

**THE STUDY OF THE IMPACT OF EXCHANGE RATE  
VARIABILITY ON INVESTMENT IN THE ELECTRIC  
POWER SUB-SECTOR IN KENYA**

**By**

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## Declaration

This research is my original work and has not been submitted for a degree in any other University.

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This project has been submitted for examination with my approval as university supervisor.

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# CHAPTER ONE

## INTRODUCTION

### 1.1. Background to the Study

Many countries moved toward more flexible exchange rate regimes over the past decade (Fischer, 2001). Among the factors underlying the move to greater flexibility has been the belief that more flexible exchange rates provide a greater degree of monetary policy autonomy and flexibility in responding to external shocks, including large and volatile capital flows. Flexible exchange rates are expected to (1) reduce one-way bets against currencies, thereby discouraging short-term capital inflows that can be easily reversed; (2) discourage a buildup of large unhedged foreign currency positions by reducing the implicit exchange rate guarantees implied by pegged and tightly managed exchange rates; and hence (3) stimulate prudent risk management and foreign exchange (FOREX) market development as market participants seek to hedge against potentially greater exchange rate risks.

There is often a reluctance to let go of pegged exchange rates despite their benefits (the so-called fear of floating). Policymakers tend to keep the pegs, reflecting, in general, the perceived costs of exchange rate volatility related to (1) concerns about losing policy credibility; (2) adverse effects of a potential appreciation of the domestic currency on external balances; (3) higher inflation from exchange rate pass-through (given the limited technical and institutional capacity to implement alternative monetary policy frameworks such as inflation targeting (IT), and underdeveloped

financial markets characterized by larger exchange rate fluctuations); and (4) potential losses from currency mismatches, in particular when markets and instruments to hedge against risks are limited. The difficulties in assessing the right time to exit and in determining the alternative regime to adopt tend to be additional factors in this reluctance (MacDonald, 1988).

The level of the exchange rate involves two competing goals – stimulating local tradable producers, and raising local purchasing power. The benefit of increasing the competitiveness of national producers comes at the cost of reducing the real income of national consumers, and vice versa. Two issues complicate theories of exchange rate policy preferences. First, exporters are likely to be torn between a concern for currency stability, on the one hand, and a concern for a favorable level of the exchange rate, on the other. These two concerns conflict, in as much as a fixed rate rules out adjusting the nominal exchange rate to improve the competitive position of exporters. Whether exporters favor stability over competitiveness, or vice versa, is likely to depend on such factors as the price sensitivity of consumers of exports, the ability of exporters to hedge against currency volatility. Secondly, and closely related, is the fact that tradable producers' concern about currency movements depends upon how directly they are affected by changes in the exchange rate, which is a function of such things as pass-through, currency invoicing, and the importance of imported inputs (Devereux and Engel, 2002; Campa and Goldberg, 2005).

A wide range of opportunities for direct and joint-venture investments exist in the manufacturing sector, including agro-processing, power generation, manufacture of garments, assembly of automotive components and electronics, plastics, paper,

chemicals, pharmaceuticals, metal and engineering products for both domestic and export markets (Republic of Kenya, 2003). The sector was initially developed under the import substitution policy. There has been a shift, however, to export-oriented manufacturing as the thrust of Kenya's industrial policy. The sector plays an important role in adding value to agricultural output and providing forward and backward linkages, hence accelerating overall growth. By the year 2003 the manufacturing sector comprised more than 700 established enterprises and directly employed over 218,000 persons as at the year 2000 (Republic of Kenya, 2003).

The power sub-sector of the manufacturing sector is dominated by power producers and suppliers. The supply of electricity in Kenya is presently the mandate of six companies under the general direction of the Ministry of Energy. These include the Kenya Power and Lighting Company (KPLC) which is responsible for all electricity distribution and transmission system in Kenya. Shareholding by the Kenya government and government institutions in KPLC currently stands at 59%, with the rest of the shareholding being drawn from private investors. The Kenya Electricity Generating Company (Kengen) which is 70% government owned and 30% public generating utility responsible for electricity generation and contributes 82% of the effective generating capacity to the national grid. The privately owned International Independent Power Producers (IIPPs) comprise of The Ibera Africa, Westmont, Tsavo and the Or-power. They command 18% of the effective electricity generating capacity. The interconnected system has an installed capacity of 1,162 Megawatts (MW) comprising 677.2MW of hydro-electric power, 398MW of thermal-power, 128MW of geo-thermal power, and 0.35MW of wind-generated power. The country

isolated stations generating capacity is 9.6 MW. Transmission/ Distribution lines that interconnect all the power stations are owned by KPLC (KenGen, 2007).

Since the 1970s after the breakdown of the Fixed Exchange Rate Bretton Woods System, the major currencies (the US Dollar, EURO and others) float freely. Encouraged by the Bretton Woods institutions, many countries (Kenya included) adopted transitional systems toward unified, market determined and convertible exchange rates. Following the repeal of the Exchange Control Act in 1995 and the licensing of foreign exchange bureaus, there has been witnessed some vibrancy in Kenya's foreign exchange market (Kurgat, 1998).

In the period prior to 1995, Kenya maintained restrictions on foreign exchange currency transactions. However, Kenya currently pursues a floating exchange rate regime, in which market forces of demand and supply interplay to determine the exchange value of currencies. Indeed, as proposed by Friedman (1953), because speculators buy low and sell high, their activities ensure that exchange rates reflect the fundamental determinants of currency values. The major participants in the foreign exchange market in Kenya are commercial banks and foreign exchange bureaus. Other participants such as corporations, institutional investors, and seldom also individual persons usually have to contact their bank or broker in order to obtain foreign currencies.

Since 1996, there have been substantial changes in the value of the Kenya Shillings over the last few years against major foreign currencies such as the US Dollars, the British Pound, the Euro, and the Japanese Yen. Little information exists as to the implication of this volatility of the shillings on investment in the Kenyan industries.

Changes in exchange rates can lead to an increase in uncertainty about income from operations in foreign countries or from trading with foreign firms. Shifts in foreign exchange rates have the potential to undermine the competitive position of the firm and destroy profits. In Kenya the significant appreciation of the Kenya Shilling against the US Dollar is having a toll on the goods exporters. The key factor affecting the expectation of changes in a country's exchange rate with another currency is the relative expected inflation rate of the two countries. Spot exchange rate adjustment reflects purchasing power parity relationship that posts that exchange rate is proportional to the domestic inflation rate and inversely proportion to foreign inflation.

## **1.2. Statement of the Problem**

The Government, in its Vision 2030, recognizes manufacturing among the sectors that will stimulate growth and economic development (Republic of Kenya, 2008). But bottlenecks such as high taxation on businesses, volatility of foreign exchange rates, corruption, poor infrastructure and difficulty in accessing business loans could erode the new ratings Kenya has achieved from the international financial institution, as they add to the cost of doing business.

The effect of exchange rate variability varies across countries based on the scale of the international balance sheet, the net value of the position and the currency composition of foreign assets and liabilities. For instance, previous empirical studies in the United States (Tille, 2003; Gourinchas and Rey, 2007; Lane and Milesi-Ferretti, 2003, 2005, 2007b) have highlighted that the foreign liabilities of the United States are mostly denominated in dollars while there is a substantial non-dollar component in its foreign assets. Accordingly, unanticipated dollar depreciation improves the net



international investment position of the United States by increasing the dollar value of its foreign assets relative to its foreign liabilities. In contrast, many emerging markets have historically issued significant amounts of foreign-currency debt - for these countries, currency depreciation has had an adverse impact on the net foreign asset position.

The electric power sub-sector by its very nature is highly capital intensive and its financial requirements are enormous. Construction in the sector also requires foreign firms who have the expertise and have to be paid in foreign currency. Operational cost is also enormous and most operational inputs are governed by price of crude oil that is very volatile. Financial obligation to the financiers (Development Financial Institutions)) and contractors requires are mostly in hard currency. For the industry to meet the planned objectives, the emerging exchange problem has to be addressed. The key research question for this study is “do exchange rates variability affect investment decisions in the Kenyan power sub-sector?” The study hypothesizes that variation in foreign exchange rates is a hindrance to new investments in the power sub-sector in Kenya.

### **1.3. Objective of the Study**

The objective of the study is to study the impact of exchange rate variability on investments in the electric power sub-sector in Kenya.

### **1.4. Significance of the Study**

#### **Energy Regulator**

The analysis has several implications for the design of ‘new portfolio balance’ models. First, the study will highlight the importance of modelling the dual role of

exchange rates in the investment adjustment process with the financially-weighted exchange rate index operating through the investment valuation channel. Second, the interaction between external wealth effects and domestic sectoral balance sheets may be important for domestic macroeconomic performance, since the net worth of manufacturing firms may be affected by currency-induced valuation shifts. In this regard, it may be useful to inform the policy makers on the conditions under which such valuation movements may have a stabilizing influence versus scenarios under which the impact is pro-cyclical. Third, an understanding of the financial implications of currency movements is important for the optimal design of monetary and fiscal policies for open economies; moreover, the optimal policy regime plausibly depends on structural characteristics, such as the degree of financial development and the contracting environment in a given economy.

#### **Firms in the Electric Power Sub sector**

The findings will guide firms in the electric power sub-sector in determining the appropriateness of various investment options in relation to the prevailing exchange rates. Some of the relevant findings to management of these firms will relate to the effect of exchange rate variability on their investments options, especially where the assets are to be acquired in foreign currencies.

#### **Future Research**

The study will also be an important resource for academicians and future researchers who may wish to investigate the effects of exchange rate movements on various aspects relating to other sub-sectors of the economy.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1. Introduction

This chapter presents a review of the literature on the relationship between variability of exchange rates and investments. The chapter is organized as follows: Section 2.2 provides the theoretical basis of exchange rate variations, Section 2.3 focuses on exchange rates variability and investments, Section 2.4 focuses on modelling relationship between exchange rates variability and investments, Section 2.5 reviews empirical evidence in Kenya. Finally, section 2.6 is the chapter summary.

#### 2.2. Theory of Exchange Rate Determination

In empirical literature on exchange rate determination, four broad approaches to modelling have been adopted; namely, the monetary, new classical, equilibrium and macroeconomic approaches. Each of these approaches has been found wanting when put to the test of explaining real exchange rate behaviour in the 1980s and 1990s. Dornbusch (1988) provided a summary account of the experiences of each of these models in explaining exchange rate movements, and he suggested that events were too large with sharp reversals for these models to explain exchange rate movements over the period. Meese and Rogoff (1983) also made this point, while Frankel and Meese (1987) after an extensive review of every testable implication, reported that in virtually every respect, exchange rate behaviour remains a mystery. Pentecost (1993) concluded from an extensive study of recent empirical literature, which purports to test structural macroeconomic models of the exchange rates against data, that none of the models adequately explains either the long-run equilibrium exchange rate or its

short-run dynamics for all time periods and exchange rates. A focus on two dimensions of the above models, namely “postulated” behavioural relationships and those based on optimizing behavioural relationships, provides an insight into the behaviour of exchange rate responses to fiscal financing decisions.

### **2.2.1. Models Based on “Postulated” Behavioural Relationships**

The classic analyses of Mundell (1963) and Dornbusch (1976) described a world of perfect capital mobility in which flows of international capital are unrestricted and where assets, which are denominated in domestic and foreign currencies, are perfectly substitutable. If a small open economy’s exchange rate is market-determined in this world, a policy of fiscal expansion will create an excess demand for money which exerts upwards pressure on the domestic rate of interest and causes the exchange rate to appreciate until the trade balance deteriorates by an amount which exactly offsets the fiscal stimulus.

More recent work, however, has demonstrated the extent to which these earlier results are dependent on model specification assumptions. In this vein, Dornbusch and Fischer (1980) and Boyer and Hodrick (1982) demonstrated that if the wealth elasticity of the money demand function is sufficiently high, the excess demand for money can be eliminated by a decline in wealth rather than by appreciation of the exchange rate. The work of Rodriguez (1979) and Mussa (1980) pointed out that the current account deficit must eventually be paid for by a switch from domestic consumption to the production of exportables which puts downwards pressure on the current exchange rate by implying the necessity of a depreciation in the long run. Considerations of portfolio balance as traced by Branson (1977), Branson and Buiter (1983), Henderson (1979) imply that expansionary fiscal policy can cause the

exchange rate to either appreciate or depreciate depending on the relative responses of the current and capital accounts of the balance of payments. Greenwood (1983) and Kawai (1985) generalized this literature by demonstrating how no unique immutable relationship exists between the government's macroeconomic policy mix, interest rates, the exchange rate and the current account of the balance of payments.

