MODELLING FUTURE PRODUCTION, PROCESSING AND TRADE IN TRANSMISSION POLES IN KENYA AND EAST AFRICA.

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1.0 A Overview

In the forest sector the demand for transmission poles has witnessed one of the fastest growths in the last 10 years. Due to current high demand for transmission poles due fast expansion of electricity distribution in the country hundreds of farmers and many companies have invested heavily in the pole production enterprises. The increased investment into Eucalyptus enterprises for production of transmission has been largely attributed to the high returns (Cheboiwo and Langat, 2008). There have been some fears that the fast growth in the treatment capacity may result in oversupply and loss of fortunes. KEFRI thus decided to carry out studies to evaluate the potential demand for the transmission poles in the country and trade opportunities in the East African Community. The results of the study indicate that the transmission poles sector processing capacity grew from 8 plants in 2008 to 17 by 2011 and the installed capacity expanded from 480,000 to over 1,000,000 in the same period. The combined annual demand for transmission poles by KPLC and REA in 2010 was 480,000. KPLC projects energy demand to grow by 25% per year but due to limited investment in electricity generation the annual demand for poles by KPLC and REA is likely to expand by less than 10% to 720,000 by 2015 that may not be sufficient to absorb the expanded production capacity in the treatment sector. Tanzania has 7 treatment plants in operation with annual capacity to treat 345,000 in 2011 surplus being exported to Kenya. Uganda has 5 treatment plants with annual production capacity of 250,000 pieces sufficient for domestic market but also targeting export opportunities in Kenya. The export opportunities in the East Africa region are low due to stagnation in electricity production that is unlikely to change in the short term and the shortage of raw poles to match installed capacities. However, there are vast opportunities in the diversified market niches that include products mixes to include fencing poles, timber seasoning and exploration of emerging markets such as those of Southern Sudan.

1.1 Purpose

The project is to develop a model to project future scenarios for production, processing and trade in transmission poles in Kenya and within East Africa.

1.2 Outputs

The expected outputs are development of a projection models and future supply/demand and trade scenarios for transmission poles in Kenya and East Africa.

1.3 Methods and Materials

The study involved collection of data on production, processing, and consumption of transmission poles in Kenya and East Africa. The data was collected from key players in the production, processing and consumption of transmission poles in EA region. The key stakeholders in Kenya interviewed were Kenya Forestry Service (KFS), Kenya Power and Lighting Company (KPLC), Rural Electrification Authority (REA) and 12 treatment plants in the country. The study involved desk top reviews of available literature, interviews with key institutional officials, treatment plants. Some field appraisals were conducted in selected sites to confirm and enrich the existing information. The institutions visited include various Kenya Forestry Service (KFS) offices, Kenya Forestry Research Institute (KEFRI), Kenya Power and Lighting Limited (KPLC), Rural Electrification Authority (REA), Kenya Bureau of Statistics (KBS), Kenya Plant Health Inspectorate Service (KEPHIS), Tim Sales Ltd, Comply Ltd, and various transmission poles treatment plants.

2.0 Study Results

2.1 Electricity generation in East Africa Community.

2.1.1 Electricity generation in Kenya

Electricity generation and distribution in Kenya is vested in three institutions Kenya Power (KP), Kenya Electricity Transmission Company (ketraco) and Kenya Energy Generation Company (KENGEN). Table 1 shows that the power generation capacity in the country between 2000 and 2008 grew from 4,178MW to 6,460MW (GOK, 2009). Similarly the maximum demand grew by an annual average of 9% from 850 in 2005 to 1,300MW in 2011 against the installed capacity of 1412MW (www.kengen, 2011) . The dominant sources of power were hydropower (50%), oil (33%) and geothermal (16%). According to KPLC the total households connected with electricity by 2011 were 39% of the total households that is projected to grow to 40% by 2030. The demand for electricity is expected to grow by 10% according to Vision 2030 projections. Thus the growth rate of power notwithstanding the shortage of finances for infrastructural will be highly correlated to the power generation expansion capacity growth. KPLC projects electricity demand to annually grow by 25% that may not be matched by the dismal growth in generation capacity within the short term. The country has almost exhausted its hydropower potential and now putting more hope in the geothermal sector that currently contribute dismal 13% of the country generation capacity. The Geothermal Development Corporation has outlined ambitious

plans to the estimated potential capacity of between 4,000-7,000MW in the Rift Valley region. However, the current annual investments in the sector is projected to add between 5-50MW per year. GDC projects that it will need Kshs 88 billion ($1.02 billion) to realize its target of 4,000MW by 2030 that remain long shot given that 2,000MW that was projected to be in operation by 2014 has remained a mirage.

