

**R I D G W A Y**  
C A P I T A L P R O J E C T S

## Provision of Financial Advisory and Modelling Services to TANESCO

### Cost of Service Study - Final Report

Prepared for Tanzania Electric Supply Company Limited (TANESCO)

15 May 2010

# Provision of Financial Advisory and Modelling Services to TANESCO Cost of Service Study - Final Report

(Songo Songo Gas Development and Power Generation Project/  
Credit No. 3569-TA)

Prepared for the

**Tanzania Electric Supply Company Limited (TANESCO)**

Prepared by

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## Foreword

This Draft Report represents the first of two reports prepared under the financial advisory consultancy supported by The World Bank's Songo Songo Gas Development and Power Generation Project (Credit No. 3569-TA). The objective of this consultancy is to assist the Tanzania Electric Supply Company Limited (TANESCO) with the development and implementation of sustainable financial plans to operate in the long term with reducing levels of support from the Government of Tanzania (GOT).

This report aggregates the financial advice and information provided to the TANESCO between April 2009 and April 2010.

The report was prepared by James Stewart and Richard MacGeorge from Ridgway Capital Projects. The Consultant gratefully acknowledges the assistance of the counterpart team from TANESCO, namely Decklan Mhaiki, Jamhuri Ngelime, Felician Mayila, Abdul Masunga, Lusekelo Kassanga and other members of the TANESCO staff for their cooperation and support.

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## Glossary

Assignment	Provision of Consultancy Services for Financial Advisory and Modelling Services under Songo Songo Gas Development and Power Generation Project (Credit No. 3569-TA)
CIP	Capital Investment Program
COS	Cost of Service
COSS	Cost of Service Study
DBSA	Development Bank of Southern Africa
DSCR	Debt Service Coverage Ratio
EWURA	Energy and Water Utilities Regulatory Authority
GOT	Government of Tanzania
IDA	International Development Association
KPI	Key Performance Indicator
LRP	Loss Reduction Program
MCC	Millennium Challenge Corporation
MV	Medium Voltage
MW	Megawatt
PSMP	Power System Master Plan
R&M	Repairs and Maintenance
RE	Rural Electrification
REA	Rural Electrification Agency
REF	Rural Energy Fund
SBU	Strategic Business Unit
TANESCO	Tanzania Electric Supply Company Limited
TOR	Terms of Reference
TSH	Tanzanian Shilling
ZESCO	Zambian Electricity Supply Corporation

## Executive Summary

### Project Scope and Context

The challenges that the Tanzanian Electric Supply Company Limited (TANESCO) face in supplying electricity to Tanzania have been well documented. Load shedding is an all too frequent occurrence which can be linked to insufficient installed generation capacity and high distribution losses. Furthermore, customers are subjected to regular unplanned outages which are often the result of a lack of repairs & maintenance (R&M) across the distribution network. In the current environment, distribution losses in 2010 are projected to exceed 1,100 GWh – almost 75% of the output of the Songas power plant.

TANESCO recognises the importance of addressing these issues and has been active in a number of ways. In 2011, 169MW of new generation capacity is scheduled to come on-line with a further 450MW to be introduced during 2012-2013 period. A comprehensive plan to reduce distribution losses has been outlined in 2011-2014 Capital Investment Program (CIP) with a Loss Reduction Program (LRP) aiming to decrease losses from the 19.7% reported in 2009 to 14.6% by 2014.

The CIP outlines TANESCO's plan for the investment of TSh 4,249 billion during the 2009-2014 period. Key features of the CIP are upgrading of the transmission backbone running the length of the country, a comprehensive LRP and the installation of additional generation capacity which would result in Tanzania becoming a net exporter of power to countries in south and east Africa. Over TSh 3,000b is projected to be lent by donors over this time and the financial stability of TANESCO is central to securing this donor support. TANESCO needs to show that it is recovering its full Cost of Service (COS) which in turn would demonstrate its ability to meet repayments on these loans and be a low risk and worthy recipient of these donor funds.

This Assignment aims to accurately identify TANESCO's true COS for the 2011-2013 period. This Study will provide the inputs to the Long Run Marginal Cost Tariff Design Study being conducted in parallel by Robert Vernstrom Consulting. The two Studies will then form the basis for TANESCO's 2011 tariff application to the Energy and Water Utilities Regulatory Authority (EWURA) which will be submitted in mid-May 2010.

### Methodology

The accurate projection of an electric supply utility's future COS is imperative for planning the long term and sustainable performance of the utility and in the provision of a reliable service which underpins the economic growth of the nation. A COS which is too low would result in inadequate revenues for investment in generation capacity and a suitably funded repairs & maintenance program. This would increase the possibility of load shedding and unplanned outages. A COS which is too high would see consumers paying too much for their energy, jeopardising investment in other sectors and potentially reducing the quality of life for residential customers by decreasing disposable income or the consequences of having lower access to electricity.

A Cost of Service Study (COSS) projects future revenue requirements from an established cost or base year. The challenge is in determining what is a fair and reasonable 'established' base from which to project. Historical data of the utility provides the most detailed information to forecast from however there is no guarantee that this data provides an accurate representation of the actual COS of the utility in the future.

The first step in any study would then be assess the data to ensure if any previous escalation (i.e. inflation) adjustment is justified and if the figures are in line with industry benchmarks.

One approach is that once a fair base has been established, these costs need to be adjusted to a per kWh basis and escalated based on current inflation estimates to ensure TANESCO has equivalent purchasing power in the future.

While escalation of reasonable costs serves as the primary means of establishing COS, some costs are better calculated through financial modelling. This is because greater precision arises for expense categories such as generation, financial expenses and depreciation. These figures are superior to traditional COS methodologies and in the instance of the TANESCO COS, almost 80% of the required revenue was calculated this way.

The EWURA 2009 Guidelines for Tariff Application proposes the following formula for establishing the required revenue of TANESCO:

$$RR = O + D + T + (WACC * RAB)$$

Where:

RR	= Revenue Requirement
O	= Operation and Maintenance Expenses (including general and administrative expenses);
D	= Depreciation expense for the year;
T	= Taxes;
WACC	= Weighted Average Cost of Capital; and
RAB	= Regulatory Asset Base

For the purposes of this application, 'Operation and Maintenance Expenses' have been defined as:

- Own Generation Expenses (both on-grid and off-grid);
- Purchased Electricity Expenses (both from IPPs and Imports);
- Repairs and Maintenance Expenses;
- Other Operating Expenses; and,
- Doubtful Debts Expense.

The required revenue formula, totals and associated average tariff projections are all exclusive of the 1% EWURA levy, 3% Rural Electrification (RE) levy and 18% Value Added Tax (VAT).

### Key Issues Identified

Measures to address the key issues of load shedding and high network losses have been proposed in TANESCO's CIP and associated LRP. Underpinning the implementation of these plans will be a tariff which is sufficient to cover TANESCO's COS and provide confidence to donors that TANESCO can meet its repayment obligations. Furthermore, the Consultant has assumed the core issues of adequate generation capacity and reducing distribution losses have been addressed through the application of a suitable cost reflective tariff.

From the Consultant's analysis by TANESCO's data, three secondary issues have also been identified that it is now addressing. First, the customer to staff ratio is well below TANESCO's own internal target. As a result, staff expenses are higher than standard for the preferred COS environment. By ensuring staff numbers meet the targeted customer/staff ratio will see TANESCO operate in a more cost effective manner.

Second, past expenditure on Repairs and Maintenance (R&M) has been inadequate to maintain TANESCO's existing assets. Even if generation capacity is added to the network and distribution losses are lowered, assets that are not properly maintained will tend to break down and interrupt power supply to customers.

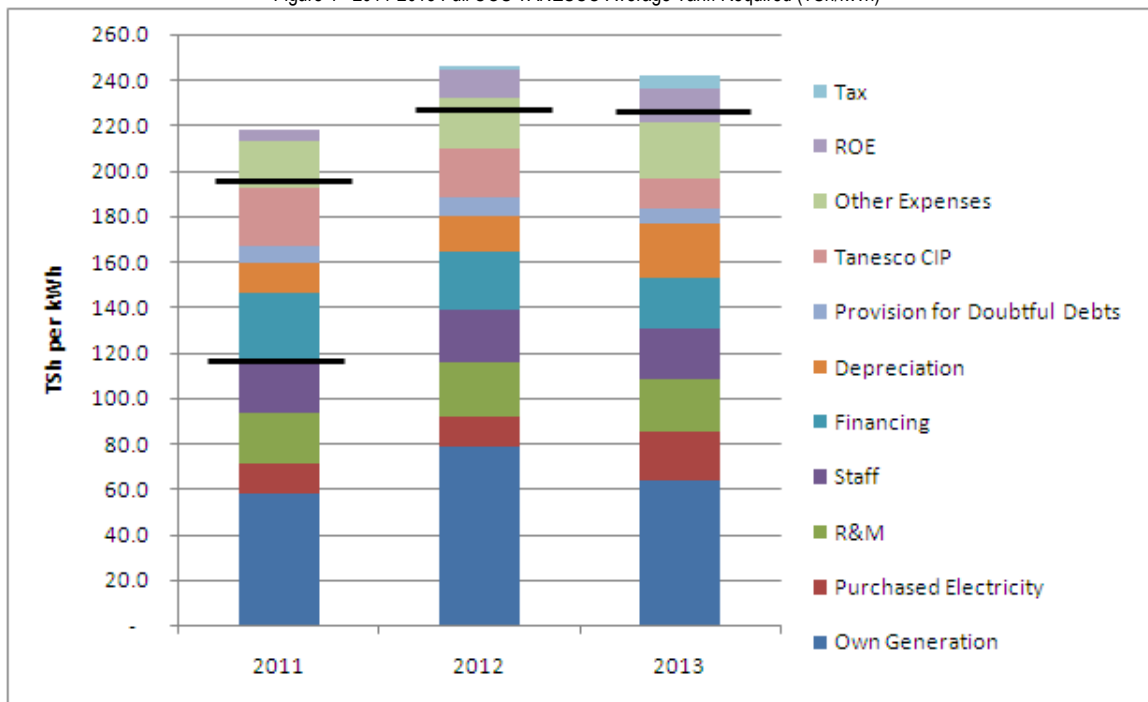
Industry best practice suggests that 12% of revenues should be invested in R&M per annum, whereas TANESCO has averaged 2.8% annually from 2005-2008. Empirical data from TANESCO suggests that cashflow constraints are largely responsible for this reduced expenditure. However, even if TANESCO had the appropriate funding it would have difficulty scaling up its R&M expenditure until it has built the human and physical resources to do so. A measured approach must be taken when assessing and determining R&M expenditure to ensure real value to the utility. The introduction of appropriation accounts is recommended to ensure the safeguarding of funds allocated for R&M expenditure.

The third issue faced by TANESCO is that of “rate shock”. TANESCO has not had a tariff increase since 2008 and if a substantial increase in the average tariff was sought and approved, it may have a detrimental effect on customers, both residential and commercial. Allowing for TANESCO’s short and long term financial viability, any tariff increase should be introduced in a gradual way.

### Cost of Service – Base Case

The Consultant conducted a full COSS of TANESCO’s eleven expense subcategories. From this analysis, it was determined that an average tariff of 197.3 TSh per kWh was needed to meet TANESCO’s COSS in 2011 (upper black line<sup>1</sup>). This proposed tariff represents 66.1% on the current average tariff of 118.8<sup>2</sup> TSh per kWh (lower black line). This analysis is represented in Figure 1 below.

Figure 1– 2011-2013 Full COS TANESCO Average Tariff Required (TSh/kWh)



<sup>1</sup> The upper black line (required average tariff) is less than the total COS identified as TANESCO also receives income from other sources. These sources include Government grants (towards IPTL capacity charges) and customer contributions for connection charges.

<sup>2</sup> The average tariff of 118.8 TSh per kWh differs from that approved by EWURA in 2007 (for 2008 : 112.9 TSh/kWh) due to differing yields across each customer class on a year by year basis. One of the main contributors to this increase in average yield was the failure of the Zanzibar connection at the end of 2009. This reduced the supply of energy with a very low yield therefore increasing the overall average tariff yield of TANESCO.

In 2011 energy costs (both purchased and TANESCO generated) account for 71.3 TSh per kWh or 36.0% of the tariff. 58.0 TSh per kWh for TANESCO produced energy and 13.3 TSh per kWh for purchased electricity. Financing expenses required an additional 28.3 TSh per kWh or 14% of the total. Almost two thirds of this financing expense is for principal repayment with the balance being interest charges.

TANESCO direct contributions to the funded by TANESCO, Staffing Expenses, R&M, and 'Other Expenses' each required 13%, 12%, 11% and 11% of the tariff respectively. Depreciation accounts for 13.6 TSh per kWh of the projected Base Case and Provision for Doubtful Debts the 7.5 TSh per kWh. The final 5.0 TSh per kWh are allocated to the Return on Equity (ROE) for the Government of Tanzania (GOT) as TANESCO's sole shareholder. No corporate tax is deemed payable in 2010 due to offsets from TANESCO's accumulated tax losses from previous years.

Under the Base Case the average tariff required would rise from 197.3 TSh per kWh in 2011 to 226.2 TSh per kWh in 2012 (a 14.7% increase). This increase is primarily due to a projected increase in the dispatch of higher cost generation to meet additional demand. The average tariff would then fall to 223.3 TSh per kWh in 2013 (a 1.3% decrease on 2012) mainly due to the commissioning of the lower cost Kiwira and Kinyerezi plants in early 2013.

### Alternative to Cost of Service Base Case

As the recovery of full COS leads to such a large increase in the average tariff, the Consultant has examined a range of alternatives to minimize this potential "rate shock". One such alternative is that TANESCO seeks an average tariff that recovers no depreciation in 2011 or 2012 (moving towards full collection in 2013 and 2014), as well as a lessened R&M component in 2011 and no ROE.

The collection of funds for depreciation is essential to ensure current assets can be replaced when they are retired. This requirement has even greater importance for TANESCO it is to move from a donor/grant/concessionary loan model of capital investment, to one of a more commercial/independent operation in the medium/long term. However, the collection of funds for depreciation is seen as of less importance to receiving an average tariff that does not subject consumers to unnecessarily high "rate shock". It is proposed that TANESCO *moves towards* recovering funds for depreciation but that this does not happen immediately. On this basis it is proposed that TANESCO recovers 0% of the total depreciation charge in 2011. By implementing this strategy the tariff would be lowered by a total of 16.2 TSh/kWh. As with R&M expenses, it is recommended that an appropriation account is established to ensure funds collected for depreciation are used only for the replacement of existing assets.