### **2.2.2. Models Based on Optimizing Behaviour**

The realization of Lucas (1976) that perceived changes in policy regimes may cause individuals to alter their maximizing behaviour in ways which modify many "postulated" macroeconomic relationships has engendered a sense of urgency into the quest for micro-foundations. The significance of this development for the present discussion lies in the fact that a number of recent studies have investigated the operation of fiscal policy in open economies with floating exchange rates using models, which are based on individual optimizing behaviour. In this vein some authors (Cuddington and Vinals 1986a; Frenkel and Razin, 1986; Obstfeld, 1981; Sachs, 1983) have constructed Walrasian market-clearing models, while the Cuddington and Vinals (1986b) have allowed for the existence of Keynesian unemployment.

Obstfeld (1981) developed an equilibrium model of the determination of the exchange rate and current account of a small open economy which is inhabited by utility – maximizing households with infinite planning horizons who consume a single good and hold only domestic money, although they have access to world credit markets. A tax-financed increase in government expenditure leads to a reduction in private consumption and a depreciation of the exchange rate as domestic residents accumulate net foreign assets in order to finance the higher level of absorption. This analysis was

later extended by Sachs (1983) and by Frenkel and Razin (1986) who investigated the potency of fiscal policy in a general equilibrium, two-country world which is inhabited by overlapping generations of intertemporal utility maximisers. The former researcher illustrated the importance of the wage determination process in predicting the exchange rate effects of fiscal policy initiatives, while the latter researchers demonstrated that the effects depend on the extent to which the initiative is temporary or permanent in nature and on the extent to which it has been anticipated prior to implementation. Cuddington and Vinals (1986b), allowed for the existence of classical and Keynesian unemployment in an economy which is inhabited by intertemporal utility maximisers who consume traded and non-traded goods while forming rational expectations about the effects of current and future policy initiatives of the authorities.

In summary the qualitative results which emerge from both types of model are broadly similar when capital movements are unrestricted across fixed exchange rates. This result, however, does not obtain when the authorities operate a floating exchange rate regime. As Kawai (1985) demonstrated, a considerable range of variation can exist depending on the precise model specification. What perhaps explains the lack of empirical support for the simpler models is that they conceal important complexities in the relationships, which exist between the important variables. Kearney (1990) made this point and Mizon (1995) pointed to the econometric modelling implications. In essence the considerable uncertainty which pervades theoretical modelling of the exchange rate suggests the appropriateness of employing the Vector Auto-Regressive (VAR) methodology to examine the impact of fiscal innovations on exchange rates across a multi-country study.

### **2.3. Exchange Rates Variability and Investments**

Traditionally, two views of exchange rates have been predominant. One regards the exchange rate as the relative price of two monies; in the other, the exchange rate is viewed as the relative price of domestic and foreign goods. These real and monetary aspects of the exchange rate determination are the most extensively modelled. A third view takes into account portfolio considerations and regards the exchange rate as the relative price of nominal assets. It has been only recently that some interest in the portfolio approach has emerged in the form of an exchange rate theory oriented to the current account (Dornbusch 1980).

The flexible-price monetary approach regards the exchange rate as an asset price. This model makes the assumption that continuous price flexibility maintains the money market in equilibrium. A critical condition in flexible-price monetary models is the assumption that price levels must be consistent with the equilibrium between the demand for and supply of money (MacDonald 1988; Marrinan 1989). The other key assumption is that purchasing power parity (PPP) holds continuously. Given the equilibrium conditions in the domestic and foreign money markets, the equilibrium national price levels are then solved by equating real money supply to money demand in each of two countries. In this approach, therefore, nominal exchange rate is explicitly expressed in current relative money supplies and factors affecting money demands (Marrinan 1989; MacDonald 1988; Isard 1995). The latter factors include real income and interest rates, where the nominal interest rate incorporates an inflation premium.

Recent empirical research on foreign direct investment and exchange rate uncertainty has highlighted the ambiguous effects of exchange rate volatility on Foreign Direct Investment (FDI). Cushman (1985) and Cushman (1988) found evidence of a positive relationship between US FDI and exchange rate uncertainty, whereas Benassy-Quere, Fontagne and Lahreche-Revil (2001) showed that exchange rate volatility in emerging economies has a negative impact on OECD outward foreign direct investment (FDI) to these countries.

Cushman (1985) showed that exchange rate risk may increase direct investment bilateral flows between the US and Canada, France, Germany, Japan and the UK, whilst Cushman (1988) finds an analogous relationship between exchange rate risk and inward US FDI. In both studies, Cushman developed a mean-variance framework in which a firm's utility is a positive function of expected profit and a negative function of the variance of profit. The latter derives solely from exchange rate risk. FDI is mainly determined by the host country's relative factor cost competitiveness, which is influenced by exchange rate volatility. The importance of exchange rate risk depends on whether the firm produces domestically or abroad, and on the share of imported inputs in production. Although Cushman attempted to apply conventional portfolio theory to the analysis of US foreign direct investment, none of the models presented in Cushman (1985) and Cushman (1988) considered that a risk-averse firm would try to minimize the variance of its total profit by exploiting the correlation between exchange rate movements.

Benassy-Quere, Fontagne and Lahreche-Revil (2001) extended Cushman's work and investigate the role of exchange rate correlation on foreign direct investment from



OECD countries into developing economies. In their study, the typical investing firm is a multinational producing abroad and exporting from there to the home country. Its location choice will be determined by the potential host relative competitiveness, which is proxied by the relative real exchange rate of the potential host against the investor's real exchange rate. An increase in competitiveness is measured by the depreciation of the host country's currency. Their empirical analysis indicated that, irrespective of the sign of exchange rate correlation between alternative locations, inward FDI to one country decreases if the competitiveness of an alternative host rises.

In their study, Barrell, Gottschalk and Hall (2003) sought to isolate the impact of exchange rate risk on US FDI in Europe, emphasizing the interaction between exchange rate uncertainty, exchange rate correlation and market power. They constructed a model based on the hypothesis that risk-averse firms would attempt to reduce the impact of uncertainty on their investment portfolio by exploiting correlations between exchange rates in alternative locations. They also showed that market power reduces the negative impact of uncertainty on investment. They tested their theoretical model on US foreign direct investment in Europe, using a panel of seven two-digit industries. They found that exchange rate uncertainty in the Euro Area and in the UK has a strong negative effect on FDI. There was strong evidence that the correlation between the sterling dollar exchange rate and the euro dollar exchange rate influenced location decisions of US firms in Europe. In particular, they found evidence that, as the exchange rate correlation move towards 1, US firms tend to divert their investment from the Euro Area to the UK. Finally, their results showed that the degree of industrial concentration has little influence on the impact of

exchange rate volatility on US FDI in Europe. Using the degree of industrial concentration as a proxy for monopoly power, they found that FDI in industries with low monopoly power is not diversely affected by exchange rate volatility than FDI in highly concentrated industries.

#### 2.4. Modelling Effects of Exchange Rates Variability on Investments

Classical regression analysis is based on several assumptions. When those assumptions are satisfied, the estimated values of regression constants can be shown to be accurate in the sense that they are close to the true behavioral parameters. The first assumption of the classical regression model is that all explanatory variables are uncorrelated with unobserved factors, that is, with the error term. The basic regression model also assumes that all variables are exogenous, which means that they are determined by factors that are not part of the behaviour under investigation (Margery and Felicity, 1999). Finally, the classical regression models assume that the error terms are normally distributed with a mean of zero and constant variance.

The population regression model of a dependent variable,  $Y$ , on a set of  $k$  independent variables,  $X_1, X_2, \dots, X_k$  is given by equation (1) below:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k + \varepsilon \dots\dots\dots (1)$$

Where  $\beta_0$  is the  $Y$ -intercept of the regression surface and each  $\beta_i$ ,  $i = 1, 2, \dots, k$  is the slope of the regression surface - sometimes called the response surface - with respect to  $X_i$ . The model assumptions are that  $\varepsilon \sim N(0, \sigma^2)$ , independent of other errors; and the variables  $X_i$  are uncorrelated with the error term. In a simple regression model, the least-squares estimators minimize the sum of squared errors from the estimated

regression line. In a multiple regression model, the least-squares estimators minimize the sum of squared errors from the estimated regression plane.

The estimated regression relationship is given by equation (2) below

$$\hat{Y} = b_0 + b_1X_1 + b_2X_2 + \dots + b_kX_k \dots\dots\dots (2)$$

Where  $\hat{Y}$  is the predicted value of  $Y$ , the value lying on the estimated regression surface. The terms  $b_0, \dots, b_k$  are the least-squares estimates of the population regression parameters  $\beta_i$ .

A statistical test for the existence of a linear relationship between  $Y$  and any or all of the independent variables  $X_1, X_2, \dots, X_k$  is guided by the system of hypotheses in equations (3) below

$$H_0: \beta_1 = \beta_2 = \dots = \beta_k = 0$$

$$H_1: \text{Not all the } \beta_i (i=1,2,\dots,k) \text{ are } 0 \dots\dots\dots (3)$$

The hypotheses are tested using the F-test based on the F-statistics that are derived from the resultant Analysis of Variance (ANOVA) table. The multiple coefficient of determination,  $R^2$ , is used to measure the proportion of the variation in the dependent variable that is explained by the combination of the independent variables in the multiple regression model of equation (1). The  $R^2$  is computed by applying the algebraic expression of equation (4) below.

$$R^2 = \frac{SSR}{SST} = 1 - \frac{SSE}{SST} \dots\dots\dots (4)$$

Where, SSR denotes the regression sum of squares, SST denotes the total sum of squares, and SSE denotes the error sum of squares.

In testing of the significance of individual regression parameters, the system of hypotheses in equations (5) below is applied.

$$\begin{aligned}
 (1) \quad & H_0: \beta_1=0 \\
 & H_1: \beta_1 \neq 0 \\
 (2) \quad & H_0: \beta_2=0 \\
 & H_1: \beta_2 \neq 0 \\
 & \vdots \\
 & \vdots \\
 (k) \quad & H_0: \beta_k=0 \\
 & H_1: \beta_k \neq 0 \dots\dots\dots (5)
 \end{aligned}$$

The test statistic for tests of equation (5) is given by

$$t_{(n-(k+1))} = \frac{b_i - 0}{s(b_i)} \dots\dots\dots (6)$$

Where  $n$  denotes the number of cases,  $k$  denotes the number of independent variables,  $b_i$  is the unbiased estimator for regression coefficients, and  $s(b_i)$  is the standard error of the estimates.

### 2.5. Empirical Evidence in Kenya

The manufacturing sector in Kenya has over the years contributed greatly to the country's Gross Domestic Product (GDP). The sector has provided employment opportunities to about 300,000 people in the formal and 3.7 million persons in the informal sectors of the economy. The manufacturing sub-sector constitutes an important component of the manufacturing sector in the country. It is one of the key sub-sectors targeted under the country's strategy for economic recovery (Republic of Kenya, 2003b).

In the first decade following the country's independence in 1963, manufacturing output in Kenya increased at the rate of 9-10 percent per annum on average, with notable expansion in the power production. At the time, public policy targeted import substituting industries for promotion (IPAR, 1996). The main policy instruments for such promotion included a combination of tariffs and import quotas supported by foreign exchange allocation measures. The exchange rate was also generally overvalued to contain the costs of imported raw materials, and credit and interest rates were implicitly subsidized for manufacturing enterprises.

A study by World Bank (2004) found that investment in the Kenyan manufacturing sector is extremely low. Out of the 202 firms for which complete information was available, only 15 per cent of firms had investment rates exceeding 10 per cent - the rate one might reasonably assume is required simply to replace worn out equipment. More than two thirds of the firms reported investment rates of less than 5 per cent. A third of all firms reported zero investment. Low levels of firm investments were found to be consistent with the low and declining rates of capital investment observed in the Kenyan economy at large. Several plausible explanations as to why investment may be so low were provided. They included: prevalence of a poor investment climate which has diminished the expected profitability of investment projects; inability of firms to raise the necessary funds to finance investment because of a poorly functioning financial market; and the weakening of the Kenya shilling against major world currencies.

