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FINANCING THE KENYA GEOTHERMAL VISION

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ABSTRACT

Kenya has commenced the process of realizing 5000 MW over the next 20 years. Currently, projects whose total capacity exceeds 800 MW are under implementation and an additional 800 MW projects are scheduled to commence soon. It is estimated that the development of the 5000 MW will cost about 18 billion US$. The Geothermal Development Company Limited (GDC), which will be the main geothermal resource developer supported and facilitated by the Government will raise 6 billion US$ through credits, annual government budget support and accrued steam sales revenues while Kenya Electricity Generating Company Limited (KenGen) and other independent power producers (IPP) will raise the balance of 12 billion US$ for installation of the power plants. The Government has assumed the responsibility through GDC to prepare bankable projects that will qualify for financing by multilateral, bilateral, and private entities by addressing the various issues which form the criteria for financial approval. The IPPs will enter through an international competitive bidding process. Already 19 and 14 investors have been shortlisted for two projects, some of whom have expressed interest to develop up to 1000 MW. The Government of Kenya to date has contributed US$ 399 million towards the ongoing projects while the multilaterals, bilateral and other green funds have committed over US$ 1.343 billion. KenGen has committed US$ 130 million towards the 280 MWe Olkaria I & IV project.

1. INTRODUCTION

Kenya has commenced the process of realizing 5000 MWe in line with Kenya Vision 2030. This is to be achieved in the next 20 years. This will translate to installing about 250 MW additional capacity of geothermal electric power every year, drilling 60 wells and operating a minimum 12 rigs for the next 20 year. All together Kenya must raise at least 18 billion US$ to achieve this goal. This excludes the additional transmission and distribution networks to evacuate and distribute the generated power.

Three projects are currently under implementation namely; the 280 MW Olkaria I & IV scheduled for commissioning in early 2014 which has an additional 75 MWe modular generation units, 36 MW Olkaria III scheduled for commissioning by 2014 and 400 MW Menengai Phase I schedule for commissioning around 2015/16 that will also integrate early generation using modular units starting with 5-10 MW plant scheduled for commissioning in 2013. The Olkaria I & IV projects is likely to be upgraded as the available steam exceeds 360 MW. In addition, the 800 MWe Bogoria-Silali Phase I project is on the pipeline with exploration drilling scheduled to start soon.

The main players in the sector will include Geothermal Development Company Limited (GDC) which is wholly owned by Government as the main resource developer, Kenya Electricity Generating Company Limited (KenGen) and independent power producers (IPP) as power generators. The institutional arrangement is that GDC will develop the steam and sell it to both KenGen and IPP as "fuel".

Generally, the ratio of cost of resource development (GDC role) to cost of power plant installation (KenGen and IPP role) for a geothermal project is in the order of 1:2. It is therefore projected that KenGen and IPP will raise 12 billion US$ for investment in the power plants while GDC supported and facilitated by the Government will raise 6 billion US$ for the resource development. GDC will raise its financial components through annual Government budget support, accrued steam sales revenues from the completed projects and credits/loans from financial institutions.

2. KEY FINANCING ISSUES

Contradictory as it may appear, it is true that in financing of projects, money is not the main problem. There is a lot of money chasing after very few promising projects. The issue is mainly whether the projects are bankable. Bankability of a project is a prerequisite for financing by financial institutions whose main criteria for assessing financial applications are technical, financial, economic and legal soundness, and appropriate risks mitigation. The agenda for financing of Kenyan 5000 MW vision will then revolve around three issues; capital funds which includes sources, availability and cost, projects viability which include technical, financial and economic and risks identification and mitigation.

3. CAPITAL FUNDS

3.1 Sources

3.1.1 Government financing

Kenya Government financing plays a very crucial role to open up and prepare project for financing by other entities. Resource exploration and appraisal are most difficult development phases to be financed by other parties as the phases bear the highest risk exposure. Kenyan experience shows that multilateral, bilateral, private entities are unwilling to invest in these phases. However, upon successful exploration and appraisal phases, multilateral, bilateral and private entities will commit funds for subsequent development, i.e. production drilling and power plant construction. Kenya has identified this aspect as a deterrent to investment and a contributor to the slow geothermal sector development over the years. As such the Government has assumed high upfront risk of exploration and appraisal and is now providing financing for these development phases. These phases are being financing through taxes, ordinary and infrastructure bonds. A green field will require about 100 million US$ to explore and appraise. The US$ 100 million will finance access roads, drilling water reticulation system and about 10 exploration and appraisal wells including feasibility study. Kenya has over 14 prime geothermal projects. To date, the Government has provided 399 million US$ towards the ongoing projects and facilitate credits/loans as enumerated below.