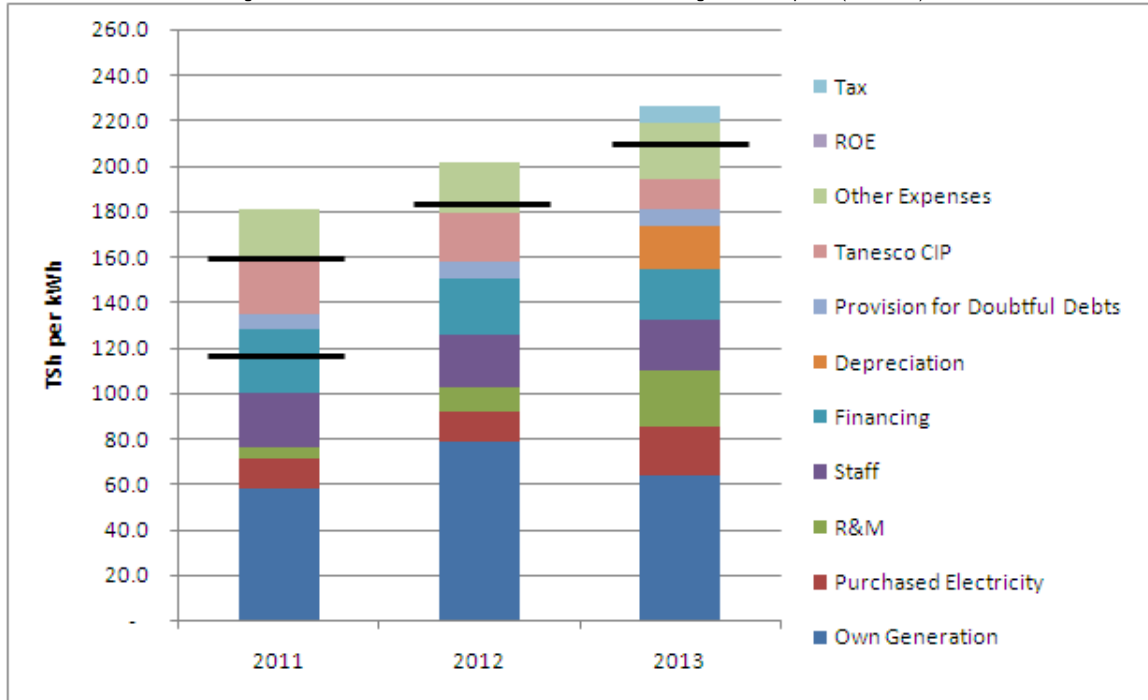
By choosing not to recover R&M at the full 12% benchmark rate this would also reduce rate-shock for TANESCO's customers. Under this strategy, it is proposed that 3.0% of revenues are allocated to R&M in 2011, rising to 6.0% in 2012 and to the full 12% in 2013. This will reduce the COS by 16.9 TSh per kWh in 2011 and 12.1 TSh per kWh in 2012.

If no ROE was delivered to the Government of Tanzania in the 2011-2014 period the COS (and therefore the rate shock) could be further lessened. This policy would decrease the average tariff by 5.0 TSh per kWh in 2011, 12.1 TSh per kWh in 2012, 15.0 TSh per kWh in 2013 and 17.0 TSh per kWh in 2014.

If these three measures are implemented, together, the 2011 average tariff required would fall to 159.9 TSh per kWh, which represents a 19.0% decrease from the full COS scenario and a relatively modest 34.6% increase on the current tariff. This increase is moderate when it is noted that a 2011 tariff increase will be three years after the last (2008).

It should be noted that in 2008, Tanzania recorded CPI inflation of 13.5%, followed by 10.8% in 2009 and assumed inflation of 8.7% in 2010. This equates to cumulative inflation of 36.6% and thus a net *decrease* of the tariff in real terms. If only inflation was being requested in the application a tariff of TSh 162.3 would be justified.

Figure 2 – 2011 Alternative COS Scenario TANESCO Average Tariff Required (TSh/kWh)



Under the Alternative Scenario the average tariff required would rise to 181.9 TSh per kWh in 2012 (an 13.8% increase on 2011) due to rising generation and R&M expenses. The 2013 average tariff would rise to 207.2 TSh per kWh (an 13.9% increase on 2012) due to rising R&M and the inclusion of depreciation and tax expenses.

### Conclusions

While TANESCO’s challenges may be numerous, it has made significant progress to remedy these and has detailed plans for further gains. TANESCO’s primary challenge is that of funds as lowering network losses and adding new generation capacity requires substantial levels of investment. Additionally, donors who are willing to lend (often on concessionary terms) require TANESCO to be operating on sound financial foundations whereby it recovers its COS.

For TANESCO to move towards being a commercially focussed utility (and away from dependence on the GOT) greater revenues are required. These revenues will allow TANESCO to develop a system with lower network losses, an adequate reserve capacity margin that can support the development of Tanzania in the most effective, competitive and sustainable manner possible.

# 1 Introduction

## 1.1 Background and Appointment

As the country's national electricity utility, the Tanzania Electric Supply Company Limited (TANESCO) plays a vital role in underpinning the nation's economic development objectives. To do so, the utility must be able to recover its costs of operation while delivering cost-effective services to consumers.

Operating on a fully commercial basis has been challenging for TANESCO. Significantly lower than forecast rainfalls over the past few years have resulted in greatly decreased hydropower generation for TANESCO. Consequently, the planned generation mix ratio has been affected and has forced TANESCO to purchase additional energy from thermal fired independent power producers. Operational expenditure has increased as a result and this has significantly impacted the utility's ability to recover its cost from consumers. Consequent operating losses have been addressed by the utility assuming a greater level of debt, supported by guarantees being required from the Government of Tanzania (GOT).

To offset some of its operational expenditure increases, on the 10<sup>th</sup> of November 2006 TANESCO applied to the Energy and Water Utilities Regulatory Authority (EWURA) for a 6% tariff adjustment. In response to this application, EWURA passed an Order on the 10<sup>th</sup> of January 2007 (No.07-001) requiring that TANESCO conduct a comprehensive Cost of Service Study indentifying the components of its cost of production during a 12-month test period and report the results thereof to EWURA. The Cost of Service Study was required to be completed prior to the earlier of 31 July 2007 or the date on which TANESCO submitted its next application for tariff adjustment. While much work has been done in developing and implementing a financial restructuring plan to enable TANESCO to recover its operation costs, a full cost of service study is the natural next step.

In the interim, a subsequent tariff application (27<sup>th</sup> August 2007) was made leading to a further 21.7% increase in tariffs effective January 1<sup>st</sup> 2008. This has been helpful for TANESCO to recover its cash operating costs but is still insufficient for full cost recovery.

In April 2009, TANESCO appointed Ridgway Capital Projects Limited of New Zealand (Ridgway) for the provision of financial advisory and modeling services for the financial strengthening of the utility, under The World Bank supported Songo Songo Gas Development and Power Generation Project (Credit No 3569-TA). This proposal was evaluated and Ridgway was subsequently appointed in April 2009 to provide these services.

The Ridgway team comprised the following specialists:

Richard MacGeorge	Team Leader/Financial Advisor
James Stewart	Financial Modeller

The contract is administered and supervised by Jamhuri Ngelime, Chief Financial Officer from April 2009 to March 2010 and Anetha Chengula, Acting Chief Financial Officer from April 2010.

Ideally, a COS is best carried out by a party that is independent of the utility in question. However, Ridgway has on this occasion been appointed by TANESCO directly. Ridgway has nonetheless acted as impartially as is reasonably possible in the conduct of its work.

## 1.2 Objectives of the Review

The overall objective of this Assignment is to assist TANESCO with the development and implementation of plans which will enable the utility to operate on a financially sustainable basis while reducing its reliance on GOT for financial support.

The core focus areas for the Consultant have been:

- To investigate financing strategies that will increase the number of funding options available to TANESCO, to reduce its cost of capital and to reduce the need for financial support from the GOT over time; and,
- To measure the costs of service and to formulate approaches for minimizing the cost of service (in financial terms) over time.

In consultation with TANESCO, key activities were identified from the Terms of Reference (TOR) and a work plan developed to effectively undertake these tasks. These activities are summarized in the table below:

Table 1 – Summary of the Assignment's Key Activities

Name of Activity	Description
Information Gathering	<ul style="list-style-type: none"> <li>• Long Term Power Master Plan Study (current draft)</li> <li>• Least Cost Expansion plan</li> <li>• Investment needs of TANESCO in generation, transmission and distribution</li> <li>• Consultation with EWURA</li> <li>• Consultation with GOT donor parties and commercial partners</li> </ul>
Initial Financial Planning	<ul style="list-style-type: none"> <li>• Review TANESCO's access expansion plan and estimate financing needs</li> <li>• Assist with preparation of short and long term plans</li> </ul>
Financial Modelling	<p>Design a series of KPIs relating to the financial strengthening of TANESCO Update TANESCO's financial model (developed by Ridgway) in the following ways:</p> <ul style="list-style-type: none"> <li>• Update projections and forecasts with real data</li> <li>• Incorporate annual projections from 2013 to 2033</li> <li>• Modelling of short and long term plans</li> <li>• Add provision for future generation options</li> <li>• Prepare the model for a comprehensive cost of service study adding calculations for assessing revenue by customer class and service charge categories</li> <li>• Prepare model for comprehensive tariff study</li> <li>• Using the model, assess the impact of the options of the least cost expansion plan from an enterprise level</li> <li>• Provide advice on how TANESCO's financial position can be improved</li> </ul>
Secondary Financial Planning	<p>Assess the ability of TANESCO to:</p> <ul style="list-style-type: none"> <li>• Self fund future investment</li> <li>• Access commercial borrowings with GOT/development partner support</li> <li>• Access commercial borrowings without GOT/development partner support</li> <li>• Initiate discussions with appropriate financing agencies, as required</li> <li>• Identify direct support available and required from the GOT over the next 3-5 years</li> <li>• Support TANESCO and the GOT in formulating a strategy to finance investment required for generation, transmission and distribution</li> <li>• Provide support in analyzing/discussing arrangements with major customers and suppliers</li> </ul>

Capacity Building	Work with the Strategic Planning and Finance units of TANESCO to update and maintain the model Providing training to nominated TANESCO staff members in the use of the model
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The Consultant's progress in the key activities is described more fully in the next section.

### 1.3 Structure of the Report

This report has been organized into eight sections and provides the basis for the LRMC tariff design report. The primary purpose of this report is to establish the total Cost of Service (COS) for TANESCO's operation for the period 2011-2014. This figure is also referred to as TANESCO's 'required revenue' and an 'average required tariff' can be calculated by dividing the required revenue by the projected sales for each given year. The LRMC tariff design report then allocates this required revenue figure across each customer class to devise appropriate tariffs.

The structure of this report is as follows:

#### **Section One (This section): Introduction**

Provides the background for undertaking the Cost of Service Study (COSS), the key activities related to this Assignment and work to date.

#### **Section Two: TANESCO Demand Development**

Provides information on TANESCO's customer base, the current generation system and growth projections.

#### **Section Three: Investment Requirements to meet Demand**

Outlines the capital investment required to meet projected growth and to ensure security of supply.

#### **Section Four: Methodology**

Outlines the process adopted by the Consultant in assessing TANESCO's Cost of Service and the rationale behind this methodology.

#### **Section Five: Calculation of Cost of Service (Base Case)**

Describes calculations which form the base case Cost of Service.

#### **Section Six: Alternatives to the Base Case Cost of Service**

Outlines different approaches that may be adopted to produce a Cost of Service for tariff setting purposes and recommends a methodology for the Tariff Application

#### **Section Seven: Allocation of Cost across Strategic Business Unit (SBU)**

Describes the allocation of the required revenue calculated under the COS across each of the four strategic business units within TANESCO.

#### **Section Eight: Key Performance Indicators (KPIs)**

Provides a summary of TANESCO's current KPIs (balanced score card) as well as additional KPIs necessary to bring its current operational environment in line with that outlined under the COS.

## 2 TANESCO Demand Development

### 2.1 Current TANESCO Generation System

TANESCO has approximately 837 MW of available capacity<sup>3</sup> across TANESCO's interconnected network and a further 68 MW of available capacity on its isolated grids. A further 15 MW of generation capacity is available from cross border imports from Uganda and Zambia. These assets are summarized in Table 2 below.

Table 2 –Grid Based Generation Assets

GRID THERMAL:	Ownership	Online From	Offline From	Installed cap. (MW)	Availability factor %
SONGAS I,II,III	IPP	Jan-09	Dec-25	185.0	87.31%
IPTL	IPP	Jan-02	Dec-26	100.0	82.38%
UBUNGO WARTSILA	OWN	Jan-09	Dec-31	100.0	87.31%
TEGETA GT	OWN	Oct-09	Jan-30	41.0	87.31%
MWANZA	OWN	Jun-11	Dec-19	60.0	82.38%
UBUNGO EPP	OWN	Jul-11	Dec-31	100.0	85.40%
KWIRA	OWN	Jan-13	Dec-37	200.0	85.40%
KINYEREZI	OWN	Jan-13	Dec-37	240.0	85.40%

GRID HYDRO:	Ownership	Online From	Offline From	Installed cap. (MW)	Availability factor %
KIDATU	OWN			204.0	98%
KIHANSI	OWN			180.0	98%
MTERA	OWN			80.0	98%
NEW PANGANI FALLS	OWN			68.0	98%
HALE	OWN			21.0	48%
NYUMBA YA MUNGU	OWN			8.0	48%
UWEMBA	OWN			1.0	48%

Additional information on TANESCO's generation assets as well as transmission, distribution, daily and seasonal load summaries can be obtained from Section 3 of the Bob Vernstrom LRMC Report.