Thus the demand for transmission poles will be highly correlated to the power transmission expansion that depends on availability of power funds to finance power generation and the distribution infrastructure in the country. The power generation in Kenya is highly constrained hence will remain the key determinant in investing into transmission infrastructure including power transmission poles. The population factor may not directly influence power distribution hence demand for transmission poles because of the already huge latent demand that cannot be met hence higher population growth with load into increasing unmet demand for power in the country. Based on the consumption rates is expected to be way below the projected demand of 25% per year and make the project the growth in the demand for power transmission poles to range from 7% to 10% inclusive of replacements within the next 10 years. The above projection takes into account the expected investments into geothermal generation facilities that may increase the available electricity power to be distributed within the next 6-15 years.

The country has also started to position itself by investing Kshs 3.7 billion in construction of power stations and power lines to tap into regional power markets including the Ethiopian Gibe I-V more importantly Give III of 1870MW to be completed in 2013 and planned Gibe IV (1472MW) and Give V (560MW) (Gilgel Gibe III Dam Wikipidia, 28th August 2011). Given that the power generation capacity in 2007 was meager 840MW definitely there will be surplus for sale to power hungry EAC countries more so Kenya. Another project is the series of hydropower projects in DR Congo including planned Grand Inga the largest touted as the largest project in Africa with an estimated capacity to generate up to 40,000MW that can power up the entire continent including the power hungry EAC countries being in the front line. However, with Inga I (351MW), Inga II (1,344MW) already undergoing upgrading their outputs may not meet the demand of DR Congo and already connected countries. Kenya may have to wait for the Grand Inga Project whose construction cost is estimated at $80 billion has raised scares among potential financing institutions and investors despite backing from World Bank due to the huge

cost involved and risks that raises doubts if it will ever be realized(www.congonforums.net,2009).

The proposed power project within East and Central Africa when realized may change our projection demand scenario for power transmission poles in Kenya. However, it will be more realistic for us to stick to current scenarios within the next 5-10 years. The construction and upgrading of power lines in readiness for tapping into the regional power markets will enhance uptake of the transmission poles in the country.

Table1: Power generation capacity and available power distributed in Kenya (2000-2008).

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean
Generation capacity	4,178	4,451	4,685	4,851	5,194	5,547	5,894	6,324	6,460	
%age change	-	6.5	5.2	3.5	7	6.8	6.2	7.3	2.2	5.6
Electricity generated	3,366	3,091	3,498	3,654	3,940	4,200	4,407	4,771	5,036	
%age change	-	-0.8	13.2	4.5	7.8	6.6	4.9	13.6	5.5	6.9

Source: Source: GOK (2009). Statistical Abstract, National Bureau of Statistics and KPLC www.kplc.co.ke, 2011

2.1.1 Uganda electricity sector

Though Uganda scenario is similar to Kenya, however, its critical problem has been stagnant generation capacity that has translated into regular hostages and rationing schedules. Uganda has been only able to connect 10% of the households. Studies have shown that its needs to generate up to 2,000 MW to meet its project demand for electricity by 2025 against that current installed capacity of 300MW. The power transmission and connections that had stagnated for year is currently constrained by inadequate generation capacity more that investment in transmission infrastructure. The growth in electricity connections in Uganda will remain modest based on the existing scenario within the short term of 5-10 years. However, Uganda is endowed with water resources and is currently undertaking various hydropower generation projects that may be able to generate extra power for distribution within the next 10 years. Another factor to consider is the likely influence of oil deposit exploitation and the possibility of enhanced oil related electricity generation due to availability of cheap oil that will have knock on effect on demand for distribution infrastructure. .

