

Comprehensive Planning for Electric Power Supply in Haiti – Regulatory, Institutional & Tariff Report

Consulting Services CPSC 142/2013, Canadian Cooperation 065/2013

SUBMITTED TO

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1.0 INTRODUCTION

1.1 DESCRIPTION OF THE REPORT

We present a report with the following items:

- ▶ Regulatory description of the Haitian Market
- ▶ Summary of a model of the electricity sector
- ▶ Summary of a regulatory mechanism proposal
- ▶ Summary of a proposed policy and regulatory framework

1.2 DEFINITIONS

BME: Bureau des mines et de l'énergie

BME – DSE: Diagnostic du secteur de l'énergie

BME – NEP: National Energy Plan 2007-2017

COS: Cost of Service

EDH: Électricité d'Haïti

INO: Independent Network Operator

LNG: Liquefied Natural Gas

MSW: Municipal Solid Waste

MTPTC: Ministère des Travaux Publics, des Transports et des Communications

NGCC: Natural Gas Combined Cycle

PAP: Port-au-Prince

PPA: Power Purchase Agreement

PV: Photovoltaic

ROR: Rate of Return

2.0 REGULATORY DESCRIPTION OF THE HAITIAN MARKET

2.1 DESCRIPTION OF HAITI'S ELECTRICITY MARKET

As in most developing and emerging countries, the Haitian political structure is centralized and keeps a significant control over many sectors of the economy, often affecting the market forces.

The energy sector is no exception. Pricing of electricity, subsidies on petroleum products and, to a different extent, maintaining EDH in a state of financial dependence are all examples of the existing political structure.

This structure has several negative effects:

- ▶ Decisions can be made based on other factors, different from real needs of the sector.
- ▶ The so-called "market" constraints are rarely respected, degenerating into a distortion of the financial reality that the government must assume. Rather the contrary to the principle of "customer user pays" normally applied in the energy sector.
- ▶ The interdependence between the Haitian's financial reality and international markets (the vast majority of the energy produced in Haiti stems from the means of production entirely dependent on fuel imports) create a gulf that becomes very difficult to fill without considering the prospect of a significant rate shock. The impacts on the situation with a government already struggling with major financial problems are virtually impossible to support medium and long term.
- ▶ The direct current institutional structure also involves many levels and affects the performance of the organizations. Indeed, no less than six ministries, two state secretariats and two independent government agencies affect, directly or indirectly, the electric power sector.
 - MTPTC (Responsible ministry)
 - Ministry of Environment (Determines the best development sites)
 - Ministry of Economy and Finance (See the financial needs of EDH in addition to pay some bills directly)
 - Ministries of Trade and Industry (Negotiates fuel purchases for EDH)
 - Ministry of Agriculture, Natural Resources and Rural Development (Analysis EDH's needs of natural resources for future projects)
 - Ministry of Justice and Public Safety (Ensures the maintenance of an adequate legislative framework and support the fight against corruption and fraud)
 - Office of Energy Security (try to find solutions to the energy problems of Haiti)
 - Planning Office (Support EDH in the development of strategic plans)
 - Office of Monetization Program Development Assistance (Performs fuel purchases)
 - Bureau of Mines and Energy (Support EDH in determining the best development sites)

It is clear that multiple levels and stakeholders becomes a factor limiting the effectiveness of EDH. In fact, during our visit, we discovered the difficulty of coordination of these departments in order to optimize the results of EDH mission often returning the ball to someone else who should ideally take it in his backyard.

2.2 AUTHORITY OF THE MINISTRY OF PUBLIC WORKS, TRANSPORT AND COMMUNICATION

The entire Haitian energy sector is under the Ministry of Public Works, Transport and Communications (MTPTC). This department also oversees the Bureau of Mines and Energy, whose function is mainly related to the promotion of research of natural resources that can be exploited commercially, including those related to energy.

In 2012, the government established a secretariat to energy security. However, no new operating budget has been added. According to the stakeholders interviewed, the office of Deputy Minister of Energy Security (BMSE) operates on the already inadequate MTPTC funds.

There is no ministry dedicated exclusively to the energy, even if it is a key sector of the Haitian economy accounting for almost 20% of GDP in 2013.

2.3 ELECTRICITY OF HAÏTI

Traditionally, a single vertically integrated company (production, transmission and distribution), public, holding from the government a monopoly right for regulated operation of the entire power grid in a defined geographic market. This company serves the entire market, with the exception of a few self-producers, for example, large energy companies producing electricity for their own needs. The organization Electricity of Haiti (EDH) is under the direct supervision of MTPTC.

The state company provides production activities:

- ▶ Generation park of 105 MW current installed capacity
- ▶ Utilization factor less than 50% due to network problems, maintenance of equipment or fuel supplies

To better describe the global situation in which EDH operate, we must add the many challenges the government has to face:

- ▶ 60% of the population is unemployed
- ▶ The operating deficit reached 20% of government revenue in 2013, or about U.S. \$200M on a budget of \$1MM
- ▶ Investments in government assets are 25% lower than those required to improve the situation. At the current level, it is not enough to maintain the level of operation of the assets.
- ▶ 60% of tax revenue is estimated not being collected due to different reasons.
- ▶ The government invested in all sectors but with very low budgetary allocation for programs and projects. According to the majors EDH's stakeholders and our own analysis, it would have been better to invest in three or four major projects in relation to government priorities; such decision would really help to put the national economy on a path of stable and steady growth over the medium and long term.

The consequences are already being felt significantly on the financial capacity of the government. Current government policy requires it to pay a monthly subsidy to fill institutionalized gaps in EDH's cash flows.

