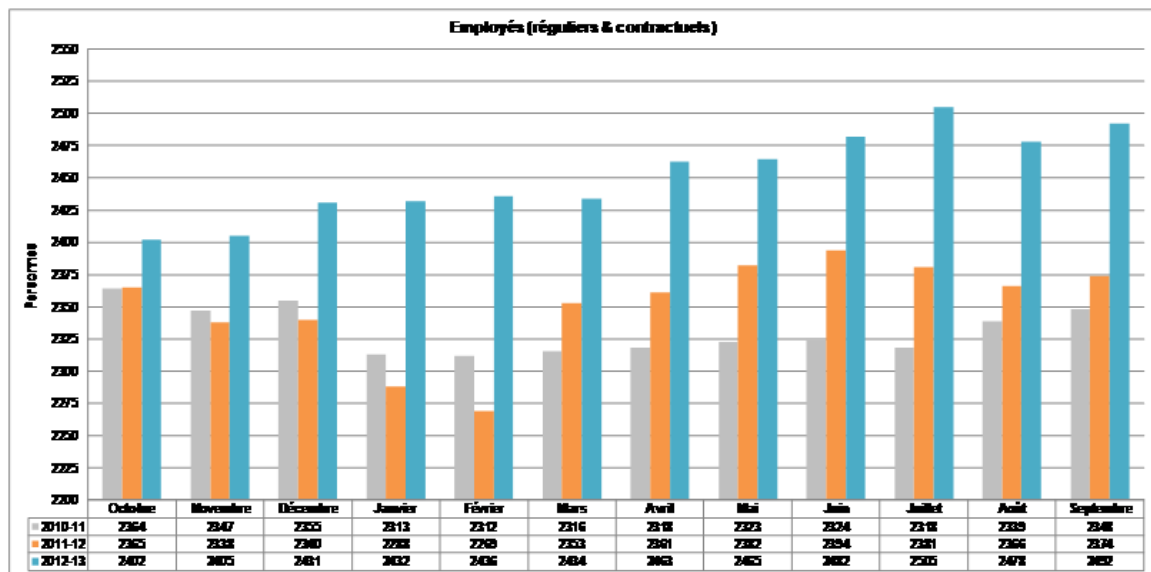
Tetra Tech presented EDH Managing Director with a proposal for gathering past and current data, identifying issues, and providing training to an internal staff member who would be responsible for the updates. This proposal was accepted, and the dashboard was built.

In addition to the dashboard, which identifies EDH key performance indicators, Tetra Tech helped EDH staff present updates to the Ministry of Finance and Economy and the MD in bi-monthly presentations. These presentations focused on the subsidy level, the payment of EDH arrears (mainly the income tax), and the payment of IPP invoices.

The dashboard was migrated to EDH’s planning organization and one key employee was properly trained. In addition, an action plan was developed for providing missing data and rectifying incorrect data. The graphs below provide a few extracts from the dashboard for illustration purposes.



Energy price for each IPP



EDH employees and contractors

The CRI and other commercial indicators (billing and collection rates, arrears, etc.) were calculated by the EDH Commercial Department with Tetra Tech's assistance. They are now the subject of a monthly report that includes recommended actions. The history of the data was established from the beginning of fiscal year 2010-2011 (June 2010).

7. ASSET MANAGEMENT

7.1. Vehicle Fleet Monitoring

In advising on and monitoring the use of EDH vehicle fuels (Task 11 of the OIA), the following actions were implemented:

- Information gathering
- Data analysis, definition of corrective actions, and implementation of controls
- Definition, implementation and evaluation of new processes
- On-the-job training.

Tetra Tech established and completed a process for the daily collection of information on the use of vehicle fuels in November 2011. The evaluation raised numerous questions, for example, a large percentage of fuel use was not attributed to individual vehicles, the estimated distance traveled in a month, and consumption during weekends. Tetra Tech thus recommended that EDH management improve the security of fuel and vehicle use at headquarters. This led to such infrastructure improvements as placing barbed wire at the boundary walls and security cameras to monitor movements after hours.

Tetra Tech also recommended to the Administrative Director the implementation of fleet software and the appointment of dedicated staff to monitor fleet consumption.

The management of a vehicle fleet requires an inventory and assessment of the state of vehicles. Although the inventory was conducted in October 2011, the physical verification of vehicles was complex due to the remote locations of vehicles around the country. As a result, the information was not provided to management until mid-2012. The assessment of the state of the fleet showed that 40 vehicles (approximately 15% of the fleet) were not operational and 65 (approximately 30%) required repairs.

Tetra Tech also investigated the external garages in Port-au-Prince where a number of vehicles had been held for several months due to EDH not having paid repair invoices. Thus, the garages kept the vehicles as leverage.

A number of processes were put in place using the fleet management system and reports on their implementation were submitted to EDH's Managing Director on a monthly basis. They covered the type of repair required, the time needed to carry out the repair, and the estimated cost and fuel consumption.

7.2. Supply Chain Management

Work in this area was conducted under Task 11 of the OIA. Considering the future implementation of a resource management system,¹⁴ Tetra Tech reviewed EDH's procurement, inventory management, and storage processes. The findings included:

- Procurement procedures are generally mastered by the 19 employees who make up the department.
- The store manager position had been vacant for almost a year.
- There are several guidelines on supply chain management, but they are sometimes conflicting.
- After awaiting EDH payment for long periods, the utility's trading partners now insist on being paid before they deliver goods to EDH.
- No proper stock inventories are taken.
- The company has no information on the actual use of its purchases.
- There is too great a variety of materials in the warehouse.
- EDH had an approximate inventory, but it was not maintained on a regular basis (the most recent inventory dated back to December 2011).
- Because of the lack of space and the wide dispersal of materials across the country, storage and handling equipment are limited and in poor condition, materials are only partially inventoried and are stored improperly, making inventory control difficult and putting the inventory at risk of misuse or theft.

Before the analysis began, it was necessary to secure the storage areas (counter service, access control, security stocks, etc.), and define the location of equipment with specific spaces dedicated for each type of material. An inventory was scheduled for completion by 30 September 2012; instead, it was completed in November 2012. Tetra Tech stressed the importance of maintaining that inventory. In addition, it recommended that outdated or broken items be thrown away and that surplus assets with economic value be sold.

In parallel with the development of the external stocking of goods, the World Bank financed the restoration of the Sudan Warehouse, which was completed in September 2012.

EDH reallocated the materials and equipment for the RF metering project. Because shipping was not coordinated, the current inventory does not line up with the supplier list provided by the project and discrepancies were difficult to correct.

¹⁴ No progress was made on the implementation of the RMS project, as the revised INDRA contract with EDH (funded by the Inter-American Development Bank) was not approved. Further action is anticipated once a new contract is signed. However this contract had been in dispute resolution for more than one year.

This situation led to the development of an experiment with a new method, which was tested by training four employees (a warehouse manager and three warehouse employees) in the principles of continuous inventory and materials management.

Tetra Tech ensured the equipment storage area was locked and insisted that the process be followed before the equipment was removed from the Sudan warehouse.



Sudan warehouse before inventory was taken

8. COMMERCIAL

8.1. Commercial Context

- **Organization and Human Resources**

During January and February 2012, Tetra Tech began holding meetings with EDH Commercial Department staff. They confirmed that the utility's commercial managers are generally left to their own devices, and that those in charge of operations often do not know the procedures and even fewer are capable of explaining, applying or implementing them.

The Commercial Department has no fixed objectives and its performance is not reviewed; thus, corrective measures are not undertaken. This limits the company's ability to react in an evolving environment or in the face of disappointing performance. Those attending the meetings also noted that EDH commercial employees don't have the necessary safety equipment.

During Tetra Tech visits to the five EDH commercial agencies in the metropolitan zone, it found that they lack essential safety and other equipment such as vehicles. Much of the equipment that is present was in very poor condition or had been awaiting repair in the EDH garage for several months. This situation was documented in the first commercial report.

The second report documented the organization in place:

- A customer management division including billing, reception, management of customer contracts, and management of customer accounts
- Field teams including meter reading, distribution of bills, and inspection of connections
- A technical and distribution division including the repair and maintenance of connections
- An administrative division including cash points.

The report concluded that the number of existing staff was not sufficient to allow the management of the number of active customers as of 31 December 2011. In addition, EDH commercial agencies did not have enough qualified employees, making good performance difficult to attain.

The third report concerned the lack of procedures, mainly procedures for the new Customer Management System (CMS). Thus, EDH leaders are confronted with the almost daily necessity of explaining the work to their employees. Tetra Tech recommended that a training plan be set up in parallel with training on basic job responsibilities and the use of the CMS.

A plan of immediate actions was presented to EDH leaders after validation by the Executive Committee. Tetra Tech recommended separating the functions of customer contract management from customer account management to guarantee good customer database handling on the one hand and good customer accounts receivable management on the other.

The aim was to disconnect 1,000 customers for outstanding payments each month and by agency, subject to the availability of vehicles.

▪ **Reliability of Commercial Statistics**

A primary objective of OIA Task 9 was to improve the quality of the commercial reporting and the reliability of commercial statistics, and to reconcile the statistics in the former billing system (FAB) and the new Customer Management System. Tetra Tech thus investigated the differences between the two systems to allow corrections to be made when differences are found and when data are not credible.

The conclusions were:

- The amount of arrears at the beginning and end of the month do not comport with amounts billed to and paid by customers, demonstrating that the FAB was not a reliable tool.
- The numbers of active and inactive customers in the metropolitan zone and the provinces had almost doubled during one month in 2012; a similar observation was made for the amount of customer receivables, indicating serious errors.
- Several million HTG of collections (low-voltage (LV) customers and medium-voltage (MV) industry) were credited in FAB after data were migrated to the CMS, but were not credited to CMS customer accounts. Corrections were requested to the affected customer accounts. It would have been preferable that CMS be capable of producing the necessary reporting from July 2011 for the metropolitan zone.
- Errors relating to delivered energy were numerous during the January to December 2011 period (there was confusion over the energy delivered from Pelligre to Mirebalais /Hinche).
- Metering is defective in most plants and substations, and the calculation of system losses is not precise; nor does it allow the direct ranking of the most affected network.
- The ratio of inactive customers / total customers was 47.5%. This very large percentage could result from many causes, such as faulty record-keeping, or inaccurate billing system, lack of meters, post earthquake damage, or fraud.
- Customer receivables were not followed up properly and arrears were not collected.
- The average price of the kWh sold is below the cost of generation. This, EDH cannot cover its operating expenses, let alone network maintenance.

Tetra Tech recommended updating the data cited in the commercial action plan and monthly commercial dashboard. The recommended corrections were implemented in February 2012 and a new edition of the EDH commercial statistics was produced using data from January 2011.

8.2. Customer Management System

Work on the CMS was conducted under Task 6 of the OIA. On 23 June 2009, EDH signed a contract with INDRA (funded by the World Bank) for the installation of the CMS (work was

planned for completion on 31 May 2010, but was disrupted by the January 2010 earthquake). Another WB-funded contract was signed on 14 March 2011 to resume INDRA's services; its terms were in conformance with those in the previous contract. This contract, signed for an initial duration of six months, was extended twice and ended on 4 April 2012.

The migration of the customer data from FAB to CMS proceeded very slowly, and in the following order:

- In July and August 2011: Petion Ville agency
- In August and November 2011: Cul de Sac agency
- In November and December 2011 : Waag et Delmas agencies
- In December 2011: Carrefour agency
- In February 2012 : large customers, ministries and autonomous institutions.

