Sustainable Energy Handbook

Module 2.1

Institutional framework in the energy sector

Published in February 2016

1 Introduction to the energy sector

This module presents the various types of organization of the electricity sector (from the entirely public one totally controlled by Governments to the completely unbundled ones) and the different steps in deregulation and reforms.

The use of energy from various sources requires the involvement of different technology providers, industries, energy utilities, financial and Government institutions. End users of energy include the industrial sector, the transport sector, the tertiary and the household sectors in addition to individuals. And all stakeholders are bound by laws, and regulations that organize the extraction, supply and use of energy sources.

The energy market can be structured from totally organized and planned sector in the hands of Governments to totally unbundled market, where the private sector plays a key role in the sector management while the role of Governments is reduced to regulation which aims at ensuring fair competition as well as accessibility and affordability of the energy services. This is the case in most industrialized countries (ICs).

Market rules have proved successful in industrial countries while they are not necessarily easily applicable in developing countries (DCs). Hence, the pure transpositions of the institutional, legal and regulatory frameworks from industrialized to developing countries have not been always well received by domestic markets. In Sub-Saharan Africa, a large share of the energy mix is still covered by traditional biomass; electricity is not easily accessible neither affordable in most of the rural areas and the energy market structure is rather inadequate for the private sector to play the expected development role due to lack of enabling environment.

2 What is the legal framework in the energy sector?

In general, the legal framework of the energy sector has the five following components:

- **Energy law**: This is the law that defines the energy sector including the hydrocarbons upstream and downstream, the renewable energy, the energy demand side including electricity, the fiscal terms related to the energy sector (royalties, VAT, Various taxes…). This law empowers the Minister in charge of energy for the enforcement of the law, for the development of the subsequent instruments and institutions and the subsequent regulations;
- **Specific laws** including international cooperation (transit of energy, interconnections, Investment projects on infrastructures such as BOT (Build Own and Transfer), BOO (Build Own and Operate), IPP (Independent Power Producer), in the energy sector, licensing, concessions, etc. and laws related to emergency situations;
- **Presidential Decrees** (mainly in developing countries) including decisions to develop specific programs in the energy sector in favor of the population or public specific and urgent needs (rural electrification, etc.);
- **Ministerial Decrees** within the powers given to the Minister by the energy law. These cover the energy tariff, the import and export of energy, the organization of the energy public institutions, etc.
- **Ministerial Decisions** within the powers given to the Minister by the energy law and by the cabinet. These cover every operational decision in favor or against the energy sector operators, etc.

3 Mainpublic institutions in charge of the energy sector

3.1 Role of the Ministry in charge of energy

It is the highest public authority that represents the Government in the energy sector through creating the legal and regulatory frameworks that enable operators to carry out their mission of development of energy resources, supply of energy products to all social and economic sectors in a sustainable, accessible and affordable manner. To achieve this goal, the Ministry often decides on the energy prices in controlled market, which is in general the case in developing countries, particularly in Sub Saharan Africa.

The Ministry is responsible of the country's energy supply security; it is also responsible of the market stability and the relations with all the stakeholders. The Ministry develops the national energy policy, the long term options and the strategy. It seeks the approval of the Government and the adoption by the parliament of the laws, and the national energy policy. It decides on the application texts (regulations) by Decree under the sole authority of the Minister in order to implement and enforce the laws.

The Ministry has the authority through the legal and regulatory framework to organize and enforce the law in the energy sector. To do so, it is organized in various departments "Directorates" dealing with all sub-sectors such as hydrocarbons, electricity, downstream (refining, transport, import and export), rural electrification, and energy conservation and efficiency.

In certain countries, the complexity of the energy sector creates the need for the creation of a regulatory body that is ideally independent from the authority of the Ministry of Energy to ensure the fulfillment of its mandate in the best possible way. Many developing countries have created such regulatory institution but do not have the required capacity and the resources to ensure its independence.

There is no unique organization for the Ministry in charge of energy. Indeed, the structure is dictated initially by the status of natural energy resources, the level of development of the energy sub-sectors, and the general macro-economy of the country.