## 2.6. Chapter Summary

Empirical studies have shown various dynamics of exchange rates variations. Although it is theoretically clear that uncertainty affects the investment decision by the firm in different ways depending upon mark ups and the degree of concentration, the result does not necessarily apply to FDI, which is an ownership decision and not necessarily a decision to invest in physical or intellectual capital. Various studies in the literature have shown that exchange rates variability have an effect on the levels of investments in a particular industry. Empirical literature regarding the effects of exchange rates variability on investments in the manufacturing sector is missing. This study sought to fill this gap by taking a focus of the Kenyan power sub-sector. The study hypothesizes that minimal investments in manufacturing sector is due to unpredictable behaviour of foreign exchange markets in Kenya.

# CHAPTER THREE

## RESEARCH METHODOLOGY

### 3.1. Introduction

This study examines the impact of exchange rate variability on investment in the electric power sub-sector in Kenya. This chapter provides the techniques, methods and procedures adopted in conducting the research. The chapter is organized as follows: Section 3.2 describes the population; Section 3.3 outlines the conceptual model used; and Section 3.4 provides the analytical model used.

### 3.2. Population

#### 3.2.1. Sample Structure

The population of the study comprised of five key players in the power generation and distribution sub-sector of the Kenyan manufacturing sector. They included Kenya Electricity Generating Company (KenGen); The Kenya Power and Lighting Company (KPLC); and the privately owned Independent Power Producers (IPPs) comprising of: The Ibera Africa, Tsavo and Or-power. The analysis conducted for KenGen and KPLC excluding the IPPs. The IPPs were excluded due to: their investment is in foreign currency and their tariff is paid in foreign currency thus suffering little fluctuations; the IPPs cost are transferred to KPLC as operations and maintenance cost and thus are covered under KPLC analysis; and the level of investment by the IPPs is limited to a once off investment and the level of investments has not changed in the last ten years.

KenGen and KPLC are the firms mostly affected by foreign exchange fluctuations by the virtue of running and earning from their operations in local currency while their major cost for capital investment, operations and maintenance, loan repayment are in foreign currencies.

**3.2.2. Data Collection**

The study applied data from secondary sources. The data for the firms was extracted from the annual reports and financial statements for the five-year period 2003-2007. The data was obtained from the company libraries of the respective firms, as well as their finance and supplies departments. Data on the foreign exchange rates over the same period was collected from the Research Department of the Central Bank of Kenya. The data on exchange rates included the historical exchanges rates data for the Euro, the Yen, and the US Dollar. All the exchange rates were expressed in Kenya Shillings (Kshs) per unit of foreign currency. The data on investments by power firms comprise of the cost of capital investments; the cost of operations and maintenance; and the level of profitability from investments.

**3.3. Conceptual Model**

The study conceptualizes that the level of exchange rate variability (*fVAR*) influences the level of investments in the Kenyan power sub-sector in regards to costs of capital investments (*CAP*); operations and maintenance costs (*OM*); and the level of profitability (proxied by current returns – *CR*). Therefore, equation (7) presents the algebraic representation of the conceptual model between the dependent and the independent variables.

$$INVESTMENT_{it} = f(Var_{it}; CAP_{it}; OM_{it}; CR_{it}) \dots\dots\dots (7)$$



Where  $VAR_{it}$  denotes the level of volatility between the Kenyan shilling and a particular foreign currency within a particular.  $CAP_{it}$ ,  $OM_{it}$ , and  $CR_{it}$  are control variables used in the model because of their direct influence on the level of investment by the firm.  $CAP_{it}$  denotes the cost of capital investments by the  $i^{th}$  firm in year  $t$ ;  $OM_{it}$  denotes the cost of operations and maintenance by the  $i^{th}$  firm in year  $t$ ; and  $CR_{it}$  denotes the level of profitability from investments by the  $i^{th}$  firm in year  $t$ .

### 3.4. Data Analysis

#### 3.4.1. Analytical Model

To establish the effects of exchange rates variability on the levels of investments in the Kenyan power sub-sector, the study applied the following regression model of equation (8).

$$INVEST_{it} = \beta_0 + \beta_1(Var)_{it} + \beta_2(CAP)_{it} + \beta_3(OM)_{it} + \beta_4(CR)_{it} + \varepsilon \dots\dots (8)$$

Where  $INVEST_{it}$  denotes the level of investment by the  $it$  firm in year  $t$ ,  $VAR_{it}$  denotes the level of volatility between the Kenyan shilling and a particular foreign currency;  $CAP_{it}$  denotes the cost of capital investments by the  $i^{th}$  firm in year  $t$ ;  $OM_{it}$  denotes the cost of operations and maintenance by the  $i^{th}$  firm in year  $t$ ;  $CR_{it}$  denotes the level of profitability from investments by the  $i^{th}$  firm in year  $t$ ; and  $\varepsilon$  is the error term.

The definition of the exchange rate variable follows closely to that used by Campa (1993). Accordingly,  $VAR_{it}$ , the exchange rate variability was measured by the

standard deviation of the exchange rate defined as the annual standard deviation of the log of the monthly changes in the exchange rate. The results derived from regression of equation (8) will be divided into two types, descriptive results and those to be obtained from the regression analysis. The Statistical Package for Social Sciences, SPSS, was used for both types of analysis.

### **3.4.2 Diagnostic Tests**

#### **3.4.2.1. T-test**

The t-test was used to test the hypothesis that a particular coefficient is significantly different from zero or whether the estimated coefficient value occurred by chance in equation (8).

#### **3.4.2.2. F-test**

The F-statistic is important to test the hypothesis that the whole relationship provided by the equation (8) is significantly different from zero, i.e. whether the levels of capital investments, operations and maintenance, and profitability can be explained by the variation in foreign exchange rates.

#### **3.4.2.3. $R^2$ - Change**

The R-squared ( $R^2$ ) value ranging from '0' to '1' or the 'corrected R-squared' ( $R^2$ ) which is adjusted for degrees of freedom indicates the explanatory power (goodness of fit) of the model.

#### **3.4.2.4. Multi-collinearity Tests**

Multicollinearity is characteristic of models containing highly correlated independent variables and large standard deviations of their respective regression coefficients, thus making it very difficult to assess the separate effects of such variables. The ordinary

least squared (OLS) method is used to study the presence of multi-collinearity (Gujarati, 1995). A correlation matrix was first constructed to check for multi-collinearity, which can arise due to the possibility of closely related variables. The most significant variables was chosen using the backward elimination method available in Statistical Package for Social Sciences (SPSS). This method removes the effect of any multi-collinearity. A two-tailed hypothesis test at a 95% confidence interval was used to accept or reject the null hypotheses detailing the presence of multi-collinearity.

**3.4.2.5. Autocorrelation Tests**

Auto-correlation test is a reliable measure for testing of either dependence or independence of random variables in a series. The serial correlation coefficient measures the relationship between the values of a random variable at time t and its value in the previous period (say t-1). Auto correlation test evidence whether the correlation coefficients for residuals are significantly different from zero. The test was based on equation (9) below:

$$\Delta r_t = r_{t-1} + \delta_1 \Delta r_{t-1} + \delta_2 \Delta r_{t-2} + \delta_3 \Delta r_{t-3} + \dots + \delta_n \Delta r_{t-n} + \epsilon_t \dots \dots \dots (9)$$

Where:

- $\delta$  = Coefficient of the error term
- $r_t$  = Residual from the regression equation (8)
- $\delta_i$  = Coefficient of the lagged residuals
- $\Delta r_t$  =  $r_t - r_{t-1}$

The presence of autocorrelation was tested by regressing equation (8) and checking whether the  $\delta_i$ 's  $i=1, 2, 3, \dots, n$  have values between [-1, 1]. Values of zero for  $\delta_i$ 's  $i=1, 2, 3, \dots, n$  suggests no autocorrelation. Ljung-Box Q statistics was used to test for

autocorrelations. Ljung-Box Q statistic follows the chi-square distribution with m degrees of freedom as shown in equation (10) below:

$$LB = n(n + 2) \sum_{k=1}^m (\hat{p}^2_k / n - k) \equiv \chi^2(m) \dots\dots\dots (10)$$

Where  $\hat{p}^2_k$  = autocorrelation coefficients at lag k; and n = Sample size

## CHAPTER FOUR

### DATA ANALYSIS AND FINDINGS

#### 4.1. Introduction

This chapter discusses the data analysis and findings of the research study. The study hypothesized that variation in foreign exchange rates is a hindrance to new investments in the power sub-sector in Kenya. The chapter is organized as follows: Section 4.2 describes the summary statistics; Section 4.3 focuses on the results of data analysis on the impact of foreign exchange volatility on investment; Section 4.4 presents the discussions of the findings. Finally, section 4.5 is the chapter summary.

#### 4.2 Summary Statistics

Table 1 and Table 2 below shows the summary statistics of the investment, profitability, capital investment and operations & maintenance cost for target firms KenGen and KPLC for the period 2003 to 2007 respectively. The monthly statistics (minimum, maximum, mean and standard deviation) for total investments, profitability, capital investment and operations and maintenance are summarized.

**Table 1 Summary Statistics of the Investment, Profitability, Capital Investment and Operations Maintenance for KenGen**

Variable	Minimum	Maximum	Mean	Std. Deviation
Investment (INVEST)	1,624,245.0	917,981,665.7	165,709,048.1	217,504,271.9
Profitability (CR)	-48,661,902.7	1,200,130.7	-14,390,742.3	14,746,428.5
Capital Investment (CAP)	5,679,022.8	938,101,031.4	174,176,248.5	218,222,950.2
Operations & Maintenance (O&M)	27,142.5	369,310,328.2	43,925,874.4	77,359,035.9

**Data Source: Finance Department KenGen**

**Table 2 Summary Statistics of the Investment, Profitability, Capital Investment and Operations & Maintenance for KPLC**

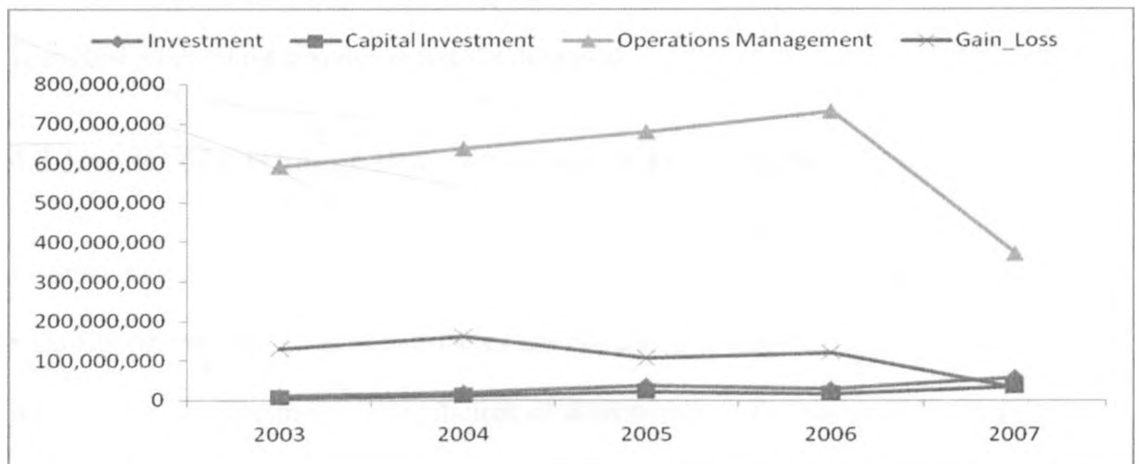
Variable	Minimum	Maximum	Mean	Std. Deviation
Investment(Invest)	2,528	516,866,588	31,201,861	77,541,203
Profitability (CR)	-24,206,910	302,626,377	102,797,605	56,516,524
Capital Investment (CAP)	1,517	310,119,953	18,721,116	46,524,722
Operations & Maintenance (O&M)	15,037	918,728,078	573,374,560	234,809,568

**Data Source: Finance Department KPLC**

According to the results in the table 1, the amount spent by KenGen on capital investment is higher than the amounts spent on operations and maintenance while according to table 2 the average amount spent by KPLC on operations and maintenance is higher than the amounts spent on capital investment. On average, KenGen makes loses on the investment as shown by the level of profitability.

The result in Figure 1 below shows the trend over years on total investment, capital investment, operations & maintenance and level of profitability.