Despite the efforts of the EDH IT and commercial teams, the situation remained poor at the end of February 2012. The number of bills issued during January and February 2012 was far lower than expected, resulting in a significant reduction in collections (January: 44,037 customers billed except major customers; February: 51,945; and March: 79,468).

A task force was organized during March 2012 with representatives from the commercial department, the new IT department head, and experts from INDRA and Tetra Tech to review the results of Tetra Tech's investigation:

- A large number of customer billing anomalies were detected by the CMS program (whereas the FAB had no such "red flag" functions). The CMS blocks the issuance of a bill if anomalies are found in the meter readings. In February, these anomalies were detected for a large percentage of active customers.
- At the request of EDH, INDRA intervened to force the billing of the meter reading routes that remained unbilled due to a large number of anomalies.
- Several difficulties were encountered in transferring information between agencies and the IT server installed at the EDH head office due to the telecommunications deficiencies. This resulted in important disturbances in the routing of meter reading data. A workaround solution was found to enhance the reliability of data exchanges.
- On 15 March 2012, 25 problems were detected, primarily involving errors in the processing of bills for certain configurations of customers.

On 4 April, the task suddenly ceased activity (this was the date when INDRA's contract ended and its experts left Haiti). A difficult period of transition ensued in April and May as a result of the numerous problems that had not been resolved.

Collaboration started again in May with return of the INDRA functional expert; collaboration strengthened over the next month with the arrival of an INDRA CMS specialist.

During June and July:

- Corrections were recommended for ten common problem areas; they were tested on a trial base and then introduced into the CMS version.

- Difficulties encountered in transmitting data between IT and the commercial agencies were corrected by enhancing the reliability of an already-tested Internet solution that was developed in March.
- Agencies were helped to accelerate the processing of the anomalies detected by the CMS, by constituting a centralized support group of five employees from the Commercial Department.
- Approximately 60 front-office employees (receptionists, cashiers, customer account managers) were trained on data capture in CMS.

On 30 August 2012, a new two-month WB-funded contract was signed with INDRA, with the following objectives:

- Treat all of the anomalies encountered with the forms
- Set up additional software for the management of outstanding payments, production of reports for management, and authorization modules.

The last problems were corrected, tested and codified in the operating version of the CMS. The number of bills sent rose from 72,000 in August to more than 90,000 in October.

A working group was established at the end of March 2012 to verify that the CMS contained the 232 features specified in the 2008 call for tenders. The features of the CMS were confirmed on 15 October. The support of the supplier continued until the end of October, the date of the end of the contract.

New problems were identified by the end of December 2012.

- INDRA had instructed its employees to stop providing support services in the absence of a paid service contract
- On 3 January 2013, INDRA blocked the system, saying that its license had not been renewed
- On 5 January, EDH was forced to generate the meter reading timetable for 2013 by itself.
- On 9 January, the IT Department had to find a solution to the blocking of the batch processing of billing by pulling unchecked updates in the database found in the INDRA statements.
- On 5 February, the batch process executed through the menu recommended by INDRA failed.

The maintenance contract was finally signed in late April 2013, after a long period of disagreements over outstanding payments from EDH to INDRA.

8.3. Commercial Action Plan 2012

This action plan was prepared under Task 4 of the OIA in light of the commercial results of the previous 2010-2011 fiscal exercise:

- Billing rate: 33.0%
- Collection rate: 75.6%
- CRI: 24.9%.

On 19 April 2012, an emergency action plan was presented to the Executive Board and was implemented. It contained the following priorities:

- Communications on partial payments
- Processing of inactive customers (residential and commercial)
- Processing of disconnected major customers
- Billing and collection of major customer outstanding payments
- Collections from autonomous institutions
- Coaching of the AST (meter readers) and improvement of the reading process.

The plan's implementation is summarized as follows:

- **Follow-up work on the reading-billing-collection cycle.** This cycle generated more than 90,000 bills every month. For the major customers, bills were controlled before distribution. Collection in the metropolitan zone progressed every month during the fiscal year, from 167 million HTG in October 2011 to 216.742 million HTG (month, year).
- **Communications on partial payments.** Posters were affixed in commercial agencies and letters of acknowledgement of debts were signed for agencies and large customers. An advertising campaign in newspapers and radios and training of cashiers and receptionists were prepared and implemented.

With the activation of the CMS's management of outstanding payments module, agencies can now schedule disconnections for outstanding payments. However, they remain hindered by the lack of available vehicles and cannot thus make all the disconnections.

- **Processing of inactive customers** (residential and commercial): This activity was implemented slowly in some agencies because of the lack of available vehicles. Priorities then turned to the installation and change of meters, as well as repairs and collections.
- **Processing of disconnected major customers:** Inquiries and processing were implemented for more than 100 customers. The results revealed that 30% of those disconnected were in buildings destroyed by the earthquake and that there was no fraud. On the other hand, important frauds were detected and handled for 20% of these customers. The outstanding payments were recovered and some major customers which had abandoned EDH for several years were added to the utility's customer base.
- **Billing and collection of major private customers:** Meter reading timetables were developed for these customers and meter reading cycles were followed up on a daily basis. In addition, bills were checked bills before being distributed.

The new procedures on revenue

protection are now being implemented and involve three employees. Follow-up on outstanding payments is made via telephone or a physical visit. A weekly reporting system was set up for each employee.

- **Collection of autonomous customer bills:** a new procedure was implemented for these collections using a detailed information system. At the end of the fiscal year, the amount collected in arrears was 36 million HTG vs. an objective of 27.5 million HTG.
- **Coaching of the AST (meter readers):** Support for dealing with billing anomalies was set up in the agencies of the metropolitan zone. The reorganization of the meter reading routes, the distribution of bills, and the organization of the work were improved.

EDH’s commercial performance at the end of the fiscal exercise was:

- Billing rate: 37.2%
- Collection rate: 82.1%
- CRI: 30.5%.

8.4. Commercial Action Plan 2012-2013

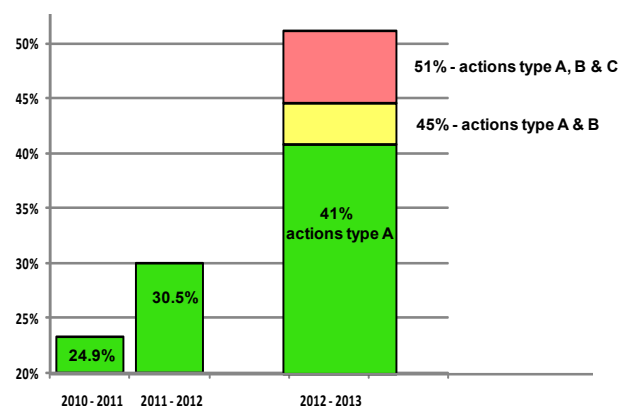
▪ Action Plan and Prerequisites

At the beginning of July 2012, an important meeting was held with EDH’s executive management and Financial Department on budget estimates for the next fiscal exercise. The discussion highlighted EDH’s serious financial constraints. As a consequence, it became imperative to strongly accelerate the utility’s commercial performance and balance its budget.

The objective imposed on the Commercial Department was to reach a CRI value of 52.0%, based on the following figures: 1) billing rate: 59.2%, 2) collection rate: 87.9%, and 3) CRI: 52.0%. The Department was to define and implement actions to achieve these goals.

Twelve main actions were defined; they were of two types: those EDH had committed to in its operating budget and those requiring outside financing.

Each of the actions proposed in the 2012-2013 Action Plan 2012-2013 was evaluated. The results are shown in the graph to the right.



The actions to be implemented were:

- A. Seven actions not requiring investments:
 1. Decrease the number of frauds
 2. Improve the quality of meter reading
 3. Effectively treat inactive large customer accounts
 4. Effectively treat inactive residential and commercial customer accounts
 5. Reduce the arrears of major customers
 6. Reduce the arrears of the autonomous GoH institutions.

- B. Actions for which financing has been acquired:
 7. Install 455 remote meters and reinstall meters on major customers connections with zero consumption (World Bank PREPSEL Project)
 8. Install 32,000 ANSI meters with remote frequency reading (IDB project)

- C. Three actions have yet-to-be defined financing:
 9. Install/replace 72,000 residential and commercial customer RF meters (total estimated cost: \$7 million).
 10. Extend remote metering to all large customer connections (1,000 connections: new project with an estimated cost of \$3 million)
 11. Rehabilitate additional circuits with the installation of 30,000 meters (new project).

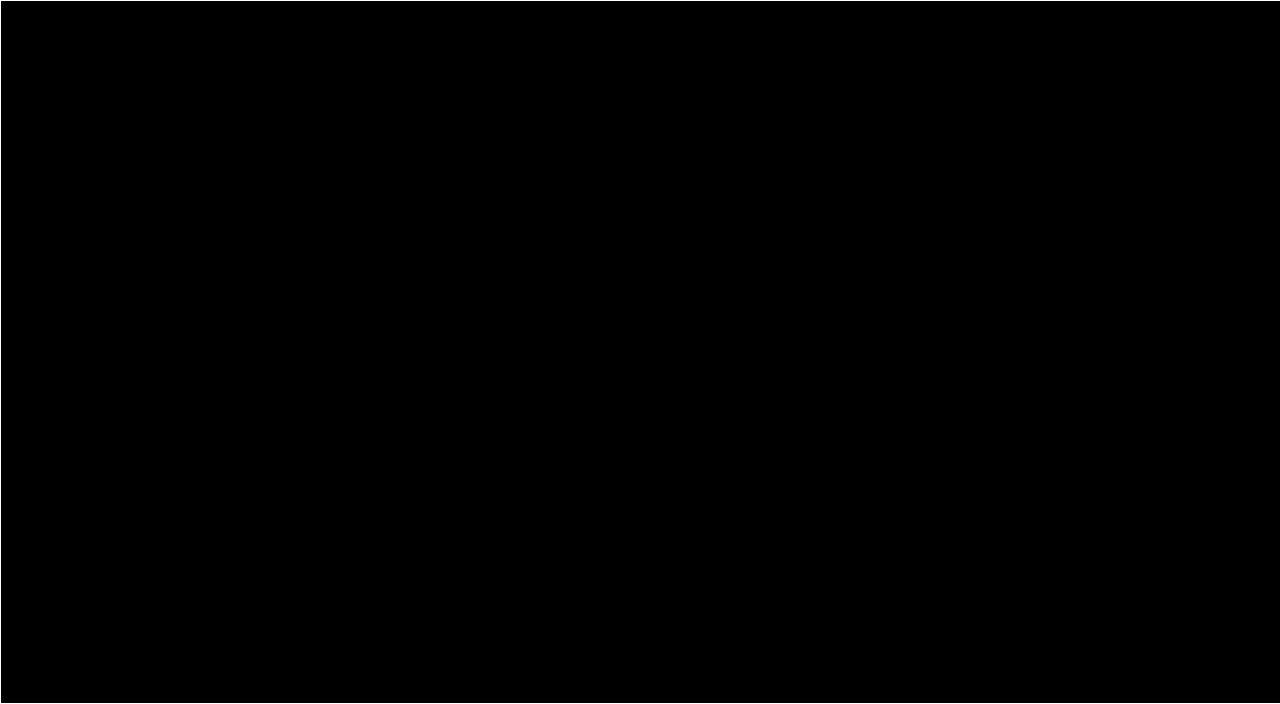
The prerequisites of the 2012-2013 Action Plan were the following:

- The Government must continue to pay for its electricity consumption, both for all public services and the communities (*mairies*).
- Finance that has been acquired must be confirmed for the installation of 455 remote meters before the end of February 2013, and the rehabilitation of three circuits, including the installation of 32,000 RF meters.
- The new financing needed to reach these goals was identified.
- The Commercial Department will arrange for adequate numbers of human resources and vehicles.
- Commercial procedures must be strictly respected and have the full commitment of all upper managers in EDH (directors, heads of departments/divisions).