<sup>3</sup> TANESCO has a further 49 MW of small diesel based generation which is nearing the end of its operational life and only used intermittently in recent years. This generation has not been incorporated in TANESCO's power system generation plan nor the COS projections

## Current Asset Values

Currently, TANESCO has an asset base with a 2009 historical cost of TSh 1,523m and a 2009 opening book value of TSh 1,296m, the difference being due to accumulated depreciation. As detailed in the table below, generation assets make up 36% of the 2009 opening book value with transmission and distribution assets accounting for 30% and 29% respectively. Land, buildings, vehicles and equipment make up the balance of the assets.

Table 3 – TANESCO Asset Historical Costs and 2009 Opening Book Values (TSHm)

TSh m	2009 Historical Cost	Opening Book Value 2009
Hydro Generation	400,258	353,401
Thermal Generation	125,294	119,599
Transmission Systems	431,203	389,325
Distribution Systems	433,886	376,029
Land and Buildings	50,186	41,544
Motor Vehicles	25,324	8,192
Office Equipment	57,152	7,506
<b>Total</b>	<b>1,523,303</b>	<b>1,295,596</b>

## 2.2 TANESCO Customer Base

As at 31 December 2008, TANESCO had 723,873 customers. As illustrated in Table 4, 59% of these were domestic customers with a further 41% assigned to the T1 'General Use' category.

Table 4 – TANESCO Customer Numbers per Class (December 2008)

Customer Class	Customers
D1 -Domestic Low Usage	413,136
T1 -General Use	308,855
T2 -Low Voltage Supply	1,627
T3 -High Voltage Supply	253
T5 -Zanzibar State Fuel & Power Corp.	1
Kahama Gold Mine	1
<b>Total Customers</b>	<b>723,873</b>

As shown in the table below, TANESCO also has a relatively small number of high use customers classified as T2 (low voltage) and T3 (high voltage) customers. When combined with the demand from the Kahama gold mine and from the Zanzibar Electricity Corporation (ZECO), high use customers accounted for over 45% of TANESCO's electricity sales in 2008

Table 5 – TANESCO Sales by Class (December 2008)

<b>Total Electricity Sales by Customer Class (GWh)</b>	
D1 -Domestic Low Usage	425.0
T1 -General Use	995.0
T2 -Low Voltage Supply	507.0
T3 -High Voltage Supply	1,037.0
T5 -Zanzibar State Fuel & Power Corp.	229.0
Resolute Gold Mine	66.0
Kahama Gold Mine	118.0
<b>Total</b>	<b>3,377.0</b>

### 2.3 Potential for Growth

Given the population of Tanzania (42.5m in 2008), the country has a very low domestic electrification rate (at 14% in 2008<sup>4</sup>) which offers TANESCO a significant opportunity to expand its customer base. Furthermore, TANESCO has set a target to connect an additional 100,000 customers each year, providing further stimulus for growth. That growth comes at a cost, however, and new capital must be found in order to support new connections.

The Rural Electrification Agency (REA) and the Rural Energy Fund (REF) have been established to assist with this expansion program, as these additional users typically live in sparsely populated areas and are located some distance away from generation facilities. Connections for these users are usually more expensive than urban counterparts. A 3% levy is added to all electricity tariffs to allow the REA to subsidize TANESCO and other distribution companies for the cost of connecting these customers.

The TANESCO Power System Master Plan (PSMP) includes the 100,000 customer target into its organic customer growth rate projections. The combined annual growth rates provided in the PSMP (2009 to 2014) are inserted as Table 6 below.

Table 6 - Projected Customer Growth Rates per Annum (TANESCO PSMP)

	2009	2010	2011	2012	2013
Customer Growth Rate per Annum	12.1%	16.9%	10.8%	9.7%	10.5%

In addition to an increasing number of customers being added to the TANESCO network, the PSMP estimates that each customer will use more energy each year. The projections for increases in billed energy growth per customer connection are outlined in Table 7. The projections are for all non-mining customers who are considered to have a constant and reliable demand for load forecast planning.

Table 7 - Projected Customer Demand Growth Rates per Connection (TANESCO PSMP)

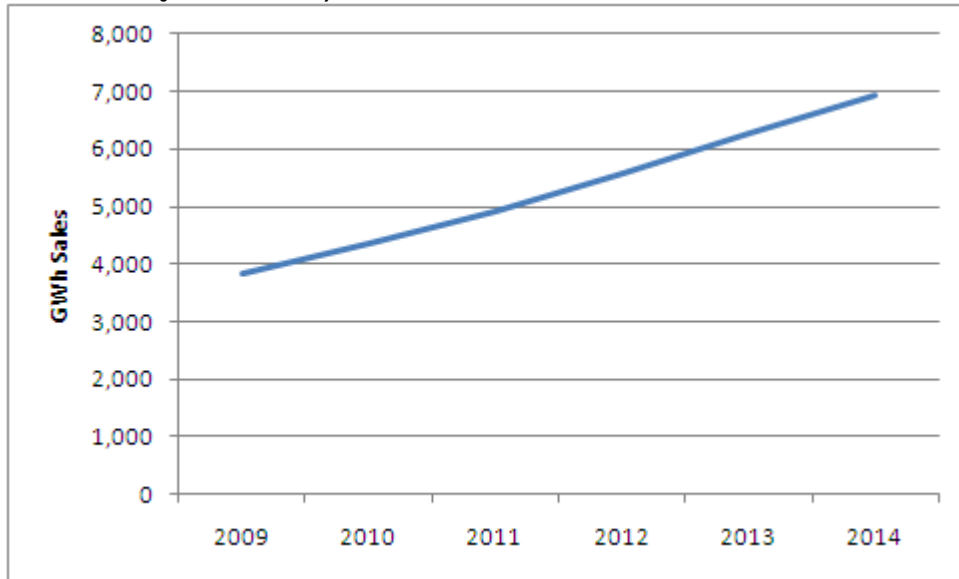
	2009	2010	2011	2012	2013	2014
% Increase Billed Energy Growth per Connection	9.2%	16.7%	10.1%	12.3%	10.5%	12.7%

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<sup>4</sup> Household Budget Survey of 2007

By combining the customer growth rate per annum and the annual increase in billed energy growth per connection the total sales across the TANESCO customer base can be projected. Figure 3 below illustrates this projected growth in GWh sales per annum increasing from 3,481 GWh sold in 2009 increasing to 6,280.4 GWh in 2013 and 6,916.2GWh in 2014

Figure 3 – Actual & Projected Total TANESCO Sales – All Customer Classes 2009-2014



## 3 Investment Requirements to meet Demand

### 3.1 Introduction

To meet the increases in energy demand as projected in the PSMP, TANESCO will need significant new investment in generation, transmission and distribution assets. Furthermore, a reduced repairs and maintenance programme over the past eight years has led to deterioration in the performance of TANESCO's current asset base with high transmission and distribution losses and frequent equipment malfunctions. Expenditure on R&M has averaged only 3.7% of sales revenues over the last eight years against the industry accepted benchmark of 12%.

A substantial Capital Investment Program (CIP) is needed to ensure that sufficient generation, transmission and distribution assets are in place to meet existing and future increases in demand and to ensure reliable supply of electricity. TANESCO's planning department has developed a CIP that summarizes the capital expenditure required and all funding/grant options available.

### 3.2 Capital Investment Program

Under the CIP, the proposed investment from 2009 to 2014 is estimated at TSh 4,243 billion. As illustrated in Table 8, 48% of this investment (TSh 2,023 billion) is targeted for transmission systems. 24% of the 2009-2014 CIP is for distribution system investment (TSh 1,034 billion). This expenditure is based on the requirement to connect an additional 100,000 new connections per annum as well as the expected higher cost per connection for rural customers. 27% (TSh 1,128 billion) of the remaining investment in the 2009-2014 CIP is focused on the development of additional hydro and thermal power plants.

Table 8 – Capital Investment Program by Asset Class 2009-2014 (TSh m)

	2009	2010	2011	2012	2013	2014
Hydro Generation	-	-	17,349	20,455	22,968	17,624
Thermal Generation	105,859	39,144	156,764	271,124	295,496	180,840
Transmission Systems	27,452	66,167	342,098	623,837	580,814	382,284
Distribution Systems	31,716	303,879	293,783	235,107	147,492	21,990
Land and Buildings	-	3,393	5,761	8,892	6,499	4,370
Motor Vehicles	-	1,500	2,000	3,000	4,000	4,000
Office Equipment	-	8,164	1,202	1,489	1,163	3,000
Consulting OPEX	-	5,908	55	109	109	-
<b>Total</b>	<b>165,027</b>	<b>422,248</b>	<b>818,957</b>	<b>1,163,903</b>	<b>1,058,432</b>	<b>614,107</b>

Approximately 21% of the total 2009-2014 CIP cost is derived from grants. 69% is projected to be sourced from loans (many on concessionary terms) and the remaining 10% from TANESCO internal funds (ie – collected from tariff revenues).

Table 9 – Capital Investment Program by Funding Mechanism 2009-2014 (TSh m)

	2009	2010	2011	2012	2013	2014
Grants	91,689	161,659	369,255	225,923	5,386	7,705
Loans	70,538	96,988	324,319	819,974	969,475	582,586
TanESCO Funding	2,800	183,925	107,442	77,865	55,921	5,652
<b>Total</b>	<b>165,027</b>	<b>442,571</b>	<b>801,016</b>	<b>1,123,763</b>	<b>1,030,782</b>	<b>595,943</b>

The full list of CIP projects and their cost/timing details is included as Attachment 1.

### 3.2.1 CIP Grants Funding

For 2009-2014, the CIP has provided for four major sources of grant funding. The GOT is scheduled to provide 32% of the grant funds and the Millennium Challenge Corporation (MCC) is anticipated to provide 26% of all grant funds. Additionally, SIDA is projected to provide 12% and the REA 11%. World Bank funds through TEDAP contribute 6%, ORET 6%, IDA 4%, JICA 3% and the AfDB 0.3%.

Table 10 - Capital Investment Program Grant Schedule by Donor 2009-2014 (TSh m)

Grants	2009	2010	2011	2012	2013	2014
MCC Grant	-	43,950	87,900	87,900	-	-
World Bank Funds - TEDAP	175	25,575	20,460	4,277	2,860	-
IDA - Songsongo - Grant	6,181	13,515	10,812	6,032	384	-
ORET - 50% loan, 50% Grant	51,169	-	-	-	-	-
REA	7,853	29,450	55,275	-	-	-
Government Contribution	12,810	35,938	150,977	70,543	-	7,705
AfDB	-	-	858	1,144	858	-
JICA	8,750	8,481	2,488	1,000	1,000	-
SIDA	4,750	4,750	40,485	55,027	285	-
<b>Total</b>	<b>91,689</b>	<b>161,659</b>	<b>369,255</b>	<b>225,923</b>	<b>5,386</b>	<b>7,705</b>

### 3.2.2 CIP Loan Funding

Under the CIP, financing from the Chinese Government is projected to contribute 42% of all CIP loans primarily for the Kinyrezi, Kiwira and Mnazi Bay generation plants and high voltage transmission projects. World Bank International Development Association (IDA) is estimated to finance an additional 28% for the 400kV Iringa – Shinyanga transmission backbone. Details on the terms of these and all other loans can be found in Section 4.3.9.

Table 11 - Capital Investment Program Loan Schedule by Source 2009-2014 (TSh m)

Loans	2009	2010	2011	2012	2013	2014
World Bank IDA - 100% loan	-	-	233,636	327,091	280,364	93,455
ORET - 50% loan, 50% Grant	51,169	-	-	-	-	-
AfDB	-	-	18,342	24,456	18,342	-
EXIM Bank of KOREA	-	8,438	6,750	8,438	6,750	-
Government of Finland	-	39,999	31,999	49,683	28,771	9,543
DBSA	-	39,588	31,671	47,506	39,588	-
TANESCO funds	2,800	169,510	125,438	118,114	83,679	23,816
Government onlending to Tanesco	-	-	-	5,183	18,660	17,624
Chinese Funding	-	8,964	1,921	357,618	576,999	461,964
50% TANESCO, 50% Buzwagi mines	19,369	-	-	-	-	-
<b>Total</b>	<b>53,969</b>	<b>266,497</b>	<b>449,757</b>	<b>938,088</b>	<b>1,053,154</b>	<b>606,401</b>

### 3.3 Loss Reduction Program

TANESCO's transmission and distribution losses are significantly above acceptable industry standards and its own internal KPI targets. 2008 distribution losses were 18.0% of all energy fed into the medium voltage (MV) network against a industry standard of 12.3%. 2008 transmission losses were 5.1% of all energy sent out from generation as opposed to the industry standard of 3.0%. TANESCO has a loss reduction strategy that is coupled with the CIP distribution investments and improved R&M expenditure. Without that funding, loss reduction initiatives are unlikely to proceed.

Table 12 - Distribution and Transmission Losses – Actual (2008 & 2009) & Target (2010-2014)

Energy Losses	2008	2009	2010	2011	2012	2013	2014
Distribution Losses (% Energy Fed into MV Network)	18.0%	19.7%	19.7%	18.5%	17.2%	15.9%	14.6%
Transmission Losses (% of Generation)	5.1%	5.3%	5.3%	5.2%	5.1%	5.0%	4.4%

Despite its historical performance, TANESCO is aiming to achieve key transmission and distribution loss reduction targets in two ways. First, certain items within the CIP are allocated for reducing the energy losses within the transmission and distribution network.

Secondly, increased expenditure on repairs and maintenance (R&M) will allow both the current and new asset base to be adequately maintained to help reduce transmission/distribution losses. While these may contribute a significant 'up-front' cost to TANESCO (either to be granted, financed or recovered directly through the tariff) the savings through a reduction in energy required to be generated will reduce upward pressure on the tariff through lower generation costs.

## 4 Methodology

### 4.1 Introduction

Following instructions from EWURA to TANESCO in Letter No. 40/1/67 (dated 30 October 2009), significant changes were made by TANESCO and the Consultant to the methodology used to calculate the COS. One of the principal changes was to move away from a forecast based upon the results of the 2007 Tariff Application. Instead a two fold approach where a detailed historical assessment of costs is undertaken and any unjustified increase in costs (on a real, per kWh basis) are decreased in line with KPIs obtained from international benchmarks for similar utilities. This methodology (where an agreed starting point to use as a 'base' is not available) has been widely used and accepted across many African utilities.