3.2. Role of the Ministry of Finance

Fiscal issues related to the energy market

The Ministry of finance is in charge of what is called "Budget Bill" the annual document approved by the Parliament specifying the fiscal terms of all economic and social activities including the prices of the domestic energy market, and the levels of the various types of taxation.

Subsidies, incentives are introduced by the Ministry in charge of energy, to encourage energy efficiency and conservation projects, and to encourage the development of renewable energy projects. It is often requested by the institutions in charge, discussed with the Ministry of Finance and passed to the Parliament for approval.

Electricity and energy products prices are covered by the Budget Bill. The interest rates or fiscal waivers on certain energy products or goods (environmentally friendly technologies for example) are also considered in the Budget Bill.

The Ministry of Finance coordinates with the Ministry in charge of Energy to determine a compromise between the necessary fiscal revenue for the State Budget and the necessary economic viability of the projects and companies operating in the energy sector.

The "Budget Bill" is proposed to the Parliament and passed as a Law.

Prices of energy products

In the course of a fiscal year, social or economic events may bring the Government to decide on a price variation for energy products especially for oil importing countries at times of sharp increase in the international prices, thus impacting heavily the price of electricity or the petroleum products in domestic market.

The Ministry of Finance and the Central Banks are obliged to reconsider the budget deficit, the measures to mitigate the negative impacts of the international energy prices on the general public deficit.

Financial authorizations for energy projects funding

The utility companies often seek loans from the international financial market place. The Ministry in charge of energy coordinates the request with the Ministry of Finance and organizes the sovereign loans based on the overall ability and eligibility of the country to borrow from international sources. In some cases sovereign loan is not required when the utility company is financially wealthy; it can borrow from the international market under market conditions with applicable guarantees.

3.3. Public Utilities in charge of power generation, transmission and distribution

In OECD countries , there are many models that moved from the National Government managed utilities of the 50's to companies with Government majority shareholder (France, UK, Denmark, etc.) or owned and managed by the private sector (USA, Nigeria, etc.).

In West and Central Africa most of the francophone countries have followed the model of EDF (Electricité de France) who has actually created the national utilities with laws and regulations drawn directly from the French electricity laws and regulations as well as technical standards. In the English speaking countries such as Ghana and Nigeria the British system was applicable. In Portuguese speaking countries (Cap Verde, Guinee Bissau) the Portuguese system was applicable while in Equatorial Guinee the Spanish system was applicable. These systems are different in terms of legislation and standards (what is applicable in one system does not apply in the other one)

Nevertheless, all of West and Central African utilities have suffered during the last three decades from political instability, lack of resources, and lack of capacity in addition to a growing electricity demand that need to be met.

The role of the utility company was mainly to generate electricity, transport it and distribute it to its end users. The utility normally owns all the related infrastructures and is responsible for their maintenance.

The utility company projects are generally financed through sovereign loans in developing countries. The infrastructure projects are implemented on the basis of turn-key contracts or in some relatively advanced countries (North Africa, and South Africa) implementation is based on EPC contracts (Engineering and procurement contracts).

When utility companies go for loans, the way to pay back the projects is based on electricity sales. However, quite often, electricity prices are heavily subsidized by the Government and the utilities face serious financial difficulties that jeopardize their ability to provide sufficient funds especially for maintenance of the equipment (generation, transmission and distribution equipment including the grid and sub-stations and transformers). They also face huge commercial and technical losses.

3.4. EnergySectorRegulator

The presence of a Power Sector Regulation Authority (PSRA) is necessary to organize the energy sector and to face the complexity of a multi-operators environment. It is also in charge of developing technical norms and standards in the power sector, and carrying out various studies related to the

sector. In many countries of Sub Saharan Africa, the regulator is in charge of providing licenses for new companies to be created and for projects to be developed such as renewable energy projects. It also overlooks the electricity code and plays the role of "arbitrage" between the various electricity sector stakeholders.

To carry out its mission, the regulator needs to be independent, and shall have its own human and financial resources. However this is not always the case especially in countries where this organization is newly created or where the financial resources are not sufficient to develop this organization properly.