2.3.1 Impacts of EDH's financial problems

The current institutional sector requires EDH to operate all aspects of the electricity sector without having the means. Indeed, by its current financial structure and its current inability to generate positive cash flows, EDH is unable to assume all responsibilities as national electricity company, namely:

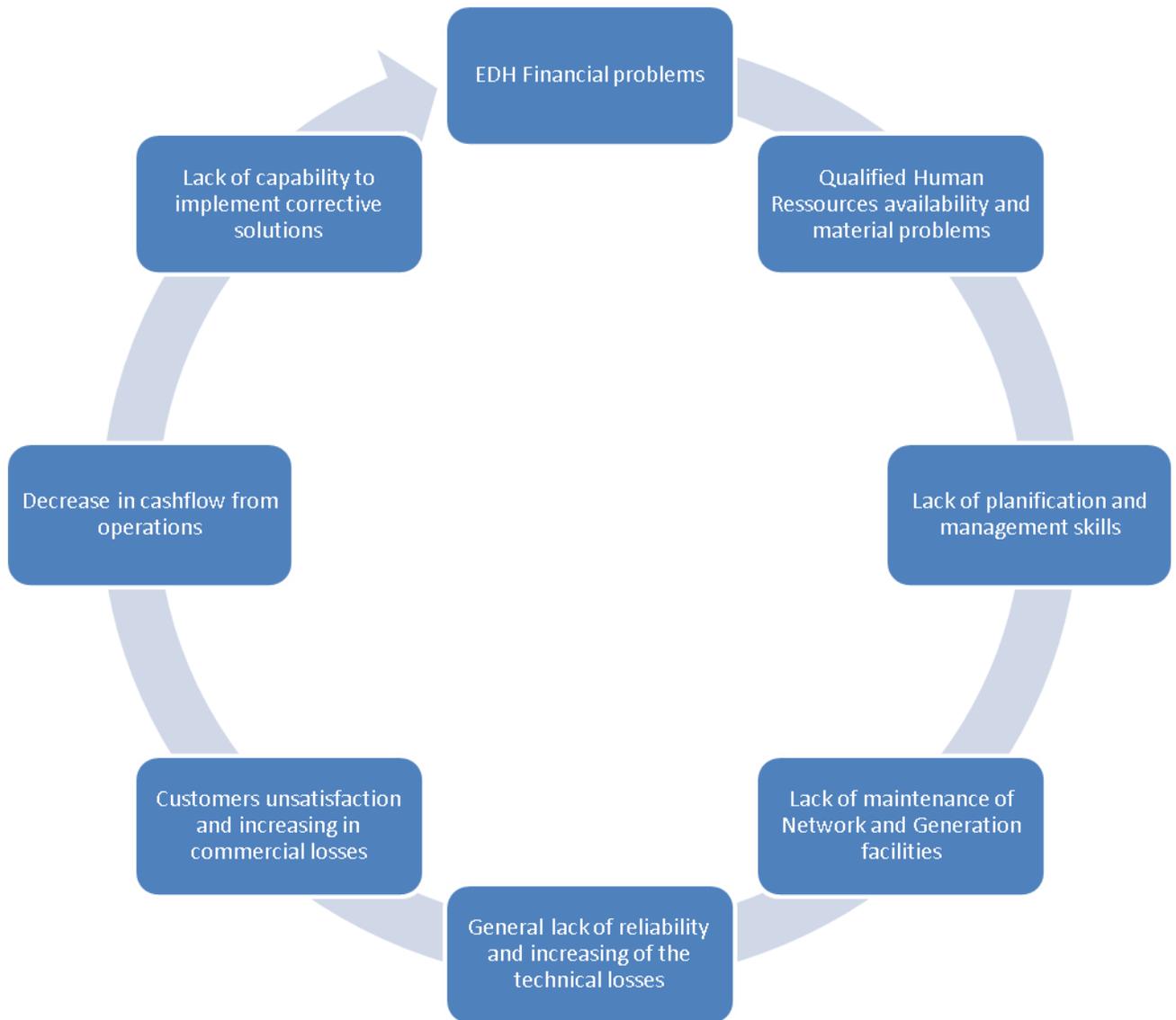
- ▶ Electricity Generation
- ▶ Transportation and Distribution
- ▶ Marketing, Selling and Collection
- ▶ Demand Analysis and Network Planning

This precarious financial situation means to limit the scope of the initiatives of leaders who do not have the resources to correct the situation. Indeed, the current financial problems of the body result in the following insidious effects:

- ▶ Lack of qualified staff
- ▶ When qualified personnel are hired by EDH, they can be quickly attracted by the often more attractive wages offered by the private sector
- ▶ The existing staff is very limited in terms of challenges, the situation of EDH forcing it to merely limit the damage without being able to implement initiatives that could be seen as motivating for the resources
- ▶ The inability of EDH to retain its most promising hands force it to often use people less trained that flows on significant productivity losses
- ▶ Lack of financial resources allocated to prevent post-training amounts necessary to eliminate this gap
- ▶ Zero capital investment capacity
- ▶ Slow but steady degradation of the electrical system

- ▶ Total dependence to contributions of donors and/or government
- ▶ Difficulty to properly plan the growing needs in production and transmission:
 - New Additions
 - Improving
- ▶ Strengthening, etc.
- ▶ Difficulty to intensify action to reduce commercial losses:
 - Lack of qualified resources
 - Lack of vehicles
 - Lack of monitoring equipment
 - Lack of resources for the purchase and installation of meters

The vicious circle in which is embedded EDH is unquestionably a spiral whose end can lead only to a failure of the current system.



To break this vicious circle, it is imperative to reform the sector by providing important institutional and regulatory changes:

- ▶ Transfer, under a form of concession, sectors that need the largest capital investments
- ▶ Focus EDH where they will have a significant impact: the management of the exclusive commercialization of the electricity in the country

2.4 PRICING ANALYSIS

2.4.1 Customers Structure

The structure of EDH customers is as follows:

- ▶ A. Residential Customers
 - Regular customers, low voltage
 - Payment of bills are made to EDH host offices
 - ± 170,000 customers - RE tariff code, managed by agencies
 - Customer Login: these customers are unmetered and are charged a fee. Experience in testing for individualized clients in low income neighborhoods
- ▶ B. Commercial Customers
 - Low voltage customers, small businesses
 - The payment of bills are made to EDH host offices
 - ± 12,000 customers - CO code rate. These clients are managed by agencies
- ▶ C. Industrial customers MT
 - Voltage limit for counting MT least 45 kw
 - ± 500 clients managed by the Corporate Banking Department. Tariff Code: IM. Double counting dial
- ▶ D. Industrial Customers BT
 - Limit voltage BT, up to 45 kw power
 - ± 1,100 clients managed by the Department Great Clients. Tariff Code: IB. Counting single dial
- ▶ E. Public Bodies
 - Buildings belonging to the GOH whose bills (Ministries and Crown corporations) are set in the state budget
 - ± 800 clients. Clients managed by the Department Great Clients. Tariff Code: GVT
- ▶ F. Autonomous Agencies
 - Public bodies whose invoice is sent to an organization that manages its own budget
 - ± 360 clients. Managed by the Department Great Clients. Tariff Code: GVA
 - Electricity bills. Issue of payment of bills
- ▶ G. Street Light
 - All light sources for street lighting. An invoice for whole streets, even sometimes for a full borough. Billing package
 - Number of invoices: ± 300. Rate code GR. Managed by Team Great Clients. In theoretical liability GOH
 - Maintenance responsibilities to be defined
- ▶ H. Other
 - Agents EDH. Price 50% off the regular residential rate. Considered BT customers

2.4.2 Pricing

As of 2013, current rates vary between 13.4 and 14 HTG/kWh (between 33 and 34 U.S. cents/kWh). There is a very little difference between the residential and industrial tariff rate for great Clients.

