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GEOTHERMAL TRAINING PROGRAMME



## **BANKABLE GEOTHERMAL PROJECT DOCUMENTS**

**Paul K. Ngugi**

Geothermal Development Company Limited  
Nairobi  
KENYA  
pngugi@gdc.co.ke

### **ABSTRACT**

Geothermal projects are financed with equity, grants and loans. The lenders finance the projects if they are attractive and when they pass a test of bankability. A project proposal is likely to be accepted if it has sufficient collateral, future cash flow, and high probability of success, acceptable to institutional lender and where all risks are identified, practical mitigation measures put forward and the risks are properly allocated to various parties involved in the project.

A feasibility study document undertaken by an experienced third party is the most authoritative technical bankable document. Detailed surface study under certain circumstance may be admissible. A power purchase agreement on a take or pay contract terms is most important document from a commercial point of view. Government guarantees are strong indicators of government support which impact the projects positively.

### **1. INTRODUCTION**

Bankability is a loose term that may be defined as the ability to attract financing from commercial sources (World Bank, 2012) while a bankable document is a project proposal that has sufficient collateral, future cash flow, and high probability of success, acceptable to institutional lender for financing (Business dictionary, 2014) A bankable document may also be considered as a document which outlines the technical risks inherent in a project, delineates methods of eliminating those risks, and quantifies the potential economic returns that can be attained at various commodity prices. Bankability generally depends of four broad criteria namely creditworthiness, legal, economic and technical viabilities.

The essence of bankability is the assessment of a project to assure that the project objective will be met and undertake a risk assessment to reassure risks are adequately mitigated. The lenders carry out the bankability check as a means to reduce credit risk while the equity investor seeks to secure levels of return on investment (Hampl et al., 2011).

Bankable documents are prepared by the project sponsor in support for a loan, grant or credit application.

## **2. PROJECT CONCEPT NOTE**

The project concept note is the owner's perception of the project, how it will be organized, implemented, financed and will perform financially.

### **2.1 Ownership or project sponsor**

The project note will declare who the owner(s) of the project is. The banks are keen to evaluate the institutional risks associated with the owners which focus on financial capability, experience, managerial and organizational capacity. Therefore the project concept note has a profile of the owner detailing their legal establishment, financial strength and business interests.

### **2.2 Project brief**

The concept note will also provide a brief project description. The brief would include location, objective, project size, scope and status. Indication of existing infrastructure such as roads, communication systems, major towns/cities which would provide social amenities and serve as load centers as well as the nearest point to connect to transmission lines are aspects that help rate the project.

### **2.3 Project justification**

Every project is designed to meet a social need. The reason which makes the project a necessity should be stated. Geothermal project may be implemented to meet future power needs arising from growing demand or to arrest high tariff where geothermal project is implemented to replace more expensive power or to achieve a power mix that best suits a country. All these three reasons have been the motivation behind the drive for expansion of geothermal in Kenya. The least cost power development plans indicate that Kenya's peak demand will increase to at least 19000MW by the year 2030. To meet the increasing demand, the Country has committed to develop at least 5000 MW additional generation capacity from its vast largely untapped geothermal resources. On the other hand, the Country's hydro and thermal generation capacity comprise over 80% of the existing interconnected grid electricity system. This combination makes electricity supply vulnerable in that hydro is prone to the frequent droughts that have hit the Country from time to time while thermal generation is subject to frequent adverse fuel price variations. Geothermal on the other hand has very high available and is independent of the weather cycles. Lastly, the Country's bulk tariff as deduced from the Kenya Power and Lighting Company 2011/12 annual statements indicate the individual tariff from different generators ranges from US\$ 0.048 per KWh (co-generation) to US\$ 0.41 per KWh (emergency power) while geothermal is priced at US\$ 0.097 per KWh). The low geothermal bulk tariff has pushed the drive for increasing geothermal generation capacity.

### **2.4 Project execution strategy**

The method, approach and way that the various activities comprising the project will be accomplished need to be defined adequately in order for a project to be understood by other parties. Figure 1 shows the transactional arrangement of a project under implementation sponsored by Geothermal Development Company of Kenya. The figure identifies the parties that are involved in the project, their anticipated roles and types of contracts to define the relationships between the parties. The execution strategy helps to evaluate the effectiveness and efficient of the implementation plan, risks associated with the project and hence risk allocation to the parties.