In West Africa, several countries have set-up their regulator (Togo with ARSE (Autorité de Régulation du Secteur de l'Electricité), Ghana with the Energy Commission of Ghana and Nigeria with NERC (Nigerian Electricity Regulatory Commission)).

NERC is the most developed in Sub Saharan Africa (see. http://www.nercng.org/index.php/about-us/goals-and-objectives). Its main goals and objectives are:

- Guaranteeing the provision of uninterrupted electricity
- Ensuring Private sector participation
- Protecting consumers
- Ensuring fair regulation

4 Power sector de-regulation

Phase 1: Privatizing production and opening up to independent power producers

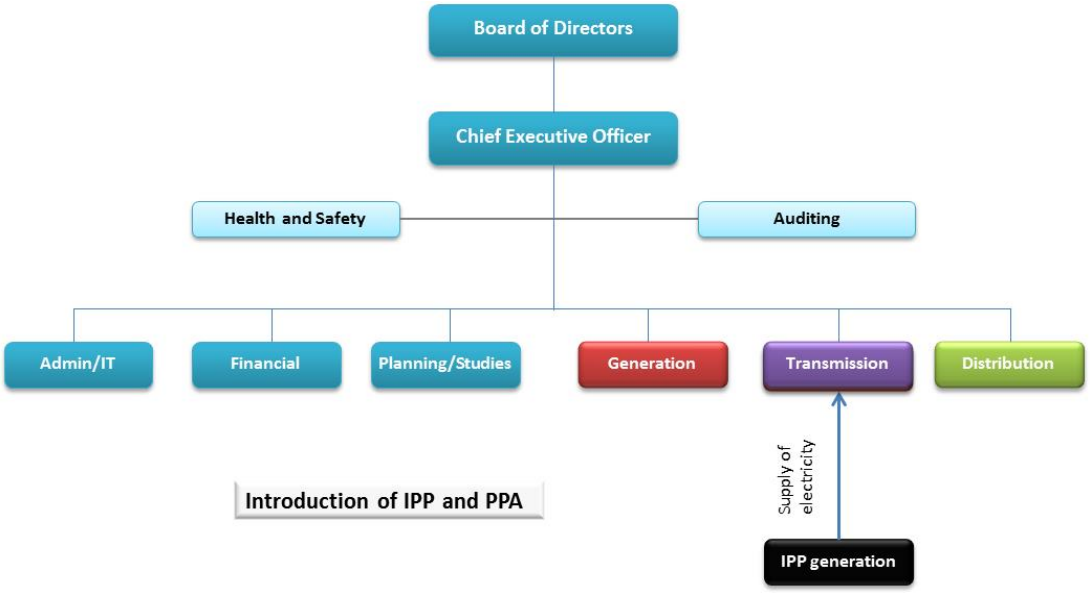
To face the financial difficulties of the utility companies and the duty to continue building infrastructures necessary to cope with increasing electricity demand in developing countries, many Governments have decided to open up the generation to Independent Power Producers (IPP).

Obviously, this profound change in the production style supposes profound reforms of the energy laws and regulations. Among the main reforms, we have the end of the monopolistic position of the utility company in power generation. However, the Transmission and distribution remain among the activities on which the utility company has the exclusivity.

The Independent Power Producer (IPP) will provide full turn-key power plant. It will sign a Purchase Power Agreement with the utility company (PPA), by which the electricity generated will be sold to the utility company at a predefined price.

The challenge faced in this case is related to the various models that are available depending on the financial set up and the various risks.