- **Commitments**

To support this action plan, EDH organized a seminar in March 2013 that brought together leaders from the Commercial Department and commercial agencies.

Among the commitments made at the seminar was that performance appraisals be conducted periodically of each commercial agency (operational unit). To implement this initiative, performance contracts were prepared containing the commercial action plan objectives. The agency leader would then be directly responsible for the implementation of the operational activities in his territory. A mid-term assessment was conducted and corrective actions defined.



Several important billing and collection procedures were proposed to EDH (management of the arrears for the private large customers and for the autonomous institutions, rescheduling of the debts commitment in writing to pay the balance in monthly installments, etc.). These procedures were reconfirmed and agreed on June 2012; IT tools were set up and formal training of the users was held.

The objective of the customer regularization is to reduce the commercial losses by completing customer enumeration, updating the CMS and regularizing the unregistered and illegal customers.

To ensure the accurate billing of large customers, a timetable for meter reading was established. The reading cycle begins on the first day of each month and is processed daily. Bills are now verified before being distributed and the inaccurate bills are reprinted after correction. Three additional staff members were assigned to reconcile large customer accounts and address outstanding payments.

Fraud teams planned and addressed large-scale “punch” operations, one or two per week over the second half of 2012, concentrating in specific areas to reduce fraudulent connections more efficiently. Support from a media campaign was an important factor in improving this large-scale operation.

Beginning in mid-May 2012, EDH carried out a comprehensive three-month training program for meter readers and bill distributors. In November, meter readers who had participated in the training were evaluated. The results were disturbing: only 27% of them could correctly read 10 standard EDH meters within 5 minutes. Another training session was held at the end of 2012; only 77% passed the final training test this time. EDH is still holding training and looking at replacing inept meter readers.

EDH was confronted with long delays in the installation of the 439 remote meters financed under the PREPSEL Program. These meters were to be installed by the contractor (only 70 had

been installed when its contract ended in June 2013 and numerous problems with the meters were still being addressed in February/March 2014). The feeder rehabilitation project in Petion Ville, where 32,000 radio frequency meters were to be installed, was also behind schedule. The project was still being implemented in February 2014 with the installation of an ITRON FCS system and its interface with the CMS. This program was carried out under the TMC Loss Reduction Equipment Procurement activity funded by USAID (see Section 9 of this report).

The success of the commercial plan hinged on a number of prerequisites that were to be satisfied from the beginning of the fiscal exercise. None of them was realized.

- Actions and investments representing an increase of more than 10% of the CRI were not implemented.
- New objectives for the Tetra Tech team were specified in October 2012 after the CRI had risen by 33.2%; its role thereafter was reduced to simple technical assistance.
- The MEF and Ministry of Interior decided that the public and autonomous institutions needed to pay for their electricity consumption, but without support from the GoH.

EDH's commercial performance at the end of October 2012 was:

- Billing rate: 38.6%
- Collection rate: 86.0%
- CRI: 33.2% (34.2% in the metropolitan zone).

8.5. Commercial Action Plan 2013-2014

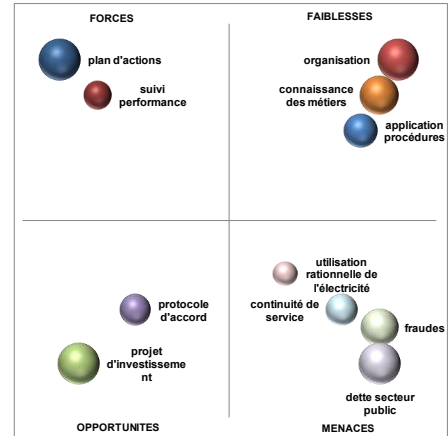
To reach a goal of 47.6% for the CRI (billing rate: 56%, collection rate: 85%), the Commercial Action Plan 2013-2014 was prepared under Task 4 of the OIA. It was intended to:

1. Strengthen all EDH commercial activities to improve customer satisfaction.
2. Set up the conditions needed for the smooth running of the organization to improve its commercial performance.
3. Strengthen the optimization of equipment use.

In setting goals under the Plan, it was assumed that the central administration (ministries) actually paid their current bills and that the areas of the municipalities and autonomous institutions were also paid.



Commercial technical team
with equipment financed by USAID



SWOT analysis

Considering EDH's commercial goals, nine priority actions were specified for the duration of the plan:

1. Implementation of a proposed new EDH organization
2. Effective management of the arrears of municipalities and autonomous institutions
3. Installation of remote reading meters under the World Bank's PRELEN Project
4. Installation of RF meters (IDB and USAID projects)
5. The continuation of the PEIPIREF program (fraud reduction activities)
6. Reduction of private sector arrears
7. Improvement of the billing process
8. Increase in the number of legal customers
9. Stabilization of the CMS.

8.6. Commercial Organization in the Metropolitan Zone

This work was conducted under the OIA's Task 12.

■ Importance and Characteristics of the Commercial Agencies

About 74% of the revenues EDH collects from the private sector come from the metropolitan zone. This amount represents 39% of the utility's revenues from major customers, 17% from the Petion Ville agency, and a little more than 6% from the Port-au-Prince (Waag) and Delmas agencies.

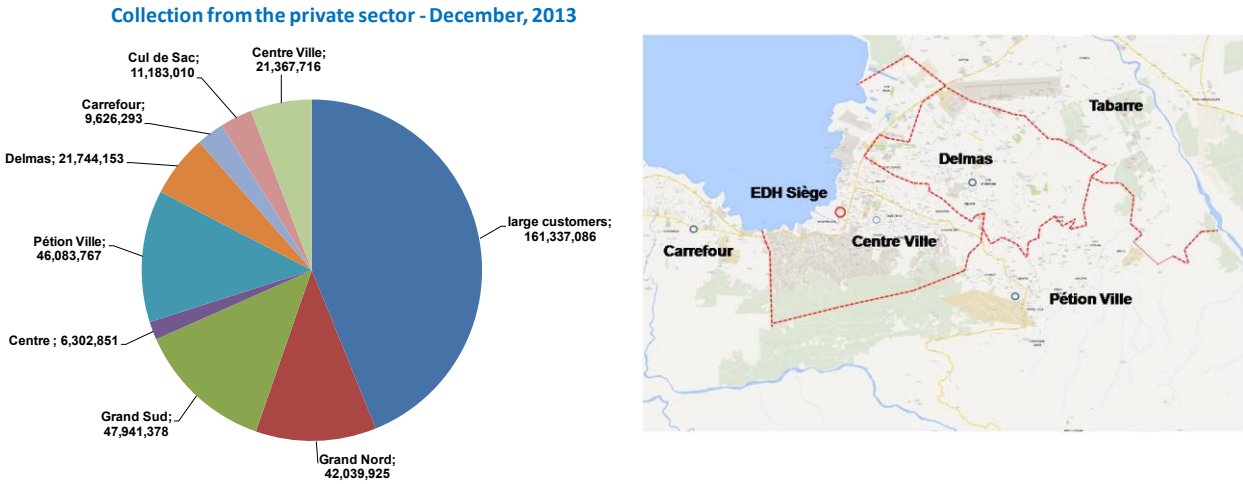
To ensure a viable commercial future for EDH, it must work toward:

- Providing improved customer service, to the level of "good"
- A better organization of its work and respect for schedules
- Attaining the results set for it and the real empowerment of individual employees
- The rigorous use of procedures and controls.

EDH agreed that these fundamental goals cannot be reached by the EDH organization in place and that changes were necessary.

For the metropolitan zone:

- The Commercial Department is responsible for the planning, organization and control of all the commercialization services delivered by EDH.
- Commercial agencies are business units that implement actions requested by the Commercial Department; they are fully responsible for achieving the results set for the residential and commercial tariff customers.



There are two categories of customers in the metropolitan zone:

- The major customers (commercial and industrial, with a monthly consumption of more than 1,000 kWh, with the following tariffs: LV industry and MV industry) and central customers (ministries, municipalities and autonomous institutions)
- The five commercial agencies that manage the other residential and commercial customers.

Commercial Agencies (end of October, 2013)	Number of Residential Customers	Number of Commercial Customers	Collections (HTG)
Pétion Ville	25 241	1 639	48 369 508
Port-au-Prince (Waag)	19 698	2 887	27 070 835
Delmas	23 457	1 350	20 071 791
Tabarre (Cul de Sac)	23 675	1 123	12 829 132
Carrefour	24 903	807	9 107 927

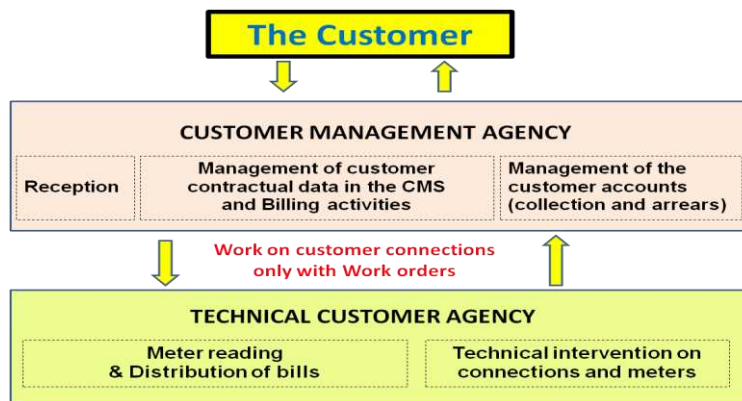
(*) data from CMS

The organizations of three central agencies of the metropolitan zone (Pétion Ville, Port-au-Prince and Delmas) were studied.

- **EDH Commercial Organization Project**

Observations at the international level show that in a successful distribution utility, losses are generally under 10%. At the 20% threshold, the reduction of non-technical losses must become a strategic focus of the company, which may necessitate modifications to the organization.

Tetra Tech proposed that EDH build its organization by refocusing activities to value-added pursuits, establish clear job descriptions, and train employees in basic skills. Details on the project were presented in November 2013. Its implementation will require the unconditional support of the Administrative Department and the possibility that EDH should rent additional space for its technical commercial staff.



9. LOSS REDUCTION EQUIPMENT AND TOOLS PROCUREMENT

Based on a USAID-provided list, Tetra Tech presented proposed procurements to EDH for approval. The list of RFQs and RFPs, along with the items to be procured, was approved at a coordination meeting with EDH and USAID on 10 May 2013.

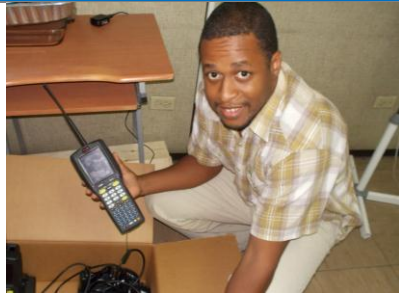
The list of tools and equipment was refined and accepted by the EDH Commercial and Technical Departments. An ADS 548 review was presented to USAID and approved for the IT procurement. The preparation and submission of RFQ and RFP documents began in early June 2013.