3.1.2 Multilateral development banks

World Bank through its various entities and the European Investment Bank (EIB) are the two multilateral development banks at the international arena. The International Development Agency (IDA) arm of the World Bank is aimed at financing credit to low income countries, International Bank for Reconstruction and Development (IBRD) serve the middle-income and creditworthy poorer countries market and International Finance Corporation (IFC) serve the private sector. World Bank

and the EIB are active in the Kenya geothermal Sector. The Word Bank has supported the geothermal sector in Kenya for the last 35 years. With their support Kenya has installed the existing three geothermal plants, two public and one IPP. For the ongoing projects the World Banks has committed 120 million US$ towards the 280 MW Olkaria I & IV and 102 million US$ for the 400 MW Menengai Phase I project. On its part, EIB has committed US$ 168 million for the 280 MWe Olkaria I & IV project and a 36 million US$ grant to 400 MW Menengai Phase I project.

There exist also regional multilateral development banks that include African Development Bank for African region, Asian Development Bank for Asia region and Inter-American Development Bank (IDB) for the American region. African Development Banks has committed 120 million US$ for development of 400 MW Menengai Phase I Project. Figure 1 below shows the various sources of financing.

			Governments							**Special purpose**		
			Grants AID - Technical assistance			**Concessional LOANS**			**Private investment**	**Green funds**	**CDM**	**Insurance**
			Advisory services	Project preparation/ feasibility	Capacity building (Training)	Technical assistance	Credit (Very long-below market interest)	Loans (Long, market rate interest)				
Multilateral Development Banks	AfDB			♦	♦		♦	♦		♦		♦
	IDA		♦	♦	♦	♦	♦			♦	♦	
	IBRD							♦				
	EIB			♦	♦			♦			♦	
	IFC								♦			
	MIGA											♦
Bilateral Financing Institutions	France	AFD	♦	♦	♦	♦		♦				
		Prorpaco							♦			
	Germany	KfW									♦	
		DEG							♦			
	Japan	JICA	♦	♦	♦	♦	♦					
		JBIC					♦	♦	♦			♦
	China Exim Bank						♦					
	USA	Exim Bank						♦				
		USTDA	♦	♦	♦							
		USAID	♦	♦								
		OPIC										♦

FIGURE 1: Sources of financing

3.1.3 Bilateral development agencies

Besides the multilateral financing institutions, there are many bilateral development financing institutions that both specialize with funding governments and often times private organizations. In Kenya, Japan International Cooperation Agency (JICA), Agency for French Development (AFD), KfW of Germany, China Export-Import Bank and United States Export-Import Bank are active in financing the Government. In addition, Japan Bank of International Cooperation (JBIC), PROPACO of France, DEG of Germany and United States Export-Import Bank are actively involved in financing private sector. JICA has committed US$ 323 million towards the 280 MWe Olkaria project, KfW has committed US$ 94.6 million (10.6 million for drilling and 84 million for power plants) for the same project. In addition, AFD has committed US$ 210 million for the Olkaria I & IV and US$ 170 million

for the 400 MWe Menengai project while China Exim Bank has loaned the Government US$ 95.4 million for drilling of Olkaria I & IV.

3.1.4 Special purpose finance (green funds)

With the advent of realities of global warming, many bilateral, multilaterals and other financing institutions are increasing engaging in green projects. Various funds exist including clean development mechanism (CDM) and scale-up renewable energy program (SREP) for Low Income Countries. Two geothermal projects in Kenya have benefited from the CDM funding and Menengai has benefitted from a US$ 40 million SREP financing.

3.1.4 Commercial banks

Kenya has a dynamic banking sector comprising of both local and foreign banks totalling to a number of 39. In the energy sector, the banks have been engaged in syndicating for financing as wells being avenues for mobilizing capital for bonds and share. The banks have in recent times been intermediaries for overseas institutions seeking to fund green energy projects within the private sector. Early power generation using modular units that Kenya is popularizing among the local private entities will see the local banks playing a greater role.