### 4.2 Evaluation of Audited Accounts

The first step in the Cost of Service approach adopted by the Consultant is the evaluation of TANESCO's historical financial data for any difficult to substantiate increases across each expense sub-category. If a cost category (e.g. Staff Costs) has increased at a rate that is not warranted, then a COS calculated from these figures will be inaccurate. If costs are found to be inaccurate, then these cost categories need to be aligned with accepted industry benchmarks to ensure a true COS is calculated.

#### 4.2.1 Adjustment for Inflation

Seeing that annual audited accounts are reported in nominal terms (currency of the day), in order to compare one year with another, inflation needs to be considered. If inflation is not factored into this process then it will appear that costs are increasing at a greater rate than they are in real terms. If this is the case, a COSS will equip the utility with sufficient cashflows to operate at breakeven only if there is no inflation. Inflation therefore needs to be allowed for in the assessment.

Adjustments for inflation are especially necessary in countries such as Tanzania that experience high levels of price increases. As detailed in the table below, data provided by the Tanzanian National Bureau of Statistics show that 2002-2009 inflation has ranged from a low of 4.6% to a high of 13.5% per annum. Inflation averaged 7.6% over this period.

Table 13 – CPI Inflation 2002-2009 : National Bureau of Statistics

	2002	2003	2004	2005	2006	2007	2008	2009
Rate of CPI Inflation	7.3%	5.6%	4.6%	5.9%	6.7%	6.4%	13.5%	10.8%

Using the reported CPI rates all historical figures from 2001-2008 are expressed in 2001 terms. This allows the COSS to reliably compare one year to another and for any increases in costs to be shown in real terms.

#### 4.2.2 Assessment of year on year increase of real / per kWh costs

The COS needs to highlight any unsubstantiated increases in expenditure by the utility but care is needed to ensure that downward adjustments are not made unduly when the utility is growing rapidly. TANESCO's 2001 sales were just 2,031 GWh but this increased to 3,303 GWh in 2008, an increase of 63%. In order to meet this increased level of demand TANESCO will obviously incur increased expenses. In order for the COS to be accurately reported expense figures need to take into account this increasingly expensive environment.

To resolve this issue and to allow an accurate COS to be calculated, year on year comparisons of each expense sub-category need to occur on a per kWh basis. Total expenses for each sub-category are divided by total sales within each given year.

#### **4.2.3 Sub category assessment and recommendations**

Once each expense sub-category has been adjusted for inflation and restated in per kWh terms, the data can be analyzed to ascertain if there have been any increases over the 2001-2008 period. To enhance accuracy the COSS needs to remove any such increases in the COS calculation. Failure to do so will result in a COS that is derived from inflated data and therefore not representative of the actual cost of service.

It should be noted that just because an expense sub-category increases from one year to the next (when stated in real per kWh terms) this does not necessarily indicate an inefficiency of the utility. The COS of a utility (in real terms) changes over time in response to changes in the operating environment. For example, a real, per kWh increase in travel cost may reflect an increased emphasis on rural electrification which would require the utility to spend more per kWh on travel costs than it previously incurred.

The COS model developed by the Consultant identifies any expense category that increases (in real per kWh terms) over (a) the eight years of historical data (to establish if there has been a long term increase) and also over (b) the last three years, in order to establish if there has been an increase over the short term (which may have been 'understated' in the eight year assessment).

### **4.3 Future Financial Calculations**

A six step process is used under the adopted methodology to calculate future costs of service

#### **4.3.1 Inflation of Sub-category figures**

First, the 2008 figures that do not require any adjustment (as determined by the process outlined in Section 3.5.1) need to be increased by inflation for each future year being considered by the COSS. Failure to do so will leave the utility operating in an increasingly expensive environment with insufficient revenues.

Inflation must be estimated and this presents a challenge. Three options are available to arrive at a rate of inflation suitable for use in the COS calculations for future years. First, a forecast from a reputable economic agency such as the Central Bank of Tanzania can be used. Second, an average of previous year's data can be used to estimate what future years inflation might reasonably be. Finally, if the historical inflation data from the Bureau of Statistics illustrates a trend (upward, downward or constant) this can be used to project what inflation might reasonably be for future years.

#### **4.3.2 Alternative Projection Methodologies**

Because of the nature of electricity utilities, it may be possible to calculate a more accurate projection for some expense sub-categories than simply by inflating historical data. The most evident example of this relates to generation expenses as these expenses are a function of plant online at the time being considered, contracted costs, fuel prices, and the merit order of the dispatch.

If, for example, the generation cost per kWh was simply kept constant in real terms then the COS would not take into account any new generation facilities coming online during the COS period and a less accurate COS would be employed. Equally, the COS would not account for the benefits brought by the PSMP as it is implemented over time.

#### **4.3.3 Incorporation of KPI adjusted subcategories**

If an expense category is subjected to either one of the tests outlined in Section 3.5.1 it is to be assessed to see whether these annual increases can be substantiated.

If any expense sub-category increase cannot be substantiated then it must be adjusted in line with an internationally accepted benchmark for a true COS to be reported. These adjustments fall into two categories, gradual and instant.

Gradual increases are appropriate for expense sub-categories that cannot be immediately reduced without incurring costs that would be greater than any benefits. Examples include staff expenses and some generation costs. For example, if staff costs were found to have increased in real per kWh terms and no explanation was available for this increase, then they would be adjusted to be in line with an international accepted benchmark. If this benchmark dictated that they were 15% too high, the utility has two choices. If it was to apply an 'instant' adjustment and dismiss 15% of the workforce then the utility would be exposed to significant operational risks. A sudden shift such as this could have devastating consequences on the utility's ability to offer safe, reliable and low-cost energy and a 'gradual' approach would be more prudent. A gradual strategy would allow for the 15% target to be achieved over a number of years, by following a manageable "glide path" allowing savings to be enjoyed whilst maintaining adequate staffing levels in the interim.

Instant adjustments are appropriate for expense sub-categories that are not tied to previous years expenditure. If, for example, the utility was spending 15% more on engine lubrication than was necessary (and no efficiency gains were being experienced) then a sudden 15% cut to the recommended level could be recommended.

The amended annual per kWh figures are then incorporated as with all other expense sub-categories.

#### **4.3.4 Scaling of per kWh figures to system-wide totals**

Based on the projections in Section 2.4 total utility-wide energy sales can be forecast for future years of the COSS. By multiplying the per kWh figure in real terms for each year by the total GWh sales the system-wide total for each expense sub-category can be calculated.

By summing all expense sub-categories at this stage, a utility-wide figure can be calculated for all non-CIP expenses.

#### **4.3.5 Incorporation of CIP costs of service**

As outlined in Section 3.2, a portion of the CIP needs to be funded internally by TANESCO. This equates to 14% of the total CIP over the 2009-2014 period. TANESCO has two options to fund this expense. First, it can simply recover the entire required amount through the tariff on a year by year basis. Alternatively it could seek commercial finance for this portion and recover only the principal and interest portion through the tariff each year.

The benefit of the second option is that (if finance can be secured over a long tenor at a reasonable interest rate) the annual requirement and the impact upon the tariff will be lower than the case of an immediate adjustment. Additionally, the payment for the asset is spread over a longer period which is reasonable for infrastructure assets due to their long term nature. If the first of these approaches was adopted, the energy users in 2011 would be funding assets that would benefit users well beyond 2011. Clearly the financing of the asset is a more equitable arrangement.

The second scenario put forward above presumes that finance can be arranged for the assets to be purchased. Whilst TANESCO may be able a bankable utility (due to its steady income stream and government ownership), for loans of the magnitude required all commercial lenders require a government guarantee. In the case of the Syndicated Loan of 2007 this process took three years, which means that further such borrowing is unlikely in the short term.

By adding the CIP cost of service to the non-CIP cost of service a 'total system-wide COS' is established.

#### **4.3.6 Deduction of revenues from non-tariff sources**

As tariff revenues are not the only source of income for the utility, these need to be taken into consideration. TANESCO has a number of income streams including Government contributions for capacity payments, and non-electricity sales related income from customers. When these are deducted from the 'total system-wide COS' the required revenue from tariffs is calculated.

#### **4.3.7 Debt Service Coverage Ratio (DSCR) Check**

As a final step in the COSS process, the utility must check whether its revenue is sufficient to satisfy the DSCR covenants imposed under the Syndicated Loan agreement. Under this arrangement, TANESCO must maintain a DSCR of 1.15. If the utility's Net Operating Income is not 115% of its Total Debt Service then it is in technical default of its loan.

If the revenue requirement derived above results in a DSCR in any year of less than 1.15, revenues must be increased in the offending year so that TANESCO can project it will meet its debt service obligations. This would result in a cash surplus and net profit situation, the implications (tax payable to GOT, use of funds) of which would need to be devised by the utility and EWURA.

## 5 Calculation of Cost of Service (Base Case)

### 5.1 Audited Account Evaluation and Adjustment for Inflation

The audited financial accounts from 2001 to 2008 were brought together and tabulated in Table 14. At the time of the COS the 2009 accounts had not yet been released in a provisional or audited form.

Table 14 – TANESCO Audited Accounts 2001-2008 – Nominal Figures

	2001	2002	2003	2004	2005	2006	2007	2008
<b>Nominal Figures (TSh m)</b>								
Own Generation	10,297	8,973	17,956	32,045	17,421	56,748	59,204	71,438
Purchased Energy	4,851	39,735	101,230	145,348	179,252	241,998	243,503	193,433
R&M	7,238	6,247	7,993	8,807	5,841	44,260	51,271	67,121
Staff Cost	13,005	11,052	11,479	16,837	20,038	27,939	30,326	87,353
Transport, Travel & Safari	4,409	2,729	3,724	4,843	2,275	1,695	1,815	2,614
Other Administration Expenses	5,897	4,127	7,223	12,020	7,682	15,629	58,513	13,271
Other Operating Expenses	6,914	4,605	15,923	9,244	3,618	66,601	31,757	39,955
Depreciation	40,347	42,546	42,374	26,323	26,788	31,343	30,349	35,032
Provision for Doubtful Debts	28,947	2,339	10,341	3,414	13,586	-	-	-
Financing Expense	15,648	120,747	157,089	77,969	4,323	7,167	12,473	29,326
<b>Total</b>	<b>137,553</b>	<b>243,100</b>	<b>375,332</b>	<b>336,850</b>	<b>280,824</b>	<b>493,380</b>	<b>519,211</b>	<b>539,543</b>

The nominal figures from 2001-2008 were then adjusted to 'real' figures in 2001 terms by removing the impact of inflation. The CPI inflation rate as approved by the Tanzanian National Bureau of Statistics<sup>5</sup> was used for this purpose. The results of this process can be seen in Table 15.

Table 15 – TANESCO Audited Accounts 2001-2008 – Real Figures

	2001	2002	2003	2004	2005	2006	2007	2008
Annual Inflation Index (2001=100)	100.0	107.3	113.3	118.5	125.5	133.9	142.5	161.7
		7.3%	5.6%	4.6%	5.9%	6.7%	6.4%	13.5%
<b>Real Figures (2001 TSh m terms)</b>								
Own Generation	10,297	8,363	15,848	27,042	13,881	42,381	41,547	44,179
Purchased Energy	4,851	37,032	89,347	122,657	142,830	180,730	170,879	119,625
R&M	7,238	5,822	7,055	7,432	4,654	33,055	35,980	41,510
Staff Cost	13,005	10,300	10,132	14,208	15,967	20,866	21,281	54,022
Transport, Travel & Safari	4,409	2,543	3,287	4,087	1,813	1,266	1,274	1,617
Other Administration Expenses	5,897	3,846	6,375	10,143	6,121	11,672	41,062	8,207
Other Operating Expenses	6,914	4,292	14,054	7,801	2,883	49,739	22,286	24,709
Depreciation	40,347	39,651	37,400	22,214	21,345	23,408	21,298	21,665
Provision for Doubtful Debts	28,947	2,180	9,127	2,881	10,825	-	-	-
Financing Expense	15,648	112,532	138,649	65,797	3,445	5,353	8,753	18,136
<b>Total</b>	<b>137,553</b>	<b>226,561</b>	<b>331,273</b>	<b>284,262</b>	<b>223,764</b>	<b>368,469</b>	<b>364,359</b>	<b>333,669</b>

<sup>5</sup> <http://www.nbs.go.tz/>

## 5.2 Assessment of year on year increase of real / per kWh costs

TANESCO has experienced significant growth in GWh sales in the 2001-2008 period expenses and subsequently has experienced increases in each of its expense sub-categories. In order to ascertain the true COS, each expense sub-category must be assessed on a cost per kWh basis. Each expense sub-category total has been divided by the total energy sales per annum to arrive at these figures. The results are found in Table 16.

Table 16 – TANESCO Audited Accounts 2001-2008 – Real Figures per kWh sold.

	2001	2002	2003	2004	2005	2006	2007	2008
Annual GWh Sold	2,031.0	2,186.0	2,326.0	2,466.0	2,628.0	2,769.0	3,187.5	3,301.8
<b>Real Data Per per kWh (2001 TSh/kWh terms)</b>								
Own Generation	5.07	3.83	6.81	10.97	5.28	15.31	13.03	13.38
Purchased Energy	2.39	16.94	38.41	49.74	54.35	65.27	53.61	36.23
R&M	3.56	2.66	3.03	3.01	1.77	11.94	11.29	12.57
Staff Cost	6.40	4.71	4.36	5.76	6.08	7.54	6.68	6.48
Transport, Travel & Safari	2.17	1.16	1.41	1.66	0.69	0.46	0.40	0.49
Other Administration Expenses	2.90	1.76	2.74	4.11	2.33	4.22	12.88	2.49
Other Operating Expenses	3.40	1.96	6.04	3.16	1.10	17.96	6.99	7.48
Depreciation	19.87	18.14	16.08	9.01	8.12	8.45	6.68	6.56
Provision for Doubtful Debts	14.25	1.00	3.92	1.17	4.12	-	-	-
Financing Expense	7.70	51.48	59.61	26.68	1.31	1.93	2.75	5.49
<b>Total</b>	<b>67.73</b>	<b>103.64</b>	<b>142.42</b>	<b>115.27</b>	<b>85.15</b>	<b>133.07</b>	<b>114.31</b>	<b>91.17</b>

With the audited accounts now presented in a real terms and on a per kWh basis they are in a format able to be assessed for the COS. The COS methodology requires an analysis of any increases from year to year. Any items that increase (in real terms per kWh) are flagged for assessment whether the increases was warranted or not.