- The price for industrial and large consumers is overvalued based on a subsidy mechanism
 - The last rate increase, and the determination of the price per kWh in 2009, was not supported by an economic study
 - The high rate of industrial sector in direct competition with the self-production
 - No regionalization: one single price for each customer category at national level
 - The rate does not take into account the commercial losses and technical losses
 - The tariff structure is applied without difficulty by the FAB implementation and future CMS application
 - Tax (TCA - 11%) is charged to customers
 - A discount is applied to large industrial customers for payment before maturity
 - No indexing is applied to the variation in production costs
- ▶ A. Special rate is offered for EDH agents
 - This rate, 50% of the regular residential rate, is provided in the Rules of Procedure of HRE.
 - Few controls currently on the portfolio "employees." A first analysis shows little drift points of consumption concerned (about 750 now), but against abuse at some counters recorded for "employees" consumption suggesting either the resale of energy, or the transfer of rights to electricity-intensive activities (production of ice for food preservation by example)
 - ▶ B. Social rate
 - There is currently no social tariff. Such a rate is not available but could be replaced instead by tax measures managed by the government
 - ▶ C. Billing in package: concept counter identifier
 - On an experimental basis, for customers without meters, expected consumption is reconstituted for each customer to a fixed consumption according to its equipment. The calculation of the invoice is made at the regular rate using the predetermined consumption

2.4.3 Pricing analysis

It is clear that the current pricing is not adapted to a context wanting to promote access to electricity at all while modulating pricing for larger consumers, the latter being the major economic drivers of the island. Besides, pricing does not even account for the overall impact of losses.

A future model should not only reflect this aggravating factor but also reflect avoided costs resulting from the application of a policy to fight against fraud.

In this context, it would be pointless at this stage to conduct a study on electricity pricing. Indeed, if we assume that we apply the institutional model presented in this report, it would be the regulatory authority's responsibility to perform such a study which could take in account the following points:

- ▶ Cost of service concession agreements in the area of generation (annual fixed costs)
- ▶ Cost of service concession agreements in the field of T & D (annual fixed costs)
- ▶ Cost of maintaining reserves of power needed to face the tip (variable costs)
- ▶ Cost EDH operation after restructuring (annual fixed costs)
- ▶ Cost of network development T & D and generation units (variable costs)
- ▶ Curve to improve the collection and reduction of commercial and technical losses projected income based (variable income)

Despite the fact that we have several elements that could allow us to build such a study, too many elements are still missing or we have not yet had access to. The lack of access to such documentation prevented us to give a more enlighten advise on this topic. Further research would be required.

3.0 SUMMARY OF A PROPOSED POLICY AND REGULATORY FRAMEWORKS

3.1 INSTITUTIONAL CHANGES BY REGULATORY CHANGES

In the electricity sector, due to the difficulty of EDH to manage all the tasks assigned due to chronic underfunding and difficulty of trained human resources, it is important that the regulatory framework comes support the changes required to enable the sector to recover over a period not exceeding 20 years. To do this, the regulatory framework should be amended to:

- ▶ Encourage the involvement of producers and private investors in the short and medium term
- ▶ Ensure these investors a stable business environment and reduce the financial risk
- ▶ Enable efficient fight against financial losses resulting from fraud
- ▶ Limit state intervention in a context in line with market forces
- ▶ Encourage state intervention to temporarily lessen the effects of conversion to an open market for disadvantaged social groups

The draft of the Electrical Code written in 2001 is an excellent start. It began the thinking and announces at the outset that the most important use of the private sector is an essential avenue to modernize Haiti's electricity sector. However, it is incomplete in some aspects but could be quickly enhanced to establish a true national carrier policy changes necessary for the transition from republic to an emerging economy by 2030, as recommended by the government.

Similarly, the law on theft of electricity currently being debated before parliament is a response to the aspirations of EDH to reduce commercial losses. However, this law is, we believe, perfectible on several views, particularly in regards to the means to be implemented and penalties. Some aspects of this legislation may not achieve the goal of transferring to the state prison sector avoided costs in the power sector.

4.0 SUMMARY OF A REGULATORY MECHANISMS PROPOSAL

4.1 REGULATORY SECTOR ANALYSIS

In most countries, the deregulation of the electricity sector has been accompanied by the establishment of an entity, the energy regulator, independent of political and economic actors in competition. Their legal form, their legal skills and intervention methods are highly variable from one country to another, but always include monitoring the operation of the newly created markets and associated rules. For the functions of regulatory agencies, we note in particular:

- ▶ Separation of reputable competitive electricity production and its marketing with management functions deemed to fall under network's natural monopoly functions. Adding that the intervention of the political factor is limited to the appointment of the members of the organization
- ▶ Development of competition in the sector and monitoring of prices so that they are better suited to the open market
- ▶ Maintaining unity of command and coordination to manage the technical balance of the system

In the case of Haitian electricity sector, it should be based on a legal and regulatory framework that would provide guarantees that the legal and judicial systems support their efforts aiming for a significant improvement of the sustainability of the network and reduction of commercial losses through proactive management of the offenders.

The current regulatory sector continues to lag behind the needs of the industry, particularly the electricity sector, as evidenced in the numerous comments of various stakeholders in the sector and the evolution of Government's bills to modernize the state still under consideration, in some cases for over 10 years.

In spite of the development of legislation to better define the institutional framework (developed in 2002 but never filed), and support efforts to reduce fraud (filed in 2005, still under discussion in the parliament), the full frame of Haiti's electricity structure has not been changed for 25 years (last revision before 1990) and does not allow the modernization of institutions nor the efforts to curb the scourge of fraud, considered by too many Haitians as an acceptable method of operation in the current context of the country.

4.2 PROPOSED POLICIES AND FRAMEWORK

Due to the failure to implement proposals that preceded our mission, we work to find the best way for our proposal to meet the approval of decision-makers, not necessarily because of its easiness but because the solutions take into account the fact that, at this current point, the electrical power sector in Haiti is at a critical crossroads in order to ensure its perenity.