Tetra Tech coordinated bidders' responses and answered their questions. The following list represents all the RFPs and RFQs presented in June 2013; copies were provided to EDH and USAID for their records.

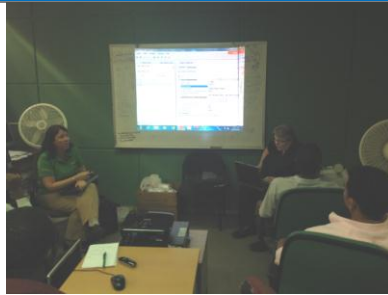
- US0389-RFP-2013-01 – Field Collection System (FCS) Meter Reading System
- US0389-RFQ-2013-02 – Computer Accessories and Software
- US0389-RFP-2013-03 – Power Distribution Analysis Software
- US0389-RFP-2013-04 – AutoCAD
- US0389-RFQ-2013-05 – Ricoh Aficio MP7500 Photocopier
- US0389-RFQ-2013-06 – OCE Printers and Scanners
- US0389-RFQ-2013-07 – Identification Equipment and Software
- US0389-RFQ-2013-08 & 09 – Protective Equipment and Field Tools.

US0389-RFP-2013-01 : Handheld Units & Software for RF meters -Itron FCS System	
Servers	COMPLETED – Servers were delivered to EDH on 8 November and are effectively operational
Handhelds	PILOT COMPLETED – Handhelds were delivered to EDH on 16 December and distributed in the Petion Ville commercial agency. The remaining handhelds are being operationalized with the deployment of the RF metering program in the commercial agencies of the metropolitan zone
FCS and CMS integration	COMPLETED – INDRA resolved outstanding issues with the integration module. The integration module between FCS and CMS was implemented and tested successfully. All pending implementation activities were completed and the system is production ready. A field test was also completed to verify the operations of the FCS system. The field test was conducted with live RF meters. The FCS system is production ready. Itron is to provide a post-production support document for on-going support of the system.
Installation and training	COMPLETED – The team completed the FCS training for EDH meter readers, operators, and IT administrative staff by 28 February. A meeting of Tetra Tech, EDH and Itron was held to review and conclude the FCS program's implementation, training and testing activities.

US0389-RFP-2013-01 : Handheld Units & Software for RF meters -Itron FCS System



Meter reader with hand-held computer



Itron training from 3 to 14 February 2014



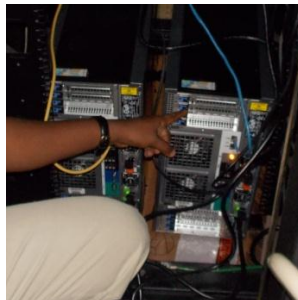
US0389-RFP-2013-02 : Computers Accessories and Software

Cisco 2811 & 2860
 Dell Optiplex 9010
 Dell Precision T1650
 Dell Prof. P2313H
 HP OfficeJet 7500A
 UPS 550VA

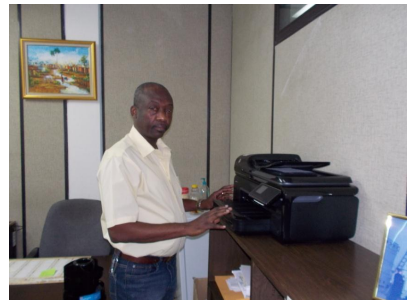
COMPLETED – Computers and screens were delivered to EDH on 30 October. Configuration and installation began on 7 November at the head office (technical, commercial and planning departments) and commercial agencies. The remaining computers and accessories are being operationalized with the deployment of the RF metering program in the commercial agencies of the metropolitan zone.



Large Customer Division
 Use of the Dell Optiplex 9010 desktop



Installed CISCO server



Head Office
 HP OfficeJet 7500A

US0389-RFP-2013-03 : ETAP Power Distribution Software

ETAP power distribution software and training

COMPLETED – This equipment was part of the US0389-RFQ-2013-02. ETAP software was installed in November. The training program ran from 17-23 November and is now complete. Four employees of the Technical Department were trained as trainers. From the database information and using the ETAP software, Tetra Tech and EDH conducted analyses to identify grid bottlenecks.

US0389-RFP-2013-04 : AUTOCAD Software

AUTOCAD electrical & 3D + training

COMPLETED – This equipment was part of the US0389-RFQ-2013-02. AUTOCAD software was installed (downloaded) with the delivery of the software on 18 December. The training program ran from 24 November through 6 December; 13 employees from the technical and planning divisions were trained. The examples provided by EDH helped personalize the training and made it even more beneficial.

US0389-RFP-2013-05 : RICOH Printer

Ricoh high-speed printers 7502S

COMPLETED – These printers were delivered to EDH on 4 December and equipment was delivered to the Commercial Division on 16 December. EDH is responsible for implementing and operationalizing the printers. One printer was installed and works. The other is supposed to be operationalized by EDH as soon as a maintenance company is selected.



The Commercial Department's Ricoh high-speed printer 7502S

US0389-RFP-2013-06 : HP Plotters

Designjet T2300 Post Script

COMPLETED – Plotters were delivered to the EDH premises on 26 November and installed in the Planning and Technical Departments on 18 December.



◀ Planning Department - Designjet T2300 Post Script eMFP Printer Hewlett Packard Printing & Imaging installed

The Network Department ▶ Director inspecting the plotter installed in the Technical Department



US0389-RFP-2013-07 : Security ID Equip – Software

Designjet T2300 Post Script

COMPLETED – Equipment was delivered to the EDH IT Division on 8 November. EDH is responsible for implementing and operationalizing the software, working closely with the Administrative Department. The distribution of printed ID cards is in progress in EDH departments. Full completion is expected in April 2014.

US0389-RFP-2013-08 & 9 : Security ID Equip - Software

Protective Equipment - tools

COMPLETED – Equipment and tools were delivered to the EDH premises on 26 November and 12 December. They were distributed to EDH technical and commercial units in December and January.



Delivery of commercial and technical tools
The EDH Managing Director gave a speech to thank USAID



Burndy Products, MD7-8 manual crimping tool



▲ Hot Stick Assy - 115V Tester

Technical team in the field ►



10. REVIEW OF THE EDH COMMERCIAL PERFORMANCE

10.1. Values of Performance Indicators before Migration in the CMS

At the request of EDH executives, an important goal was realized: to make performance indicator values official before data is migrated to the new invoicing system.

The values of the indicators and outcomes from the FAB (the old billing system) data were calculated for the month preceding migration to the CMS, as listed below:

- Total metropolitan zone: June 2011
- Port-au-Prince (Waag): October 2011
- Petion Ville: June 2011
- Delmas: October 2011
- Tabarre (Plaine Cul de Sac): October 2011
- Carrefour: November 2011
- Large customers (LV and MV industry tariffs): January 2012
- Municipalities, government and autonomous institutions: January 2012.

The reserved values of the indicators for the metropolitan zone were:

- CRI: 19.1%
- Billing rate: 26.6%
- Collection rate: 71.8%
- Average price of the kWh sold: 18.3 Gourdes
- Inactive customers: 54.8%

10.2. Cash Recovery Index

The latest data available from EDH by the end of the project were for January 2014. At that point, the CRI was 25.0% (25.6% for the metropolitan zone and 23.6% for the provinces). The table below presents the details of the index's values.

January, 2014	Metropolitan zone	Grand Nord	Grand Sud	Centre
CRI	25.6%	18.8%	38.6%	15.5%
Billing rate	43.9%	37.3%	65.4%	47.8%
Collection rate	58.3%	50.3%	59.0%	32.5%

(*) Indicators are calculated on a 12 months period (YTD figures)

The high value of the billing rate observed for the Grand Sud (65.4%) is explained by the erroneous report of negative losses for Jacmel (approximately -14% in January). However, the commercial performance of this semi-autonomous commercial center is questionable.

This CRI was calculated over a period of 12 months (year-to-date figures) according to the formula below and expressed in %:

$$\text{CRI (\%)} = \frac{\text{Amount collected (HTG)} \times \text{energy billed (MWh)} \times 100}{\text{Sales (HTG)} \times \text{energy injected in the network (MWh)}}$$

This indicator is a measure of the effort EDH has committed to increase the collection rate while reducing losses at the same time. A value of 50% means that the amount collected represents 50% of what EDH would have been able to collect if all the energy injected into the network had been billed and paid.

To avoid a premature conclusion, it is necessary to understand the variation in the CRI since May 2011 and the evolution of its two main components: the billing rate and the collection rate.

10.3. Billing Rate and System Losses

The increase in the billing rate is the result of actions taken within the framework of activities to get the FAB and CMS billing systems to work properly, and to reduce non-technical and technical losses. Investments strongly influence the results. The total losses and the billing rate are calculated as follows:

$$\text{Total losses (\%)} = (\text{Einjected} - \text{Ebilled}) / (\text{Einjected}) * 100$$

$$\text{Billing rate (\%)} = \text{Ebilled} / \text{Einjected} * 100$$

- Einjected is the energy injected in the network (GWh)
- Ebilled is the sum of the energy billed to the customers (GWh).

For an energy distribution company, the ratio is calculated over a period of 12 months (using year-to-date figures) – that is, by using the sum of the monthly values for each of the components of the indicator.

During the TMC contract, the implementation of the new billing system (CMS) in the metropolitan zone achieved measurable improvement. Other investments (RF metering program and remote reading metering project) were only realized during the final months of the TMC.

Tetra Tech completed the field collection system (FCS) training of EDH meter readers, operators, and IT administrative staff three weeks before the end of the TMC contract (the USAID-financed loss reduction equipment was procured at the end of the contract). INDRA resolved the outstanding integration module issues. The integration module between the FCS and CMS was implemented and tested successfully. All pending implementation activities were completed and the system is now production ready. A field test was also completed to verify the operations of the FCS system; it was conducted using live RF meters. Tetra Tech, EDH and Itron met to review and conclude the FCS program's implementation, training and testing

activities. Itron provided a post-production support document for on-going support of the system. The FCS system was production ready on 12 February 2013.

Data were migrated to the new CMS in the metropolitan zone between July 2011 and February 2012. The billing rate did not change significantly during this period as adjustments were being made in the implementation of the CMS. This phenomenon has been observed in comparable countries that changed their billing systems.

The billing rate was 26.4% in May 2011 and 29.7% (+3.3%) at the end of the data migration in February 2012. Only when the problems inherent to the implementation of the CMS were solved did the billing rate increase, from 29.7% to 38.8% (+9.1%) at the end of the 2011-2012 fiscal exercise, reaching 43.9% in January 2014.

The increase in the billing rate during the TMC contract was 17.5% for the metropolitan zone. This implies a 17.5% reduction in non-technical losses.

During the TMC contract, the former billing system (FAB) was maintained in provinces, with the known problems remaining. These include the transfer of the active customers disconnected for outstanding payments (an inactive customer is no longer billed, but can reconnect on his/her own). The billing rate in the provinces increased only by 7.9%. The deployment of the CMS in the provinces will bring more discipline to billing and provide a more effective way to disconnect customers for outstanding payments.