The annual rates of year on year increase are outlined in Table 16.

Table 17 – Year on Year percentage increase – TANESCO Audited Accounts 2001-2008 /Real Figures

	2001	2002	2003	2004	2005	2006	2007	2008
<b>Real Data Per per kWh (2001 TSh/kWh terms)</b>								
Own Generation	5.07	3.83	6.81	10.97	5.28	15.31	13.03	13.38
Purchased Energy	2.39	16.94	38.41	49.74	54.35	65.27	53.61	36.23
R&M	3.56	2.66	3.03	3.01	1.77	11.94	11.29	12.57
Staff Cost	6.40	4.71	4.36	5.76	6.08	7.54	6.68	6.48
Transport, Travel & Safari	2.17	1.16	1.41	1.66	0.69	0.46	0.40	0.49
Other Administration Expenses	2.90	1.76	2.74	4.11	2.33	4.22	12.88	2.49
Other Operating Expenses	3.40	1.96	6.04	3.16	1.10	17.96	6.99	7.48
Depreciation	19.87	18.14	16.08	9.01	8.12	8.45	6.68	6.56
Provision for Doubtful Debts	14.25	1.00	3.92	1.17	4.12	-	-	-
Financing Expense	7.70	51.48	59.61	26.68	1.31	1.93	2.75	5.49
<b>Total</b>	<b>67.73</b>	<b>103.64</b>	<b>142.42</b>	<b>115.27</b>	<b>85.15</b>	<b>133.07</b>	<b>114.31</b>	<b>101.06</b>

The Financial Model assesses each expense sub-category for increases over both an eight year period (2001-2008) and a three year period (2006-2008). Each category is reported as either increased (highlighted in red) or decreased with the extent of the increase/decrease also stated. Table 17 summarizes these results and identifies that every expense subcategory has increased over either the 2001-2008 period or the 2006-2008 period.

On this basis no TANESCO expense subcategory is automatically able to proceed to the next stage of the COS process. Every expense sub-category requires further analysis to see whether the increases can be substantiated (and thus representative of the true COS) or unjustified (and thus in need of downward adjustment in order to be represent TANESCO’s true COS).

Table 18 – TANESCO Expense Sub-Category Assessment 2001-2008 & 2006-2008

<b>B) Assessment of Real Movements per kWh Sold</b>			
<b>2001-2008</b>			
Overall a 163.92% real increase in Own Generation costs per kWh from 2001 to 2008			
Overall a 1416.89% real increase in Purchased Energy costs per kWh from 2001 to 2008			
Overall a 252.77% real increase in R&M costs per kWh from 2001 to 2008			
Overall a 247.24% real increase in Staff Cost costs per kWh from 2001 to 2008			
Overall a 77.45% real decrease in Transport, Travel & Safari costs per kWh from 2001 to 2008			
Overall a 14.39% real decrease in Other Administration Expenses costs per kWh from 2001 to 2008			
Overall a 119.83% real increase in Other Operating Expenses costs per kWh from 2001 to 2008			
Overall a 66.97% real decrease in Depreciation costs per kWh from 2001 to 2008			
Overall a 100% real decrease in Provision for Doubtful Debts costs per kWh from 2001 to 2008			
Overall a 28.71% real decrease in Financing Expense costs per kWh from 2001 to 2008			
<b>2006-2008</b>			
Overall a 12.58% real decrease in Own Generation costs per kWh from 2006 to 2008			
Overall a 44.49% real decrease in Purchased Energy costs per kWh from 2006 to 2008			
Overall a 5.32% real increase in R&M costs per kWh from 2006 to 2008			
Overall a 117.13% real increase in Staff Cost costs per kWh from 2006 to 2008			
Overall a 7.1% real increase in Transport, Travel & Safari costs per kWh from 2006 to 2008			
Overall a 41.03% real decrease in Other Administration Expenses costs per kWh from 2006 to 2008			
Overall a 58.34% real decrease in Other Operating Expenses costs per kWh from 2006 to 2008			
Overall a 22.38% real decrease in Depreciation costs per kWh from 2006 to 2008			
No Change			
Overall a 319.06% real increase in Financing Expense costs per kWh from 2005 to 2008			

### 5.3 Sub category assessment and recommendations

#### 5.3.1 Own Generation & Purchased Energy

As TANESCO increases its own generation output (by definition this would generally only occur if it could do so at a lower cost than by purchasing energy) this will offset energy purchased from IPPs thus lowering the energy charge incurred. On this basis ‘Own Generation’ and ‘Purchased Energy’ are direct substitutes for each other and it makes sense from a financial analysis point of view for these two expense sub-categories to be viewed as one cost category from this point forward.

By reclassifying this data as one expense sub-category it can be seen that TANESCO's energy cost per kWh increased dramatically (in real terms) from 2001-2004 with another subsequent increase in 2006 (due to lower than forecast hydro levels and the resulting need to purchase more energy from IPPs) . Considerable decreases in TANESCO's energy cost per kWh have been evident from 2006-2008.

Table 19 – TANESCO Generation Cost Percentage Change on Previous Year – 2002-2008

Own Generation & Purchased Energy Combined	2002	2003	2004	2005	2006	2007	2008
Year on Year percentage increase (real per kWh)	178%	118%	34%	-2%	41%	-20%	-34%

One approach for COS analysis would be to levelize the total energy costs for the past eight years and to calculate TANESCO's future COS from this point. This however does not provide a true representation of TANESCO's actual COS when a far more accurate calculation is available.

The Financial Model developed by the Consultant incorporates an Merit Order Dispatch mechanism that calculates the projected demand by TANESCO customers over a given period and the lowest cost way for TANESCO meet this demand. The Financial Model then assigns the fixed energy cost (TSh per kW) for each generation option and the variable energy cost (TSh per kWh) to arrive at the projected actual generation COS.

On this basis it has been projected that TANESCO's customers will purchase 4,913 GWh of energy in 2011. TANESCO's 2011 Loss Reduction Program (LRP) targets station usage of 1.1% of gross generation, transmission losses of 5.2% of energy sent out and distribution losses of 18.5% of energy fed into the MV network. Taking these aspects into account TANESCO will require 6,425 GWh of generation in 2011. In other words, if TANESCO's losses are greater than the LRP then the cost of those losses is not passed through to consumers but will lead to a loss that will be reflected in the company's balance sheet through a reduction in shareholders profits.

Imports from TANWAT, Zambia (66kV) and Uganda plus generation from isolated grids is projected by TANESCO's planning department to be 210.5 GWh for 2011. This leaves 6,215 GWh of generation required from TANESCO's grid based network.

TANESCO's Planning Department has forecast that 2,689 GWh will be generated through hydro in 2011. This is comprised of 436 GWh from Mtera, 1,089 GWh from Kidatu, 35 GWh from Nyumba Mungu, 85 GWh from Hale, 370 GWh from Pan Falls and 674 GWh from Kihansi. This generation is dispatched first where possible due to its low energy cost. This leaves 3,526 GWh being required from thermal plant.

Fixed and variable costs (both fuel and non fuel) for each of the thermal plant available to TANESCO are outlined in Table 20 below. TANESCO currently has 430MW of thermal plant available through the Songas and IPTL IPPs and its own Ubungo and Tegeta plant.

9MW of biomass is scheduled to come on-line in January 2011 followed by the 60MW Mwanza HFO plant in June 2011 and an additional 100MW plant at Ubungo. An additional 10MW of biomass is scheduled to come on-line in January 2012. Two significant plants are scheduled for operation in January 2013, the 200MW Kiwira coal plant and the 240MW Kinyerezi.

Table 20 –Thermal Energy Generation Data.

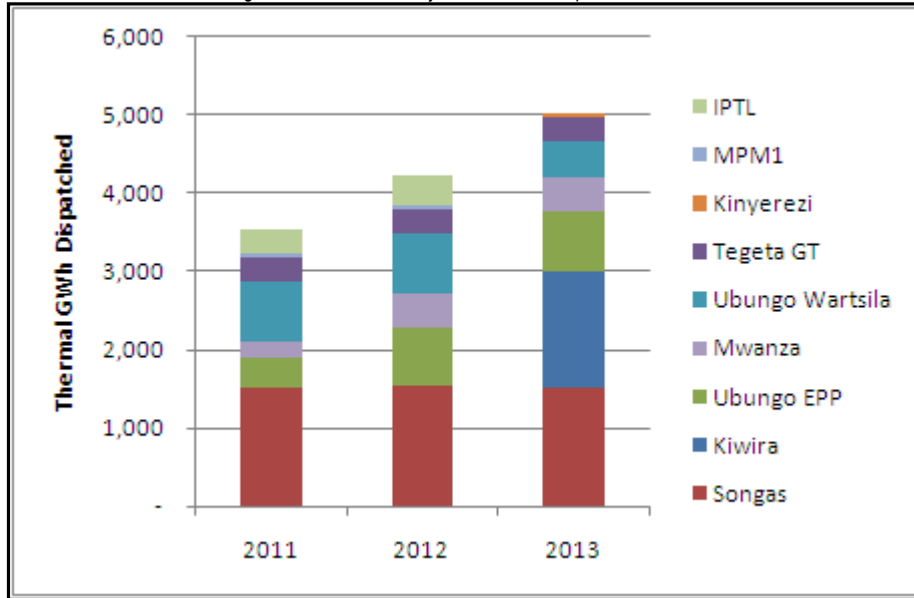
Thermal Plant	Installed Capacity (MW)	Online From	Offline From	Fixed O&M (\$/KW/Mth)	2009 VOM (US¢/kWh)	VOM Escalation Rate pa	Availability Factor (%)	Rank
Songas	189	Jan-09	Dec-25	7.50	1.47	US Inflation	91.3%	2
IPTL	100	Jan-02	Dec-26	27.50	10.29	US Inflation	82.4%	9
Ubungo Wartsila	100	Jan-09	Dec-31	0.67	3.09	US Inflation + 3%	80.0%	5
Tegeta GT	41	Oct-09	Jan-30	0.67	2.47	US Inflation + 3%	87.3%	4
Mwanza	60	Jul-11	Jun-31	2.25	14.36	US Inflation + 3%	82.4%	10
MPM1	9	Jan-11	Dec-30	3.33	8.83	US Inflation + 3%	50.0%	7
MPM2	10	Jan-12	Dec-31	3.33	8.83	US Inflation + 3%	80.0%	8
Ubungo EPP	100	Jul-11	Dec-31	0.67	1.71	US Inflation + 3%	85.4%	3
Kwira	200	Jan-13	Dec-37	6.67	0.99	US Inflation + 3%	85.4%	1
Kinyerezi	240	Jan-13	Dec-37	0.67	4.20	US Inflation + 3%	85.4%	6

Thermal generation dispatch is designated based on lowest energy cost across the plant options available. The sole exception to this is the Mwanza HFO plant in northern Tanzania which is dispatched on a demand basis. TANESCO dispatch is also constrained by gas requirement (where applicable) given the daily constrained gas supply and the Consultant has allowed for the constraint in the Financial Model. Table 19 outlines the order for the dispatch of the required 3,526 GWh and Figure 5 illustrates how the future load is projected to be met as additional plant comes on-line.

Table 21 –Thermal Energy Dispatch 2011.

Thermal Generation Plant - 2011	GWh
Songas	1,524.2
Ubungo EPP	374.1
Tegeta GT	313.6
Ubungo Wartsila	758.0
MPM1	32.9
IPTL	306.3
Mwanza	216.5
<b>Total</b>	<b>3,525.5</b>

Figure 4 – TANESCO Projected Thermal Dispatch 2011-2013



Based on the 2011 thermal dispatch summary and the associated fixed and variable costs of each plant it is projected that TANESCO will incur capacity charges of TSh 73.7b and energy charges of TSh 195.9b in 2011. Generation cost for Isolated Stations for 2011 is projected to be TSh 74.2b and TSh 6.6b is projected for imported energy. This equates to a total energy cost of TSh 330.6b TSh or 67.3 TSh/kWh.

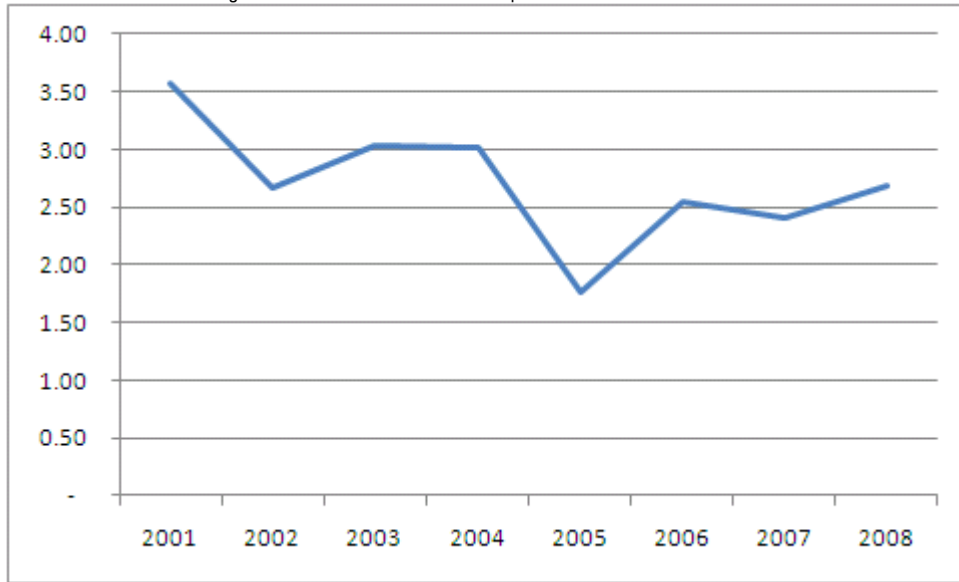
Table 22 - Thermal Generation Capacity and Energy Costs 2011.