3.1.5 Private equity

The Government recognizes that it will be impossible to finance the Vision without the participation of both the public and the private investors. The Government has mandated GDC to facilitate entry of IPP into the geothermal sector by accelerating resource exploration and appraisal. The entry of the IPP will be through international competitive bidding. The Country has already solicited expression of interest for 400 MW Menengai Phase I where 4 investors are being sought and 800MW Bogoria-Silali block Phase I where 8 investors are being sought. 19 and 14 investors have been shortlisted for the two developments respectively. Some of the investors have expressed interest to develop up to 1000 MW.

3.1.6 Project revenues

The Country has structured its geothermal power generation prices so as to afford reasonable return to the private investors, and adequate funds for the government entities. It is expected that the price of steam will be about 3.5 US cents per kWh while the total generation cost will range between 7 – 10 US cents per kWh. It is appreciated that substantial long term Government financial support for resource exploration and appraisal may not be sustainable. GDC is therefore designed to become financially self-sustaining through generation of adequate revenues from sale of steam so as to relieve the Government from this burden. GDC projections indicate that it will require US$ 2.57 billion in the next 10 years, US$ 1.52 billion of which will accrue from revenues. The balance amounting US$ 1.05 billion is the seed money that GDC requires to establish itself and will be raised through debt and budget support from Government. Thereafter, GDC will rely mainly on accrued revenues for all other future development.

3.2 Cost of capital

Except for grants, all other sources of capital funds cost money to procure them. Multilateral (IDA, AfDB) and some bilateral (JICA) provide funds at no cost except for a service charge which is generally less than 1%. Figure 2 shows various sources of financing and their indicative cost (interest) of capital. Some financiers provide funds pegged at commercial rates e.g. on London Inter-Bank Overnight lending (Libor) or Eurobar but provide a grant component (AFD, EIB) for concessional financing or premium for commercial financing. Most bilateral and multilateral lending institutions