2.1.1 Tanzania Electricity sector

The Tanzanian electricity power generation is dominantly hydropower based but relatively still low generation capacity that stood at 367MW in 1998 and was projected to expand by 8% annually to 2312 by 2025 on condition of sufficient funding opportunities (Mwinava et al, 2003), however, the funding for such ambitious expansion have not been realized. This is attested by the fact that by 2011 Tanzania Electricity Supply Company (Tanesco) could only guarantee 347MW against the demand of 550MW hence some imports from Uganda and Zambia was required to fill the deficit. Tanzania like the other EAC countries of Uganda and Kenya faces the same problems of high demand for power against inadequate generation capacity. Therefore it our assumption that the power transmission growth in Tanzania is likely to be modest within next the 5-10 years period that translates into low growth distribution infrastructure including the demand for power transmission poles.

2.2 Dynamics in pole production and processing In East Africa

2.2.1 Kenya transmission pole sector

In 2004 there were only 2 treatment plants in the country capable of processing 160,000 power transmission poles per year. These were Timber Treatment International (TTI) formerly East African Tannin Extract Company (EATEC) at Eldoret and Gilgil Telecommunications Industries (GTI) at Gilgil. By 2005 there were 5 treatment facilities capable of producing 250,000 treated poles per year (Cheboiwo and Langat, 2006). In 2009 there were 8 treatment plants capable of producing 450,000 treated poles per year (Cheboiwo, 2010. However, by January 2011 there were already 17 registered commercial treatment plants in the country with an estimated combined installed capacity of up to 1.5 million pieces per year and on the increase. The sector has been undergoing some rapid expansion fueled by the high demand for transmission poles by KPLC and REA. Despite such massive expansion of processing capacity, a study revealed by 2010 the demand for the power sector could not be made because most of the plants operated below installed capacities due to shortage of semi-processed poles and sometimes delays in delivery of chemical.

Table 2: List, location and capacities for treatment plants for transmission poles

Company	Location	installed capacity/yr
TTI-EATEC	Eldoret	50,000
TTI-EATEC	Londiani	40,000

TELKOM-GTI	Gilgil	72,000
Timsales Ltd	Elburgon	84,000
ComplyLtd	Nakuru	36,000
EA Cabro	Elmenteita	90,000
Typsy Timber Treatment Ltd	Eldoret	72,000
Muringa Holdings Ltd	Limuru	50,000
KUZA Ltd	Kitale	40,000
Central Imenti Cooperative Society	Meru	40,000
Murendat Timber Treatment Ltd	Nakuru	40,000
Kakuzi Ltd	Thika	40,000
Makuyu Timber Treatment Ltd	Maragua	40,000
Rosogo Enterprises Ltd	Molo	75,000
Keystone Treatment Services	Lessos	25,000

Source: Cheboiwo (2011)

2.2.1 Uganda transmission pole sectior

Uganda has been a net importer of treated poles for power transmission from South Africa and South America for a long time but within the last 10 years it has become self sufficient and currently exploring export markets. This has been because of rapid investments in pole treatment capacity in the country that has grown from zero to 5 by 2011 with an estimated annual capacity of 320,000 treated poles(Table 3). The capacity is in excess of the current demand of about 80,000 pieces per year by 2010. The Green Resources plant at Mityama, near Jinja has installed capacity of 120,000 pieces per year that exceed the country's demand with surplus for sale and hence the country have realized excess treated transmission poles within the short term.

Table 3: List, location and estimated capacities for treatment plants for transmission poles

Company	Location	capacity/yr
New Forests Company	Mityama-Fort Portal	120,000
Busoga Forest Company	Masese-Jinja	50,000

Nile Ply Pole Treatment Plant	Kakoge-Nakasongola	100,000
Fersult Ltd	Mukono-Kampala	20,000
Uganda Electricity Distribution Company	Kampala	50,000
Total		320,000

Source: Cheboiwo (2011)

2.2.1 Tanzania transmission pole sector

In 2011 Tanzania by 2010 had 7 pole treatments plants with installed capacity of approximately 345,000 poles per year (Table 4). Given its low power generation capacity and hence modest distribution investments the country produces treated poles in excess of the existing domestic demand and hence surplus is exported. This explains the reason Tanzania has remained an exporter of transmission poles into Kenya. Tanzania exports have locked out South Africa from Kenyan markets and currently exploring export opportunities in Central and Southern Africa. The development in the pole sector has been largely due to the private sector investment in plantations in Southern Tanzania mostly in Iringa area. Based on the power generation capacity above Tanzania will remain a net exporter of treated transmission poles within the 5-10 years period and its expansion will be constrained by regional markets absorption capacity.

