

The Problem of Electric Power in the Face of the Development of the Great Katanga

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Abstract: *Katanga is located southeast of the DR CONGO, it is a real castle dominated by a steep slope, whose rivers flow from the South, towards the North in the direction of the central basin, these streams are dotted with falls and rapids allowing him to have a rich hydropower potential reinforcement distributed throughout the region. Its installed hydroelectric power is 504MV (SNEL, 2014) so the current production is MVA is% of its installed capacity. It should be noted that the average electricity consumption is 344 Kwh per inhabitant per year, while that of Sub-Saharan Africa is 534.5 Kwh / Hab / year (PROPARCO, 2013), while the electricity deficit is 500MMW (Ministry RHE RD Congo, 2014) due to the lack of energy policy in our country. Indeed, the increase in electricity production is an essential indicator of economic development, which is synonymous with the improvement of the quality of life and wealth creation (observed, 2013), underlining that in DR CONGO the LAW N° 14/011 of 17 June 2014 RELATING TO THE ELECTRICITY SECTOR dedicated to the effective liberalization of the electricity sector still does not attract investment in this sector until today.*

Keywords: Energy Issues, Energy Deficit, Hydroelectric Generation, Energy and Development Potential

1. Introduction

The proliferation of the metallurgical industry, economic growth as well as population growth in the Democratic Republic of Congo in general and in Katanga in particular are not without consequences on the demand for electricity on the hydroelectric production network of the Société Nationale d'Electricité (SNSEL acronym), whose state of disrepair of its basic infrastructure does not say its name. Indeed, Katanga is one of the world's regions on the rate of access to water and electricity remains the lowest, while it is no secret that access to these energy resources is among the objectives. millennium for development.

Currently, the world is turning to renewable energies to significantly reduce the emission of greenhouse gases. Katanga has a rich hydroelectric, photovoltaic, wind, nuclear and thermal potential, Will be able without constraint to launch the development of the bankable projects and their realization in order to answer the needs in electricity whose access rate is very low.

In order to achieve this, we intend to address the issue by reviewing: hydroelectric and photovoltaic generation, installed hydro capacity, available power and deficit. Finally, we will fall by the (discussion) analysis and interpretation of the result of our research in addition to the presentation of the law on Electricity in R & D. Congo.

2. The Problem and context of the study

The proliferation of the metallurgical industry, economic and population growth in the Democratic Republic of the Congo in general and Katanga are not without consequences on the demand of electrical energy in medium, high and very high voltage network. National Electricity Company (SNEL), whose infrastructures are aged and others in state of despairing can no more satisfy the load demand. Katanga is one of the regions in the world where access to water and

electricity remains the lowest, while it is well known that access to these energy sources is one of the millennium goals for the development. From these facts we wonder if:

- 1) Will Katanga's current energy infrastructure meet the growing energy demand?
- 2) There is a national energy policy that can boost this sector, which, moreover, is in high demand.
- 3) Are there alternative energy sources that can be added to those we currently using?
- 4) Will Katanga be able to develop without access to enough electricity?

3. Objectives and hypothesis

In order to solve this puzzle; we proposed ourselves:

- a) Make the state of place of the energy situation of Katanga;
- b) Raise its energy deficit;
- c) Compare it to other parts of the world;
- d) To highlight the fact that energy efficiency is not implemented as well as initiated by the authorities of the former Katanga province;
- e) Review legal texts on electricity in our country D.R.Congo; and finally,
- f) Discuss decentralized energy resources (renewable energy).

Geographical Situation of DR Congo

DR Congo our country is located in the center of Africa and is part of sub-Saharan African countries. Its area is 2,345,000 km² (*Ministry of the DRC plan, 2005*) for a population of 71 million inhabitants in 2014 (*Ministry of RHE DRC, 2014*) with an average electricity service of 9.43% (*RHE DRC Ministry, 2014*), one of the lowest in the world and sub-Saharan African countries.



Figure 1: Map of DR Congo before October 2015
Source: *Katanga Province, 2007*

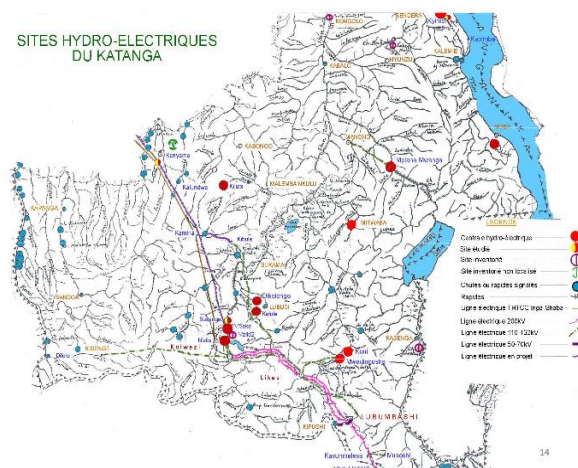


Figure 3: Hydroelectric sites in Katanga
Source: *Katanga Province, 2007*



Figure 2: Map of Katanga after Oct.2015
Source: *R.D.C, Information Note, Jan 2016*