Some of the elements that have guided our thinking are:

- ▶ Reducing the political power involvement of any sector's operational decision
- ▶ Importance of focusing on the reduction of commercial losses
- ▶ The significant financial cost to put the country in a state to develop its power infrastructure
- ▶ Importance of carefully plan projects in the electricity sector in order to better coordinate donor investments and work to do
- ▶ Need in the planning, development, construction and maintenance process of power plant and transmission and distribution networks
- ▶ EDH lack of financial and human resources in the management of electricity generation units
- ▶ EDH knowledge of his customer base and commercialization practices
- ▶ The importance of maintaining a national electricity utility
- ▶ The importance, in the context of a reform, to protect as far as possible employment
- ▶ Ensure careful planning of development efforts in the context of the country's electrification projects
- ▶ Develop less polluting means of additional generation
- ▶ Ensure the sustainability of generation equipment and T&D network

However, we believe, based on our experience and empirical analysis of other countries, that the proposed reforms will save a great deal of money to the government. In the short term, large investment are necessary to accelerate the upgrade of the national grid, to optimize the level of power generation, increase the economic activity as well as solve part of the cash flow problems.

In addition, the implementation of this reform is affordable, increases government transparency and could encourage more international donors to invest because of the greater efficiency of the system and socio-economic benefits that result.

Here are listed below several interesting examples:

4.2.1 Oceania

New Zealand (1987) and Australia (1991) have carried out initiatives to restructure the electricity sector.

4.2.1.1 New Zealand

In the case of New Zealand, the restructuring of the electricity sector corresponded to the government's goal to reduce its stake in the country's economy, due to significant financial and structural problems and the desire to introduce market forces in potentially competitive segments in the industry. Today, competition exists, at least theoretically, in the production sector, although Electricity Corporation of New Zealand still controls 95% of production and the number of distribution companies went from 61 to 40. It regulates distribution through anti-trust devices, rather than a gender commission Public Utilities Commission. Transport rates reflect the distances and costs. The government has established a special fund to promote energy efficiency in the residential sector.

Between 1988 and 1994, industrial tariffs have increased rates, but the movement was not constant. Moreover, residential rates have fallen by 5% between 1988 and 1992. There was decrease in employment (6,000 to 3,200 employees) at the Electricity Corporation of New Zealand at the time of the restructuring of the company. Some of these jobs have been transferred to the private sector. Overall, there was an increase in the efficiency of the industry, lower average costs of Electricity Corporation of New Zealand between 1987 and 1994, a substantial improvement in productivity in the segments of the distribution and sale ("retailing") and an increase in the productivity of labor and capital.

4.2.1.2 Australia

In Australia, the restructuring of the electricity sector corresponded to the objective of introducing market forces in the economy in order to develop competitive industries worldwide. We also wanted to increase productivity in the industry, lower prices and reduce the level of public debt through privatization. Today, competition is part of the retail market in the two states of Victoria and New South Wales. The "pools" that were already working in the states of Victoria and New South Wales harmonized their operations and began to operate as Electricity National Market (NEM) in February 1989. In an unspecified future, energy transactions that will go through the ENM will include seven states and territories. The impacts are felt mainly in Victoria, where there was a reduction of direct employment in the industry, from 20,000 to 6,000 jobs. Seven new energy retailers have settled in the state. We also witnessed the arrival of new small cogeneration natural gas energy producers. About 40% of consumers, who had the option, changed energy supplier. There was a decline in prices varying according to the bargaining power of consumers. As for energy prices in the segments that are still monopolistic, they have fallen in real terms, thanks to incentive regulation ("price caps"). Finally, an improvement in the quality of service is emphasized (as per comment of the Victoria's Office of the Regulator-General).

4.2.2 South America

The restructuring experiences of the electricity sector occurred mainly in Chile (1978) and Argentina (1992).

4.2.2.1 Chile

In Chile, the government began to privatize the electricity sector in the late 70s due to significant financial and structural problems in the economy and also due to the need to modernize the industry. Currently, 11 production and transportation companies, as well as 23 distribution companies operate on the market. Private investment is permitted in the production and transmission networks and distribution. Private networks are interconnected by a public network providing non-discriminatory access.

The market functioning depends on the National Energy Commission (CNE) and the open and transparent regulatory framework. CNE develops and coordinates investment plans, policies and regulations for the electricity sector. It also determines the components regulated tariffs and manages the network and coordination between the activities of generation, transmission and distribution to ensure the balance of the system in real time (functions independent system operator (ISO)).

In the large (greater than 2 MW request) market, competition exists. Through this competition, prices are close to marginal production costs. For the residential market, the CNE fixed caps. Residential rates include energy, transport and distribution costs. CNE manages physical exchanges in the manner of a "pool", in order to optimize the system. However, exchanges are organized in bilateral contracts, meaning that all producers should have long-term contracts to sell their products and all consumers should have long-term contracts to meet their demands. Regulations prohibit short-term exchanges ("spot transactions").

Since the restructuring, there has been a significant increase in investment in industry (mainly private) and improvement in service quality began. Actual electricity prices have dropped 40% in the industrial sector and 20% in the residential sector. However, price developments in these two areas have not been steady.

4.2.2.2 Argentina

In Argentina, the restructuring of the electricity sector is under a privatization plan implemented by the government to address the significant financial and structural problems in state enterprises. Currently, more than 30 generation companies, resulting from the split of generation enterprises to the level of individual plants, are evolving in the market. Most of the enterprises have been privatized and count for no more than 8% of total sales in the country. The management of six transport companies is entrusted to the private sector, but for fixed periods of time (15 years the first time and 10 years later). Transport activities are regulated by an incentive method ("price caps"). There are 22 distribution companies, three public (federal). These three companies are managed by the private sector, with allocation of franchises as in the case of transport networks. Activities of other distributors are under the control of states by companies that are mostly state-owned enterprises.

The quality of the service is evaluated through a system created within the regulatory framework, based on three parameters:

- ▶ Technical Service (continuity, etc.)
- ▶ Technical Product (voltage fluctuation)
- ▶ Commercial Service (service customers)

Fines are provided for service failures. A "pool", created for the discussion on the wholesale market, operates in a standard way, except that producers submit only their availability, the price is set by the regulator. These prices are based on the standard features of the various sectors of production.

More than 65% of energy exchanges are managed by long-term contracts (bilateral contracts). The rest passes through the "pool".