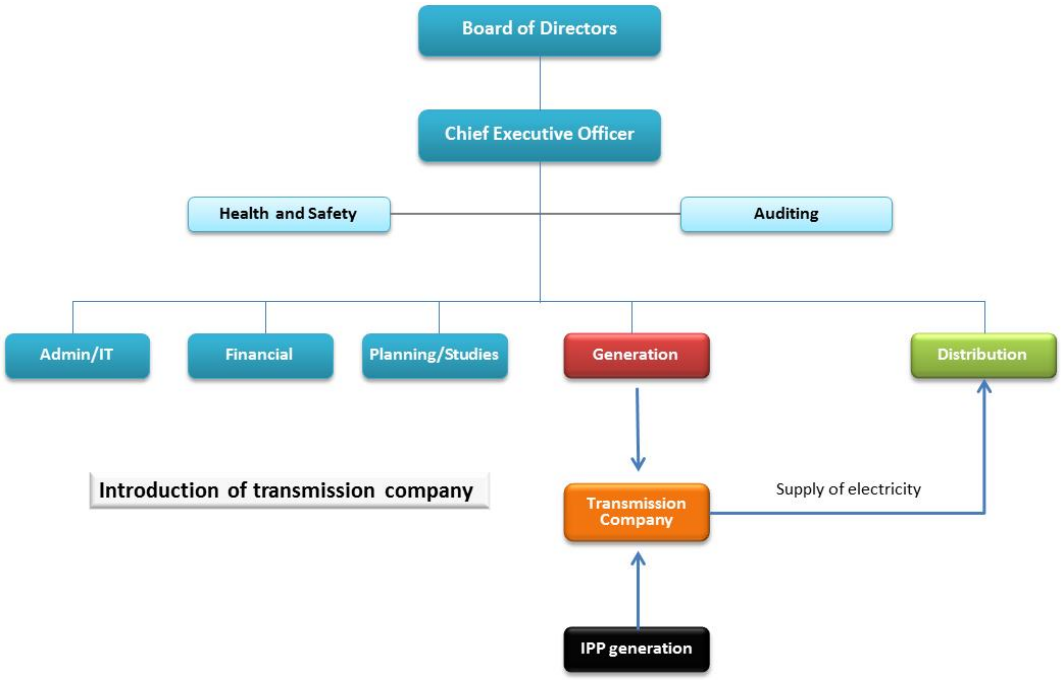
IPP concepts are discussed among the Ministries in charge of energy, industry and finance. It is proposed for the Government approval and in some countries it is subject to Decree law.



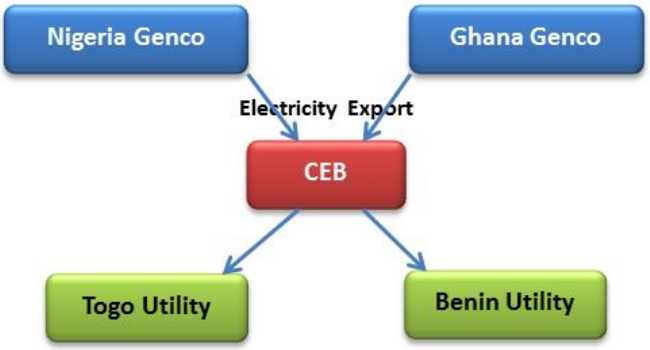
Phase 2: Privatizing the transmission system

In many developing countries deregulation of the power sector goes beyond power generation towards separation of transmission and distribution activities. This activity is then entrusted to a new operator called Transmission system operators (TSO) in charge to operate the high-voltage transmission grid through which energy is channeled over longer distances e.g. from production plant to a distribution grid.

They are also normally in charge of interconnectors, i.e. the cross-border connections to other countries and of cross-border imports and exports. This implies additional reforms of the law to be introduced by the Ministry in charge of energy. All producers including utility company and the IPPs use a new transmission company to supply electricity to the grid.