10.4. Collection Rate

The collection rate is defined in the formula below:

Collection rate (%) = amount paid during the month (M) / amount billed during the month M-1

This ratio is expressed as a percentage; collection and the amount billed (sales) is expressed in Gourdes (HTG). It takes into account only bills for electric energy use and excludes quite different payments (new connections, technical interventions, etc.). It covers all the LV and MV customers. The collection rate includes the payment of the current bills and the collection of arrears.

The successive Action Plans described the actions EDH had to implement to achieve an increase in the CRI, taking into account investments already financed and other investments for which financing was not yet available. The situation was complicated by the long delays of suppliers on major projects (CMS billing system, remote meter installation and RF meter installation), which meant that at best, EDH could only partially achieve the expected results.

With the October 2012 signing of the MoU by the Ministry of Finance, Ministry of Public Works, Transportation and Communications, and EDH, a road map was established for EDH's financial self-sufficiency by 2016.

Following the signature of the MoU, the Ministry of Economy and Finance, in its letter of 29 January 2013, informed EDH of its intention not to pay any more arrears or the electricity bills of certain public institutions, in particular, those of the communities (local governments). Thus, payments by the government were 276.5 million HTG during fiscal year 2012-2013, compared with almost 1,450 million HTG during the previous fiscal year (a decrease of 1,173.5 million HTG).

This decision led to a very important increase in the arrears of the municipalities and no measures were formalized to guarantee their payment. Thus, the corresponding arrears reached 1,705 million HTG in January 2014 (those of the autonomous institutions – 194 million HTG – should also be added to this amount). The arrears of the central administration (Ministries) were 121.9 million HTG at the end of January 2014.

The amount collected would surpass 5,600 million HTG if these arrears had been paid. Thus, the increase in the annual amount of collections would have been more than 2,900 million HTG (\$67 million) compared to the 2,661 million HTG collected in May 2011.

10.5. Number of Active Customers

“Active customer” is defined here in contrast to an “inactive customer.”¹⁵ A legal active customer is one who is properly connected to the EDH network and for whom a bill is produced. The number of active customers could increase as new customers of EDH are connected, consumers who had a fraudulent link to the network but opted to become a legal customer of EDH, and customers who for diverse reasons were not previously enumerated in the billing system.

The number of active customers of EDH was 240,444 at the end of January 2014 (136,139 in the metropolitan zone and 104,305 in the provinces). This represents an increase of 59,228 from May 2011, when EDH had 181,216 customers, as shown in Table 6 below.

¹⁵ In the case of EDH, when a customer’s contract was terminated at the customer’s initiative, there was transfer in the file of the inactive customers of the former billing system. In addition, customers disconnected for outstanding payments were transferred to the inactive customers file in the database and thus were no longer billed. In the new CMS billing system, the reactivation of the customers is the object of a particular procedure bound to the management of disconnections in the outstanding payments module. There are no inactive customers in the CMS, only cancelled customers.

10.6. Summary of the TMC results

The table below presents a summary of the results reached during the two periods covering the TMC. It confirms the following points:

- The CRI reached 33.2% in October 2012 then decreased to 25.0% in January 2014
- System losses decreased continually, from 70.3% to 55.1% over this period
- The collection rate reached 86.0% in October 2012 then was subject to the non-payments of communities and autonomous customers, and fell to 55.8%
- The number of active customers increased regularly, reaching 240,444.

	May, 2011	October, 2012	January, 2014
CRI total EDH	18.9%	33.2%	25.0%
Port au Prince	19.0%	34.2%	25.6%
System losses total EDH	70.3%	61.4%	55.1%
Billing rate EDH	29.7%	38.6%	44.9%
Collection rate EDH	63.5%	86.0%	55.8%
Revenue /year (million HTG)	2,661	5,032	3,599 (*)
Revenue /year (million USD)	61.9	117.0	83.7 (*)
Number of active customers	181,216	204,255	240,444

* Arrears on 31 December 2014: Central administration: 122 million HTG (\$2.8 million), municipalities: 1,705 million HTG (\$39.7 million), and autonomous institutions: 194 million HTG (\$4.5 million).

Table 1 - EDH: CRI (%) between May, 2011 and January, 2014

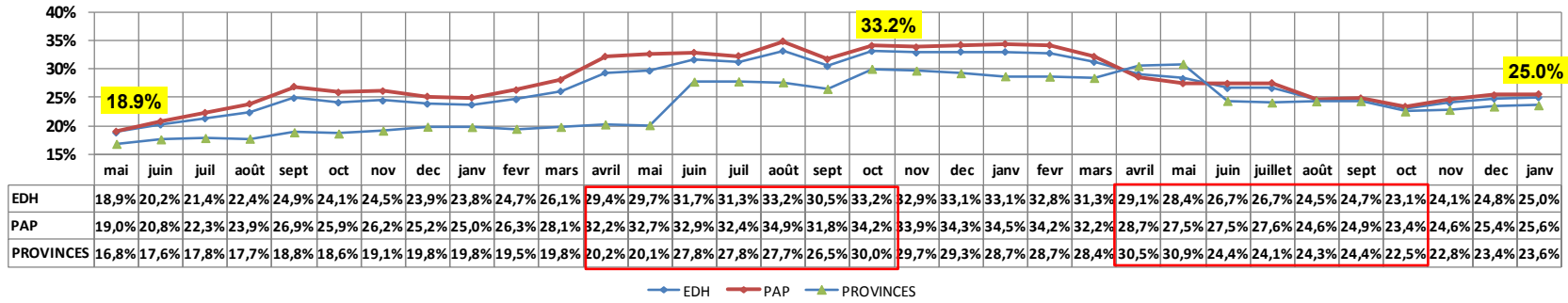


Table 2 - EDH: Billing rate between May, 2011 and January, 2014

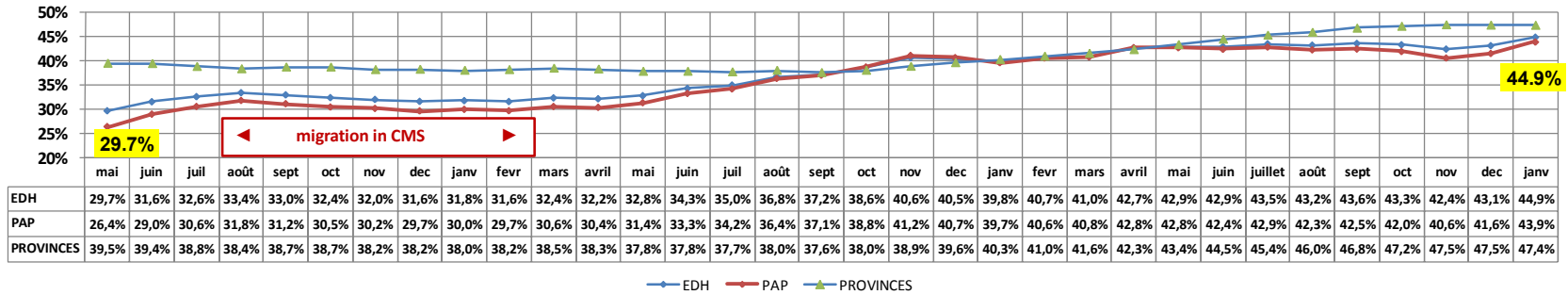


Table 3 - EDH: System losses between May, 2011 and January, 2014

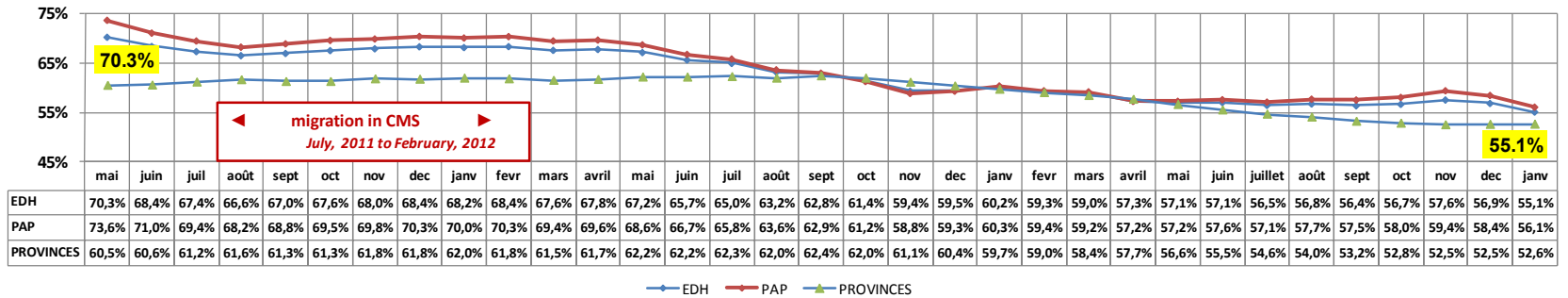


Table 4 - EDH: Collection rate between May, 2011 and January, 2014

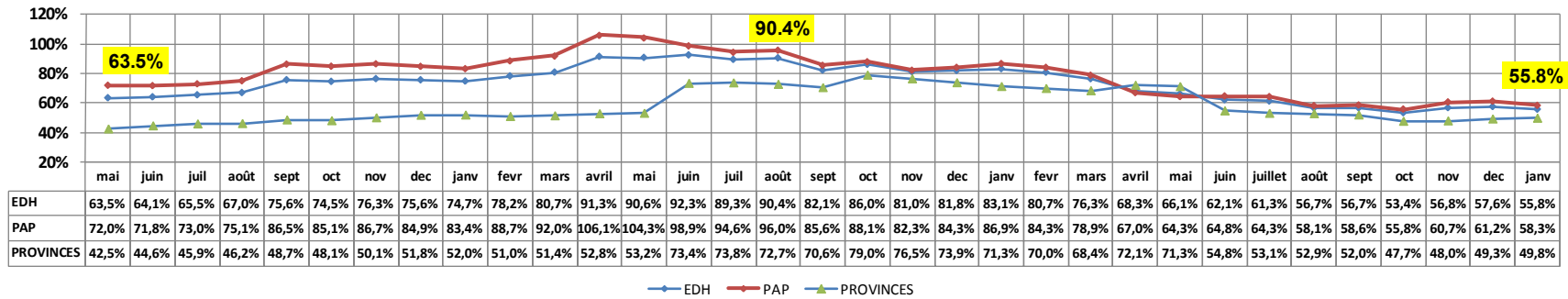
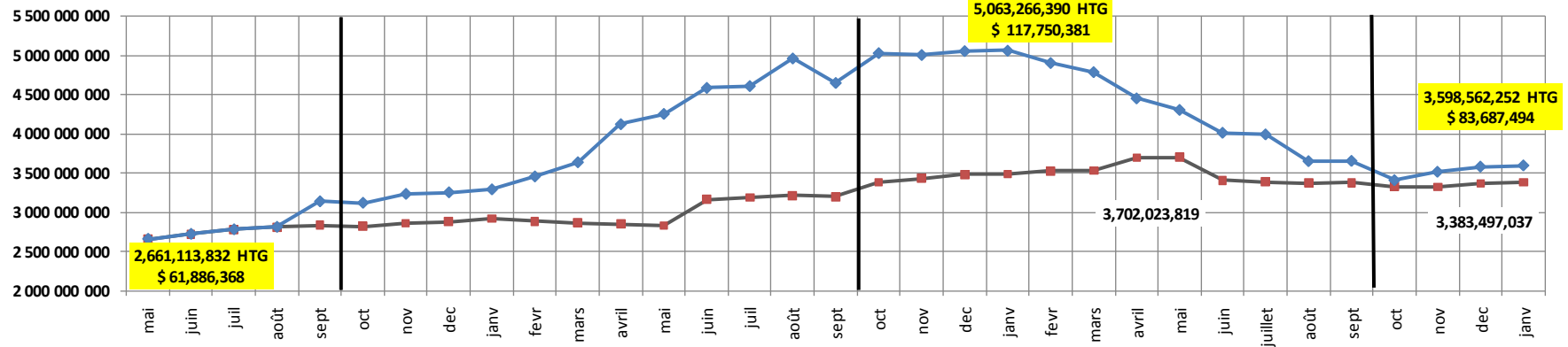


Table 5 - EDH: YTD Collection between May, 2011 and January, 2014



Payments by Govt
(million HTG)

≈ 371 (09-11/11) ≈ 1,000 (02-05/12) ≈ 329 (08/12) ≈ 276 (10/12)

≈ 136 (11/13)
payment of arrears
as at 30/09/13

11. LESSONS LEARNED DURING THE HAITI TMC CONTRACT

11.1. Commercial

- **Lessons Learned**

Even though EDH managers now bear all responsibility for management improvements, power sharing arrangements were not implemented

As noted above, the management contract was re-named the Operations Improvement Agreement (OIA) to avoid confusion with the management contract defined under the Council for Modernization of Public Enterprises (*Conseil de Modernisation des Entreprises Publiques* - CMEP) at the beginning of Tetra Tech's contract.