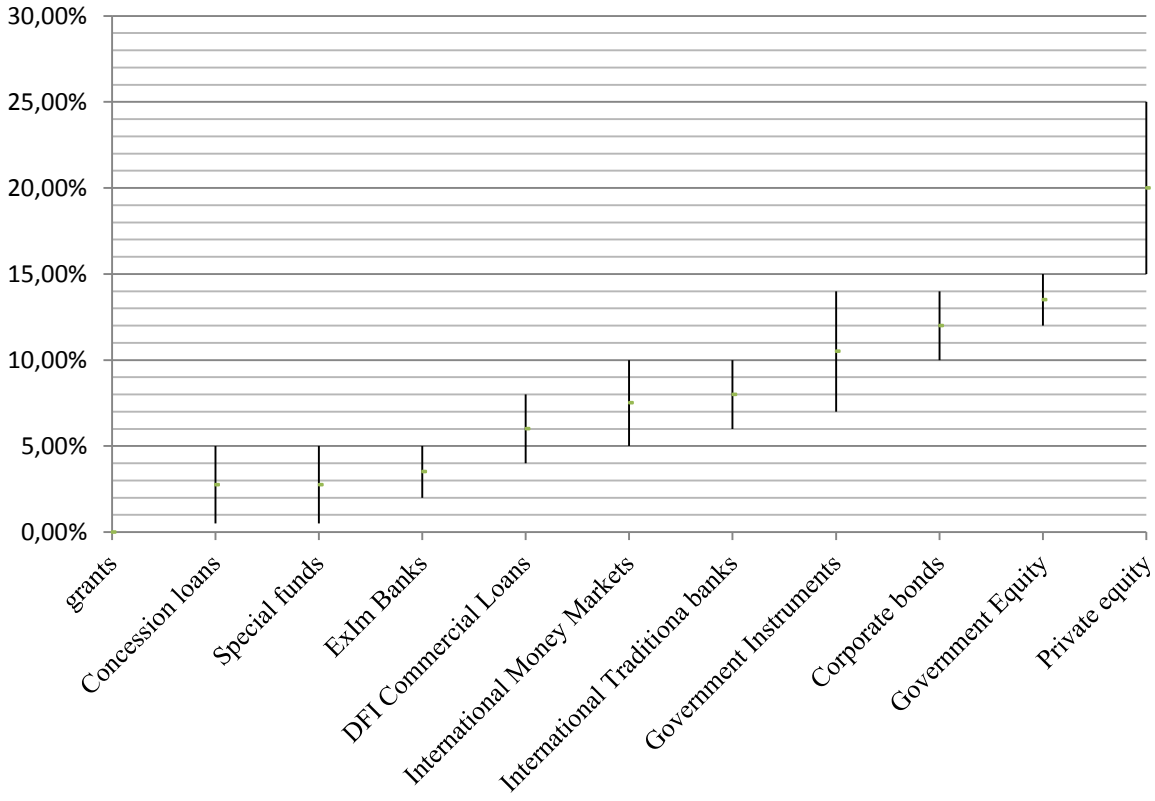

FIGURE 2: Indicative cost of capital for various sources

have both concession and commercial lending aimed at meeting the diverse money markets. The average cost of capital in the local Kenyan market is assumed to be 12%.

Apart from debt, the Government budget support is considered as equity to GDC and KenGen both of which are public organization except that KenGen has a 30% private shareholding. The Government expects a return on its investment to these organizations of at least 15%. Private entities expect a return ranging between 18 and about 23% although exceptional cases exist outside of this range.

3.3 Availability

Grants that are cost free funds are very limited. While there are many institutions that provide grants, they are mainly limited to less than 2 million euros and hardly ever greater than 5 million euros. Grants are also limited in their application with the providing entity dictating their use. Most of the grants are aimed at capacity development, technical assistance in studies and provision of specialized skills. The application process for grants is very intensive and generates great competition thus limiting chances of obtaining them. However, if obtained they fill gaps that help drive projects forward.

The concession window normally reserved for countries and at times made available to private entities is the most important window for developing countries like Kenya. This window is designed to enable disadvantaged countries achieve development. However, the window has ceiling for each country set by each bilateral and multilateral financing institution. In addition, since the windows are made available to the countries, competition between various sectors exist requiring countries to prioritize and allocate the available credit/loan accordingly. In addition, since the concessional finance is available to national governments, their ability to repay their existing and additional commitment plays a great role in limiting the funds the country can access. In Kenya, infrastructure and in particular energy has been a great beneficiary of this window.

The commercial window is broad and diverse and may have the highest potential to provide large amounts of funds. However, the cost of capital may be inhibitive in some cases and the purchasing power of the buyer may limit affordability of the goods manufactured employing this window.

The equity market through the stock market has shown great ability to raise capital. Recent initial public offers for several companies have attracted such great capital than could fund a 100 MWe power plant (360 million US$). Kenya is eying this market as a source of future financing of power project. In particular, local private entities are being encouraged to invest in small modular or wellhead power plants to be employed early in the geothermal project development.

4. VIABILITY

4.1 Technical viability

Both investors and financiers put their resources into a project with the hope of recovering their investment at a profit over the life of the investment. Geothermal projects have long economic life of at least 20 years and typically 25 to 30 years with payback period of about 10 to 15 years. The recovery for invested resources including profits can only be assured if the project is technically viable. The industry as of today lacks a direct measurement of various resource parameters that define a prospect. They are only inferred through indirect measurement. In addition, positive conclusions of surface studies are only proven by drilling exploration wells. At this point in time, there is a significant investment at stake as drilling and the requisite infrastructure require substantial amounts of money. Consequently, technical viability poses one of the most crucial risk factors in a geothermal project.

Kenya has adopted the worldwide normal practice for resource assessment and management. Detailed surface studies that involve geological, geochemical, geophysical and shallow heat measurement studies are carried out at the prospecting stage. The conceptual model and resource characteristic inferred from the detailed surface studies are subjected to a peer review. The members of the peer review team are drawn from different regions and who are acclaimed experts in their respective disciplines. A "go or no go" decision is made as to whether the resource development should be advanced to exploration drilling which attracts substantial financial resources. Successful drilling of a discovery well including several appraisal wells (typically about 10 wells) would culminate to bankable feasibility study. The feasibility study is contracted to third parties in order to give comfort to investors and financiers. Feasibility studies are key to financing and are aimed at matching the resource to existing technology, identifying physical and chemical constraints and offer various risk mitigation measures. Most importantly they demonstrate the financial and economic viability of the projects.

Equally important is that a management plan is put in place upon commencement of generation to monitor the resource response to exploitation. The monitoring includes steam status, chemical characteristics of the geothermal fluids and ground level movement.