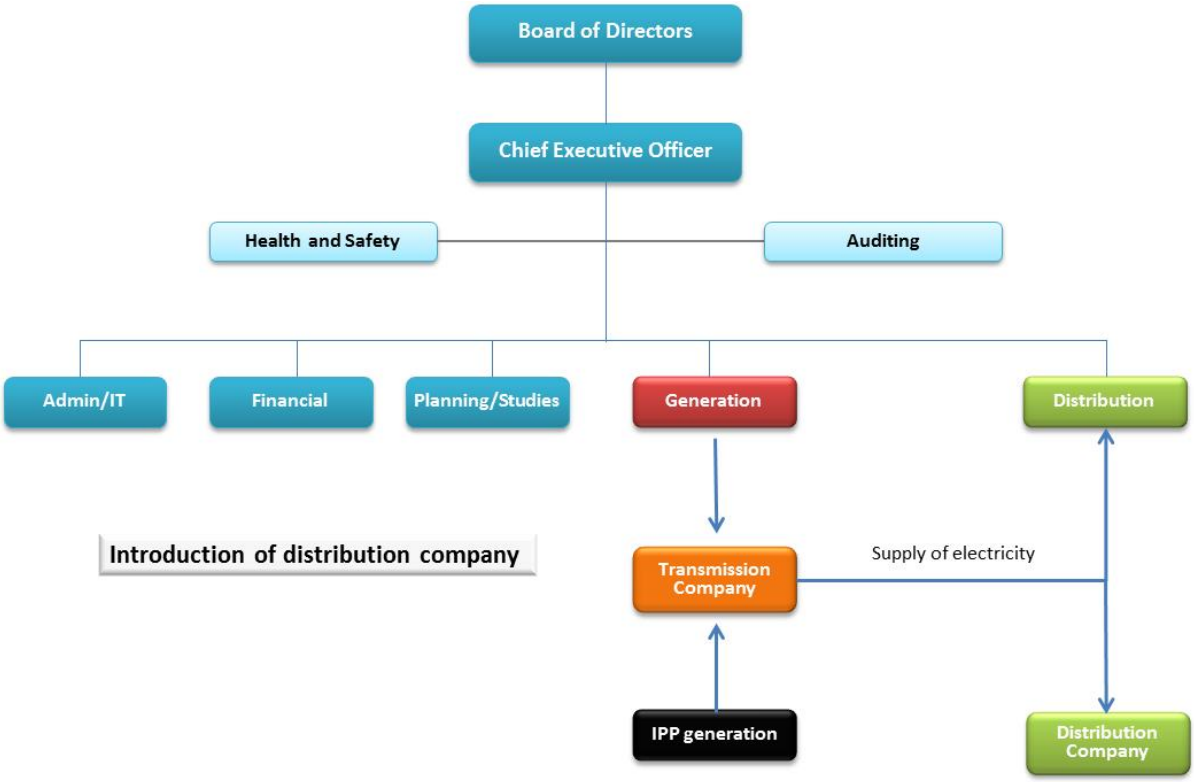
This is the case of the CEB (Communauté Electrique du Benin) that operates in Togo and Benin at the same time under the "Benin-Togo" electricity code.



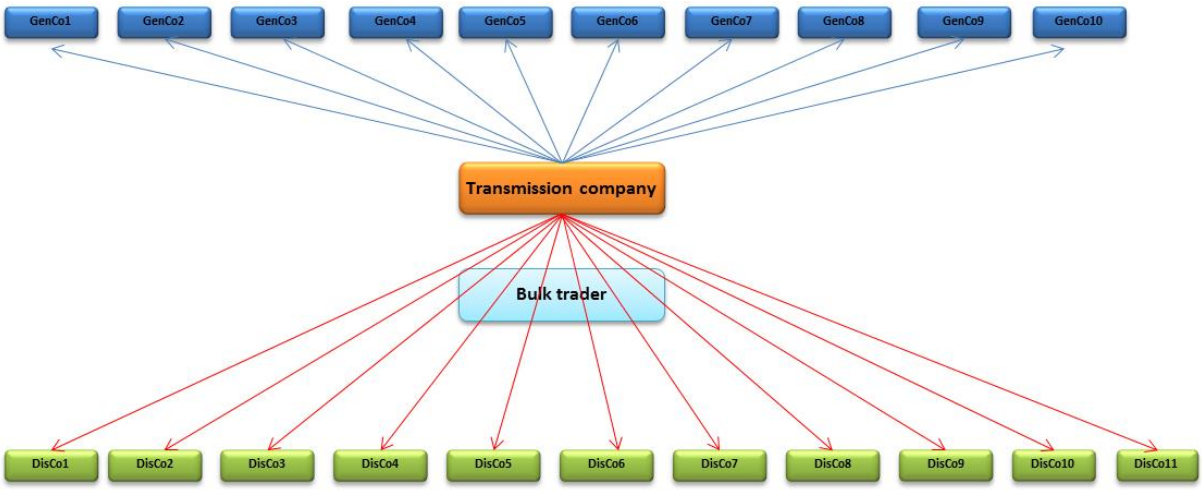
CEB is in charge of importing electricity through interconnections with Ghana and Nigeria. It is also in charge of the transmission systems in Togo and Benin. This arrangement is unique in West Africa. However the electricity supply security is heavily dependent on the availability of excess power in the neighboring countries. The Governments in the Togo and Benin are considering profound restructuring of their power sector and common code in order to improve the levels of security of supply.