Table 4: List, location and estimated capacities for treatment plants for transmission poles

Company	Location	installed capacity/yr
Sheda	Mafinga, Iringa	15,000
Ihembe	Mafinga, Iringa	15,000
Sao Hill Industries	Mafinga, Iringa	160,000
Tanwat	Njombe, Iringa	40,000
Lesheyal	Mufindi, Iringa	30,000
MWPT	Mufindi, Iringa	70,000
Mwijage	Makambako, Iringa	15,000
Total		345,000

Source: Cheboiwo (2011)

2.2 Transmission pole market chain analysis in Kenya

Studies done by Cheboiwo (2010) in western Kenya show that the pole treatment sector has attracted many investors in processing plants, financing, transportation, procurement and marketers. The study revealed that the services provided by the investors include logging, treatment, financing and marketing cut off 86-79% of the transmission pole delivery prices to KPLC yard leaving tree growers with between 14-23%. The entry of many players into treatments plant business has increased competition in the supply of treated transmission poles. The development is likely to drive prices down by up to 40% in the coming years from an average of Kshs 12,000 ($150) to 7,200 ($90). The price fall can only be checked by the continued shortage of semi-processed poles, availability of export markets and better bargains by tree growers. The same trends is presumed in Uganda and Tanzania

2.3 Trends in semi-processed pole prices

The supply of semi-processed poles from plantations and farms in Kenya has been on the increase due to the expanded growing of Eucalyptus in the country within the last 10 years. Studies by Cheboiwo (2010) show that the farm gate prices for semi-processed poles increased by 233% from Ksh 750 in 1999 to 2500 per piece by 2009. The remunerative pole prices have motivated hundreds of farmers and tea estates to invest commercial growing of *E. grandis* and *E. saligna* in many parts of the country mostly in Rift Valley, Central and Western provinces for production of semi-processed transmission poles (Cheboiwo and Langat, 2006). The prices for semi-processed poles from tree growers have progressively risen as some offers reached Kshs 4,000 ($50) for 180mm diameter and 12 metres length by January 2011. The prices for larger poles used in intercity electricity transfer that forms small proportion of the total demand as compared to smaller and medium distribution poles are relatively higher.