4.2 Financial viability

Financial viability is an aspect of bulk power purchase price vis-à-vis investment and operation and maintenance costs. The ability of the projects to generate adequate revenues not only to meet their operation requirements but also to meet debt repayment commits and attractive returns on investment to investors will be critical for financing of the Kenya geothermal dream. Kenya has develop a feed in tariff for bulk power purchase for plants limited to 70 MW capacity which has been revised often to reflect economic realities. In addition, the acceptable bulk power price is within the international

range hence offering comparable benefits. Kenya has been working towards creating sector attractiveness by introducing incentives.

4.3 Economic viability

Kenya since 1996 on continuous basis has compare alternative source of power and have developed and keeps updating the least cost power combination for the country. Figure 3 shows the current screening curves used in selecting the most economical alternative for different power sources. The curves shows that geothermal option is least cost power for plants load factors exceed 60%. Imports are not general considered least cost due to their associated cross border supply risks.

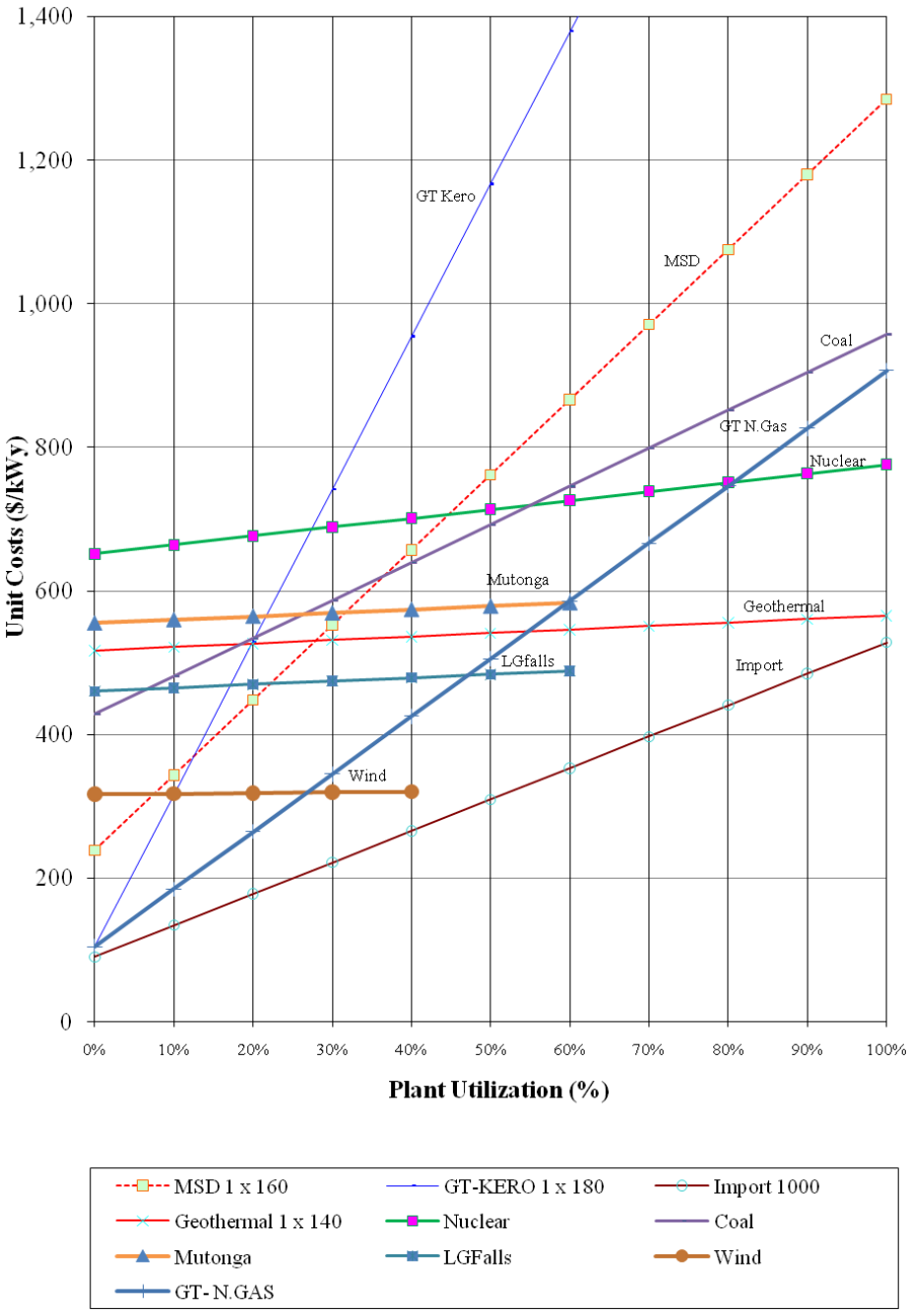

FIGURE 3: Screening curves (Kenyan Ministry of Energy, 2011)