**Figure 1 Trend of the Variables used in the Study by Year**

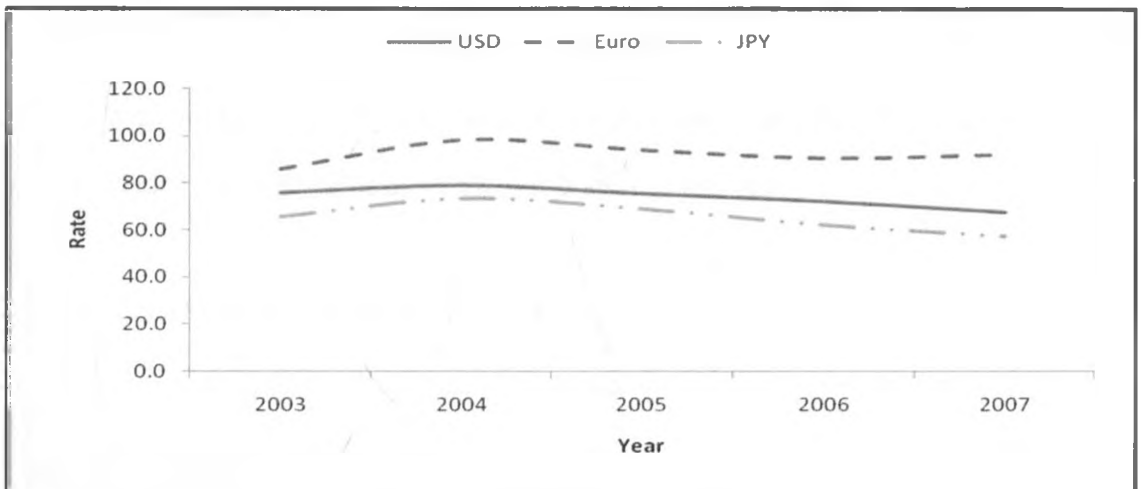


**Source: Finance Department of KenGen and KPLC**

The result shows an upward increase in the amounts spent by firms on operations & maintenance from the year 2003 to 2006 and a fluctuation a continuous drop on the profitability. There is small increase in total investment and capital investment.

Figure 2 shows below the trend of foreign exchange currencies over the years (2003-2007).

**Figure 2: Trend of Foreign Exchange Rates against the Kenya Shillings**



Source: Research Department of the Central Bank of Kenya

The result in the figure shows a slight decline in the foreign currencies rate in relation to the Kenya shillings. Most currencies have been stable over the years except for the year 2004 where most currencies were at their peak.

### 4.3 Impact of Exchange Rate Volatility on Investments

In order to establish which of the above variables best explains foreign exchange volatility on investment as the variables are correlated, a stepwise regression model was carried out. The multiple coefficient of determination,  $R^2$ , was used to measure the proportion of the variation in the dependent variable that is explained by the

combination of the independent variables in the multiple regression model of equation. The R-squared ( $R^2$ ) value ranging from '0' to '1' or the 'corrected R-squared' ( $R^2$ ) which is adjusted for degrees of freedom indicates the explanatory power (goodness of fit) of the model.

#### 4.3.1 Regression Analysis for KenGen

The R-square value according to the model summary table 3 below is 0.459 for KenGen while the adjusted R-square is given as 0.397 implying that the regression model explains approximately 39.7% of the dependent variable (Investment). The Durbin-Watson statistics to test for serial autocorrelation shows that there exists no autocorrelation since the value of the Durbin Watson is less than 7.0.

**Table 3 Model Summary (R-square) for KenGen**

R	R Square	Adjusted R Square	Durbin-Watson
0.678 <sup>a</sup>	.459	.397	2.627

The results in table 4 show the test of significance of individual regression parameters used in the model for KenGen.

**Table 4 Regression Model for KenGen**

	Coefficients	t-value	P-value
INTERCEPT	60,666,307.08	0.43	0.668
PROFITABILITY (CR)	-8.59	-4.52	0.000
CAPITAL INVESTMENT (CAP)	0.23	1.79	0.083
OPERATIONS & MAINTENANCE (O&M)	0.11	0.32	0.748
LOGRATE	-16,612,913.96	-0.48	0.633



The results show that of all the regression parameters, only profitability is statistically negatively significantly related to the dependent variable (Total Investment) at 5% level of significance ( $t=-4.52$ ,  $p\text{-value}=0.000$ ).

The coefficient of the rate of foreign exchange (lograte) is negative implying that as the rate of foreign exchange increases, there is reduction in the level of total investment. This implies that variation in foreign exchange rates affects the amounts of investments in the power sub-sector in Kenya.

The slope coefficients for Capital Investment (CAP) and operations management (OPM) are positive but not statistically significant at 5% significance level. This implies that as the value of investment increases so does the amounts spent on Capital Investment and Operations Management.

**4.3.2 Regression Analysis for KPLC**

The R-square value according to the model summary table 5 is 0.092 for KPLC while the adjusted R-square is given as 0.082 implying that the regression model explains only 8.2% of the dependent variable (Investment). The Durbin-Watson statistics to test for serial autocorrelation shows that there exists no autocorrelation since the value of the Durbin Watson is less than 7.0.

**Table 5 Model Summary (R-square) for KPLC**

R	R Square	Adjusted R Square	Durbin-Watson
0.304	0.092	0.082	2.125

The results in table 6 show the test of significance of individual regression parameters used in the model for KPLC.

**Table 6 Regression Model for KPLC**

	Coefficients	t-value	P-value
Intercept	42,511,951	3.255	0.001
Profitability (CR)	-0.485	-4.682	0.000
Operations & Maintenance (O&M)	0.086	3.462	0.001
LOGRATE9	-215,816	-1.725	0.086

The results show that profitability is statistically negatively significantly related to the dependent variable (Total Investment) at 5% level of significance ( $t=-4.862$ ,  $p\text{-value}=0.000$ ) while operations & maintenance is positively and significantly related to total investment at 5% level of significance ( $t=0.086$ ,  $p\text{-value}=0.001$ ).

The coefficient of the rate of foreign exchange (lograte) is negative implying that as the rate of foreign exchange increases, there is a reduction in the level of total investment. This implies that variation in foreign exchange rates affects the amounts of investments in the power sub-sector in Kenya. The variable Capital Investment (CAP) was not included in the model because it was correlated with total investment.

#### 4.4. Discussions

There is a negative significant relationship between foreign exchange rate and the amount spent on capital investment implying that the amount spent on capital investment reduces when foreign exchange rate is higher compared to the Kenya shillings. From the result, a negative significant relationship between profitability and the amount spent on capital investment implies that that the higher the amount spent

on capital investment the lower the gains. The results of the regression model concludes that profitability is statistically negatively significantly related to the total investment confirming that variation in foreign exchange rates affects the firms decision on new investments.

#### **4.5 Summary**

Firms in the power subsector are both highly capital intensive and with a high degree of operational costs and do suffer from the various dynamics of exchange rates variations. Regression analysis model confirms that exchange rates variability does affect investment decisions in the Kenyan power sub-sector. It particularly affects the amount of gain/loss and overall investments made by the firms in the Kenyan power sub-sector. The results of the analysis confirm that minimal investments in manufacturing sector power sub-sector are due to unpredictable behaviour of foreign exchange markets in Kenya.

# **CHAPTER FIVE**

## **SUMMARY AND CONCLUSION**

### **5.1 Introduction**

This chapter discusses the summary and conclusion of the research study that variation in foreign exchange rates is a hindrance to new investments in the electric power sub-sector in Kenya. The chapter is organized as follows: Section 5.2 focuses on the summary of key findings; Section 5.3 highlights the conclusion of the study; Section 5.4 discusses the limitations of the study; and finally Section 5.5 provides recommendations for further study.

### **5.2 Summary of Key Findings**

The study set out to study the impact of exchange rate variability on investments in the electric power sub-sector in Kenya with a hypothesis that variation in foreign exchange rates is a hindrance to new investments in the electric power sub-sector in Kenya

The results in Chapter 4 established the existence of negative correlation between total investment and level of profitability. This implies as firms in the electric power subsector undertake major capital investments, these investments eats into the company profits due to foreign exchange adjustments from payments of foreign contractors, payment of loans and day to day operations of these investments.

The study has also established that there is positive correlation between total investment and the amount spent capital investment. Most of the capital investment for the firms in the power subsector is in form of equipment and not services and thus the investments in these equipments is capitalized in the company's balance sheet as part of the total investment of the firm.

The significant appreciation of the Kenya Shilling against the major foreign currencies is having a toll on the firms in the manufacturing sector. Shifts in foreign exchange rates have the potential to undermine the competitive position of the firm and destroy profits.

### **5.3 Conclusion**

Changes in exchange rates can lead to an increase in uncertainty about income from operations and uncertainty in the level of investments. Shifts in foreign exchange rates have the potential to undermine the competitive position of the firm and destroy profits. The study confirms that exchange rates variability does affect investment decisions in the Kenyan electric power sub-sector. The level of profitability and overall investments decisions made by firms in the Kenyan Power sub-sector are significantly affected by foreign exchange fluctuations.

### **5.4 Limitations of the Study**

Under the current Power Purchase Agreement (PPA), power generators are required to recover foreign exchange losses from part of their operations. This recovery of foreign exchange losses for some costs may have distorted the values for level of

profitability. Government control of the amount of tariff that can be charged by these firms may also have distorted the level of profitability by the firms.

Linear relation is assumed in the test as opposed to nonlinear relationship and the model only explains 8.2% on investment. This suggests that the relation is unlikely to be monotonically increasing as modelled by a linear relation.

The data for the IPPS was not readily available for analysis though their revenues are earned in foreign currency and they suffer minimal foreign exchange losses. Two of the IPPS are owned and managed by the parent company that manufactures electric equipment that forms larger part of their operations & maintenance cost for a plant.

## **5.5 Recommendations for Further Research**

The study can be enhanced by furtherance of correlation analysis for the IPPs firms that are not wholly owned by parent equipment manufacturers. This will attest the variability of investments on decisions making while not protected by the parent company.

The study can also be enhanced by similar research in other manufacturing subsectors that are not highly capital intensive and or government majority owned and who derive their income in foreign currencies.

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## APPENDIX I: EXCHANGE RATE DATA

### MONTHLY AVERAGE EXCHANGE RATE TO KENYA SHILLINGS

YEAR	MONTH	US \$	EURO	JP YEN (100)
2003	January	77.72	82.60	65.41
2003	February	76.84	82.78	64.33
2003	March	76.58	82.67	64.54
2003	April	75.66	82.18	63.14
2003	May	71.61	82.82	61.17
2003	June	73.72	86.08	62.34
2003	July	74.75	85.04	62.99
2003	August	75.96	84.70	63.93
2003	September	77.90	87.48	67.69
2003	October	77.77	91.02	70.97
2003	November	76.74	89.78	70.27
2003	December	76.02	93.28	70.50
2004	January	76.29	96.22	71.66
2004	February	76.39	96.56	71.72
2004	March	77.26	94.85	71.15
2004	April	77.91	93.41	72.43
2004	May	79.24	95.13	70.60
2004	June	79.27	96.19	72.36
2004	July	79.99	98.19	73.18
2004	August	80.83	98.50	73.24
2004	September	80.72	98.61	73.36
2004	October	81.20	101.43	74.55
2004	November	81.20	105.36	77.46
2004	December	79.77	106.88	76.90
2005	January	77.93	102.33	75.48
2005	February	76.94	100.14	73.33
2005	March	74.80	98.80	71.30
2005	April	76.15	98.55	71.12
2005	May	76.40	96.97	71.61
2005	June	76.68	93.25	70.57
2005	July	76.23	91.83	68.09
2005	August	75.81	93.16	68.46
2005	September	74.10	90.86	66.72
2005	October	73.71	88.56	64.22
2005	November	74.74	88.15	63.19
2005	December	73.11	86.69	61.63
2006	January	72.21	87.53	62.55
2006	February	71.80	85.84	60.94
2006	March	72.28	86.90	61.63
2006	April	71.30	87.45	60.94
2006	May	71.76	91.64	64.24
2006	June	73.41	92.96	64.03
2006	July	73.66	93.50	63.71
2006	August	72.87	93.34	62.89
2006	September	72.87	92.86	62.26
2006	October	72.29	91.26	60.95

YEAR	MONTH	US \$	EURO	JP YEN (100)
2006	November	71.13	91.58	60.65
2006	December	69.63	92.03	59.47
2007	January	69.88	90.87	58.09
2007	February	69.62	91.04	57.76
2007	March	69.29	91.77	59.08
2007	April	68.58	92.68	57.73
2007	May	67.19	90.82	55.65
2007	June	66.57	89.33	54.27
2007	July	67.07	91.99	55.17
2007	August	66.95	91.15	57.38
2007	September	67.02	93.06	58.25
2007	October	66.85	95.09	57.76
2007	November	65.49	96.13	58.93
2007	December	63.30	92.24	56.52