Thermal Generation Plant	Capacity (TShM)	Energy (TShM)
IPTL	46,119	49,227
Songas	23,772	35,059
Mwanza	1,132	48,529
Ubungo Wartsila	1,118	36,525
Ubungo EPP	559	9,963
Tegeta GT	458	12,095
MPM1	503	4,529
<b>Total</b>	<b>73,661</b>	<b>195,927</b>

### 5.3.2 R&M Cost

An assessment of TANESCO's historical expenditure on R&M reveals that it has been severely cash constrained as illustrated in Figure 2. The disbursement of funds for R&M per kWh has been declining from 2001-2007 however it appears that when the Syndicated Loan reached financial close in 2007 this facilitated increased funding closer to 2001 levels.

Figure 5 – TANESCO Annual R&M Expenditure 2008 – Real TSh/kWh



TANESCO's expenditure on R&M has averaged 2.7% of revenue from 2005-2008, well below the Industry Accepted Practice figure of 12%. If cashflow was sufficient to enable TANESCO was able to spend this level of revenue on R&M it would add 17.3 TSh/kWh to the tariff in 2011.

### 5.3.3 Staff Cost

TANESCO's real staff cost per kWh increased dramatically over the 2001-2006 period but the results of efforts by TANESCO's management can be seen in the 2007-2008 period. Overall however, in 2008 TANESCO had only 130 customers per employee, well short of its own internal target of 250 customers per employee. On this basis it would not be prudent to simply project TANESCO's 2011-2013 COS for Staff from current 2008 levels. This would result in a higher tariff than if staff numbers were aligned with the KPI target over time.

It is proposed that TANESCO's COS for staff expenses is derived from its meeting of the KPI target of 250 customers per employee by 2016 as illustrated in Table 23. This will require the total number of TANESCO staff to only increase from 5,527 in 2008 to 5,770 in 2011.

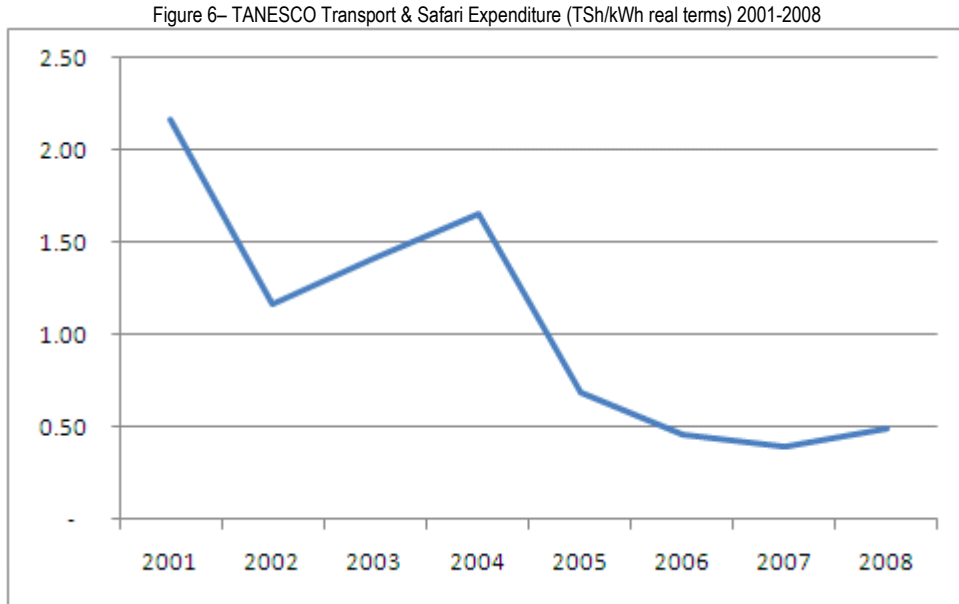
Table 23 – TANESCO Customer : Employee Ration KPI Target 2008-2016

	2008	2009	2010	2011	2012	2013	2014	2015	2016
Customers	718,853	783,873	883,873	983,873	1,083,873	1,183,873	1,283,873	1,383,873	1,483,873
Staff	5,527	5,550	5,638	5,710	5,770	5,821	5,864	5,902	5,935
Customer:Staff Ratio	130.06	141.24	156.78	172	188	203	219	234	250

The 2008 Staff Cost per employee was TSh 15.8m and this figure has been escalated in line with projected inflation to a 2011 figure of TSh 20.7m per employee. On this basis the COS for TANESCO's Staff in 2011 has been calculated at TSh 118.0b or 24.0 TSh per kWh.

### 5.3.4 Transport & Safari

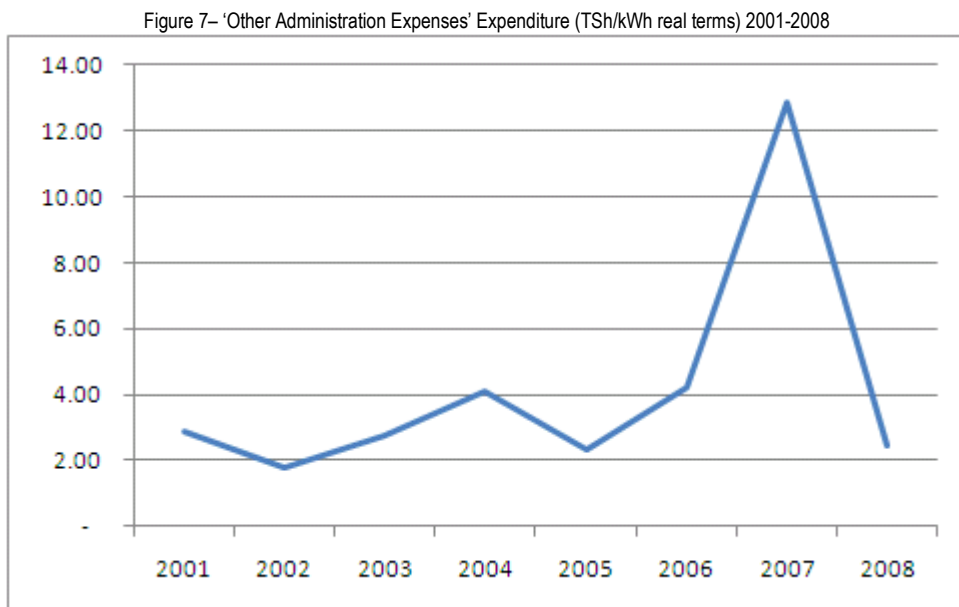
TANESCO's per kWh expenditure on Transport & Safari has fluctuated in real terms over the 2001-2008 period. Overall Transport and Safari expenditure has decreased over the 2001-2008 period with an exception of increases in 2003 and 2004 and a very slight increase in 2008.



For the purposes of COS analysis, continuing to allow the real per kWh increase in expenditure is not considered prudent by the Consultant. On this basis the 2001-2008 average has been used as a basis for COS projections. Keeping this figure constant in real terms equates to 2.4 TSh/kWh in 2011 terms.

### 5.3.5 Other Administration Expenses

As with Transport/Travel & Safari, 'Other Administration Expenses' have also fluctuated widely from 2001-2008 making the establishment of a base for COS projections difficult.

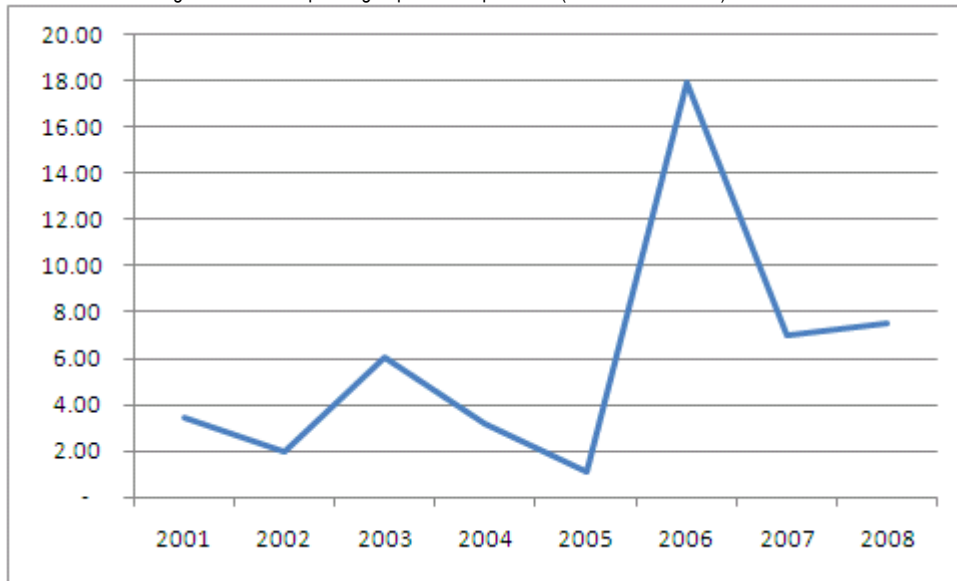


Between 2001 and 2006 the expense varied between approximately 2 and 4 TSh/kWh. A large spike in 2007 to almost 13 TSh/kWh was reversed the following year. On this basis a 2001-2008 average of 5.0 TSh/kWh has been used for the projection of COS. Keeping this figure constant in real terms results in a 2011 figure of 6.6 TSh/kWh.

### 5.3.6 Other Operating Expenses

As is the case with Transport/Travel & Safari and 'Other Administration Expenses', 'Other Operating Expense' have also varied significantly from 2001-2008.

Figure 8 – 'Other Operating Expenses' Expenditure (TSh/kWh real terms) 2001-2008



On this basis the 2001-2008 average of 9.1 TSh/kWh has been used for the projection of COS. Keeping this figure constant in real terms results in a 2011 figure of 11.9 TSh/kWh.

### 5.3.7 Depreciation

The depreciation calculation for the COS is derived from TANESCO's existing asset register and new assets projected to be purchased under the CIP (Table 8 – Section 3.2). On this basis, the depreciation charge for 2011 is TSh 66.8b which equates to 13.6 TSh/kWh.

Significant additional capital expenditure is also planned for 2012 and 2013 in order to lower TANESCO's transmission/distribution losses, connect the targeted 100,000 new customers and expand TANESCO's generation capacity. TSh 1,164b of additional investment is scheduled for 2012 which results in a depreciation expense of TSh 91.4b or 16.4 TSh/kWh. TSh 1,058b of additional investment is planned for 2013 and a depreciation expense of TSh 146.2b results. This equates to a requirement of 23.3 TSh/kWh in 2013.

### 5.3.8 Provision for Doubtful Debts

The COS projection for Provision for Doubtful Debts has been based on TANESCO's own internal target of recovering 96% of all revenues billed. TANESCO's recovery of billed energy has been impressive (and far above that of many other similar utilities) with 95% recovered in 2008. A target higher than the 96% internal target was

considered however, in the experience of the Consultant, the cost of recovering these additional outstanding bills is greater than the value of the bills themselves. On this basis, the 96% target is deemed appropriate for inclusion in the COS resulting in an expense of TSh 33.9m or 7.3 TSh/kWh in 2011. Significant investments are planned into the ‘Revenue Protection’ department of TANESCO. This activities involve the pursuit of long term unpaid accounts and the roll-out of Luku prepaid meters. On this basis, it is projected that the Provision for Doubtful Debts will decrease to 3.4% in 2012 and 2013.

### 5.3.9 Financing Expense

The COS for TANESCO’s Interest Expense has been calculated directly from the Financial Model as opposed to using 2008’s figures as a base year and then escalating to allow for growth and inflation. This results in a more accurate and cost reflective projection for the purposes of COS modeling. TANESCO’s current loan balances, interest rates and tenors have provided a basis for this calculation and loan details are also available for the additional borrowing required for the CIP over the 2010-2014 period.

TANESCO currently has five loans with plans to access another nine sources of finance in order to fund the CIP. The current balances (where applicable), interest rates, tenors and grace period details for each loan are outlined in Table 24.

Table 24 – TANESCO Current and Future Loan Details

Loan Details	CB 2008	Interest Rate	Start Date	Tenor	End Date	Grace Period Until
Syndicated Loan	240,986	17.0%	Jan-09	6.0	Dec-14	
Government Loan	56,013	6.5%	Jan-09	15.0	Dec-23	May-13
Government Loan - Deferred Capacity Charge	75,756	6.5%	Jan-09	17.0	Dec-25	
ING - Optical Fibre	24,891	5.0%	Jul-09	10.0	Jun-19	Jun-13
ING - Tegeta 45 MW	22,502	5.0%	Jan-09	10.0	Dec-18	
World Bank IDA - 100% loan		0.75%	Jul-10	40	Jun-50	Dec-13
ORET- 50% loan, 50% Grant		7.10%	Jan-15	20	Dec-34	Dec-11
AfDB		7.10%	Jan-11	20	Dec-30	Dec-10
EXIM Bank of KOREA		7.10%	Jan-11	20	Dec-30	Dec-10
Government of Finland		7.10%	Jan-11	20	Dec-30	Dec-13
DBSA		7.10%	Jan-11	20	Dec-30	Dec-13
Government onlending to Tanesco		7.10%	Jan-12	20	Dec-31	Dec-14
Chinese Funding		3.76%	Jan-20	12	Dec-31	Dec-14
Buzwagi mines		5.60%	Jan-08	12	Dec-19	Dec-11

When the above loan details are combined with the drawdown requirements of the CIP (see Section 4.3.10) the following loan summaries result.