The role of Tetra Tech quickly became one of supplying advice and expertise, and it was limited to that of traditional technical support. While its technical support would allow EDH to realize improvements in its technical and commercial performance, it did not allow for a plan to ensure an evolution of EDH policy or corporate culture.

A preferable course would have been to execute the scheme for the sharing of responsibilities between parties, as designed in the OIA. The complexity of the project perhaps explains why EDH was overly careful in addressing important changes and its wish to maintain control over all decisions and the scope of the management contract.

EDH should not be too ambitious about what can be achieved through technical assistance (TA) projects and the time frame required to achieve the expected results

It takes months to build consensus among the EDH leaders and TA experts and build skilled resources through on-the-job training. Strategies, procedures, and implementation were realized at a late stage of the project, and the timeline for the project's phases 3 and 4 was not sufficient to reach all expectations for EDH's improved performance.

This was exacerbated by the time needed to implement the WB-funded CMS System and to complete the necessary USAID-funded procurements. Because the supplier of the World Bank/IDB-funded remote metering program was late in implementing the project, EDH had to limit the number of meters installed in a realistic way during the last three months of the contract. Also, the installation of RF meters was slated to begin and the Customer Management System had not yet implemented the interface to bill customers. In addition, the contract modification to allow Tetra Tech to procure and supply loss reduction equipment and tools agreed to by EDH was provided only at the end of the project.

A TA project can provide useful technical, intellectual, global best practice support, and capacity building, but it is not in a position to accelerate the organizational changes needed

The complexity of administrative process during phases 3 and 4 of Tetra Tech's contract extended the time taken to make decisions and obtain clearances on major changes proposed. For example, improvements in meter reading and bill distribution were a priority because bills were distributed to only 32% of the meters to be read in September 2012. Although this problem was lessened in December 2012, EDH has not yet been able to implement the corrective actions needed. It was only at the end of phase 4 that EDH took into account the need to modify the organization's commercial plan for 2013-2014.

In the end, phases 3 and 4 of the contract period were too short. Even if EDH's operational leaders had been willing to take full advantage of the Tetra Tech's expertise, it would have been unrealistic to expect great changes to the management of EDH's operational activities within such a short timeframe.

The evaluation of TA projects is complex; during the design of project monitoring, it is difficult to foresee how outputs will be realized and how managers will react to the recommendations

Project monitoring indicators should be selected carefully and be objectively measurable. However, for a project aiming to develop the capacity of a specific beneficiary group, the degree of improved capacity is difficult to monitor unless it is specified in detail. Subjective evaluation beyond the indicators could also be necessary to evaluate achievements in case the originally selected indicators do not fit.

For example, improving EDH's skills in managing major customers and professionalizing the employees concerned is not easily translated in the calculation of the cash recovery index or the number of new active customers. Indeed, the real efforts undertaken by the EDH commercial staff to implement commercial actions in the private sector were offset by the large increase in the collection arrears of the public institutions, entailing a reduction in the collection rate and thus in the CRI.

▪ Recommendations

Emergency Plan

EDH's structure is still top-down and not adapted to the modern imperatives of good management:

- Its decision-making process is cumbersome and complex
- An integrated information management system is still being developed
- Internal controls are ineffective
- Staff productivity is low.

Important knowledge gaps, even for basic jobs, remain. Many EDH staff do not have the necessary skills to run the utility's basic day-to-day activities, and of course improvement projects represent an even greater challenge than normal course of business.

In addition to these internal problems, the company's external environment is fraught with difficulties:

- The distribution network is in poor condition
- Cost-reflective electricity tariffs have not been adopted
- Communities and autonomous institutions do not pay for their electricity consumption
- There is outside interference in the management of the company, not only at the level of the GoH but also at the level of the President
- There are multiple international donors, each with its own voice, which command the attention of the government and EDH Director General
- There are various potential investors coming to Haiti, each with its own pet project (coal, wind, solar, municipal solid waste, etc.), which also occupy the attention of the government and EDH Director General
- The general population makes illegal connections, depriving EDH of revenues.

These problems have several consequences, one of which is a financial situation characterized by an unbalanced financial structure, excessive deficits, and untenable debts.

The current situation at EDH has necessitated the rehabilitation of the distribution networks and the restructuring of the company to allow the utility to improve its efficiency and contribute to Haiti's economy.

An emergency plan should thus be articulated around six main themes:

1. **Strengthening EDH's governance**, particularly its executive management and the key functions of the company. To accomplish this, the company's executives must improve the EDH organization and its management so as to make it a real commercial company, particularly in the areas where its performance is considered critical.
2. **Continuing the rehabilitation of infrastructure** through the implementation of the priority investment plan. This will contribute to increasing collected revenue, which could in turn be allocated to financing investments in other EDH networks, in particular, the isolated areas.
3. **Progressively decentralizing and empowering sectors of activity management.** EDH is a vertically integrated company whose decision-making powers are too centralized; this adds to the complexity and slow pace of operations on the ground. A progressive decentralization would delegate to each sectors of activity (generation, T&D networks, commercial) all the necessary powers for autonomous management (technical, operational, financial and human resources). This initiative would contribute to the progressive, positive evolution of EDH to a commercial company.
4. **Implementing a new policy to manage the consumption of communities and autonomous customers** will have an important impact on EDH's financial viability. These collections represent almost 20% of the volume of electrical energy delivered to the network. The implementation of a new policy would rationalize consumption while putting a halt to numerous initiatives to fight the payment of arrears, thus contributing to an improvement in the collection rate.
5. **Rationalizing the utility's structure and staff training for key jobs.** A progressive decentralization should be accompanied by an internal reorganization of EDH

departments. This action implies a rationalization of the company's structure and its human resources management, the hiring of new staff, and the institutionalization of a good training department at EDH, with trainers and necessary equipment.

6. **Implementing public-private partnerships.** EDH has already experimented with public-private partnerships, essentially to increase its generation capacity, with mixed results. EDH also committed to creating two semi-autonomous electric distribution utilities in Jacmel and Les Cayes to bring these two local utilities to full autonomy with a well-established legal framework. The two concerns may now be open to the participation of a private partner.

There is more than one approach for restructuring a public company. A study should be conducted to explore other possibilities in other sectors of EDH activities. For example, public-private partnership pilots could be set up under services contracts, in particular in the network and commercial sectors, to improve public electricity services.

Management Contract of EDH

To support improvements at EDH, the Law on the Modernization of Public Enterprises proposes three possible paths to modernization through the CMEP:

- *Modernization by Management Contract.* Here, the State transfers the management of a state-owned company to a private company for a defined period of time, and pays management fees.
- *Modernization by Concession.* In this scenario, the State grants to the concessionaire the right to take over the company for a defined period of time, with the concessionaire assuming the responsibility for investments that remain under GoH ownership, and pays concession fees.
- *Modernization by Capitalization.* Here, the State remains the shareholder of a joint stock company, with the private investor paying in cash for the acquisition of a fraction of the shares; the proceeds are used to finance investments.

To be successful, the contract must address the immediate operational and financial challenges EDH faces while contributing to the strategic objectives for the sector. It must be structured by taking into account the priorities of EDH.

The management contract operator would be primarily responsible for the day-to-day management of EDH and the realization of the objectives defined in its business plan. For that purpose, the operator would supply a semi-permanent team of several persons to occupy key management positions, to be agreed with the GoH through the CMEP. The experts would be given full authority and responsibility for all decisions, including hiring and firing of staff. Their mission would be to prepare their counterparts so they are capable of resuming their posts at the end of the management contract.

Within the framework of an international call for tenders, the State would also recruit an auditor of the contract; the auditor must have the required skills, experience and independence to control

the contract's execution and conciliation between the parties. The auditor would report to a steering committee that monitors the state of progress of the contract.

The operator's remuneration could include fixed and incentive components. The former would allow the operator to cover its costs of services, while the incentive portion would be paid according to the performance achieved, calculated through a formula balancing the performance indicators of the operator. The auditor would be in charge of reporting on the results achieved for each of the objectives that govern any incentive-based portions of the remuneration of the MC operator.

However, it should be noted that the GoH rejected the management contract concept during the development of the USAID-funded TMC, citing exclusions under Haitian law, under which public enterprises must be managed by Haitian entities.

Services Contract of EDH

Another form of management contract (this one for selected services, such as "revenue cycle management") could be executed under the following conditions:

- The executive management of EDH remains responsible for coordinating the project and for the success of a performance contract signed with the State
- Management wishes to develop the corporate culture and the organization of EDH.

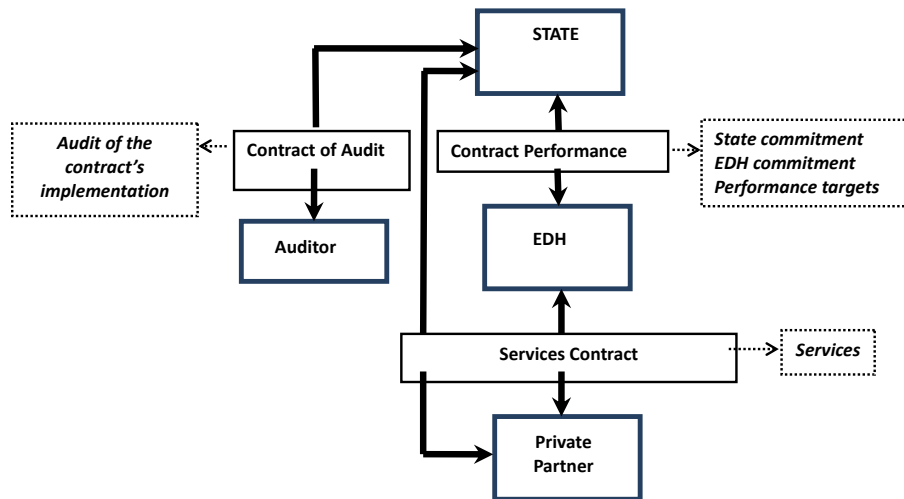
The services contract(s) would encompass three instruments:

- 1) The commitments signed between the State and EDH in the performance contract
- 2) The strategic support EDH receives from international experts
- 3) A technical and financial audit, which would be used as a tool for controlling the execution of the performance contract.