The geographical location of Katanga Province; not long time ago Katanga Province was one of the eleven provinces of DR Congo (Figure1) before October 2015 where it was broken into four new provinces (Figure 3) from the dismemberment law of October 2015 namely: Upper Katanga, Haut Lomami, Lualaba, and Tanganyika. It was located in the south-east of R.D. Congo and its capital was the Lubumbashi copper city, said "Wantanshi" is the first. Its population of around 8 million inhabitants (*Province of Katanga, 2007*) in 2007 and 10.384.000 inhabitants (*Ministry of RHE DRC, 2014*) in 2014 with a service in electricity of 5.64% (*RHE ministry DRC, 2014*) and an area of 496,877 km² (*Ministry of the DRC Plan, 2005*). It borders four former provinces namely: South Kivu in the North-East, Maniema in the North-West, and the two former Kasai provinces in the North-West. It is an international border with 3 countries including: Tanzania to the East via Lake Tanganyika; Zambia to the South and Angola to the Southwest. This position allows it to make a rich exchange not only energy, but also commercial, economic, cultural, scientific, etc., both at national and international level (Figure 1).

The total installed power in Katanga is estimated at 504 MW for a production of 312,56MW or 62.02% of electricity produced against 344.38 MW in 2010 or 68,33% it emerges a significant improvement of 6,31 % over two years. The average production (consumption) of electricity is 344 Kwh per inhabitant per year. This value is higher than the national average (181.77 kWh / year) but it is lower than that of sub-Saharan Africa which is 534.5 kWh / inhabitant / year while the latter is the lowest of all regions of the world. It is observed an uneven distribution of electricity production resources, with a negative impact on the development of these different geographical zones which are in reality new provinces resulting from the territorial division where the distribution of the electrical energy is more or less well distributed. This explains the lack of energy policy in D.R.Congo in moment where it is facing the challenge of the Millennium Development Goals.

Admittedly, the development of a region or a country passes by its industrialization, supported by a good quality and a good amount of electrical energy. So, faced with this situation, we wonder if the current network of production, transmission and distribution of electricity in the Great Katanga will be able to satisfy it.

We are aware that human civilization is based on the use of energy to live in one's home, to work, to move, to transport, to inform oneself, to train oneself, etc.

The increase in global energy consumption is plus or minus 3% per year, and as the world population increases in about the same proportion, it follows that the average consumption per individual remains the same or hardly change.

This is paradoxical to the situation in sub-Saharan African countries, where demand for electricity is increasing sharply, mainly because of economic growth and the lack of electricity access policy, as production capacity has only increased since the 1990s. Currently only 30% (*PROPARCO, 2013*) of the population in sub-Saharan African countries has access to electricity compared to 80% (*PROPARCO, 2013*) in the world. It is true that the economy of many African countries is highly disrupted and

paralyzed by the quality and quantity of available electricity and the D.R.Congo or even Katanga is no exception. By just observing around the country, the load shedding and indescribable fluctuations on the low, medium and high voltage networks in residential and industrial districts of the DRC in general and Katanga in particular, no sector of life is spared and this, with the effects of training including; damage to appliances and / or equipment sensitive to all levels; shutdowns and production losses in industry, premature deaths of patients in hospitals, the expiry of pharmaceuticals and those of good that must be kept in cold rooms etc.

Katanga Energy Deficit

The energy deficit is one of the main causes of underdevelopment and poverty in Katanga, it was estimated at nearly 500 MW (*Ministry of RHE D.R. Congo, 2014*) it is caused by:

- The immobilization of the machines of the production parks
- Limiting the transportation of electric power on the Inga-Kolwezi line
- Increased demand by the mining industry
- Absence of integration of the electricity demand in the investment program of the mining operators.
- Absence of serious energy policy
- Strong demographic growth

Electricity production in the world

Since the industrial revolution, global energy consumption has steadily increased. It more than doubled between 1973 and 2013 (*World Resources and Energy Consumption Wikipedia, 2014*) in forty years.

Table 2: Rates of access to electricity in some countries and regions of the world

Country / region	Electricity access rate	Population without electricity
world	80%	>1300
Africa	34,3%	1 million
North Africa	97%	
Sub-Saharan Africa	30%	585,2
RD Congo	9,43%	60
South Soudan	1%	9,3
Morocco (Tunisia)	97% (99,5)	
Senegal	42%	7,3
Ethiopia	22,5%	64,5
Tanzania	14%	37,7
Zambia	18,8%	10,5
IvoryCost	47,3%	11,1

Source; *Word Energy Outlook 2011*

Note that all these charges are fully supported by the customer (subscriber) himself, and even if the customer (subscriber) would be compensated, the final situation would always be the same, that is to say there will have partial or complete paralysis of productive activities in Katanga. The ideal is therefore to compensate the customer but to maintain the balance between demand and production.