Source: Research Department of the Central Bank of Kenya

## APPENDIX II: DATA COLLECTION

PAYMENT	CURRENCY	AMOUNT	RATE	ACTUAL PAID	BASE	PROJECTED	GAIN	LOSS	INVESTMENT	CAPEX	O&M
28.01.2003	JPY	76,259,323.00	0.66	50,102,375.21	0.55	41,942,627.65	-8,159,747.56		50,102,375.21	30,061,425.13	15,030,712.56
15.01.2003	USD	92,696.01	76.95	7,132,957.97	65.00	6,025,240.65	-1,107,717.32		7,132,957.97	4,279,774.78	2,139,887.39
13.01.2003	USD	350.00	77.55	27,142.50	65.00	22,750.00	-4,392.50		27,142.50	16,285.50	8,142.75
24.01.2003	USD	154,582.88	79.35	12,266,151.53	65.00	10,047,887.20	-2,218,264.33		12,266,151.53	7,359,690.92	3,679,845.46
13.01.2003	USD	174,508.02	77.55	13,533,096.95	65.00	11,343,021.30	-2,190,075.65		13,533,096.95	8,119,858.17	4,059,929.09
28.01.2003	USD	0.00	77.90	0.00	65.00	0.00	0.00		0.00	0.00	0.00
15.01.2003	USD	17,040.00	76.95	1,311,228.00	65.00	1,107,600.00	-203,628.00		1,311,228.00	786,736.80	393,368.40
28.01.2003	USD	0.00	77.90	0.00	65.00	0.00	0.00		0.00	0.00	0.00
26.02.2003	USD	30,044.70	76.60	2,301,424.02	65.00	1,952,905.50	-348,518.52		2,301,424.02	1,380,854.41	690,427.21
25.02.2003	USD	25,700.00	76.60	1,968,620.00	65.00	1,670,500.00	-298,120.00		1,968,620.00	1,181,172.00	590,586.00
02.05.2003	USD	3,000.00	74.55	223,650.00	65.00	195,000.00	-28,650.00		223,650.00	134,190.00	67,095.00
02.05.2003	USD	3,500.00	74.55	260,925.00	65.00	227,500.00	-33,425.00		260,925.00	156,555.00	78,277.50
02.04.2003	USD	35,311.80	76.55	2,703,118.29	65.00	2,295,267.00	-407,851.29		2,703,118.29	1,621,870.97	810,935.49
28.03.2003	EUR	12,702.00	83.41	1,059,473.82	69.86	887,361.72	-172,112.10		1,059,473.82	635,684.29	317,842.15
03.10.2003	JPY	66,282,028.00	0.71	46,960,816.84	0.55	36,455,115.40	-10,505,701.44		46,960,816.84	28,176,490.10	14,088,245.05
03.11.03	JPY	31,894.00	0.70	22,469.32	0.55	17,541.70	-4,927.62		22,469.32	13,481.59	6,740.80
14.04.2003	EUR	950.00	81.70	77,615.00	69.86	66,367.00	-11,248.00		77,615.00	46,569.00	23,284.50
4.02.2003	EUR	306,268.53	84.40	25,849,063.93	69.86	21,395,919.51	-4,453,144.43		25,849,063.93	15,509,438.36	7,754,719.18
14.04.2003	JPY	63,795,194.00	0.63	40,082,520.39	0.55	35,087,356.70	-4,995,163.69		40,082,520.39	24,049,512.23	12,024,756.12
14.04.2003	JPY	72,255,661.00	0.63	45,398,231.81	0.55	39,740,613.55	-5,657,618.26		45,398,231.81	27,238,939.08	13,619,469.54
14.04.2003	USD	544.65	75.95	41,366.17	65.00	35,402.25	-5,963.92		41,366.17	24,819.70	12,409.85
14.04.2003	USD	61,635.90	75.95	4,681,246.61	65.00	4,006,333.50	-674,913.11		4,681,246.61	2,808,747.96	1,404,373.98
14.04.2003	USD	132,463.97	75.95	10,060,638.52	65.00	8,610,158.05	-1,450,480.47		10,060,638.52	6,036,383.11	3,018,191.56
14.04.2003	USD	25,700.00	75.95	1,951,915.00	65.00	1,670,500.00	-281,415.00		1,951,915.00	1,171,149.00	585,574.50
14.04.2003	USD	13,000.00	75.95	987,350.00	65.00	845,000.00	-142,350.00		987,350.00	592,410.00	296,205.00
14.04.2003	USD	14,180.00	75.95	1,076,971.00	65.00	921,700.00	-155,271.00		1,076,971.00	646,182.60	323,091.30

PAYMENT	CURRENCY	AMOUNT	RATE	ACTUAL PAID	BASE	PROJECTED	GAIN LOSS	INVESTMENT	CAPEX	O&M
14.04.2003	USD	2,391.90	75.95	181,664.81	65.00	155,473.50	-26,191.31	181,664.81	108,998.88	54,499.44
14.04.2003	USD	149.00	75.95	11,316.55	65.00	9,685.00	-1,631.55	11,316.55	6,789.93	3,394.97
14.04.2003	USD	44.00	75.95	3,341.80	65.00	2,860.00	-481.80	3,341.80	2,005.08	1,002.54
05.05.2003	JPY	14,129,497.00	0.62	8,774,417.64	0.55	7,771,223.35	-1,003,194.29	8,774,417.64	5,264,650.58	2,632,325.29
05.05.2003	USD	10,850.00	73.80	800,730.00	65.00	705,250.00	-95,480.00	800,730.00	480,438.00	240,219.00
05.05.2003	USD	1,238.09	73.80	91,371.04	65.00	80,475.85	-10,895.19	91,371.04	54,822.63	27,411.31
05.05.2003	USD	46,915.50	73.80	3,462,363.90	65.00	3,049,507.50	-412,856.40	3,462,363.90	2,077,418.34	1,038,709.17
13.06.2003	JPY	57,181.00	0.63	36,197.29	0.55	31,449.55	-4,747.74	36,197.29	21,718.37	10,859.19
30.06.2003	JPY	4,375,500.00	0.62	2,712,810.00	0.55	2,406,525.00	-306,285.00	2,712,810.00	1,627,686.00	813,843.00
30.06.2003	JPY	55,453,148.00	0.62	34,380,951.76	0.55	30,499,231.40	-3,881,720.36	34,380,951.76	20,628,571.06	10,314,285.53
26.06.2003	JPY	337,000.00	0.64	214,938.60	0.55	185,350.00	-29,588.60	214,938.60	128,963.16	64,481.58
17.06.2003	USD	1,750.00	74.20	129,850.00	65.00	113,750.00	-16,100.00	129,850.00	77,910.00	38,955.00
23.07.2003	EUR	25,448.73	86.70	2,206,404.89	69.86	1,777,848.28	-428,556.61	2,206,404.89	1,323,842.93	661,921.47
23.07.2003	EUR	32,500.00	86.70	2,817,750.00	69.86	2,270,450.00	-547,300.00	2,817,750.00	1,690,650.00	845,325.00
07.03.2003	JPY	57,658,599.00	0.65	37,622,235.85	0.55	31,712,229.45	-5,910,006.40	37,622,235.85	22,573,341.51	11,286,670.75
07.03.2003	USD	39,000.00	76.50	2,983,500.00	65.00	2,535,000.00	-448,500.00	2,983,500.00	1,790,100.00	895,050.00
07.03.2003	USD	11,816.99	76.50	903,999.74	65.00	768,104.35	-135,895.39	903,999.74	542,399.84	271,199.92
14.07.2003	USD	28,080.00	75.35	2,115,828.00	65.00	1,825,200.00	-290,628.00	2,115,828.00	1,269,496.80	634,748.40
07.03.2003	USD	147,497.25	76.50	11,283,539.63	65.00	9,587,321.25	-1,696,218.38	11,283,539.63	6,770,123.78	3,385,061.89
07.03.2003	USD	25,700.00	76.50	1,966,050.00	65.00	1,670,500.00	-295,550.00	1,966,050.00	1,179,630.00	589,815.00
20.08.2003	EUR	4,294.64	86.60	371,915.82	69.86	300,023.55	-71,892.27	371,915.82	223,149.49	111,574.75
18.08.2003	JPY	10,470,000.00	0.64	6,685,095.00	0.55	5,758,500.00	-926,595.00	6,685,095.00	4,011,057.00	2,005,528.50
18.08.2003	JPY	3,525,273.00	0.64	2,250,886.81	0.55	1,938,900.15	-311,986.66	2,250,886.81	1,350,532.09	675,266.04
08.05.2003	USD	115,000.00	73.55	8,458,250.00	65.00	7,475,000.00	-983,250.00	8,458,250.00	5,074,950.00	2,537,475.00
08.05.2003	USD	1,032.00	71.70	73,994.40	65.00	67,080.00	-6,914.40	73,994.40	44,396.64	22,198.32
20.08.2003	USD	1,000,000.00	75.90	75,900,000.00	65.00	65,000,000.00	-10,900,000.00	75,900,000.00	45,540,000.00	22,770,000.00
18.08.2003	USD	500,000.00	75.90	37,950,000.00	65.00	32,500,000.00	-5,450,000.00	37,950,000.00	22,770,000.00	11,385,000.00
18.08.2003	USD	1,000,000.00	75.85	75,850,000.00	65.00	65,000,000.00	-10,850,000.00	75,850,000.00	45,510,000.00	22,755,000.00
22.09.2003	EUR	451,774.83	89.90	40,614,557.22	69.86	31,560,989.62	-9,053,567.59	40,614,557.22	24,368,734.33	12,184,367.17
22.09.2003	EUR	58,116.00	89.90	5,224,628.40	69.86	4,059,983.76	-1,164,644.64	5,224,628.40	3,134,777.04	1,567,388.52