The services contract would seek to strengthen the capacities of EDH so as to give them the means to realize all the services planned by under the performance contract.

The proposed strategic support under such a services contract implies that a "strategic alliance" is effective between the various partners of the project, as regards common objectives and the sharing of resources and risks. Such support will only be effective if the organization and the actions proposed by the services contract's operator are accepted and implemented by EDH.

Another objective of the services contract would be to meet EDH's immediate operational and financial challenges while contributing to the strategic objectives of the electricity sector. The performance contract between the GoH and EDH Board would be used as a tool to monitor the actions taken within the framework of the emergency plan and for its performance appraisal.



The performance contract defines: 1) the commitments of the GoH and those of EDH, 2) performance indicators and objectives, and 3) the modalities of follow-up of the performance contract. It also specifies the mutual obligations of GoH and EDH.

The services contract is the tool for the follow-up of the technical support to EDH and concerns the assistance the operator gives to its EDH counterparts. The coordination of the project's key operational aspects is assured at the highest level of the company.

Experience shows that a co-management aimed at improving both technical performance and the management of the company is impractical because of the reluctance to share daily management responsibilities with the contracting party. On the other hand, a contract under which management is delegated allows the counterpart to be directly involved in the implementation of decisions. In addition, it facilitates the transfer of knowledge.

Support to the CMEP to Prepare the Management Contract and/or the Services Contract

The CMEP is a structure implemented by the Haitian government to lead the policy on reforming public enterprises. The CMEP is in charge of proposing strategies for global reforms, sectoral and company reform strategies, and new legal, statutory and institutional frameworks for governing public enterprises. It is also to assist institutions and public services in the implementation of the reform process.

To implement the State's intention to disengage from trade services, EDH, like other public enterprises, must launch a process to redefine its mission and modes of intervention, the modernization of its structures, and the strengthening of its performance, which will be measured in terms of customer expectations and satisfaction.

If the CMEP elects to implement a management or services contract, then for either type of contract to be effective, several conditions must be met:

- EDH accepts the principle of a management contract or a services contract
- The GoH confirms its will to reform EDH and resolve the problems at EDH that are related to the government
- The concerned authorities also first decide on the path of reform for the electricity sector, including the regulatory function and the possible restructuring of EDH.

Requests for proposals for the service to be provided under either contract type must be aligned with the competitive bidding rules of the international financial institutions (e.g., World Bank, IDB).

- Donors will supply funds needed to finance the management or services contract
- CMEP will prepare the specifications and launch of the call for tenders.

The following activities must be completed:

- Examine the diverse options for restructuring EDH, comparing the advantages and disadvantages of various restructuring options under the management or services contract (or contracts)
- Present project specifications, which could be modified during discussions between the CMEP and the companies interested within the framework of a call for tenders
- Draft the call for tenders for the management or services contract(s); it would include the initial terms, which can be amended during discussions that take place within the framework of the call for tenders.
- Determine the field of pre-qualified companies through an “expression of interest” stage
- Contact qualified companies under a formal consultative process with CMEP to define the operator's role.
- Ensure effective competition during the call for tenders.

11.2. Technical

Utility Technical Requirements and Network Planning

The panoply of technical studies noted in this report has been confounded by various government directives, creating confusion among EDH staff, and slowed progress. Many studies and the involvement of several donors and government agencies with different ideas have had a detrimental effect on the existing situation.

A better-integrated system should be adopted to ensure that EDH’s needs and projects are better defined to alleviate duplication and unnecessary complexity.

In a utility with a deficit as high as that of EDH, network growth / extension should not be supported without first fixing fundamentals: the hemorrhaging financial situation and conditions for viable and sustainable network growth. Increasing the number of customers without fixing the situation will only compound the problem. Offering more hours of electricity was a political goal and has also contributed to increasing the deficit of the company to a point where EDH/GoH cannot absorb the economic outcome. The IPPs have shut down on occasion as a result, endangering the economic and social future of EDH and Haiti in general.

Human Resource Availability

The availability of expertise in a utility becomes more difficult to obtain when the utility is not financially viable. When surviving from month to month is a major concern, expertise is not developed within the company, the company cannot afford to attract good talent, and the most valuable staff tend to move towards better prospects.

EDH has lost many valuable staff to the private sector in the past several years. It has tried, unsuccessfully, to hire different managers, engineers and other professionals to improve its situation. Its current staff capacity is limited and they have difficulty obtaining good results in the use of donors' money or equipment. Even when some budget was made available, the staff did not know how plan projects and then execute them.

The dysfunctional organization of the utility has opened many doors to corruption within EDH departments. We believe that an anti-corruption unit is needed – that will file charges, which will then be followed through as legal court cases with the government's support. Of course it is known there is corruption, and so the lack of trust within the organization has brought on other problems as well, such as specifying so many controls for procurements that the process is now so complicated and time-consuming that more than five to seven months are required to make most materials available, including the crucial parts needed for operations or vehicles to fight illegal connections. In some cases, materials finally received after the long drawn out process did not meet the initial specifications, rendering them obsolete or substandard at best.

Project Integration

Project planning and integration has been a major concern and it has taken a very long time for EDH staff to begin making contributions to some of the projects (such as new substations). It was not until the contractor started making physical installations or changes that the EDH staff began to participate. Even though Tetra Tech was not installing the substations, it had to take most of the technical decisions on the substations and present solutions to EDH for discussion and agreement. After the process was initiated, EDH joined and contributed very positively to the achievement of the project within the time frame, which was much appreciated by all involved parties. In addition, much of the contractor's requests for help or support from EDH were met on time, which has helped to preserve good relations.

On a general note, all projects, without exception, should include a professional project manager, and all vendors should be bound under a support or maintenance contract, and provide proper training to ensure continuity. The delivery of crucial spare parts is also essential, as attested by the amount of materials provided by donors that are simply sitting in storage until spare parts can be located and purchased.

11.3. Planning

A combination of governance and management failings has led to EDH's poor performance, and many of these relate to the planning function. The principal problems include:

- *Lack of a legal and regulatory framework.* The power sector operates without rules or required performance criteria other than a few general directives contained in the EDH charter decree. In particular, because there are no explicit criteria for setting tariffs, this is left implicitly to EDH, which consults informally with the government on tariffs; unfortunately the President himself actually has the final say on tariff questions. Normally, tariffs and regulatory affairs are a key planning function, but EDH does not address this.

- *The government's roles as policy maker, owner, and customer of EDH are often in conflict, leading to political interference and the blurring of lines between the finances of EDH and the government budget. This tends to distort EDH's incentives and accountability, and in turn, the planning function.*
- Lack of institutional capacity to put sector development plans in place.
- Weak corporate governance standards at EDH.
- Lack of transparency and competition regarding private sector participation, and an inability in some cases to attract capable and responsible companies for tenders run by the planning function.
- An overly intrusive GoH approach towards the management of public utilities like EDH, which impacts planning.
- Lack of resources and strategy to provide electricity services to rural areas, which makes planning for these areas much more difficult.
- A weak human resource base in the planning function.

Human Resource Base

Many of EDH's most critical challenges are related to its weak human resource base. Shortfalls occur at all levels of the organization and in all aspects of the knowledge base (e.g., leadership, management skills, technical and other specialized skills, such as project management, configuration management, planning, control and analysis). In addition, some key functions are not fully staffed (e.g., planning, administration).

Overall, the human resource situation has caused continuous, severe delays in implementing corrective actions, process improvements, internal controls, or the ability to obtain basic information. It has also required tremendous effort to ensure follow up, to address problems that should have been managed internally, or simply to gain a basic understanding of a problematic situation.

The ability to replace unskilled employees seems to be hampered by labor unions or political pressures (this is not a transparent process) and upper management positions require a political nomination. On the other hand, EDH's difficulty in attracting and hiring talented management staff is often directly related to the utility's inability to offer attractive compensation packages.

The Director General has recently made significant efforts to find external funding to increase salaries and draw more applicants to key positions. If successful, this, combined with strong technical support over a period of time, will improve EDH's personnel situation.

Legal and Regulatory Framework

Tetra Tech's mandate did not include addressing legal, regulatory, or other governmental issues, making it difficult to put forward specific observations and recommendations in this key area. Thus, sector planning was outside its scope.

That said, the Law for the Modernization of Public Enterprises was to provide a vehicle for introducing private sector participation and creating a CMEP commission, which would be authorized to reform public enterprises and introduce private sector participation through management contracts, concession contracts, or the capitalization of public companies. However, at least over the last three years, CMEP has not taken any initiatives towards modernizing EDH.

One sector-level planning effort was a joint USAID-IFC-DOS analysis in July 2012, which recommended a performance-based management contract as the most appropriate solution for restructuring EDH. However, this report seems to have become “buried” by GoH.

At least from a short-term perspective, improving EDH management and technical capabilities through hiring better talent, coupled with technical support, would produce noticeable results, and serve as a base for a larger-scale modernization effort through a management contract.

Network Planning

Despite some investments in specific fields, Haiti’s electrical network is suffering from a lack of investment over time and poor infrastructure maintenance. Major planning efforts should be focused on preparing a realistic network expansion plan for the next 20 to 30 years. This plan would serve as the base for prioritizing all government and donor investments, and the development of three- to five-year investment plans. Several studies are available for EDH to draw from, including the January 2012 Parsons report (“Least-Cost Expansion Plan for a Designated Area of Economic Development and Growth”), the July 2006 “Atlas Éolien d’Haïti” study, and some work under the TMC. Without proper global network planning, the investments will be subject to various priorities and interests, and no optimization/integration will be possible.

Metering Projects

Regarding EDH’s current investments in metering, we recommend pursuing the implementation of remote metering for large customers as well as the deployment of radio frequency (RF, remote-read) metering, not only for commercial customers but also (over time) for residential customers. We recommend the launch of a pre-paid communal meter pilot project as a trial for high-density populations (shantytowns) and rural electrification. The lessons learned from the remote metering project should be incorporated into the second phase request for quotes, funded under the World Bank (the PREPSEL Program).

Similar recommendations would apply to the network rehabilitation projects, which are introducing RF meters in Port-au-Prince. The first three circuits funded by the IDB (32,000 meters) should be followed by a second phase for the remaining circuits (140,000+ meters). As a key recommendation, going forward, all major donors’ investments should also include professional project management as part of the project cost. It has been widely recognized that EDH does not have this level of knowledge in their organization. The continuation of the meter replacements and ensuring compliance with new standards will greatly improve EDH’s cash recovery index. It will also eliminate manual readings and the re-keying of data into the billing systems, therefore reducing errors, improving invoice quality, and providing control over illicit consumption. The pre-payment meter pilot project should be launched to validate the technology, operational processes, and acceptance of the Haitian population.

Program and Project Managers

Regarding the implementation of adequate investment management, including benefits realization, we recommend two initiatives. The first is to continue with the implementation of a Program Management Office at EDH, including the development of local project documentation, and the deployment of tracking tools (such as Microsoft Project). The second is to ensure that all major projects are given funding for experienced professional project managers; for larger projects the funding would also support a schedule / cost manager.