5. RISK MITIGATION

5.1 Country risk

5.1.1 Political stability

The 25 year economic life of a geothermal project will see several changes of government. Elections particularly in Africa often times result to civil disobedience and may at time degenerate to civil war. Incoming governments are likely to formulate new policies if only to make political statements or may altogether vary policies seriously impacting existing and future developments. Investors and financial serious worry over whether they will be able to repatriate their investment to their country of origin, convertibility of the local currency to other currency without making serious exchange losses or restriction and whether investment owned by foreigners will not be expropriated by rogue governments.

Kenya recognizes and actually targets foreign investment as a source of capital for national development especially in the energy sector. In 2010, the country promulgated a new constitution that was aimed at creating stronger institutions rather than individuals and that devolved power to stem abuse thereby create stable political environment in the country. The country has further liberalized the exchange rate and has created institutions to promote foreign investment in Kenya.

5.1.2 Legal and regulatory

All investments will result to various business transaction and contractual relationships. Potentially all these transactions and relationships could give rise to disputes necessitating arbitration and or court adjudication. Therefore investors and financiers would be concerned whether justice can be served and be enforced by evaluating institutions and national policies. In this regard, Kenya continues to work towards and independent judiciary and enters into varies treaties and membership so as to provide comfort to investors.

5.1.3 Policy

Investors would want assurance that they will be free to repatriate their incomes to their country of origin, be free to hold and poses foreign currency and to convert currencies without restrictions. Today, Kenya allows both locals and foreigners to hold and keep foreign currency including possessing a foreign currency bank account, holds no restriction on repatriating income to home countries and exercises a fair taxation policies including providing tax incentives to foreign investors.

5.2 Institutional

Both investors and the financiers will be concerned on the capacity of the institutions in the entire electricity generation and distribution value chain. Figure 4 shows the value chain. Besides GDC, KenGen and IPPs, Kenya Electricity Transmission Company Limited (KETRACO) is mandated to develop transmission infrastructure and Kenya power and lighting Company limited (KPLC) off take power, distribute and sale to the retail consumers. The Ministry of Energy offer oversight responsibility over the entire value chain and coordinates and synchronized the entire sector development to match generation to transmission and distribution.

5.3 Projects

5.3.1 Resource related risks

In general, for a geothermal project, the resource offers the most significant risk. The resource risks may arise from the failure to discover steam, resource size being smaller than anticipated, lack of

existence of temperature, unsuitable fluid chemistry, high drawdown and cold inversion (Robertson-Tate, 2008; Combs, 2006). In particular, private investors and financials are very cautious investing in a green field until the resource is proven. The Kenya Government through GDC has assumed the upfront resource risks associated with resource assessment. The GDC will also provide guarantee for steam supply over the plant life. This has excited very many investors leading to expression of interest by major players in the industry.

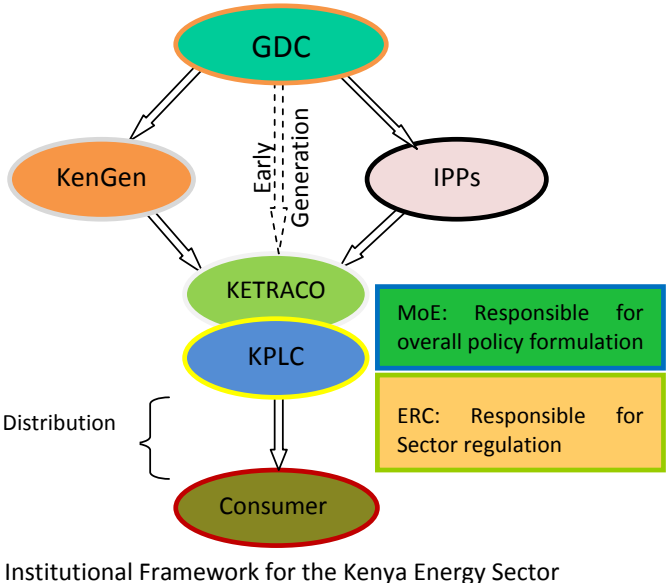

FIGURE 4: Key entities in the electricity generation and distribution

5.3.2 Technological risks

Financiers are risk averse and they would be careful to approve untested technology that may jeopardize recovery of their credit/investment. Geothermal conventional steam turbines and binary technology are now fully reliable.