PAYMENT	CURRENCY	AMOUNT	RATE	ACTUAL PAID	BASE	PROJECTED	GAIN LOSS	INVESTMENT	CAPEX	O&M
16.09.2003	EUR	915.00	89.60	81,984.00	69.86	63,921.90	-18,062.10	81,984.00	49,190.40	24,595.20
16.09.2003	JPY	5,864,089.00	0.68	3,987,580.52	0.55	3,225,248.95	-762,331.57	3,987,580.52	2,392,548.31	1,196,274.16
09.12.2003	JPY	220,095.00	0.71	156,729.65	0.55	121,052.25	-35,677.40	156,729.65	94,037.79	47,018.90
22.09.2003	JPY	31,415,325.00	0.70	21,890,198.46	0.55	17,278,428.75	-4,611,769.71	21,890,198.46	13,134,119.08	6,567,059.54
09.12.2003	JPY	220,095.00	0.71	156,729.65	0.55	121,052.25	-35,677.40	156,729.65	94,037.79	47,018.90
09.12.2003	JPY	21,388,250.00	0.71	15,230,572.83	0.55	11,763,537.50	-3,467,035.33	15,230,572.83	9,138,343.70	4,569,171.85
09.12.2003	JPY	21,388,250.00	0.71	15,230,572.83	0.55	11,763,537.50	-3,467,035.33	15,230,572.83	9,138,343.70	4,569,171.85
17.09.2003	JPY	114,278,904.00	0.68	77,641,087.38	0.55	62,853,397.20	-14,787,690.18	77,641,087.38	46,584,652.43	23,292,326.21
09.05.2003	USD	2,041.25	71.80	146,561.75	65.00	132,681.25	-13,880.50	146,561.75	87,937.05	43,968.53
19.09.2003	USD	54,735.00	78.80	4,313,118.00	65.00	3,557,775.00	-755,343.00	4,313,118.00	2,587,870.80	1,293,935.40
09.05.2003	USD	3,605.00	71.80	258,839.00	65.00	234,325.00	-24,514.00	258,839.00	155,303.40	77,651.70
27.10.2003	EUR	46,870.00	90.80	4,255,796.00	69.86	3,274,338.20	-981,457.80	4,255,796.00	2,553,477.60	1,276,738.80
30.10.2003	EUR	23,250.00	90.00	2,092,500.00	69.86	1,624,245.00	-468,255.00	2,092,500.00	1,255,500.00	627,750.00
23.10.2003	EUR	102,456.00	89.65	9,185,180.40	69.86	7,157,576.16	-2,027,604.24	9,185,180.40	5,511,108.24	2,755,554.12
21.10.2003	JPY	10,893,152.00	0.70	7,625,206.40	0.55	5,991,233.60	-1,633,972.80	7,625,206.40	4,575,123.84	2,287,561.92
21.10.2003	USD	836,693.00	76.80	64,258,022.40	65.00	54,385,045.00	-9,872,977.40	64,258,022.40	38,554,813.44	19,277,406.72
10.03.2003	USD	4,862.00	76.65	372,672.30	65.00	316,030.00	-56,642.30	372,672.30	223,603.38	111,801.69
10.06.2003	USD	740.00	75.50	55,870.00	65.00	48,100.00	-7,770.00	55,870.00	33,522.00	16,761.00
10.03.2003	USD	4,862.00	76.65	372,672.30	65.00	316,030.00	-56,642.30	372,672.30	223,603.38	111,801.69
10.03.2003	USD	4,862.00	76.65	372,672.30	65.00	316,030.00	-56,642.30	372,672.30	223,603.38	111,801.69
10.03.2003	USD	4,862.00	76.65	372,672.30	65.00	316,030.00	-56,642.30	372,672.30	223,603.38	111,801.69
10.03.2003	USD	4,862.00	76.65	372,672.30	65.00	316,030.00	-56,642.30	372,672.30	223,603.38	111,801.69
0.02.2003	USD	69,168.00	77.10	5,332,852.80	65.00	4,495,920.00	-836,932.80	5,332,852.80	3,199,711.68	1,599,855.84
28.11.2003	JPY	12,540,000.00	0.70	8,809,350.00		6,897,000.00	-1,912,350.00	8,809,350.00	5,285,610.00	2,642,805.00
11.12.2003	USD	3,000.00	76.20	228,600.00	65.00	195,000.00	-33,600.00	228,600.00	137,160.00	68,580.00
11.12.2003	USD	3,000.00	76.20	228,600.00	65.00	195,000.00	-33,600.00	228,600.00	137,160.00	68,580.00
11.08.2003	USD	1,860.00	75.75	140,895.00	65.00	120,900.00	-19,995.00	140,895.00	84,537.00	42,268.50
22.12.2003	JPY	15,591,874.00	0.71	11,035,928.42		8,575,530.70	-2,460,397.72	11,035,928.42	6,621,557.05	3,310,778.53
22.12.2003	JPY	15,591,874.00	0.71	11,035,928.42		8,575,530.70	-2,460,397.72	11,035,928.42	6,621,557.05	3,310,778.53
12.02.2003	JPY	91,691,762.00	0.64	58,407,652.39	0.55	50,430,469.10	-7,977,183.29	58,407,652.39	35,044,591.44	17,522,295.72

PAYMENT	CURRENCY	AMOUNT	RATE	ACTUAL PAID	BASE	PROJECTED	GAIN LOSS	INVESTMENT	CAPEX	O&M
12.02.2003	JPY	79,274.00	0.64	50,497.54	0.55	43,600.70	-6,896.84	50,497.54	30,298.52	15,149.26
22.12.2003	USD	17,663.00	75.90	1,340,621.70	65.00	1,148,095.00	-192,526.70	1,340,621.70	804,373.02	402,186.51
12.09.2003	USD	14,320.00	78.30	1,121,256.00	65.00	930,800.00	-190,456.00	1,121,256.00	672,753.60	336,376.80
22.12.2003	USD	737,274.13	75.90	55,959,106.47	65.00	47,922,818.45	-8,036,288.02	55,959,106.47	33,575,463.88	16,787,731.94
12.02.2003	USD	67,445.41	76.80	5,179,807.49	65.00	4,383,951.65	-795,855.84	5,179,807.49	3,107,884.49	1,553,942.25
22.12.2003	USD	64,730.40	75.90	4,913,037.36		4,207,476.00	-705,561.36	4,913,037.36	2,947,822.42	1,473,911.21
17.12.2003	USD	42,832.30	76.05	3,257,396.42	65.00	2,784,099.50	-473,296.92	3,257,396.42	1,954,437.85	977,218.92
12.02.2003	USD	142,155.07	76.80	10,917,509.38	65.00	9,240,079.55	-1,677,429.83	10,917,509.38	6,550,505.63	3,275,252.81
22.12.2003	USD	17,663.00	75.90	1,340,621.70	65.00	1,148,095.00	-192,526.70	1,340,621.70	804,373.02	402,186.51
12.02.2003	USD	15,523.33	76.80	1,192,191.74	65.00	1,009,016.45	-183,175.29	1,192,191.74	715,315.05	357,657.52
17.12.2003	USD	42,832.30	76.05	3,257,396.42	65.00	2,784,099.50	-473,296.92	3,257,396.42	1,954,437.85	977,218.92
22.12.2003	USD	64,730.40	75.90	4,913,037.36		4,207,476.00	-705,561.36	4,913,037.36	2,947,822.42	1,473,911.21
22.12.2003	USD	737,274.13	75.90	55,959,106.47	65.00	47,922,818.45	-8,036,288.02	55,959,106.47	33,575,463.88	16,787,731.94
01.11.04	JPY	4,000.00	0.77	3,080.00	0.55	2,200.00	-880.00	3,080.00	1,848.00	924.00
24.02.2004	EUR	13,121.89	96.20	1,262,325.82	69.86	916,695.24	-345,630.58	1,262,325.82	757,395.49	378,697.75
02.02.2004	EUR	51,893.10	95.50	4,955,791.05	69.86	3,625,251.97	-1,330,539.08	4,955,791.05	2,973,474.63	1,486,737.32
23.02.2004	JPY	4,000.00	0.71	2,840.00	0.55	2,200.00	-640.00	2,840.00	1,704.00	852.00
24.02.2004	USD	98,317.20	76.60	7,531,097.52	65.00	6,390,618.00	-1,140,479.52	7,531,097.52	4,518,658.51	2,259,329.26
23.04.2004	EUR	98,995.95	95.50	9,454,113.23	69.86	6,915,857.07	-2,538,256.16	9,454,113.23	5,672,467.94	2,836,233.97
13.04.2004	JPY	36,905,542.00	0.73	27,070,215.06	0.55	20,298,048.10	-6,772,166.96	27,070,215.06	16,242,129.03	8,121,064.52
13.04.2004	JPY	66,638,168.00	0.73	48,879,096.23	0.55	36,650,992.40	-12,228,103.83	48,879,096.23	29,327,457.74	14,663,728.87
05.01.04	EUR	20,245.00	95.50	1,933,397.50	69.86	1,414,315.70	-519,081.80	1,933,397.50	1,160,038.50	580,019.25
05.02.2004	JPY	43,361,051.00	0.73	31,458,442.50	0.55	23,848,578.05	-7,609,864.45	31,458,442.50	18,875,065.50	9,437,532.75
05.11.04	USD	1,873,332.22	81.15	152,020,909.65	65.00	121,766,594.30	-30,254,315.35	152,020,909.65	91,212,545.79	45,606,272.90
05.02.2004	USD	47,367.90	76.50	3,623,644.35	65.00	3,078,913.50	-544,730.85	3,623,644.35	2,174,186.61	1,087,093.31
06.01.04	USD	360.00	76.45	27,522.00	65.00	23,400.00	-4,122.00	27,522.00	16,513.20	8,256.60
06.01.04	USD	100.00	76.45	7,645.00	65.00	6,500.00	-1,145.00	7,645.00	4,587.00	2,293.50
06.01.04	USD	37,422.48	76.45	2,860,948.60	65.00	2,432,461.20	-428,487.40	2,860,948.60	1,716,569.16	858,284.58
07.01.04	EUR	272,670.48	97.20	26,503,570.66	69.86	19,048,759.73	-7,454,810.92	26,503,570.66	15,902,142.39	7,951,071.20
07.01.04	USD	55,347.14	76.45	4,231,288.85	65.00	3,597,564.10	-633,724.75	4,231,288.85	2,538,773.31	1,269,386.66



PAYMENT	CURRENCY	AMOUNT	RATE	ACTUAL PAID	BASE	PROJECTED	GAIN LOSS	INVESTMENT	CAPEX	O&M
08.04.2004	EUR	23,250.00	94.80	2,204,100.00	69.86	1,624,245.00	-579,855.00	2,204,100.00	1,322,460.00	661,230.00
09.01.04	EUR	33,400.00	96.10	3,209,740.00	69.86	2,333,324.00	-876,416.00	3,209,740.00	1,925,844.00	962,922.00
09.01.04	USD	59,488.84	76.10	4,527,100.72	65.00	3,866,774.60	-660,326.12	4,527,100.72	2,716,260.43	1,358,130.22
10.03.2004	JPY	113,036,742.00	0.69	78,198,818.12	0.55	62,170,208.10	-16,028,610.02	78,198,818.12	46,919,290.87	23,459,645.43
12.02.2004	EUR	59,553.84	98.00	5,836,276.32	69.86	4,160,431.26	-1,675,845.06	5,836,276.32	3,501,765.79	1,750,882.90
12.05.04	USD	632,268.00	79.30	50,138,852.40	65.00	41,097,420.00	-9,041,432.40	50,138,852.40	30,083,311.44	15,041,655.72
02.08.2005	USD	604,873.00	76.90	46,514,733.70	65.00	39,316,745.00	-7,197,988.70	46,514,733.70	27,908,840.22	13,954,420.11
21.04.2005	JPY	15,342,148.00	0.72	11,113,413.70	0.55	8,438,181.40	-2,675,232.30	11,113,413.70	6,668,048.22	3,334,024.11
15.04.2005	USD	115,381.13	76.45	8,820,887.39	65.00	7,499,773.45	-1,321,113.94	8,820,887.39	5,292,532.43	2,646,266.22
28.04.2005	USD	8,964.20	77.20	692,036.24	65.00	582,673.00	-109,363.24	692,036.24	415,221.74	207,610.87
15.04.2005	USD	162,365.55	76.45	12,412,846.30	65.00	10,553,760.75	-1,859,085.55	12,412,846.30	7,447,707.78	3,723,853.89
15.04.2005	USD	40,943.73	76.45	3,130,148.16	65.00	2,661,342.45	-468,805.71	3,130,148.16	1,878,088.90	939,044.45
05.07.2005	JPY	32,204,000.00	0.69	22,236,862.00	0.55	17,712,200.00	-4,524,662.00	22,236,862.00	13,342,117.20	6,671,058.60
07.09.2005	JPY	367,000.00	0.68	250,661.00	0.55	201,850.00	-48,811.00	250,661.00	150,396.60	75,198.30
13.07.2005	USD	67.38	76.32	5,142.40	65.00	4,379.70	-762.70	5,142.40	3,085.44	1,542.72
13.07.2005	USD	96,291.54	76.32	7,348,864.45	65.00	6,258,950.10	-1,089,914.35	7,348,864.45	4,409,318.67	2,204,659.34
13.07.2005	USD	29,586.00	76.50	2,263,329.00	65.00	1,923,090.00	-340,239.00	2,263,329.00	1,357,997.40	678,998.70
13.09.2005	JPY	330,822,651.00	0.68	224,297,794.00	0.55	181,952,458.05	-42,345,335.95	224,297,794.00	134,578,676.40	67,289,338.20
09.11.2005	JPY	117,906.00	0.64	75,931.50	0.55	64,848.30	-11,083.20	75,931.50	45,558.90	22,779.45
26.09.2005	JPY	16,000.00	0.65	10,376.00	0.55	8,800.00	-1,576.00	10,376.00	6,225.60	3,112.80
14.09.2005	USD	34.38	74.90	2,575.10	65.00	2,234.70	-340.40	2,575.10	1,545.06	772.53
19.09.2005	USD	8,404.60	73.60	618,578.56	65.00	546,299.00	-72,279.56	618,578.56	371,147.14	185,573.57
26.09.2005	USD	1,674.86	74.45	124,693.33	65.00	108,865.90	-15,827.43	124,693.33	74,816.00	37,408.00
09.08.2005	USD	68,018.00	77.25	5,254,390.50	65.00	4,421,170.00	-833,220.50	5,254,390.50	3,152,634.30	1,576,317.15
09.08.2005	USD	35,687.20	76.15	2,717,580.28	65.00	2,319,668.00	-397,912.28	2,717,580.28	1,630,548.17	815,274.08
09.06.2005	USD	36,166.45	77.00	2,784,816.65	65.00	2,350,819.25	-433,997.40	2,784,816.65	1,670,889.99	835,445.00
09.05.2005	USD	12,206.49	76.10	928,913.89	65.00	793,421.85	135,492.04	928,913.89	557,348.33	278,674.17
17.10.2005	JPY	71,405,512.00	0.65	46,342,177.30	0.55	39,273,031.60	-7,069,145.70	46,342,177.30	27,805,306.38	13,902,653.19
11.08.2005	JPY	8,000.00	0.68	5,464.80	0.55	4,400.00	-1,064.80	5,464.80	3,278.88	1,639.44
11.08.2005	JPY	1,673,000.00	0.68	1,142,826.30	0.55	920,150.00	-222,676.30	1,142,826.30	685,695.78	342,847.89