Since the restructuring, competition in the production sector is real. The franchise system for the transmission and distribution worked well for the initial allocation of franchises. The assessment of quality, within the regulatory framework, has had a significant impact on improving the quality of the service. The prices were quite volatile.

Between 1988 and 1995, home prices have increased by 11%. Industrial prices have experienced larger increases.

4.2.3 Africa

A conclusive experiment was conducted by the National Office of Electricity (ONE) in Morocco with the support of various development banks, through the PERG (Programme d'Électrification Rural Global) that helped increase access to electricity from 18% in 1995 to 96% in 2007. If the interconnected network remains the main vehicle of electrification, it is supplemented by a decentralized solution, through which 400,000 people benefit from photovoltaic systems (10% of Moroccan villages) and that is delegated to private operators. This multi-services electrification is now developing in several countries in Africa, Senegal and Uganda in particular.

4.2.3.1 Uganda

A World Bank-sponsored project was intended to undertake all of the preparatory and implementation work related to the restructuring of Uganda Electricity Board, the establishment of Uganda's Energy Regulatory Authority, and the privatization of Uganda's two hydropower stations at Owens Falls, as well as the country's distribution network.

The Government of Uganda implemented the privatization of the government's businesses via concession. The generation concession of UEGCL was awarded to Eskom Enterprises in 2003 and the 20-year distribution concession of UEGCL was awarded to Umeme (a joint venture led by Globeleq) in 2005. The restructuring of the Uganda electricity board and the country's power sector raised capital through the sale of concession interests and agreements to invest. These agreements set aside enough capital to expand the distribution concession, enough to increase the country's electrification by a factor of four over time.

4.2.4 PROs & CONs

At this stage of the report, we could try to make a comparison with many possibilities offered to the Haitian government to see which would be a better choice.

Our experience in several countries (Haiti, Benin, Canada, Guinea, Mali, Ghana, and Uganda) gives us the possibility to expose this summary of the proposed choices.

	PROs	CONs
Regulatory authority	<ul style="list-style-type: none"> • Choice of several countries to regulate their energy market. Their experience is well documented and largely positive • Independent of the political power • Designed to protect customer interest while insuring a good commercial environment to private sector 	<ul style="list-style-type: none"> • Political choices not always taken in account • Less centralized control of government
New role of EDH	<ul style="list-style-type: none"> • Capital intensive sector to private sector; less investment needs for a period necessary to develop its expertise in modern T&D management systems • Mobilization of skills in the improvement of critical factors to its profitability • Significant reduction of government financial involvement; financial dividends could be expected over a certain period 	

	<ul style="list-style-type: none"> • Remain the only National Electricity company • Highly responsible of the management of its country development: apply Government decision in regards to strategic orientation in matter of energy • Its new exclusive role ensure challenges to the staff and help to keep best resources • After a determined period, EDH will bring back every assets (generation and T&D) Into its fold to regain total control over its market, but this time with assets properly maintained and in good conditions, and financial mean to ensure their sustainability • Provides a new financial credibility in regards to IPPs, INOs, and international fund donors 	
<p>Single ministry responsible for the Energy sector</p>	<ul style="list-style-type: none"> • All decisions concentrated in a single entity • Lower duplication of tasks improved efficiencies • Significant reduction in time frame related to the project advancement 	<ul style="list-style-type: none"> • Political power of some ministries would be affected
<p>Involvement of the private sector in electricity generation</p>	<ul style="list-style-type: none"> • Generally more efficient operators involving lower cost of services and lower cost for the electricity generation • Responsible for the large investments required to build and operate new power plants necessary to adequately supply Haitian growing needs • Will use a significant portion of EDH resources to operate power plant; this will reduce EDH current HR costs • Will return assets to EDH, over a determined period of time, in good condition • At the end of the BOOT contract, a transition period shall allow IPPs to transfer knowhow to EDH 	<ul style="list-style-type: none"> • For a while, EDH would not develop expertise in generation
<p>Involvement of the private sector in T&D</p>	<ul style="list-style-type: none"> • Generally more efficient operators involving lower cost of services and lower cost for the electricity generation • Responsible for the large investments required to renovate existing lines, or build and operate new T&D lines necessary to adequately supply Haitian growing needs • Support EDH in its struggle to reduce 	<ul style="list-style-type: none"> • For a while, EDH would not develop expertise in T&D

	<p>commercial and technical losses</p> <ul style="list-style-type: none">• Will use a portion of EDH resources to maintain lines; this will reduce EDH current HR costs• Will return assets to EDH, over a determined period of time, in good condition• At the end of the BOOT contract, a transition period shall allow INOs to transfer knowhow to EDH	
Creation of a Planning office	<ul style="list-style-type: none">• Will align government objectives with project planning using the best available resources according to the needs of the population• Set priority on most promising project	

5.0 SUMMARY OF A MODEL FOR THE ELECTRICITY SECTOR

5.1 ELECTRICITY SECTOR MONOPOLISTIC CHARACTERISTICS

The electricity industry has certain characteristics of a natural monopoly. It involves significant fixed costs, the average cost of production decreases with the quantity produced. In a natural monopoly, the cost is minimized when the entire market demand is satisfied by a single company. Until recently, the physical and economical size of power plants (hydraulic, thermal and other renewable energy) has continued to grow, which allowed them to achieve economies of scale as they may well serve a larger market.

Transmission and distribution activities, which are organized in networks, have an immediate characteristic of natural monopoly because it is not economical to have several distribution lines in parallel on the same territory.

Governments have always taken a great interest in the development of the electricity industry to ensure its effectiveness and minimize costs so that they are competitive and thereby promote economic development. They are also concerned with issues such as regulation, security of supply, etc., because of development impacts of this industry on the well-being of consumers.

Monopolistic companies operating electricity networks are also often called "public services". The monopoly that characterizes electricity companies has always been accompanied by a number of responsibilities, constraints and obligations. The government, or its regulator, fixed rules of behavior (pricing, service, etc.) to protect consumers and promote industrial and social objectives.

This regulation is generally performed by a government "regulatory" agency independent of executive and legislative powers, although in many cases, regulation is exercised directly by the government, as it is the case in Haiti.

Overall, in most developed countries, this regulation covers three types of objectives:

Ensure the economic viability of the utility

- ▶ This objective is consistent with the mission of the government, because of the importance of electricity in economic and social life and the consequences that would result from the failure of electricity company

Ensure quality of services to consumers at a reasonable price

- ▶ The government must impose to the only company that offers electricity service quality criteria (reliability, security, etc.) and accessibility (reasonable prices)

Ensure a smooth integration of social utility

- ▶ The utility must behave in "good citizen", especially as regards to human resources management, environment, etc.