### **2.5 Time line**

The concept note will provide the major milestones to be accomplished during the implementation of the project. In addition, key target dates to achieve the milestones should be given. As a minimum,

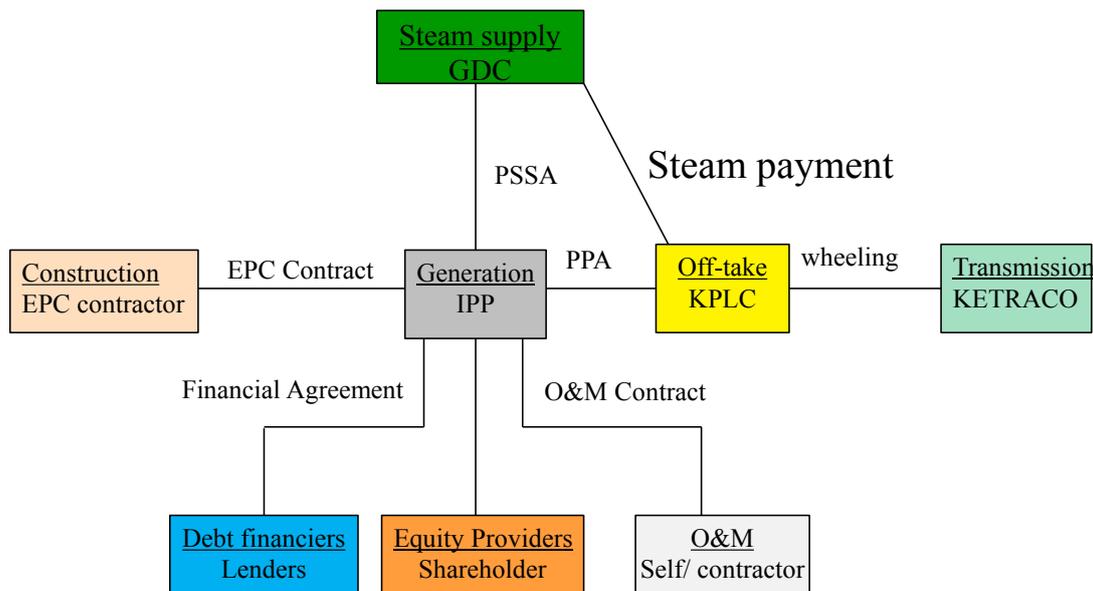


FIGURE 1: Transaction model used by Geothermal Development Company of Kenya

the dates of the key decision point should be provide. The decision points include, when detailed surface study will be done, exploration and appraisal drilling, feasibility study, commencement of the construction of the power plant and the commissioning. This information help all in planning, monitoring the project progress and evaluating time related risks.

## 2.6 Budgets

The project budget provides information on the total capital cost required for the project and should be indicated in the proposal. A detailed cost break down showing various budget items and the amount required for each year of development is most helpful. This helps in planning disbursement schedules from the various financiers. In addition, the data is used to evaluate whether the project cost are under or overestimated and whether adequate contingencies have been factored in.

The second component of the budget is the operation and maintenance requirements. While in general this cost are financed from the revenues, the data is necessary in the preparation of the financial models that help evaluate the financial performance of the project.

## 2.7 Financing plan

A financing plan should be provided in the proposal. One major question answered by the project concept note is how the project sponsor anticipates the project financial requirements will be met. The financing plan in addition match source of financing and budget items to be financed. This information is helpful in evaluating the reliability of the sources identified and in determination of the cost of financing from the individual sources and combined.

## 2.8 Financial model

The proforma financial statements should be attached to the proposal. A financial model of geothermal power project is essential in defining the various parameters required to enable investors make decisions for or against the project, convince financiers to commit resources to the project and government, utilities or off-takers to sign on the project. Financial models typically take the format of proforma financial statements.