PAYMENT	CURRENCY	AMOUNT	RATE	ACTUAL PAID	BASE	PROJECTED	GAIN	LOSS	INVESTMENT	CAPEX	O&M
23.11.2005	JPY	3,414,000.00	0.63	2,159,355.00	0.55	1,877,700.00	-281,655.00		2,159,355.00	1,295,613.00	647,806.50
23.11.2005	JPY	860,000.00	0.63	543,950.00	0.55	473,000.00	-70,950.00		543,950.00	326,370.00	163,185.00
23.11.2005	USD	2,171,231.85	75.90	164,796,497.40	65.00	141,130,070.25	-23,666,427.15		164,796,497.40	98,877,898.44	49,438,949.22
17.11.2005	USD	85.10	75.95	6,463.30	65.00	5,531.50	-931.80		6,463.30	3,877.98	1,938.99
12.04.2005	JPY	68,598,168.00	0.71	48,588,082.40	0.55	37,728,992.40	-10,859,090.00		48,588,082.40	29,152,849.44	14,576,424.72
12.04.2005	JPY	68,598,168.00	0.71	48,588,082.40	0.55				48,588,082.40	29,152,849.44	14,576,424.72
19.12.2005	USD	6,821,817.34	75.77	516,866,587.85	65.00	443,418,127.10	-73,448,460.75		516,866,587.85	310,119,952.71	155,059,976.36
13.01.2006	JPY	4,000.00	0.63	2,528.00	0.55	2,200.00	-328.00		2,528.00	1,516.80	758.40
01.11.2006	USD	15,945.96	72.60	1,157,676.70	65.00	1,036,487.40	-121,189.30		1,157,676.70	694,606.02	347,303.01
01.03.2006	USD	55,711.17	73.65	4,103,127.67	65.00	3,621,226.05	-481,901.62		4,103,127.67	2,461,876.60	1,230,938.30
01.09.2006	USD	86,548.45	72.62	6,284,715.70	65.00	5,625,649.25	-659,066.45		6,284,715.70	3,770,829.42	1,885,414.71
22.02.2006	JPY	13,865,250.00	0.61	8,457,802.50	0.55	7,625,887.50	-831,915.00		8,457,802.50	5,074,681.50	2,537,340.75
21.02.2006	JPY	319,589,433.00	0.61	194,693,882.60	0.55	175,774,188.15	-18,919,694.45		194,693,882.60	116,816,329.56	58,408,164.78
02.02.2006	JPY	23,652,500.00	0.61	14,416,198.75	0.55	13,008,875.00	-1,407,323.75		14,416,198.75	8,649,719.25	4,324,859.63
27.02.2006	JPY	1,544,000.00	0.62	950,332.00	0.55	849,200.00	-101,132.00		950,332.00	570,199.20	285,099.60
13.03.2006	JPY	162,307.00	0.61	99,331.90	0.55	89,268.85	-10,063.05		99,331.90	59,599.14	29,799.57
13.03.2006	JPY	9,117,142.00	0.61	5,579,690.90	0.55	5,014,428.10	-565,262.80		5,579,690.90	3,347,814.54	1,673,907.27
03.11.2006	USD	3,411.90	73.00	249,068.70	65.00	221,773.50	-27,295.20		249,068.70	149,441.22	74,720.61
03.08.2006	USD	8,891.62	73.55	653,978.65	65.00	577,955.30	-76,023.35		653,978.65	392,387.19	196,193.60
04.12.2006	JPY	6,222,000.00	0.61	3,782,976.00	0.55	3,422,100.00	-360,876.00		3,782,976.00	2,269,785.60	1,134,892.80
19.04.2006	JPY	36,000.00	0.61	21,895.20	0.55	19,800.00	-2,095.20		21,895.20	13,137.12	6,568.56
25.04.2006	USD	89.77	71.60	6,427.53	65.00	5,835.05	-592.48		6,427.53	3,856.52	1,928.26
04.04.2006	USD	166,493.00	71.50	11,904,249.50	65.00	10,822,045.00	-1,082,204.50		11,904,249.50	7,142,549.70	3,571,274.85
30.05.2006	USD	86,098.00	73.50	6,328,203.00	65.00	5,596,370.00	-731,833.00		6,328,203.00	3,796,921.80	1,898,460.90
06.09.2006	JPY	180,000.00	0.63	113,400.00	0.55	99,000.00	-14,400.00		113,400.00	68,040.00	34,020.00
06.12.2006	JPY	249,249,125.04	0.60	150,297,222.40	0.55	137,087,018.77	-13,210,203.63		150,297,222.40	90,178,333.44	45,089,166.72
15.06.2006	JPY	12,000.00	0.65	7,764.00	0.55	6,600.00	-1,164.00		7,764.00	4,658.40	2,329.20
16.06.2006	USD	378,850.00	74.60	28,262,210.00	65.00	24,625,250.00	-3,636,960.00		28,262,210.00	16,957,326.00	8,478,663.00
06.06.2006	USD	70.63	72.80	5,142.00	65.00	4,590.95	-551.05		5,142.00	3,085.20	1,542.60
06.01.2006	USD	4,861.71	73.30	356,363.34	65.00	316,011.15	-40,352.19		356,363.34	213,818.01	106,909.00

PAYMENT	CURRENCY	AMOUNT	RATE	ACTUAL PAID	BASE	PROJECTED	GAIN LOSS	INVESTMENT	CAPEX	O&M
06.12.2006	USD	994,000.00	70.05	69,629,700.00	65.00	64,610,000.00	-5,019,700.00	69,629,700.00	41,777,820.00	20,888,910.00
07.07.2006	JPY	49,174,391.00	0.65	31,914,179.76	0.55	27,045,915.05	-4,868,264.71	31,914,179.76	19,148,507.86	9,574,253.93
07.03.2006	JPY	2,547,855.00	0.62	1,574,574.39	0.55	1,401,320.25	-173,254.14	1,574,574.39	944,744.63	472,372.32
25.07.2006	JPY	33,685,194.00	0.64	21,558,524.16	0.55	18,526,856.70	-3,031,667.46	21,558,524.16	12,935,114.50	6,467,557.25
18.07.2006	USD	358,703.02	74.80	26,830,985.90	65.00	23,315,696.30	-3,515,289.60	26,830,985.90	16,098,591.54	8,049,295.77
26.07.2006	USD	1,069,514.75	74.40	79,571,897.40	65.00	69,518,458.75	-10,053,438.65	79,571,897.40	47,743,138.44	23,871,569.22
07.07.2006	USD	56,246.15	73.95	4,159,402.79	65.00	3,655,999.75	-503,403.04	4,159,402.79	2,495,641.68	1,247,820.84
07.03.2006	USD	11,587.52	72.00	834,301.44	65.00	753,188.80	-81,112.64	834,301.44	500,580.86	250,290.43
30.08.2006	JPY	890,000.00	0.64	569,600.00	0.55	489,500.00	-80,100.00	569,600.00	341,760.00	170,880.00
29.08.2006	USD	25,709.81	73.95	1,901,240.45	65.00	1,671,137.65	-230,102.80	1,901,240.45	1,140,744.27	570,372.13
24.08.2006	USD	66,855.64	94.20	6,297,801.29	69.86	4,670,535.01	-1,627,266.28	6,297,801.29	3,778,680.77	1,889,340.39
14.08.2006	USD	44,054.82	73.60	3,242,434.75	65.00	2,863,563.30	-378,871.45	3,242,434.75	1,945,460.85	972,730.43
08.09.2006	USD	58,714.00	73.50	4,315,479.00	65.00	3,816,410.00	-499,069.00	4,315,479.00	2,589,287.40	1,294,643.70
13.09.2006	JPY	330,461,897.00	0.62	205,877,761.83	0.55	181,754,043.35	-24,123,718.48	205,877,761.83	123,526,657.10	61,763,328.55
09.06.2006	JPY	28,083,378.00	0.64	18,043,570.37	0.55	15,445,857.90	-2,597,712.47	18,043,570.37	10,826,142.22	5,413,071.11
09.02.2006	JPY	8,000.00	0.60	4,832.00	0.55	4,400.00	-432.00	4,832.00	2,899.20	1,449.60
09.11.2006	USD	21,158.48	71.80	1,519,178.85	65.00	1,375,301.20	-143,877.65	1,519,178.85	911,507.31	455,753.66
09.01.2006	USD	378,850.00	73.90	27,997,015.00	65.00	24,625,250.00	-3,371,765.00	27,997,015.00	16,798,209.00	8,399,104.50
10.05.06	JPY	41,934,068.00	0.65	27,194,243.10	0.55	23,063,737.40	-4,130,505.70	27,194,243.10	16,316,545.86	8,158,272.93
16.10.2006	JPY	75,688,757.00	0.60	45,787,129.10	0.55	41,628,816.35	-4,158,312.75	45,787,129.10	27,472,277.46	13,736,138.73
19.10.2006	USD	55,436.37	72.35	4,010,821.37	65.00	3,603,364.05	-407,457.32	4,010,821.37	2,406,492.82	1,203,246.41
11.04.2006	JPY	72,209,001.00	0.60	43,650,341.10	0.55	39,714,950.55	-3,935,390.55	43,650,341.10	26,190,204.66	13,095,102.33
11.10.2006	JPY	12,000.00	0.61	7,308.00	0.55	6,600.00	-708.00	7,308.00	4,384.80	2,192.40
15.11.2006	USD	7,019,869.27	71.00	498,387,552.60	65.00	456,291,502.55	-42,096,050.05	498,387,552.60	299,032,531.56	149,516,265.78
22.11.2006	USD	328,800.00	71.25	23,427,000.00	65.00	21,372,000.00	-2,055,000.00	23,427,000.00	14,056,200.00	7,028,100.00
11.09.2006	USD	26,230.00	73.60	1,930,528.00	65.00	1,704,950.00	-225,578.00	1,930,528.00	1,158,316.80	579,158.40
17.11.2006	USD	46,779.84	71.15	3,328,385.62	65.00	3,040,689.60	-287,696.02	3,328,385.62	1,997,031.37	998,515.68
11.08.2006	USD	5,290.69	73.85	390,717.46	65.00	343,894.85	-46,822.61	390,717.46	234,430.47	117,215.24
16.11.2006	USD	2,254.99	71.50	161,231.79	65.00	146,574.35	-14,657.44	161,231.79	96,739.07	48,369.54
22.12.2006	USD	45,000.00	69.72	3,137,400.00	65.00	2,925,000.00	-212,400.00	3,137,400.00	1,882,440.00	941,220.00