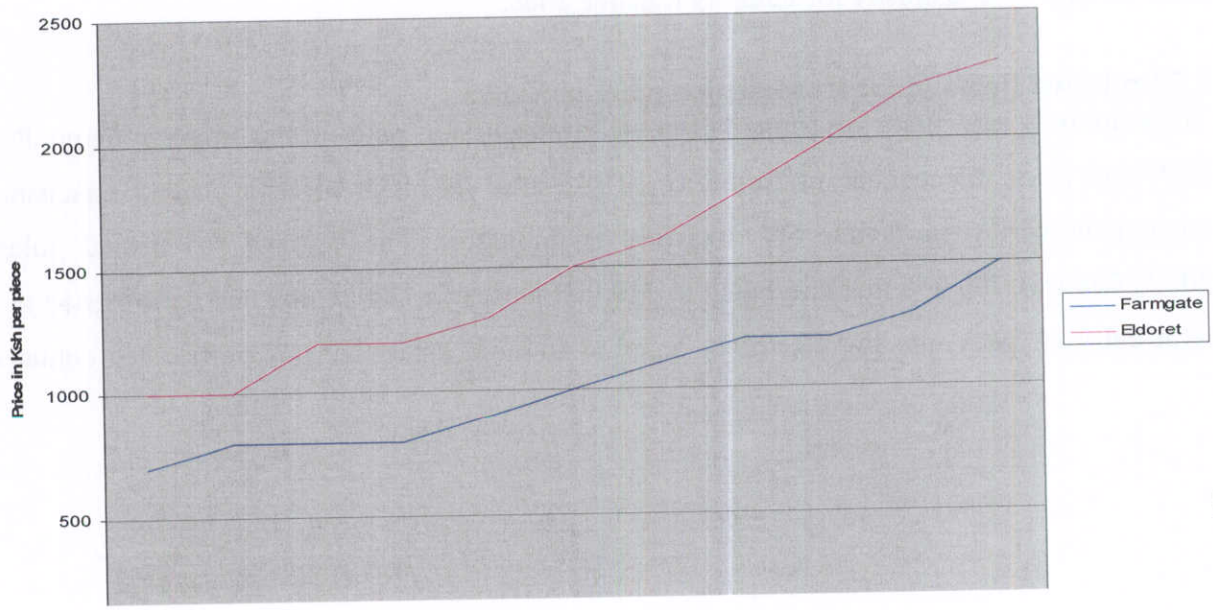

Figure 2: Price trends for semi-processed transmission poles in Kenya for 1999 to 2008.

2.4 Challenges in the sector

The sector is facing various challenges that range from high cost and shortage of inputs and competition from emerging products and increasing firms. The following are some of the listed challenges that face the transmission poles sector. The plants and processing capacity have been expanding fast that has translated into excess capacity and hence severe shortage of the semi-processed poles hence most of the treatment plants are operating below their installed capacities. The high demand for raw poles and good prices has increased investments in the growing of *E. grandis* to supply the market within the last 10 years and the pressure is likely to ease in the next few years when the recently planted poles will enter the market. The treatment plants complaint of high prices of imported treatment chemicals due falling value of the Kenya shilling against the US dollar and global economic recession. Others include the fast growth of treatment plants that has increased competition for poles hence high prices for poles at farm levels and harvesting of immature poles from fast growing plantations that lack sufficient strength for the intended purposes. Another factor is the entry of new substitute products with greater strength and durability into the market through the recent introduction of concrete pylons. Though the initial production capacity of the concrete pylons stand at less than 10% of the current annual demand for transmission poles it will squeeze market share of wooden poles from the upper sizes mostly for intercity transfer grids.

2.5 Projected Demand for transmission poles in Kenya

There are only two major consumers of treated transmission poles in the country, Kenya Power (KP) and Rural Electrification Authority (REA) after TELKOM-Kenya ceased expansion of telegraphic wiring in favour of wires less technologies. The demand for treated poles in 2007/2008 was 700,000 that had fallen to 310,000 pieces for 2008/2009 and have started to rise with entry of REA into the electricity supplies in rural areas that has pushed the demand to

520,000 pieces in 2010. The fall has been due to clearing of the backlog connection and concentration on new projects and replacements.

KPLC in 2008 was supplied with 300,000 treated poles worth Ksh 3.45 billion, with 70% from local sources and local firms was projected to supply 100% of the KPLC power transmission pole requirements by 2012. The KPLC demand was projected to expand from 330,000 poles in 2009 to 440,000 by end of 2012 with monetary values increasing from Ksh 4.312 billion ($53.9 million) to 6.500 billion ($81.25 million) during the same period. REA procured from local sources 60,000 pieces in 2008, 67,000 in 2009, 83,000 in 2010 and projects 113,000 for 2011. The sector has good potential markets for commercial Eucalyptus pole growers in Kenya and the region. REA projects to expand its coverage to at least 4,200 kilometres at an average of 20 poles per kilometers that translates to about 84,000 poles in 2011 and expects to increase its coverage by 10% per year within the next 5 years on condition that the projected funds will be available.