Table 25 – Current Loan Summaries 2009-2014

<b>Syndicated Loan</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>
Opening Balance	240,986	296,432	249,373	193,567	137,761	81,955
Drawdown	65,000	-	-	-	-	-
Repayment	(20,000)	(47,000)	(53,500)	(53,500)	(53,500)	(40,000)
Interest Due	43,255	46,995	38,337	28,913	19,490	10,738
Interest Paid	(32,809)	(47,054)	(40,643)	(31,220)	(21,796)	(12,090)
Closing Balance	296,432	249,373	193,567	137,761	81,955	40,603
<b>Government Loan</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>
Opening Balance	56,013	59,764	63,767	68,037	72,594	69,541
Drawdown	-	-	-	-	-	-
Repayment	-	-	-	-	(4,639)	(6,958)
Interest Due	3,751	4,003	4,271	4,557	4,712	4,313
Interest Paid	-	-	-	-	(3,127)	(4,313)
Closing Balance	59,764	63,767	68,037	72,594	69,541	62,583
<b>Govt Loan - Def Cap Charge</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>
Opening Balance	75,756	105,685	86,179	52,064	20,554	(8,927)
Drawdown	29,929	-	-	-	-	-
Repayment	-	(19,505)	(34,116)	(31,510)	(29,481)	(29,901)
Interest Due	5,979	6,492	4,599	2,412	402	(1,473)
Interest Paid	(5,979)	(6,492)	(4,599)	(2,412)	(402)	1,473
Closing Balance	105,685	86,179	52,064	20,554	(8,927)	(38,828)
<b>ING - Optical Fibre</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>
Opening Balance	24,891	26,164	27,503	28,910	30,389	28,558
Drawdown	-	-	-	-	-	-
Repayment	-	-	-	-	(2,599)	(5,198)
Interest Due	1,273	1,339	1,407	1,479	1,520	1,309
Interest Paid	-	-	-	-	(752)	(1,309)
Closing Balance	26,164	27,503	28,910	30,389	28,558	23,361
<b>ING - Tegeta 45 MW</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>
Opening Balance	24,891	22,401	19,911	17,422	14,932	12,442
Drawdown	-	-	-	-	-	-
Repayment	(2,490)	(2,490)	(2,490)	(2,490)	(2,490)	(2,490)
Interest Due	1,187	1,063	939	814	690	565
Interest Paid	(1,187)	(1,063)	(939)	(814)	(690)	(565)
Closing Balance	22,401	19,911	17,422	14,932	12,442	9,952

Table 26 – Future Loan Summaries

<b>World Bank IDA - 100% loan</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>
Opening Balance	-	-	-	234,588	564,776	850,532
Drawdown	-	-	233,636	327,091	280,364	93,455
Repayment	-	-	-	-	-	(24,506)
Interest Due	-	-	951	3,097	5,392	6,676
Interest Paid	-	-	-	-	-	(6,676)
Closing Balance	-	-	234,588	564,776	850,532	919,480
<b>ORET- 50% loan, 50% Grant</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>
Opening Balance	-	53,180	57,082	61,269	58,604	55,939
Drawdown	51,169	-	-	-	-	-
Repayment	-	-	-	(2,665)	(2,665)	(2,665)
Interest Due	2,011	3,901	4,187	4,263	4,074	3,885
Interest Paid	-	-	-	(4,263)	(4,074)	(3,885)
Closing Balance	53,180	57,082	61,269	58,604	55,939	53,273
<b>AfDB</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>
Opening Balance	-	-	-	17,914	40,825	56,420
Drawdown	-	-	18,342	24,456	18,342	-
Repayment	-	-	(428)	(1,545)	(2,746)	(3,321)
Interest Due	-	-	697	2,170	3,521	3,898
Interest Paid	-	-	(697)	(2,170)	(3,521)	(3,898)
Closing Balance	-	-	17,914	40,825	56,420	53,099
<b>EXIM Bank of KOREA</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>
Opening Balance	-	-	8,769	14,923	22,367	27,698
Drawdown	-	8,438	6,750	8,438	6,750	-
Repayment	-	-	(596)	(994)	(1,419)	(1,630)
Interest Due	-	332	865	1,354	1,804	1,913
Interest Paid	-	-	(865)	(1,354)	(1,804)	(1,913)
Closing Balance	-	8,769	14,923	22,367	27,698	26,068
<b>Government of Finland</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>
Opening Balance	-	-	41,571	77,877	135,225	175,046
Drawdown	-	39,999	31,999	49,683	28,771	9,543
Repayment	-	-	-	-	-	(23,551)
Interest Due	-	1,572	4,307	7,666	11,050	13,034
Interest Paid	-	-	-	-	-	(13,034)
Closing Balance	-	41,571	77,877	135,225	175,046	161,039
<b>DBSA</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>
Opening Balance	-	-	41,144	77,078	132,105	182,941
Drawdown	-	39,588	31,671	47,506	39,588	-
Repayment	-	-	-	-	-	(10,768)
Interest Due	-	1,556	4,263	7,521	11,247	12,638
Interest Paid	-	-	-	-	-	(12,638)
Closing Balance	-	41,144	77,078	132,105	182,941	172,172

<b>Government onlending to Tanescoc</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>
Opening Balance	-	-	-	-	5,387	25,176
Drawdown	-	-	-	5,183	18,660	17,624
Repayment	-	-	-	-	-	-
Interest Due	-	-	-	204	1,129	2,540
Interest Paid	-	-	-	-	-	-
Closing Balance	-	-	-	5,387	25,176	45,340
<b>Chinese Funding</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>
Opening Balance	-	-	9,148	11,458	376,882	980,187
Drawdown	-	8,964	1,921	357,618	576,999	461,964
Repayment	-	-	-	-	-	-
Interest Due	-	185	390	7,806	26,305	47,014
Interest Paid	-	-	-	-	-	-
Closing Balance	-	9,148	11,458	376,882	980,187	1,489,165
<b>Buzwagi mines</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>
Opening Balance	-	19,966	21,114	22,327	19,534	16,741
Drawdown	19,369	-	-	-	-	-
Repayment	-	-	-	(2,793)	(2,793)	(2,793)
Interest Due	598	1,147	1,213	1,179	1,022	866
Interest Paid	-	-	-	(1,179)	(1,022)	(866)
Closing Balance	19,966	21,114	22,327	19,534	16,741	13,949

Table 27 – Combined Loan Summary 2009-2014

<b>Total</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>
Opening Balance	422,537	583,594	625,562	877,434	1,631,935	2,554,248
Drawdown	165,467	96,988	324,319	819,974	969,475	582,586
Repayment	(22,490)	(68,995)	(91,130)	(95,496)	(102,332)	(130,346)
Interest Due	58,056	68,583	66,425	73,435	92,357	95,974
Interest Paid	(39,976)	(54,608)	(47,742)	(43,412)	(37,187)	(59,714)
Closing Balance	583,594	625,562	877,434	1,631,935	2,554,248	3,031,255

As can be seen in Table 27, in 2011 TANESCO is scheduled to repay TSh 91.1b of principal and TSh 47.7b of interest charges. This equates to a total financing expense of 28.3 TSh/kWh in 2011, 25.0 TSh/kWh in 2012 and 22.2 TSh/kWh in 2013.

### 5.3.10 Capital Investment Program

As outlined in Section 3.2, some items in the CIP are neither funded by grants or loans. This portion must be funded by TANESCO and, in turn, this portion must be recovered through the tariff. In 2011 this amount equates to TSh 125.4b or 25.5 TSh per kWh. This decreases to 21.2 TSh per kWh in 2012 as the unfunded portion of the CIP decreases to 118.1 TSh per kWh. In 2013 this again decreases to TSh 55.1b or 83.7 TSh per kWh.

## 5.4 Implications of Cost of Service (Base Case)

As can be seen in Figure 7 if TANESCO was to recover its full COS in 2011 an average tariff of 197.3 TSh/kWh would be necessary (top horizontal line<sup>6</sup>). This would represent a 66.1% increase on the current 2009 average tariff of 118.8 TSh/kWh (bottom horizontal line). Such a substantial increase to the average tariff would likely see a significant impact on the standard of living of almost all Tanzanians as well as materially adverse consequences for the commercial sector as costs of production rise. It might also reduce consumption of electricity depending on the electricity elasticity of demand in Tanzania which would further drive up the average cost of production.

Figure 9 – 2011 TANESCO Average Tariff Required (TSh/kWh)



While this 197.3 TSh/kWh may represent the “full-cost of service” it is not the recommendation of the Consultant that this is the figure that TANESCO should apply for to EWURA in its tariff application. Such a scenario would likely result in ‘rate shock’ and would have large negative impacts on demand, economic growth and quality of life of the Tanzanian population.

However, given that the Consultant has been asked to assist TANESCO in the determination of the COS, this report has set out to do so as a matter quite distinct from providing supporting material for a tariff application. An alternative scenario to the base case has been developed which is outlined in Section 6.

<sup>6</sup> The average tariff required does not equal the sum of all expense sub-categories as TANESCO also receives revenue from other sources (Government contributions for IPTL capacity charges and non-electricity customer contributions for connections)

## 6 Alternatives to Cost of Service (Base Case)

As a 2011 tariff that recovers TANESCO's full COS would likely cause substantial 'rate shock', an alternative COS strategy has been developed which incorporates changes to two subcategories Repairs & Maintenance and Depreciation.

Under this scenario, it is also proposed that the three expense sub-categories are used to 'smooth' the tariff so that consumers are not subjected to such a dramatic initial increase in the tariff.

It is worthy of note that whilst 'full cost recovery' is not being delivered, no cash shortfall will result. Expenditure on the R&M would be limited to match reduced revenues and, depreciation is not a cash-expense as is further outlined in Section 6.3 below.

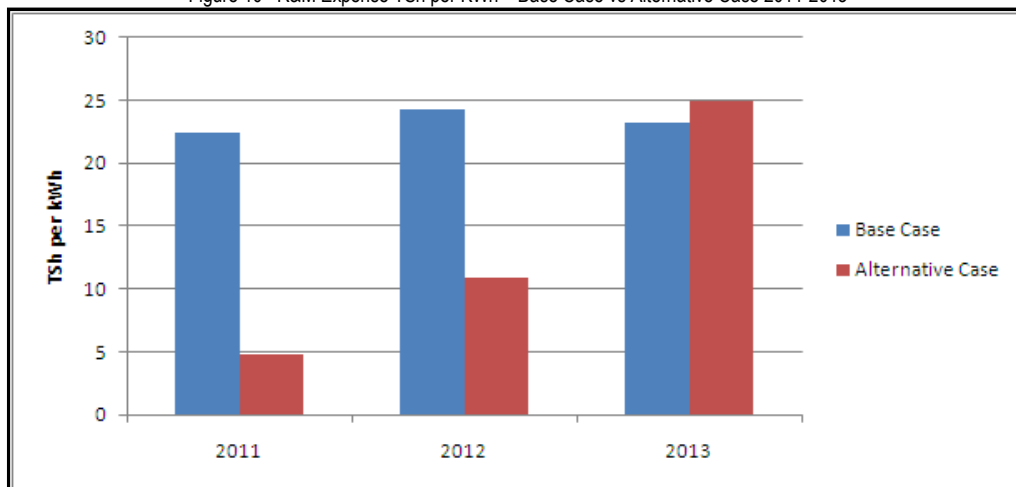
### 6.1 R&M

As stated in Section 5.3.2 TANESCO's expenditure on R&M has averaged 2.8% from 2005-2008, well below the Industry Best Practice figure of 12%. However, EWURA has stated concerns that TANESCO would be unable to mobilize the resources necessary to prudently invest this level of expenditure if granted immediately. It is therefore proposed that TANESCO is gradually granted a greater proportion of its revenues for R&M expenditure over a four year period.

It is proposed that TANESCO is permitted to recover 3% of revenues for R&M in 2011, 6% of revenues in 2011 and 12% of revenues in 2012. This would reduce the R&M component of the tariff to 4.8 TSh per kWh in 2011, and 10.9 and 24.9 TSh per kWh in 2012 and 2013 respectively.

The impact of this would be a decrease of the tariff by 18.1 TSh per kWh in 2011 and 13.5 TSh per kWh in 2012<sup>7</sup>.

Figure 10– R&M Expense TSh per kWh – Base Case vs Alternative Case 2011-2013



<sup>7</sup> Note the decrease of the tariff is greater than the reduction of the R&M component of tariff as this decrease also has flow-on-effects to Provision for Doubtful Debts (which itself is a percentage of total revenue, thereby if R&M decreases, total revenue decreases thus decreasing the PDD requirement)

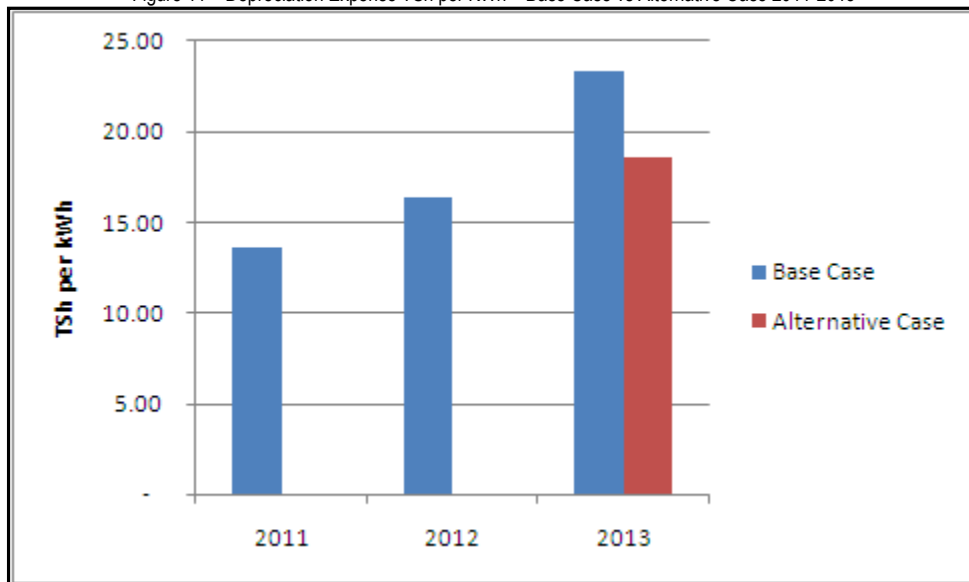
## 6.2 Depreciation

Ideally TANESCO's 2011 tariff would be sufficient to recover full depreciation to enable TANESCO to replace its current asset base when it is retired. The reality is that the creation of a reserve account for this purpose is a second order priority when the prospect of large tariff increases (as outlined in Section 5.4) are taken into account. On this basis it is proposed that TANESCO does not aim to recover its full depreciation COS in the 2011-2014 period to lessen the 'tariff shock' burden in its customers.

It is proposed that TANESCO does not recover any funds for depreciation in 2011, this would remove the 13.6 TSh/kWh commitment and would lower the tariff by a total of 16.2 TSh/kWh when reductions in R&M and Provision for Doubtful Debts are considered. The same is recommended for 2012.

It is proposed that in 2013 TANESCO is permitted to recover 82% of the full depreciation expense (rising to 100% in 2014).