It should be noted that, according to estimates, nearly 7000 MW (*PROPARCO, 2013*) should be added each year to the African power grid over the period from 2005 to 2015 to

meet the unsatisfactory demand and strengthen the production capacity, this implies an investment of 40 billion dollars a year, which corresponds to 6.5% of Africa's GDP. Until 2013, capital expenditure on electricity was estimated at \$ 4.6 billion a year, or 11.5% (calculated) of annual forecasts, of which 50% is covered by public resources.

Energy-development

Electricity generation, a development indicator to be handled with care. Electricity is a critical factor for economic development in every country in the world. Its relative importance increases with technical progress, industrialization and the need for modern comfort. The increase in production is synonymous with improved quality of life and wealth creation (*observe, 2013*). The production of electricity reduced to the number of inhabitants as shown in Table 3 is therefore a good indicator for measuring development gaps between different regions of the world.

Katanga produces an average of 344 kWh. hab./year, whereas the region of the world to which it belongs produces on average 490kwh / hab./ year. Note that this last is the lowest production of all the regions of the world, which means that Katanga is in bottom of the threshold minimum electricity production in the world.

Table 3: Electricity production per capita in 2012 in the regions of the world

N°	Regions	kWh/hab./an	kWh/\$	TCAM 2002-2012	TCAM / unité de PIB
1	North America	14167	0.33	-0.3	-1.1
2	Central America	1992	0.2	2	0.5
3	South America	2742	0.26	3.3	-0.1
4	North Africa	1771	0.28	4.7	2.1
5	Sub-Saharan Africa	490	0.23	0.3	-2.4
6	Western Europe	6646	0.24	0.1	-0.5
7	Central Europe	4411	0.28	0.3	-2.6
8	Community of Independent States	5448	0.49	1.8	-3.1
9	Middle East	4385	0.37	3.6	1.5
10	South Asia	781	0.25	4.3	-1.4
11	East and South East Asia	9400	0.38	6.6	2.1
12	Oceania	8156	0.32	-0.7	-1.8

It should be noted that the differences in per capital of electricity production does not only reflect income disparities they also reflect differences in the level of electrical content of economic growth. (the amount of electricity needed to produce unit of GDP).

Whenever in the world, it takes on average 0.32 kWh to produce dollar value added. This figure has remained relatively constant over the last decade.

Energetic efficiency

This concept is almost new to us, but it is of great importance that it will be necessary to speak about it. Energy efficiency refers to using less energy than before to provide equivalent energy services (*Intelligent Energy, 2013*). It should be noted that man needs energy to live but now he has become expensive sometimes an over budget, regardless of the sector of activity, whether it is the

appliance or the industry through the commercial. It will be remembered that the authorities of the former Katanga Province had proposed the use of economic lamps instead of incandescent lamps, in order to reduce the consumption of electricity in the residential sector. This had been favourably heard and applied in some districts of the city of Lubumbashi, with the consequence of reducing the frequency of untimely load shedding.

Electricity Act in D.R. Congo

The right to decent housing, the right of access to drinking water and electricity are guaranteed. The law lays down the procedures for the exercise of these rights (*Constitution of D.R. Congo Article 48*)

The legislator of D.R. Congo has adopted a new law relating to the electricity sector **LAW No. 14/011 OF 17 JUNE 2014 RELATING TO THE ELECTRICITY SECTOR**, which declare to the effective liberalization of the electricity sector; the promotion and harmonious development of electricity supply in urban, peri-urban and rural areas; to cover the electricity needs of all categories of consumers with quality supplies and in compliance with safety and environmental standards; the creation of the institutional framework and the economic conditions allowing the realization, the security and the profitability of the investments in the electricity sector as well as the national energy emergence in a mode of partnership and finally the guarantee of a fair competition between operators and respect for the rights of users.

It should be noted that this law does not apply to plants with an installed capacity of less than or equal to 50 kW and intended for non-commercial use; speech distribution facilities and facilities for scientific research and state security.

It is true that this law is favourable to a massive influx of investors in the electricity sector but it is clear that the investments have been coming since its promulgation in June 2014. Note that this law is not known by Congolese and even intellectuals and indeed many intellectuals confuse liberalization with the privatization of a sector of economic activity.

Environmental consequence of the lack of electricity

It has been observed that with declining forest resources in biomass due to the rapid growth of demand for wood and charcoal the accessibility and reliability of electricity supply. Given the variation in forest cover based on forest resources, taking 1990 as a reference point, there is a decline of nearly 4% in forest resources (*Weo, 2011*).

4. Conclusion

In view of the above, Katanga produces very little electrical energy (344kwh / hab./year) compared to other parts of the world, and this value is lower than that produced in sub-Saharan Africa (490kwh /hab./year). It therefore produces little good and service compared to the world's poorest region (S.S.A), but requires little electricity to produce a unit of wealth (0.23kwh / \$) .This situation has accelerated the decrease in resources almost 9 million people have no

access to electricity. We can therefore say that the Katanga development involves the rehabilitation of existing electricity generation infrastructure and the construction of new clean energy production infrastructure or decentralized renewable energy while integrating energy efficiency and the liberalization of this sector in the image of the Ivory Coast without which "the development of Katanga would be a utopia".

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