To achieve these objectives, the regulatory agency intervention is at two levels: the regulation of internal activities of the utility and regulation of market activities. These two interventions are interdependent; the regulatory approach must be integrated and coherent.

The degree of intervention by the regulatory agency in the internal activities varies greatly from one jurisdiction to another, according to the mandate entrusted to him and the government's objectives. Pricing is the main intervention. The traditional regulatory mechanism for pricing, which was almost universal until the late 80s, is the regulation of the rate of return that the company is authorized to set rates which ensure a reasonable return on its capital investment. It is often said that this mechanism is based on costs ("cost of service"), because its starting point is the definition of the costs incurred to provide the service.

The regulatory agency may also hold a supervisory power or control over certain elements, such as physical facilities (new power plants, transmission lines, etc.), purchasing policies, choice of fuels, regional economic impacts in the quality of service (reliability, access, etc.), environment and social objectives. Note: the interconnections between power systems often require a different level of organizational structure and another layer of regulation. Network characteristics of the industry and the interconnections between networks are very important factors in the restructuring assessment. The presence of interconnections can break or accelerate restructuring, depending on regulatory requirements in different jurisdictions.

As we have seen in Haiti, the government has demonstrated that in the current context, its policy has difficulty producing convincing results.

5.2 NEW FORMS OF REGULATION IN THE INDUSTRY

5.2.1 Production Sector

When competition is allowed in the generation market, the need to regulate this sector decreases greatly. Potential producers should always get permission from environmental authorities for the construction of new plants and comply with safety standards like any industrial facility.

But the need to approve new projects based on demand network no longer exists since producers are subject to the vagaries of the free market. Similarly, the profitability of producers is no longer subject to regulation based on the yield of the company, but it is related to market conditions (supply, demand and competition).

If established in an open market where electricity is bought on a "Day Ahead Market bid" system (or other similar form) from totally independent generation producers, restructuring in the production sector, however, brings the problem of "stranded costs". These costs occur when the regulated assets, primarily power plants, lose their value due to the introduction of competition from companies that normally have production costs much lower than existing plants. The owners of these assets are entitled to recover investment costs they incurred to build these facilities and who have been authorized by the regulator in the traditional regulatory system. The solution to this problem varies by jurisdiction. In general, following complex negotiations with the companies, the regulator imposes a charge to all consumers at each billing period, and for several years, so the company can recover, in part or in full, the stranded costs.

This could be a possible solution to the present Haitian IPP's contracts to reduce their impact on the future expected price of electricity in Haiti following the introduction of new generation plant more efficient and less costly.

5.2.2 Distribution Sector

There seems to be a consensus that on the short and even medium term, the T&D segments maintain their characteristic of natural monopoly and still require regulatory intervention to ensure, as in the natural gas sector, a non-discriminatory network access, making a real and viable competition possible in the production sector.

This does not mean, however, that the traditional rules continue to be applied, in particular because it is often criticized for regulation based on the rate of return and does not provide sufficient incentives to minimize costs and lead to an efficient allocation of resources.

Over the last fifteen years, observers rather suggest incentive regulation, where the company assumes more of the risk in the market and it is entitled to a profit level greater if it performs well ("performance-based regulation"). Most often, rather than ensuring a return to the regulated firm, the regulator sets caps for electricity prices ("price caps").

Productivity gains that the company can make help to reduce costs and allow it to increase its profits. However, the regulator also imposes constraints on the technical quality of service, and progressive reductions in tariffs, which take into account indirectly, productivity gains expected, so that consumers can share the benefits.

In the transport sector, restructuring raises the specific issue of non-discriminatory access of new competitors to transport networks. To ensure such access, it requires transport networks through Independent System Operator (ISO), publicly displayed transmission rates (often approved by the regulator) and acceptance of any request of transportation, taking into account of course network constraints. It also requires transport networks to display their availability, specifying the different points and times when networks are available.

5.2.3 The New Role of Regulators or Regulated Utilities

With the restructuring of the electricity market, the mandate of regulators has also evolved in many ways. Now, the regulator must impose the introduction of competition or incentives in segments where competition is not considered possible. It must ensure the monitoring of new organizational forms ("pool" and bilateral exchanges) to ensure proper operation. It must make the new regulatory framework for tasks (ISO) for the management of transport. Finally, it must address the changes in environmental and social regulation (integrated resource planning, energy efficiency, etc.) to reflect the lesser role played by the central planning system.

Several sectors are mobilized to reduce the carbon intensity of the electricity sector, which increased in most developing countries, mainly because of the rapid growth of coal and heavy fuel oil. Regulatory framework and incentive conditions of Power Purchase Agreement for effective renewable electricity are needed for these sectors to develop. If these provisions are put in place in some emerging countries like India, China and most recently South Africa and Turkey, they are lacking in most developing countries.

5.3 HAITIAN PROPOSED MODEL

5.3.1 Managing Ministry

The Haitian government would be well advised to consider creating a sole ministry responsible for all aspects of the energy sectors as it is in most of the developed countries.

A single entity would simplify negotiations currently taking place between the 10 entities currently involved in the sector. Such an initiative would reduce inefficiencies, allow a better resource allocation and shall reduce the time limit for the implementation of solutions developed by the government in power.

5.3.2 Regulatory Authority

Electricity sector should be based on an institutional framework consisting of a national Department of Energy supported by a regulatory authority. This structure has been applied in many industrialized countries and is being implemented in several emerging countries. Required changes to regulatory frameworks were initiated around (including Haiti) which usually ensures the private sector, as long as the state consents, more security about their investment.

Functions that can be assigned to this regulatory authority might include:

- ▶ Regulate the marketing context and consumer prices based on supply costs, plans to expand the network as well as the price of raw materials for the production of electricity
- ▶ Determine the appropriate ROR to encourage private investors to invest in the development of the network of T & D and production
- ▶ In the case of smaller projects or unprofitable economic, require a research for grant support from the government or international donors to bring a minimum profitability framework for EDH (lower cost of service) by lowering construction cost for INOs

5.3.3 Generation

- ▶ Independent Private Producers ("IPP") operate by delivering energy and power. The proportion of power reserved for each of both concepts is determined depending on the nature of the facilities and their versatility. The standard power availability of the overall grid should be set around 20% as it is in developed market.
- ▶ IPPs would take over all EDH current facilities under concession agreements for a limited period to be determined. All facilities shall be returned to EDH at the end of the said period.
- ▶ The IPPs sign Power Purchase Agreement (PPA) with EDH (government guarantee in support).
- ▶ The portion of the contract for energy is purchased on a principle of "TAKE OR PAY".
- ▶ The portion of the contract for power is purchased on a principle of auction and subject to an agreement of delivery request.
- ▶ EDH determines its daily needs and notifies, a day ahead, IPPs.
- ▶ IPPs bid for energy and/or power requested by EDH.
- ▶ EDH agrees to purchase energy from the lowest bidder, up to the power required. The price set for buying energy is then in line on the price of the highest bidder accepted.