Phase 3: Privatizing electricity distribution through local concession

In order to improve the electricity supply, some Governments choose to open the electricity distribution to the private sector participation. This implies that the new distribution company the additional profound reforms of the electricity law, thus authorizing other operators to operate in the field of electrical energy distribution. The challenges in this case are linked to the organization of the flows of energy and the prices of the distribution services to be provided to the generation companies. A tremendous amount of coordination is required to have a successful competitive electricity market.



The ultimate case in Sub Saharan Africa is Nigeria with a total of 11 Distribution companies, one transmission company and 10 Generation companies including 4 IPPs as illustrated in the graph below.



Complexity of the Nigerian unbundled power sector (source: TAF)

The Generation companies produce electricity, the bulk trader purchase the electricity on the basis of a purchase power agreement (PPA). The bulk trader sells the same to the Distribution companies on the basis of a specific PPA. All prices are decided by the NERC (Nigerian Electricity Regulation Commission). This particular case is not considered so far as very successful due to the Government ownership of the Bulk Trader, still some shares in the Discos.

5 Institutions in charge of rural electrification

The institution in charge of rural electrification is under the responsibility of the Ministry in charge of energy. As rural electrification is expensive (new connection cost can easily reach 1,000 USD when close to the grid, and much more when the electricity is derived from mini-grid projects). This activity is not most of the time profitable (the purchasing power of the rural population is limited) and therefore needs to be subsidized. Donors' assistance is crucial to launch concrete projects to provide rural communities with the initial electrification programs (World Bank, GIZ, USAID, JAICA, DANIDA, CIDA, etc.). We talk often about pre-electrification as part of rural master plans for rural electrification (solar lamps, or rechargeable batteries to have the minimum level of light) in areas with little chances of being electrified in the medium and longer term. Strategy and action plan are also needed to set-up priorities and identify the investment required. In some countries, rural electrification funds have been set-up to fund rural electrification programs. The financial resources come from Government grants and donors.

The module dedicated to on-grid rural electrification presents various business models of rural electrification involving the private sector, although it is very difficult to secure the private sector interest in this category of projects.

6 Institutions in charge of energy conservation and efficiency

The concept of energy efficiency is related to the technology aspects when producing and consuming energy. Using efficient technologies in the industrial sector, the transport sector, the power generation, transmission and distribution, the household appliances, and the building sector lead to reducing the level of energy consumption per capita or per unit of GDP. This concept is called energy intensity. Economies are considered more energy efficient when their energy intensity per unit of GDP (Kg of Oil Equivalent/$) is lower.

The importance of this factor has justified in many countries the creation of specific institutions in charge of energy conservation and efficiency.