PAYMENT	CURRENCY	AMOUNT	RATE	ACTUAL PAID	BASE	PROJECTED	GAIN LOSS	INVESTMENT	CAPEX	O&M
19.12.2006	USD	19,200.00	69.80	1,340,160.00	65.00	1,248,000.00	-92,160.00	1,340,160.00	804,096.00	402,048.00
16.01.2007	JPY	9,706,400.00	0.59	5,692,803.60	0.55	5,338,520.00	-354,283.60	5,692,803.60	3,415,682.16	1,707,841.08
19.01.2007	JPY	210,416,290.00	0.58	121,873,115.17	0.55	115,728,959.50	-6,144,155.67	121,873,115.17	73,123,869.10	36,561,934.55
01.11.2007	USD	830,183.00	66.95	55,580,751.85	65.00	53,961,895.00	-1,618,856.85	55,580,751.85	33,348,451.11	16,674,225.56
01.11.2007	USD	191,340.00	66.95	12,810,213.00	65.00	12,437,100.00	-373,113.00	12,810,213.00	7,686,127.80	3,843,063.90
01.10.2007	USD	26,031.01	66.99	1,743,817.36	65.00	1,692,015.65	-51,801.71	1,743,817.36	1,046,290.42	523,145.21
01.03.2007	USD	33,675.07	69.54	2,341,801.41	65.00	2,188,879.55	-152,921.86	2,341,801.41	1,405,080.85	702,540.42
02.08.2007	JPY	2,301,000.00	0.55	1,262,098.50	0.55	1,265,550.00	3,451.50	1,262,098.50	757,259.10	378,629.55
02.08.2007	JPY	2,122,969.00	0.55	1,164,448.50	0.55	1,167,632.95	3,184.45	1,164,448.50	698,669.10	349,334.55
26.02.2007	USD	43,920.00	70.25	3,085,380.00	65.00	2,854,800.00	-230,580.00	3,085,380.00	1,851,228.00	925,614.00
02.03.2007	USD	142,859.54	69.35	9,907,309.10	65.00	9,285,870.10	-621,439.00	9,907,309.10	5,944,385.46	2,972,192.73
02.11.2007	USD	3,470,795.69	67.10	232,890,390.80	65.00	225,601,719.85	-7,288,670.95	232,890,390.80	139,734,234.48	69,867,117.24
02.10.2007	USD	1,711.80	66.97	114,641.13	65.00	111,267.00	-3,374.13	114,641.13	68,784.68	34,392.34
03.08.2007	JPY	504,521,917.00	0.56	284,802,622.15	0.55	277,487,054.35	-7,315,567.80	284,802,622.15	170,881,573.29	85,440,786.64
14.03.2007	JPY	499,111,546.00	0.60	298,718,260.28	0.55	274,511,350.30	-24,206,909.98	298,718,260.28	179,230,956.17	89,615,478.08
20.03.2007	USD	34,533.53	69.80	2,410,440.39	65.00	2,244,679.45	-165,760.94	2,410,440.39	1,446,264.24	723,132.12
15.03.2007	USD	4,846.40	69.80	338,278.72	65.00	315,016.00	-23,262.72	338,278.72	202,967.23	101,483.62
29.03.2007	USD	1,766,205.00	68.90	121,691,524.50	65.00	114,803,325.00	-6,888,199.50	121,691,524.50	73,014,914.70	36,507,457.35
03.09.2007	USD	40,584.00	67.10	2,723,186.40	65.00	2,637,960.00	-85,226.40	2,723,186.40	1,633,911.84	816,955.92
03.04.2007	USD	965,912.73	68.70	66,358,204.55	65.00	62,784,327.45	-3,573,877.10	66,358,204.55	39,814,922.73	19,907,461.37
03.01.2007	USD	56,880.00	69.65	3,961,692.00	65.00	3,697,200.00	-264,492.00	3,961,692.00	2,377,015.20	1,188,507.60
17.04.2007	JPY	76,244,290.00	0.58	43,916,711.05	0.55	41,934,359.50	-1,982,351.55	43,916,711.05	26,350,026.63	13,175,013.32
04.10.2007	JPY	819,850.00	0.58	477,480.64	0.55	450,917.50	-26,563.14	477,480.64	286,488.38	143,244.19
27.04.2007	JPY	2,690,000.00	0.58	1,549,440.00	0.55	1,479,500.00	-69,940.00	1,549,440.00	929,664.00	464,832.00
17.04.2007	JPY	236,782,481.00	0.58	136,386,709.05	0.55	130,230,364.55	-6,156,344.50	136,386,709.05	81,832,025.43	40,916,012.72
04.09.2007	USD	34,324.85	66.99	2,299,383.94	65.00	2,231,115.25	-68,268.69	2,299,383.94	1,379,630.37	689,815.18
24.04.2007	USD	88,670.00	68.30	6,056,161.00	65.00	5,763,550.00	-292,611.00	6,056,161.00	3,633,696.60	1,816,848.30
05.09.2007	JPY	346,600,000.00	0.58	200,161,500.00	0.55	190,630,000.00	-9,531,500.00	200,161,500.00	120,096,900.00	60,048,450.00
30.05.2007	JPY	17,015,200.00	0.55	9,392,390.40	0.55	9,358,360.00	-34,030.40	9,392,390.40	5,635,434.24	2,817,717.12
31.05.2007	JPY	143,125,478.00	0.55	78,948,013.66	0.55	78,719,012.90	-229,000.76	78,948,013.66	47,368,808.20	23,684,404.10

PAYMENT	CURRENCY	AMOUNT	RATE	ACTUAL PAID	BASE	PROJECTED	GAIN LOSS	INVESTMENT	CAPEX	O&M
30.05.2007	USD	18,371.85	67.30	1,236,423.50	65.00	1,194,170.25	-42,253.25	1,236,423.50	741,854.10	370,927.05
29.05.2007	USD	115,000.00	66.90	7,693,500.00	65.00	7,475,000.00	-218,500.00	7,693,500.00	4,616,100.00	2,308,050.00
30.05.2007	USD	5,738.00	67.30	386,167.40	65.00	372,970.00	-13,197.40	386,167.40	231,700.44	115,850.22
15.05.2007	USD	9,600.00	67.30	646,080.00	65.00	624,000.00	-22,080.00	646,080.00	387,648.00	193,824.00
15.05.2007	USD	7,019,869.27	67.08	470,869,665.06	65.00	456,291,502.55	-14,578,162.51	470,869,665.06	282,521,799.04	141,260,899.52
05.09.2007	USD	2,666,410.00	67.03	178,729,462.30	65.00	173,316,650.00	-5,412,812.30	178,729,462.30	107,237,677.38	53,618,838.69
21.06.2007	JPY	10,800,000.00	0.55	5,929,200.00	0.55	5,940,000.00	10,800.00	5,929,200.00	3,557,520.00	1,778,760.00
22.06.2007	JPY	2,602,000.00	0.55	1,418,090.00	0.55	1,431,100.00	13,010.00	1,418,090.00	850,854.00	425,427.00
22.06.2007	JPY	69,421.00	0.54	37,591.47	0.55	38,181.55	590.08	37,591.47	22,554.88	11,277.44
06.03.2007	USD	10,500.00	69.75	732,375.00	65.00	682,500.00	-49,875.00	732,375.00	439,425.00	219,712.50
28.06.2007	USD	99,100.48	66.30	6,570,361.82	65.00	6,441,531.20	-128,830.62	6,570,361.82	3,942,217.09	1,971,108.55
07.06.2007	JPY	1,024,704.00	0.55	564,611.90	0.55	563,587.20	-1,024.70	564,611.90	338,767.14	169,383.57
13.07.2007	JPY	504,521,918.00	0.54	272,845,453.25	0.55	277,487,054.90	4,641,601.65	272,845,453.25	163,707,271.95	81,853,635.98
07.09.2007	USD	3,155,000.00	67.03	211,479,650.00	65.00	205,075,000.00	-6,404,650.00	211,479,650.00	126,887,790.00	63,443,895.00
07.09.2007	USD	38,450.80	66.95	2,574,281.06	65.00	2,499,302.00	-74,979.06	2,574,281.06	1,544,568.64	772,284.32
07.06.2007	USD	61,677.00	67.20	4,144,694.40	65.00	4,009,005.00	-135,689.40	4,144,694.40	2,486,816.64	1,243,408.32
07.03.2007	USD	49,550.24	69.65	3,451,174.22	65.00	3,220,765.60	-230,408.62	3,451,174.22	2,070,704.53	1,035,352.27
08.01.2007	JPY	144,800.00	0.59	84,852.80	0.55	79,640.00	-5,212.80	84,852.80	50,911.68	25,455.84
14.08.2007	JPY	730,000.00	0.57	414,275.00	0.55	401,500.00	-12,775.00	414,275.00	248,565.00	124,282.50
13.08.2007	USD	5,536,886.48	66.70	369,310,328.22	65.00	359,897,621.20	-9,412,707.02	369,310,328.22	221,586,196.93	110,793,098.46
17.09.2007	JPY	582,876,033.00	0.58	340,574,466.08	0.55	320,581,818.15	-19,992,647.93	340,574,466.08	204,344,679.65	102,172,339.82
13.09.2007	JPY	504,521,917.00	0.58	293,682,207.89	0.55	277,487,054.35	-16,195,153.54	293,682,207.89	176,209,324.73	88,104,662.37
24.09.2007	USD	180,127.44	67.30	12,122,576.71	65.00	11,708,283.60	-414,293.11	12,122,576.71	7,273,546.03	3,636,773.01
20.09.2007	USD	30,876.65	67.40	2,081,086.21	65.00	2,006,982.25	-74,103.96	2,081,086.21	1,248,651.73	624,325.86
17.09.2007	USD	268,427.25	67.10	18,011,468.48	65.00	17,447,771.25	-563,697.22	18,011,468.48	10,806,881.09	5,403,440.54
17.09.2007	USD	157,512.83	67.10	10,569,110.89	65.00	10,238,333.95	-330,776.94	10,569,110.89	6,341,466.54	3,170,733.27
18.10.2007	JPY	50,000.00	0.57	28,600.00	0.55	27,500.00	-1,100.00	28,600.00	17,160.00	8,580.00
17.10.2007	USD	18,310.00	67.00	1,226,770.00	65.00	1,190,150.00	-36,620.00	1,226,770.00	736,062.00	368,031.00
15.10.2007	USD	25,400.00	67.00	1,701,800.00	65.00	1,651,000.00	-50,800.00	1,701,800.00	1,021,080.00	510,540.00
23.10.2007	USD	58,411.62	66.85	3,904,816.80	65.00	3,796,755.30	-108,061.50	3,904,816.80	2,342,890.08	1,171,445.04

PAYMENT	CURRENCY	AMOUNT	RATE	ACTUAL PAID	BASE	PROJECTED	GAIN	LOSS	INVESTMENT	CAPEX	O&M
25.10.2007	USD	110,240.00	67.30	7,419,152.00	65.00	7,165,600.00	-253,552.00		7,419,152.00	4,451,491.20	2,225,745.60
24.10.2007	USD	61,652.00	67.30	4,149,179.60	65.00	4,007,380.00	-141,799.60		4,149,179.60	2,489,507.76	1,244,753.88
19.10.2007	USD	180,601.00	66.95	12,091,236.95	65.00	11,739,065.00	-352,171.95		12,091,236.95	7,254,742.17	3,627,371.09
11.09.2007	JPY	151,685.00	0.59	89,873.36	0.55	83,426.75	-6,446.61		89,873.36	53,924.02	26,962.01
11.04.2007	JPY	2,361,033.00	0.58	1,374,121.21	0.55	1,298,568.15	-75,553.06		1,374,121.21	824,472.72	412,236.36
19.11.2007	JPY	504,521,917.00	0.60	300,947,323.49	0.55	277,487,054.35	-23,460,269.14		300,947,323.49	180,568,394.09	90,284,197.05
23.11.2007	JPY	504,394.00	0.60	302,636.40	0.55	277,416.70	-25,219.70		302,636.40	181,581.84	90,790.92
12.03.2007	JPY	6,653,060.00	0.60	3,961,897.23	0.55	3,659,183.00	-302,714.23		3,961,897.23	2,377,138.34	1,188,569.17
21.12.2007	JPY	15,196,920.00	0.56	8,540,669.04	0.55	8,358,306.00	-182,363.04		8,540,669.04	5,124,401.42	2,562,200.71
17.12.2007	USD	1,067,479.45	62.88	67,123,107.82	65.00	69,386,164.25	2,263,056.43		67,123,107.82	40,273,864.69	20,136,932.35
21.12.2007	USD	138,136.12	62.75	8,668,041.53	65.00	8,978,847.80	310,806.27		8,668,041.53	5,200,824.92	2,600,412.46
17.12.2007	USD	77,839.54	62.88	4,894,550.28	65.00	5,059,570.10	165,019.82		4,894,550.28	2,936,730.17	1,468,365.08
17.12.2007	USD	6,509.27	62.88	409,302.90	65.00	423,102.55	13,799.65		409,302.90	245,581.74	122,790.87
12.11.2007	USD	105,250.00	66.80	7,030,700.00	65.00	6,841,250.00	-189,450.00		7,030,700.00	4,218,420.00	2,109,210.00
12.11.2007	USD	36,210.00	66.80	2,418,828.00	65.00	2,353,650.00	-65,178.00		2,418,828.00	1,451,296.80	725,648.40
12.06.2007	USD	345,891.98	67.35	23,295,824.85	65.00	22,482,978.70	-812,846.15		23,295,824.85	13,977,494.91	6,988,747.46

Source: Finance Department of KenGen and KPLC