5.3.3 Environmental and social risks

Environment and social economic issues (Takaya, 1995) are one of the most sensitive issues that can lead to a viable project not to be approved for developed, be denied financing and disbursement of funds to the project to be curtailed. It is one area that many world governments would control and regulate through legislation and have government bodies to monitor on a continuous basis. For projects of electricity generation in Kenya, an environmental permit must be issued by National Environmental Management Authority (NEMA). Further, most financial institutions will require environmental audit during project appraisal and implementation with a requirement to meet certain standards. Most financial institutions have employed specialists in the environmental and social matters for this purpose.

In order to management these risks, Kenya geothermal development projects have embraced environmental management. It is customary to carry out baseline environmental and social studies alongside detailed surface exploration studies, carry out environmental and social impact assessment studies upon successful surface exploration before commencement of any site development on the basis of which the environmental license/permit is issued. Prior to project ground breaking and during the life of the project management engage host communities by holding open gatherings to build project awareness, to receive concerns, complaints and community based proposals for corporate social responsibility. In addition, weather stations are erected within and outside of the project area to monitor various factors of the project that could affect the environment. In addition, various environmental audits are carried out regularly to establish data and basis for corrections where standards are not met.

5.3.4 Market risks

The end user pays for all cost arising from electricity provision and therefore their desire for power, willingness and ability to pay are influencing factors. Besides demand, access to the market may be curtailed by lack of the necessary infrastructure including transmission and distribution network. The

Government continues to invest in the transmission and distribution network in order not to inhibit access to the market. In addition, the power purchase agreements are regulated to ensure affordability.

6. GOVERNMENT ROLE AND LEADERSHIP

6.1 Alignment of generation expansion with economic development

The Kenyan geothermal vision is premised on the envisaged development under the Vision 2030. The Vision 2030 is a national blue print aimed at taking Kenya to middle income country. In the Vision various large power consuming project are planned without which demand will fall behind supply. Commitment of the Government towards achievement of the projects will assure the projected demand.

6.2 Resource assessment financing

Kenya has granted four concessions three of which are non-performing even though some are as old as five years and will be lapsing soon. The only performing concession is yet to develop to half the concession capacity of 100 MW 13 years after. In contrast, the Government has developed over 360 MW in the last 5 years and undertaken exploration drilling in a green field. In order to maintain the development pace, Government investment in resource assessment will be crucial.

6.3 Credit access facilitation

Geothermal developments are capital intensive. The country will require large sums of financing to keep the desired development pace. Besides GDC and KenGen both of whom are involved with geothermal power generation, KETRACO and KPLC will require expanding and transforming the existing transmission and distribution networks in order to reach new load centres and manage the increased power. These public companies will continue relying on the Government in accessing credit facility on an on-lent basis or through sovereign guarantees.

6.4 Sector development coordination

While all the public and private companies involved in the power industry will act in independence, development of all value chain components will have to be synchronized to eliminate redundancies arising from capacity shortfalls. The Government will therefore continue to be an important factor in sector coordination.

6.5 Investor assurance

The Vision 2030 will be implemented over several different government. Investors perceive these regime changes as a source of risk. Successive government will therefore be required to assure investor by being commitment to the Vision 2030 development agenda and maintain or improve policy and investment climate.

6.6 Development partners coordination

Achievement of the geothermal vision will involve large sum of funds beyond the ability of the Government to fund from its internal sources. Therefore the development financial institutions will continue to play a major role in the development of the energy sector. In order to harness the synergies arising from the financial institutions, the Government will continue to prioritize and coordinate their activities.

6.7 Institution and policy development

The health of public institutions involved in the energy sector as regards to their financial position, human resource and technical capacity, management and policy will remain a key area of interest to existing and potential investor. The Government oversight, policy formulation and restructuring of the institutions will be key to delivery of the geothermal vision.

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