## 2.9 Basic financial performance appraisal

A basic assessment of the project financial performance should be included in the project proposal. The objective of setting aside financial resources to an individual investment including the granting of loans is aimed at ensuring the limited resource are allocated to the most economic activity. There is an opportunity cost associated with committing financial resource to a specific project. For this reason, both investors and lenders use various tools to choose between alternative and competing projects. Some of these tools include internal rate of return, payback period and breakeven point. In addition, financial ratios are used to evaluate the financier performance of a project. A basic assessment of the project will provide comparative information to provide a perspective of the project financial performance.

## 2.10 Assumptions

The proposal should clearly state the assumptions made in preparing the proposal. The data provided in the proposal is as good as the assumptions made. If the assumptions change, the proposal information also changes. The assumptions typically made include well output, cost of various activities, performance levels such as number of drilling per rig per year, success rate and terms of financing.

## 3. PRE-FEASIBILITY STUDY

Detailed surface study is the first comprehensive technical report produced in relation to the project prospect. The detailed surface study cover geological and hydrogeological studies, gravity measurement, resistivity measurement, sampling of fumaroles gas seepages, chemistry of borehole fluids and temperature measurement at shallow depth. Infrared and micro-seismic studies may also be undertaken.

A high quality study is very useful in helping design the technical decisions such as wells casing programs and give insight to the likely problems that are likely to arise when the project is implemented. The study does give an indication of the temperature/ pressure expected and hence the possible technology to employ, like hood of scaling, size of resource, resource depth. In addition, the study help site the exploration wells. On the basis of the study, the initial project concept note may be prepared.

The document however, is not admissible as a bankable document except where governments back the document with sovereign guarantees or private investors with balance sheet financing. Most of the conclusions of the detailed surface study are inferred and therefore may actually differ from reality. For this reason under project finance (limited recourse) arrangement, the documents would be considered highly risky.

Risk associated with exploration drilling has been identified as a risk that deters private sector participation at the early stages of geothermal resource development, thus accounting to a great extend for the low geothermal development. Recent efforts (Combs, 2006) are exploring possibility of providing financial instruments aimed at accelerating development at these very early stages of development. If successful, the detailed surface studies may become bankable.

## 4. FEASIBILITY DOCUMENT

Feasibility is the most authoritative technical bankable document when it is prepared by third party reputable and experienced firms. It should establish sufficient quality and technical standard to produce the desired level of reliability. In a project finance arrangement, the lenders bear the full

project risk. The feasibility document therefore is subjected to rigorous and all aspects of the project receive the highest level of scrutiny from the financiers. The document is prepared when well data is available.

#### **4.1 Data collection and re-interpretation**

The main concern here is to analyze the real data obtained during the drilling and well discharge activity so as to make a decision on the characteristic of the resource in terms of type (steam or water dominated) the temperature/ pressure, well discharge fluid chemistry, non-condensable gases, scaling potential and well productivity behavior. This information is important in evaluating the suitability of the resource, the size and the possible utilization challenges.

#### **4.2 Exploitation models**

Sustainable exploitation model is one of the key answers that a feasibility study must provide. Computer numerical simulation model is prepared and calibrated using historical data. Various exploitation models are run and the response of the project reservoir response is noted. The scenario that best fits the project in terms of project size and PPA period is chosen if the runs shown resource sustainability.

#### **4.3 Preliminary design**

A preliminary design of the project is prepared based on the chosen utilization model. The preliminary design would include well sites for the projected number well of steam/ binary wells and hot and cold reinjection wells. In addition, a preliminary steam gathering network would be designed. The power plant location would be provided and the power plant operation characteristics chosen.

#### **4.4 Power system study and design**

The feasibility study should answer the question of demand, existence of infrastructure to transmit and distribute the power to the market. The document will recommend the method of connecting to the existing system, the routing of the proposed connection lines and environmental scoping associated with the line.

#### **4.5 Financial and economic models**

The firms undertaking the feasibility study will further undertake a financial model based on the preliminary design. The input cost should be reflective of the market situation as close as possible. The key concern would be to evaluate financial viability of the project. Where governments obtain concession financing, an economic analysis of the project would be necessary.

#### **4.6 Environmental Scoping**

It is common in Kenya to require that the firm undertaking the feasibility study also provide a chapter on suggested areas of environmental consideration when undertaking a full environmental and social impact assessment.