11.4. Information Technology

Although donors have invested substantial sums in new technology for systems such as the customer management system, resource management system, and outage management system, these projects have been chronically underperforming and even failing. Tetra Tech's analysis of the IT situation at EDH is described below.

Information Technology and Communications

EDH's information technology systems and infrastructure are not capable of supporting the utility's distribution, commercial and corporate functions such as human resources, accounting and finance. EDH lacks both the IT infrastructure and systems needed to run these functions and their operation, including:

- *Reliable data center facilities* – The EDH data center is not even tier 1, which is the absolute minimum for a functional data center. The existing data center cannot be recovered in case of a catastrophic event or even a failure of its individual components.
- *Reliable wide area network (WAN) and local area network (LAN)* – All EDH connectivity across all locations in Port-Au-Prince is based on internet connections, creating an inefficient, unreliable and insecure WAN infrastructure. The current WAN cannot even support the on-going commercial and distribution operations at locations across the city with intermittent service, reliability, bandwidth and capacity issues. The existing LAN infrastructure in the EDH headquarters is slow and unreliable, and does not support the existing needs within EDH headquarters.
- *IT infrastructure management systems* – EDH currently has no IT infrastructure management systems to support its current IT operations or infrastructure. The lack of such systems makes nearly impossible for the IT Division to detect, resolve or avoid any major issues, and also provides no visibility into the commercial and distribution systems. Any growth in the IT infrastructure or implementation of new business systems will exacerbate the situation due to the lack of required IT infrastructure management systems.
- *End user computing* – EDH also lacks a robust end user computing environment, which affects end user daily operations. The end user computing environment lacks efficient computing systems, service management systems and customer service operations.
- *Disaster recovery* – EDH does not have any disaster recovery capability for its core information technology systems, core IT infrastructure and business IT systems. All the

existing information technology components operate in a single point of failure mode. Tape backup exists for only specific data, and has never been tested. As new distribution and commercial systems are introduced, the lack of disaster recovery exposes EDH to significant loss of revenue, loss of critical business and operational data, and failure of commercial and distribution operations.

Besides the above-mentioned IT components, the EDH Information Technology Department does not have skilled IT staff to design, build and run the IT operations, systems and infrastructure. Besides the support of core IT functions, the staff also lacks the skillsets needed to support the commercial and distribution technology systems. There is a severe disconnect between IT and the rest of EDH's business units. In today's environment, the introduction of any business system requires Information Technology Department involvement and support.

To support the improvement of EDH's commercial and distribution operations, customer service, revenues and reduce losses, the following needs to be accomplished at a minimum:

- A comprehensive IT strategy and roadmap with long- and short-term investment planning
- Significant investment in core IT infrastructure and systems such as network infrastructure (LAN and WAN), datacenter, messaging, storage, security, servers, end user computing, service management, database and disaster recovery
- Significant investment in the EDH technology for commercial, distribution and corporate management systems such as metering systems, CRM, asset management, finance and accounting management, human resources management, and GIS.
- Capacity development of the IT staff, leadership, and organization
- Development and implementation of IT operations, standard operating procedures, and other policies and procedures.

We recommend continuing to focus on the following short-term actions:

- Raise the knowledge levels of EDH staff through hiring and technical support prior to a potentially much larger modernization effort in the future
- Improve program and project management capabilities
- Focus on metering projects in order to increase the overall cash recovery index
- Mount a much larger planning initiative, focusing on the preparation a network evolution plan
- Invest in EDH communications infrastructure and an EDH IT team.

ANNEX: ADDITIONAL PHOTOGRAPHS

The photographs contained here are primarily related to the procurement of loss reduction equipment.



Shipment 6a – Inspection at EDH premises
Network Director, Tetra Tech COP and the assistant



Tetra Tech team in charge of deliveries receipt, inspection
and distribution of equipment



Shipment 3b - US0389-RFQ-2013-08 & US0389-RFQ-2013-09 – Commercial & Technical Tools
Delivery of equipment. The EDH Managing Director gave a speech to thank USAID.



Shipment 3b - US0389-RFQ-2013-08 & US0389-RFQ-2013-09 - Commercial Tools
Delivery of 32 ft fiberglass extension ladder w/300 lb load capacity Type IA duty rating to commercial agencies

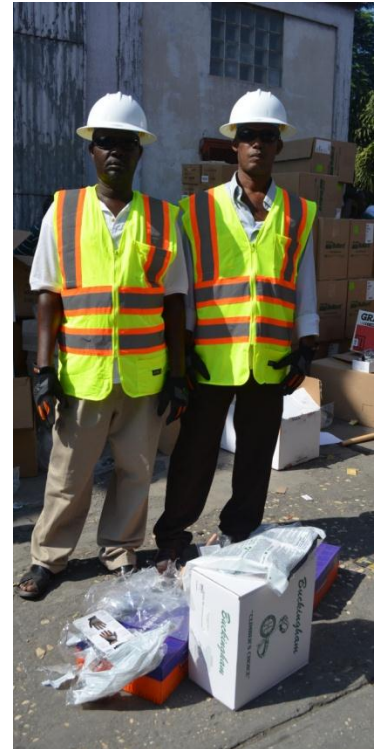




Shipment 3b - US0389-RFQ-2013-08 & US0389-RFQ-2013-09 – Technical Tools
Delivery of equipment to Network Department under EDH security control



Shipment 3A - US0389-RFQ-2013-08 & US0389-RFQ-2013-09 - Commercial & Technical Tools
Burndy Products, MD7-8 manual crimping tool





Shipment 3b - US0389-RFQ-2013-08 & US0389-RFQ-2013-09 – Technical Tools
Delivery and use of equipment to network department



Shipment 3A- US0389-RFQ-2013-08 & US0389-RFQ-2013-09 – Technical Department
Safety work boots ready for distribution





Shipment 3a,3b,3c - US0389-RFQ-2013-08 & US0389-RFQ-2013-09
Delivery of equipment to EDH premises



Shipment 5 - Delivery to EDH premises



Shipment 3b - - Commercial tools- Delivery of equipment to commercial agencies



Shipment 6a – Inspection at EDH premises



Shipment 6a – Grounding set



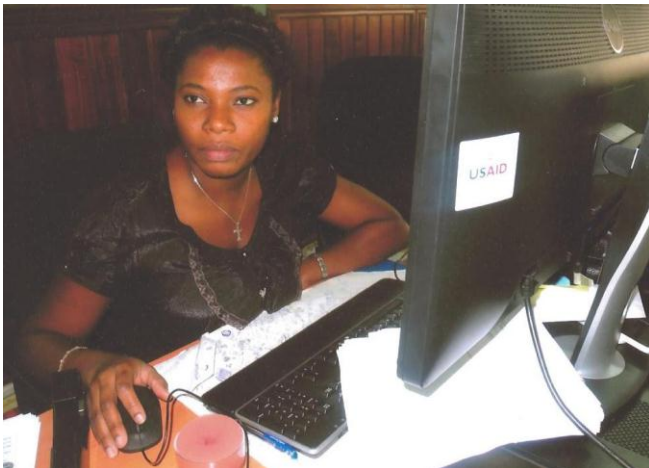
Shipment 6a - Hot Stick Assy - 115V Tester



Shipment 6a – Ground set



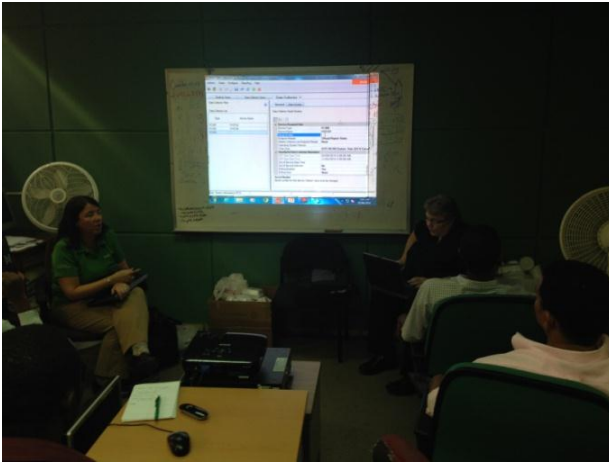
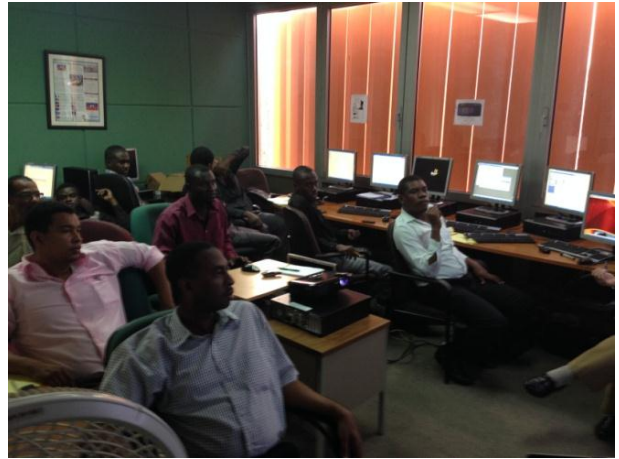
Shipment 6a - Voltage tester, non-contact, tic trace - TIC 300Pro



Shipment 1 - US0389-RFQ-2013-02
Large Customer Division – Use of the Dell Optiplex 9010 Desktop with 3 yrs of Prosupport service



Shipment 1 - US0389-RFQ-2013-02
EDH Deputy Managing Director - HP OfficeJet 7500A Wide-Format All-in-One



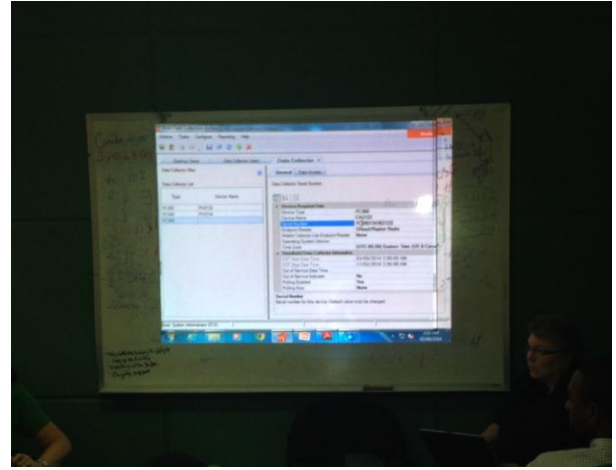
Shipment 7a - US0389-RFQ-2013-01
FCS/SGC interface – delivery of Itron training from 3
February to 14 February 2014

Shipment 4
US0389- RFQ 2013-01 FCS Meter readers
Hand held computer, SRead Radio, including radio
transmitter, BT, English WIN CE - 5.0 Pro, 1 GB SD card.
Touchscreen - Itron Model FC300 Part # FC3-0004-001





EDH Deputy Commercial Director and Tetra Tech Contracts Manager



Shipment 3a - US0389-RFQ-2013-06

Planning Department - Designjet T2300 Post Script eMFP Printer Hewlett Packard Printing & Imaging installed

The Network Department Director inspecting the Designjet T2300 Post Script eMFP Printer Hewlett Packard Printing & Imaging installed



Shipment 4
US0389-RFQ-2013-05 - Commercial Department, Ricoh
High Speed Printer 7502S