Table 5: KPLC Consumption and Projected demand for Transmission poles 2008-2012

Year	Requirements	Value in Ksh (billions)	Local supplies	% total	Imports	% total
2008	300,000	3.45	210,000	70	90,000	30
2009	330,000	4.312	280,500	85	49500	15
2010	363,000	4.960	326,700	90	36,300	10
2011	400,000	5.703	400,00	100	0	0
2012	440,000	6.560	440,000	100	0	0

2.6 Imports of transmission poles

The dependence of Kenya and Uganda on imports has been on the decline due to increased local processing capacities. For example Kenya in 2006 had a deficit of 200,000 transmission poles, valued at Ksh 2 billion ($25 million) that necessitated importation from various countries (Cheboiwo, 2010). To fill the gap Kenya imported 47,000 pieces from consortium of Tanzanian suppliers lead by Sao Hill estimated at about Ksh520 million and in 2007 150,000 treated transmission poles were imported from various countries mostly Tanzania, South Africa, Brazil and Finland. Similarly, in 2008 Kenya imported 65,316 transmission poles from Tanzania, Uganda and Chile. The imported transmission poles were through open tender that attracted and Table 6 show the competitive market prices for treated imported transmission that ranged from Ksh 10,000 ($125) and 13,000 ($163) within the last 5 years from both local processing plants and imports from outside the country (Cheboiwo, 2010). According to KPLC projections

transmission poles imports is expected to decrease from 10% of its consumption in 2010 to zero by 2012 (Guda, 2010). The demand for imports into the country will depend on the continued shortage of the raw poles from plantations and farms. There may not be complete halt in imports but there will a rapid decline in the coming few years. The large treatments capacity already installed in the Kenyan will exceed the domestic demand and many treatments plants are already exploring export opportunities within the COMESA region. This is because KP has reduced backlogs in connections and the eminent shortfall in power generation if the planned investment to increase power generation by 25% year is not realized.

Table 6: Tenders Prices for Treated poles purchased by KPLCin April 2006 in US$ per piece

Company	9m	Ksh	10m	Ksh	11m	Ksh
TTI-Kenya	-	10,800	160 US$	11,520	180 US$	12960
Sao Hill -Tanzania	150 US$	10,800	160 US$	11,520	180 US$	12960
TTP-SA	127.5 US$	9,180	147.2 US$	10,598	170.1 US$	12,247

Source: Ministry of Energy, 2006

3.0 Conclusions and Recommendations

The EA countries are facing cute shortage of power generation that cannot meet fast growing demand for electricity in the respective countries. Under such conditions the demand for transmission poles will remain modest at between 7-10% per year in the next 5-10 years despite increased investments in the treatments capacities in the region. Unless the Kenyan geothermal and the Ethiopian Gibe III projects come into fruition the growth in power generation in the region will remain dismal and will be the major constraint to power distribution and demand for treated transmission poles in the region. There has been remarkable investment in commercial growing of Eucalyptus plantations in EAC countries by both the private and public sector targeting production of semi-processed poles hence the likelihood of ease in current supply shortage in the next 10 years in the region. The trade in treated poles between the EAC countries will drastically reduce given the expanded treatment capacities within each of the member countries. This is more significant in Kenya that has been the major destination of exports from Uganda and Tanzania. The firms that will cut production costs in forestry operations and sustain increased supply of semi-processed pole production will have the natural advantage for surplus and hence export due to the likelihood of suppressed farm gate prices likely to drive high profit seeking investors out of the sector.

The EAC will have developed sufficient capacity the production and processing of treated transmission poles but current conditions of inadequate funding to expand power generation and

transmission infrastructure is likely to realize surplus hence the need for prudent diversification of market opportunities outside the region within the wider COMESA to compliment member interstate trade. The existing environment that has facilitated smooth trade in treated transmission poles within the EA member states should be encouraged to enable competition and boost the chances of exports to countries outside the EAC. Unlike other forest products like timber treated transmission poles have not attracted policy and legal barriers and therefore have greater potential to evolve a competitive markets and marketing systems. Kenya stands to benefits through open trade within ECA countries as opposed to restriction given its huge existing and projected power generation capacity and installed treatment capacity. The competition will ensure that the power transmission sector is assured of stable supply of poles from wider EAC countries and its surplus treated poles can be traded within EAC and COMESA. The forestry sector as part of its contribution to Vision 2030 should factor in the growing, processing and trade in treated transmission to ensure that surplus products find exports market beyond EAC and encourage diversification into many products such as fencing posts among others to ensure that the sector remain profitable into the future.

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