7 Summary table presenting the main actors according to the type of electricity sector organisation

Main functions	Monopoly of the public sector in the electricity field	Partly privatised generation (Phase 1 of liberalisation)	Privatised generation and Transmission (Phase 2 of liberalisation)	Privatised generation, transmission and distribution Phase (3) of liberalisation
Legal framework	Ministry in charge of energy	Ministry in charge of energy	Ministry in charge of energy	Ministry in charge of energy
Energy fiscal policy	Ministry of Finance	Ministry of Finance	Ministry of Finance	Ministry of Finance
Power sector regulation	Ministry in charge of energy or National Regulation Authority	Autonomous regulator body	Autonomous regulator body	Autonomous regulator body
Electricity generation	National utility company	Independent Power Producer (IPP), and National Utility		
Electricity transmission	National utility company	IPP and National utility company	Private Transmission company that takes over from the National utility company	
Electricity distribution	National utility company	IPP and National utility company	IPP and National utility company and Private Transmission company	Private Distribution company
Mini-grid	National utility company	IPP and National utility company	IPP and National utility company and Private Transmission Company	Private Distribution company
Rural electrification	National utility company Or/and Rural electrification agency			
Energy efficiency	National utility company Or/and Agency for energy efficiency and conservation as part of the maintenance programme and demand side management	IPP as part of its maintenance programme	IPP and Transmission company as part of maintenance programme	Private distribution company as part of their maintenance programme
Renewable energy promotion	Ministry in charge of energy as part of the Government energy policy.			
Examples	**Algeria, Togo, Benin, Saudi Arabia,**	**Côte d'Ivoire, Nigeria, Togo, Morocco, Tunisia**	**Nigeria**	**Industrialized countries**
Advantages	Access to concessional loans thanks to the Government guarantee. This allows lower production cost - Can better target investment in the interest of the population - Use the electricity sector as a development tool	- Private sector is more appropriate to daily manage electricity generation - Private sector has more capacity to mobilise funds	- Possibility to attract private investors to develop the transmission grid - Management of the grid could become more efficient	- -Higher competitiveness that could impact positively the service quality and sometimes the prices of energy

Disadvantages	- risk of poor governance - investment may be politically oriented - risk to be financially weak - Lack of autonomy in the management of the sector	- Price of kWh produced by the private sector is often higher than the public sector - -Long term commitments to pay high electricity rates (in general take or pay formulas) may be very costly to the final consumers/Public finances.)	- Complete deregulation and losses in terms of public services(for non- economically viable activities be it grid extension) - The transition to private power market may be too long and too complex in terms of regulation and difficult to manage. - Transmission is a key function in the sector and naturally stays under the responsibility of the public sector for as much as possible	- Difficult to manage as there are many key players. - Rural electrification is costly and not very profitable and therefore doesn't attract private investors, pushing Governments to more subsidies

8 List of key questions

- At what stage of privatisation is the country
- What will be the added value for the country to privatize power production, the transmission and distribution sectors?
- How the Government will benefit from the privatisation of the power production, transmission and distribution sectors?
- What is the role of the regulator of the power sector?
- Does the privatization impacts positively the promotion of renewable energy?
- Does the privatization of the power sector impacts negatively the rural electrification?

9. Useful references and links

- Electricity Sector Reform in Developing Countries: An Econometric Assessment of the Effects of Privatisation, Competition and Regulation https://dspace.lib.cranfield.ac.uk/bitstream/1826/4101/1/Electricity_sector_reform_in_developing_countries.pdf

- Reforming Power Markets in Developing Countries: What Have We Learned? http://siteresources.worldbank.org/INTENERGY/Resources/Energy19.pdf

- Road map for power sector reform in Nigeria. Presidential Task Force http://www.nigeriapowerreform.org/content/Roadmap%20for%20Power%20Sector%20Reform%20-%20Revision%201.pdf

- Electricity Supply Industry Reform Strategy and Roadmap 2014 – 2025 in Tanzania http://www.gst.go.tz/images/TANZANIA%20ELECTRICITY%20SUPPLY%20INDUSTRY%20REFORM%20STRATEGY%20&%20ROADMAP.pdf

- Making Africa's power sector sustainable, UNDP http://www.un-energy.org/sites/default/files/share/une/powersectorreport.pdf

- Energy law and regulations, The world Bank http://ppp.worldbank.org/public-private-partnership/sector/energy/laws-regulations

- Energy sector policy, laws and regulation in Kenya https://books.google.tn/books?id=ieKNBQAAQBAJ&pg=PA163&lpg=PA163&dq=Legal+and+regulatory+framework+for+the+energy+sector&source=bl&ots=l8L9gd6dn1&sig=NAV82tzVQmZsthpIQYipFHvrsmA&hl=fr&sa=X&redir_esc=y#v=onepage&q=Legal%20and%20regulatory%20framework%20for%20the%20energy%20sector&f=false