5.3.4 Transport & Distribution

- ▶ Independent Network Operators ("INO") sell their services to EDH who rents their line's capacity.
- ▶ INOs are obliged to accept any request for transit as network's capacity allows.
- ▶ The grid is operated by EDH according to its projected needs.
- ▶ The availability of lines is the INO's responsibility. Any interruption of service on a line (intended or not) is the responsibility of the INO who shall ensure the availability of a bypass line to ensure the delivery of energy without significant interruption.
- ▶ In case of non-availability of a line, the OPR must take a penalty by full hour of non-delivery.
- ▶ In the beginning of such contractual agreement, a grace period shall be allocated to allow the repair and remodelling of the INO's network to improve reliability in line with the new standards to be established by the authority of regulation.

5.3.5 Control & Marketing

- ▶ EDH remains the exclusive distributor of electric power on the Haitian territory. All IPPs must sell their electricity to EDH.
- ▶ EDH would be responsible for the conduct of the network according to its needs and those of different regions. (ISO role)
- ▶ IPPs are required to sell their energy to EDH under PPA.
- ▶ INOs are required to provide transmission capacity and distribution required by EDH and are paid by EDH under a concession agreement (Cost of Service Agreement, or "COS").
- ▶ The marketing operations are the sole responsibility of EDH, including the following obligations:
 - Electricity metering
 - Billing electricity
 - Combating Economic losses (together with INOs)

5.3.6 Planning

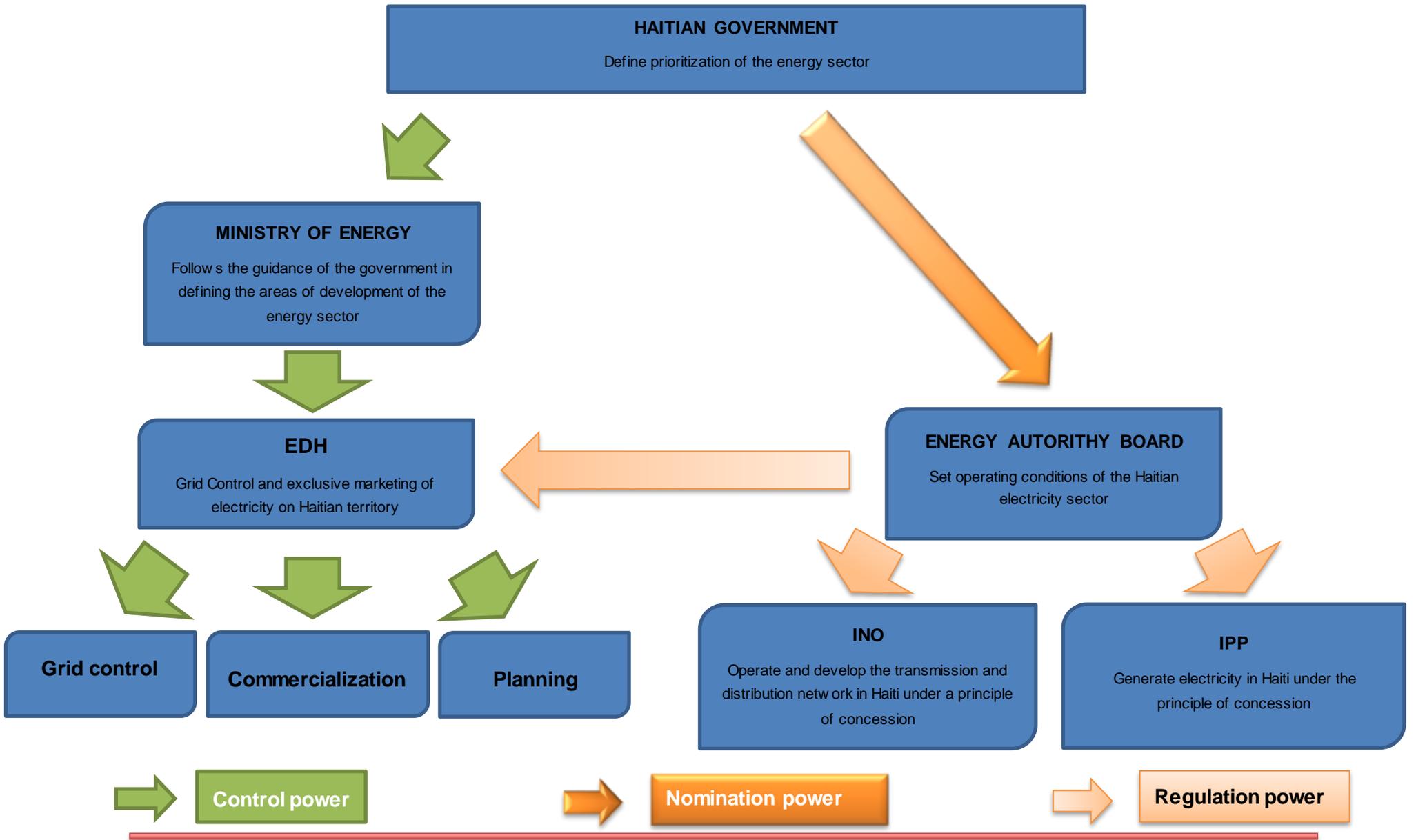
Operations planning and network development, production additions, consolidating transmission lines or distribution, rural electrification and changes in technical standards to be imposed on IPPs and INOs are the responsibility of Office of Planning for electrical services ("BPSE").

The BPSE launch its studies following EDH expression of needs about new industry developments considered due to the application of public policy recommendations, safety requirements, major technological changes or direct need expressed by the ultimate customer.