### **5. POWER PURCHASE AGREEMENT**

Power purchase agreement is one of the 'must have' bankable document for the private investment. Perhaps due to their strategic nature, the power sectors worldwide are largely controlled by government agents through independent commissions, utilities, municipalities or government ministries. In addition, transmission and distribution networks, infrastructure put in place by other

parties, are necessary for the producer of electricity to reach the consumers. The electricity market is therefore not a free market and even if the market were free, the investment requirement is so inhibitive to gamble. Ultimately except where government provides subsidies, the end user pays for all the costs arising from electricity provision. The power purchase agreement (PPA) therefore assures the investors as well as the lenders of the right to the market for the period of the PPA. Further, it assures investors and lenders that in the absence of the market, the risk is transferred to the power off-taking party. Without the PPA regardless of how good the project proposal is, private investor will find it difficult to raise funds from financial institutions. Where the government is the investors as well as the off taker, the PPA is not necessary.

The PPA are designed to assign the market (generation capacity), roles and responsibilities, rights including the right of step-in by the lenders, define the nature of contract, take or pay being the most popular, set the term of the PPA, project milestones, agree on the dispatch and operation procedures, penalties to be levied against default, procedure and manner of treating forced majeure, termination, and allocate risks.

## **6. GOVERNMENT GUARANTEES**

Government guarantees have very positive impact on bankability of a geothermal project. Government guarantee may be sovereign or a letter of comfort both which are instruments obligating the government to step in and meet certain obligation if any government agent involved in a power project default. The document may cover such risks as default of the agents, political risk and termination in the case where termination occurs due to default of the government agent. While the instruments are designed to be called on as a last result, issuing of the same strongly indicate government commitment which has a very positive impact on the bankability of the project proposal.

## **7. EPC CONTRACT**

The engineer-procure-construct (EPC) contract is another of the key documents that make a project proposal bankable. The bulk of the investment funds are expended during the construction stage of the development. It is imperative that the plants and equipment are constructed installed and commissioned within time, on budget and meeting the design functional characteristics. The risk during construction is borne by the investors. Therefore the EPC contract transfers the risk from the investor to the EPC contractor. The selection of the EPC contractor is essential for the success of the project.

Key clauses relate to project cost preferably lump sum cost, payment structure and milestones, completion tests, minimum functional specifications, support services, provisions for cost escalations, copyrights, training manuals, spare parts, warranties, penalty provisions and LDs, force majeure, arbitration / liquidated damages, jurisdiction (Subramanyam P., 2012).

## **8. ESIA AND ENVIRONMENTAL LICENCE**

Another of the must have document for a project to be bankable is the environmental certificate/licence. It is true for Kenya as it is in many other countries that one cannot commence the project with an environmental licence. In Kenya, it is typical to undertake two ESIA one for the drilling activities and another for the power plant. The latter is undertaken as a follow up of the feasibility study environmental scoping. The process of approving the ESIA allows a period for the public to raise concerns or objection to the project. The major development financial institutions further display the ESIA on their website for a period before they can consider providing financing.

## 9. SUPPORTING DOCUMENTS

From a Kenyan context, a ratification of the PPA by the Energy Regulatory Commission is required in addition to obtaining a generation licence. Loans obtained by the Government would require an opinion from the Attorney General. Projects implemented under the public private partnership would require Cabinet approval.

## 10. CONCLUSION

Bankability may be viewed as a measure of the attractiveness of a project to the extent that it can attract financing from lending institutions. The criteria of measuring bankability is based on the project ability to generate adequate revenues to sustain itself while serving debts and meeting its investors financial expectation, existence of a resource that can be utilized using matching proven technology and where risks of technical nature are properly mitigated, existing power market and where inflation, currency exchange rate and interest rates are favorable to enable the project to be undertaken profitably and on where there is no legal or regulatory requirement that can stop the project to be undertaken.

Determination of bankability of a project entails evaluation of documents submitted by the project sponsor for application for financing of the project. The documents include the project proposal or concept note, detailed surface study (under certain conditions), feasibility study, power purchase agreement, government guarantees, EPC contract, ESIA and environmental licence among others.

A project proposal is likely to be accepted if it has sufficient collateral, future cashflow, and high probability of success, to be acceptable to institutional lender and where all risks are identified, can be mitigated and properly allocated to various parties involved in the project.

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