The organization tasks are:

- ▶ When adding new production facilities:

- A study of the energy demand in the region
 - The best location to locate the new plant
 - Type of production envisaged
 - A cost study for the construction and operation of such a plant
 - The proportion of energy production / power
 - Cost connection
 - Techno-economic study to validate a model case for the project
 - Installation of terms of reference to be enrolled in the public tender for the provision of the service
- ▶ When adding new lines:
- A study of energy demand in the region
 - The best location to locate the new line and positions (if necessary)
 - The type and power lines and stations considered
 - A cost study for the construction and operation of such a line (and items therein)
 - The proportion of energy production / power
 - Cost connection
 - Techno-economic study to validate a model case for the project



5.4 QUICK PICTURE OF THE EVOLUTION OF POWER GENERATION IN THE MEDIUM-TERM FUTURE

Needs for new sources of electricity generation should not be immediate considering the anticipated decline in marginal consumption following control efforts with technical and commercial losses. However, based on models that will be provided in the Generation expansion report, from the fourth year of the beginning of the implementation of the reform, Haiti would probably have to consider increasing its generation capacity. To this end, it is likely that the finances of EDH would still be fragile and the least expensive means of production would have to be considered. To this end, we believe that the construction of an LNG port and an LNG terminal would allow the establishment of gas fired plants, cheaper and less polluting than oil. The LNG terminal project is already in the pipeline of a private partner who might be tempted to make the project more quickly if the government promoted, within the formal policy of energy, accommodative tax measures.

On the long term, Haiti should aim to promote the use of Renewable energy sources. In the short term, this solution is not favorable because of the greater costs of using such initiatives.

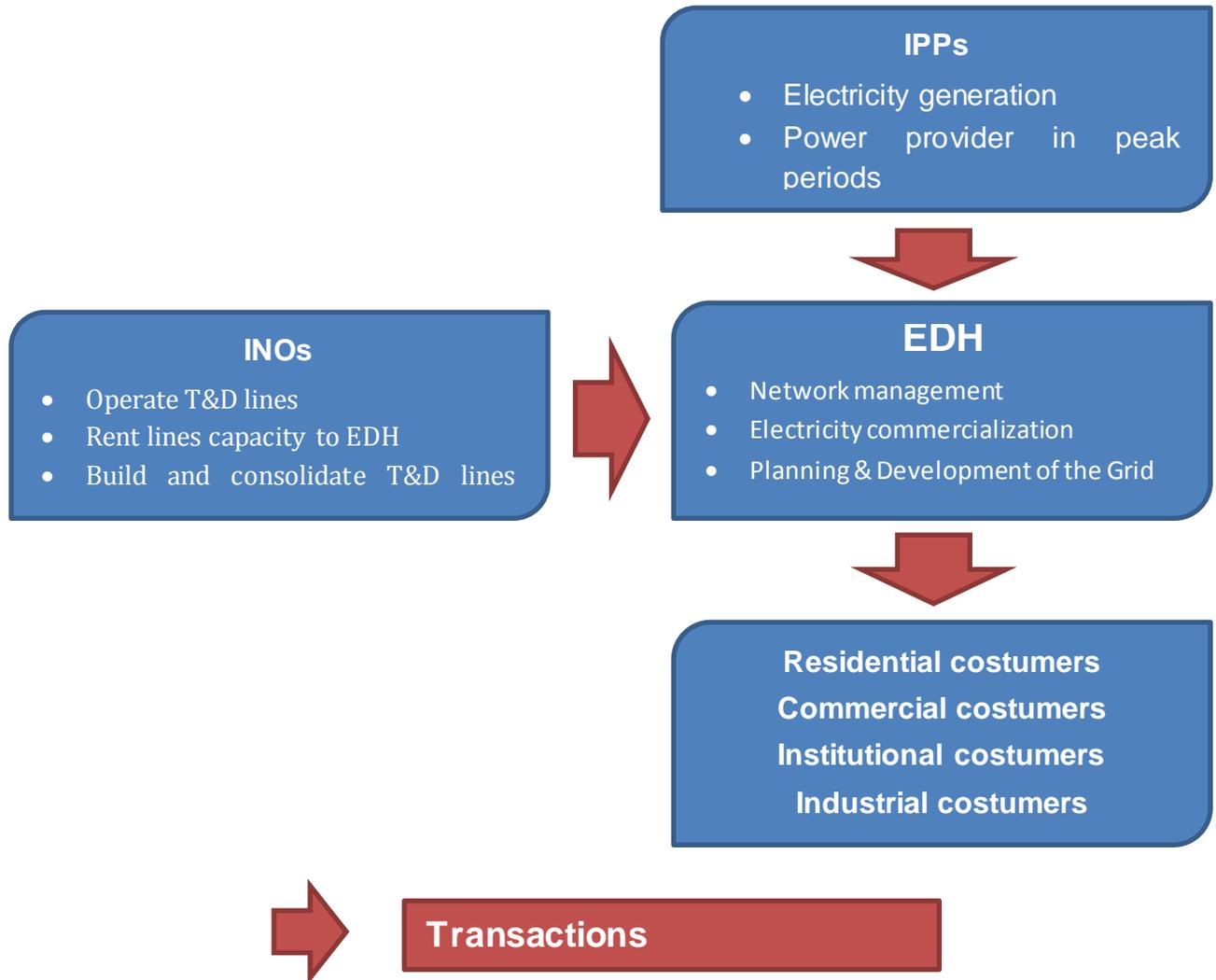
In the next three years however, EDH could entrust a private partner the opportunity to manage a monopoly for solar production in the territory. This production quota would be based on EDH's needs and its ability to lead the network according to fluctuations accompanying this type of generation. Two approaches could be explored:

One aspect would be small-scale production for commercial, industrial and institutional (park on the adjacent roofs or spaces for the use of solar to relieve the main electricity consumption).

Another component could include the installation of small islanded park for rural areas not having the possibility of being connected to the national grid in a near future.

The following structure is common, generally accepted in many countries, and in the Haitian context, would not be overly complicated to put in place.

PROPOSED ORGANIZATION CHART OF THE GENERATION, TRANSPORT & DISTRIBUTION, AND COMERCIALIZATION OF THE ELECTRICITY



6.0 CONCLUSION

Several forms of institutional and regulatory structures have been implanted worldwide in different jurisdictions. Through our previous mandates and based on our experience and the experience of several countries in this type of project, the proposed form for Haiti is not only the best but also one that is most likely to enable the country to meet government targets to achieve the title of emerging countries by 2030. It guarantees the long-term energy sovereignty as well as managing a period of transition in the most possible economical way.

No such transition occurs without effort, but after our visit, we are even more convinced that the Haitian people are ready to take on these challenges after too many years of fruitless efforts.