Figure 11 – Depreciation Expense TSh per kWh – Base Case vs Alternative Case 2011-2013



## 6.3 Return on Investment

It is proposed that the 2011-2013 tariffs are set in a manner that does not require a dividend to be paid to TANESCO's sole shareholder, the GoT. If this is not possible higher tariffs will be necessary and the degree of 'rate shock' will also increase. It is proposed that returns to the shareholder are reassessed for 2015 once tariffs have increased closer to a full COS situation.

If EWURA agree to such a proposal, the 2011 would decrease by 4.1 TSh per kWh in 2011 and 3.6 TSh per kWh in 2012.

## 6.4 Impact of Alternative Scenario

If these three adjustments are put into place, this strategy will result in a 2011 tariff of 159.9 TSh per kWh as opposed to 197.3 TSh per kWh in the Base Case Scenario, a 19.0% reduction. The tariff would only need to increase by 34.6% in 2011 as opposed to 66.1% under the Base Case Scenario.

The 2012 average tariff would decrease from 226.2 TSh per kWh under the Base Case Scenario to 181.9 TSh per kWh, an 19.6% decrease. The 2013 average tariff would decrease from 223.3 TSh per kWh under the Base Case Scenario to 207.2 TSh per kWh, an 7.2% decrease.

Figure 12 – Average Tariff Required : TSh per kWh – Base Case vs Alternative Case 2011-2013

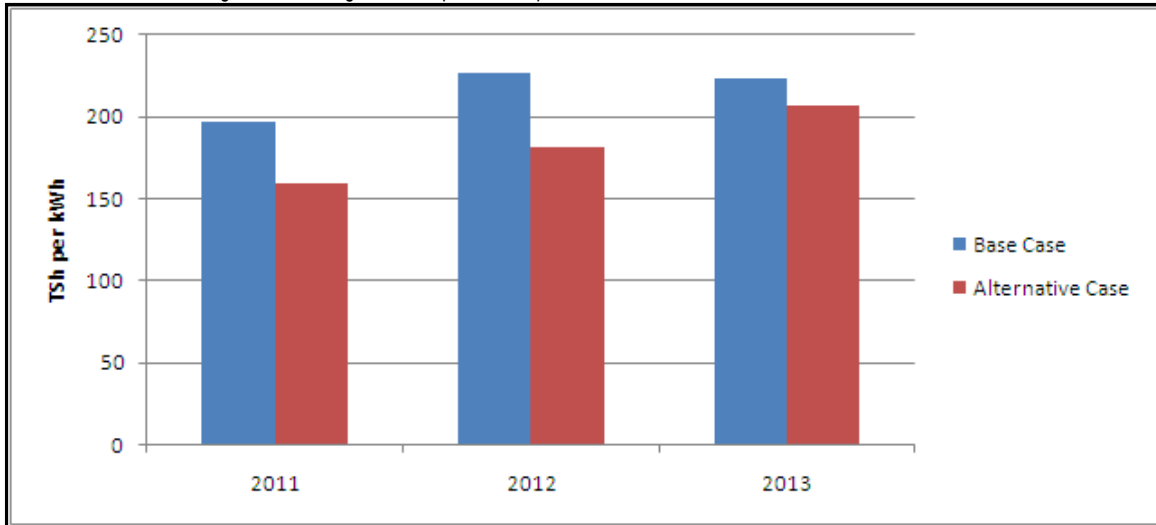
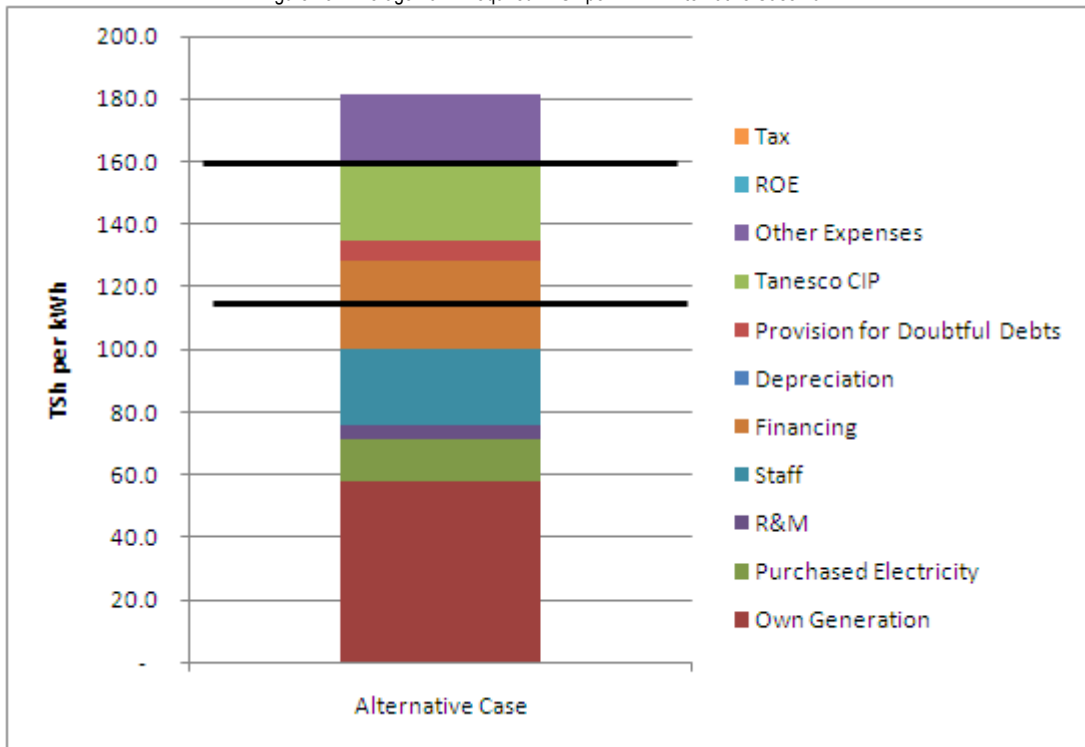


Figure 13– Average Tariff Required : TSh per kWh –Alternative Case 2011



## 7 Allocation of Cost across Strategic Business Unit (SBU)

### 7.1 Introduction

EWURA has requested that TANESCO's cost be allocated for each cost category across the three strategic business units of generation, transmission and distribution. These costs can be assigned on either a *direct allocation, common allocation or a hybrid allocation*. Each of these treatments is discussed below. It is important to note that these results provide an indicative guide only for allocation across the three SBUs. If TANESCO was to be separated into individual operational units a full study would be required to more accurately allocate tariffs to each unit.

#### 7.1.1 Direct Allocation

A direct allocation methodology is employed when the cost category is clearly and completely attributable to one SBU. Examples of these include 'Own Generation' (generation) and 'Provision for Doubtful Debts' (distribution).

#### 7.1.2 Common Allocation

Common allocation of costs occurs when an expense sub-category is attributable to more than one cost category. An example of this is financing costs where the loans drawn down have been used to purchase assets across one or more of the SBUs.

In these instances a methodology needs to be devised to equitably allocate the gross expense across the associated SBUs. Methodologies need to identify the cost drivers of the expense sub-category and use these as a basis for allocating costs. In the above example of financing costs, the value of assets purchased for each SBU would provide an accurate proxy for allocating the interest and associated expenses.

#### 7.1.3 Hybrid Allocation

Some expenses might require a combination of direct and common allocations to provide a more accurate allocation across the SBUs. Staff costs are an example of this with some salaries/wages being easily assigned to a business unit (i.e Generation Engineers salaries to the generation SBU) whereas some salaries/wages are of a common nature (i.e. that of the CEO). Other types of head office allocation would also be most appropriately categorised using a hybrid approach.

### 7.2 Methodology

This section describes each major TANESCO expense category and how these are allocated between each subsystem.

#### 7.2.1 Own Generation

Expenses associated with Own Generation are 100% allocated to the generation SBU.

#### 7.2.2 Purchased Electricity

Expenses associated with Purchased Generation are 100% allocated to the generation SBU.

### **7.2.3 R&M**

A common allocation methodology is applied to the Repairs and Maintenance expense sub-category. Historical percentages from previous years (where the actual expenditure on each SBU is known) is one option for allocating future years expenses projected under the COS. However, this approach does not take into account proportional adjustments in future expenditure across asset classes. For example, distribution R&M may have accounted for 40% of all R&M in the past but applying this percentage to future allocations would not take into consideration a large investment in transmission (which itself would require R&M). This is a pertinent example give TANESCO's planned transmission backbone.

A more prudent strategy is to use the current asset base plus forecast CIP expenditure (a known/relatively accurate projection) to assign the R&M expense amongst generation, transmission & distribution.

### **7.2.4 Staff**

As outlined in Section 7.1.3, staff expenses require a hybrid allocation. For the base year allocation, staff costs that can be directly assigned to a SBU should be as an initial step. Staff expenses that cannot be readily attributed should be assigned on a pro-rata basis using direct staff costs as a proxy.

For future years, each SBU shall be deemed to be allocated a proportion of the forecast total Staff expense in equal measure to the proportion of the SBU closing book value in the asset register of that year. In recognition of TANESCO's generation and transmission assets being relatively high value (and thus potentially distorting the staff expense projection) a correction factor has been applied. In this case 20% of generation and transmission staff expenses allocated to the distribution SBU to take its relatively staff-intensive nature into account.

### **7.2.5 Financing**

As outlined in Section 7.1.2, financing costs are an example of common allocation. The asset base and each year's additional capital investment for each SBU is used as a proxy to determine the financing cost for each SBU.

### **7.2.6 Depreciation**

Depreciation expenses can be accurately allocated across each SBU by considering actual capital expenditure projections and the associated economic lives of each asset class.

### **7.2.7 Provision for Doubtful Debts**

As provision for doubtful debts concerns non-payment of bills by end-users, this expense sub-category is allocated 100% to the distribution SBU.

### **7.2.8 TANESCO CIP**

TANESCO internally funded CIP is an example of hybrid allocation. First, asset purchases that are assigned to each SBU can be allocated accordingly. Second, asset purchases that do not belong to a specific SBU (shared motor vehicles/office accommodation etc) are allocated across generation/transmission/distribution according to the percentages of directly allocatable assets above.

### **7.2.9 Other Expenses**

As 'other expenses' encompass such a broad range of sub-categories (transport & safari, 'other administration expenses' and 'other operating expenses') a trade-off must be made between a complex methodology and an arbitrary one. On this basis, 'other expenses' will be allocated across each SBU on a pro-rata basis according to the levels determined by a weighted average of all other expense sub-categories.

### 7.2.10 Return on Equity

There is no basis for ROE to be apportioned differently between each SBU. On this basis ROE has been pro rated across generation, transmission and distribution in line with a weighted average of each of the previous nine categories.

### 7.2.11 Tax

As with ROE, there is no basis for tax to be apportioned differently between each SBU. As with ROE, tax has been pro rated across generation, transmission and distribution in line with a weighted average of each of the previous nine categories.

## 7.3 SBU Allocation

Base on the methodology above, the proportionate allocation for each expense sub-category across the three SBUs is illustrated in Tables 28-30 for each of the years 2011, 2012 and 2013.

Table 27 – Strategic Business Unit Apportioning Percentages 2011

	2011		
	Gen	Trans	Dist
Own Generation	100%	0%	0%
Purchased Electricity	100%	0%	0%
R&M	30%	32%	38%
Staff	24%	26%	50%
Financing	30%	32%	38%
Depreciation	33%	23%	43%
Provision for Doubtful Debts	0%	0%	100%
TanESCO CIP	21%	42%	36%
Other Expenses	42%	19%	38%
ROE	56%	17%	27%
Tax	56%	17%	27%

Table 28 – Strategic Business Unit Apportioning Percentages 2012

	2012		
	Gen	Trans	Dist
Own Generation	100%	0%	0%
Purchased Electricity	100%	0%	0%
R&M	28%	39%	32%
Staff	23%	32%	46%
Financing	28%	39%	32%
Depreciation	32%	28%	40%
Provision for Doubtful Debts	0%	0%	100%
TanESCO CIP	25%	54%	20%
Other Expenses	42%	24%	34%
ROE	61%	19%	21%
Tax	61%	19%	21%

Table 29 – Strategic Business Unit Apportioning Percentages 2013

	2013		
	Gen	Trans	Dist
Own Generation	100%	0%	0%
Purchased Electricity	100%	0%	0%
R&M	29%	43%	28%
Staff	23%	35%	42%
Financing	29%	43%	28%
Depreciation	32%	35%	33%
Provision for Doubtful Debts	0%	0%	100%
TanESCO CIP	30%	55%	14%
Other Expenses	43%	26%	31%
ROE	57%	22%	21%
Tax	57%	22%	21%

When combined with the average required tariffs calculated in Chapter 6, the following TSh/kWh allocations are derived. By summing the total for each year an SBU total can be established leading to a percentage total for 'All Revenues' for the SBU when compared to the other categories.

As TANESCO also receives revenue from sources other than tariffs, these need to be taken into consideration. First, Grants & Subsidies represent the GOT contribution to IPTL capacity charges, this is deducted from the generation SBU. Second, "Non Electricity Sales Related Customer Payments" relate to consumer contributions to their connection costs, this is deducted from the distribution SBU. Finally, "other income" is allocated across all three SBUs on a pro-rata basis.

After this treatment, generation costs equate to 59% of the total COS in 2011, increasing very slightly to 63% in 2012 and decreasing to 60% in 2013. Across the 2011-2013 period transmission costs increase gradually from 21% in 2011 to 23% in 2012 and 25% in 2013. The distribution SBU decreases from 20% of the total COS in 2011 to 14% in 2012 and 2013.

Table 30 – Strategic Business Unit COS per Expense Sub-Category 2011

	2011		
	Gen	Trans	Dist
Own Generation	57.99	-	-
Purchased Electricity	13.84	-	-
R&M	1.44	1.54	1.84
Staff	5.75	6.16	12.08
Financing	8.43	9.03	10.81
Depreciation	-	-	-
Provision for Doubtful Debts	-	-	6.42
TanESCO CIP	5.49	10.78	9.26
Other Expenses	8.83	4.04	8.00
ROE	-	-	-
Tax	-	-	-
Total for All Revenue	101.77	31.56	48.41
Percentage for All Revenue	56%	17%	27%

Table 31 – Strategic Business Unit COS per Expense Sub-Category 2012

	2012		
	Gen	Trans	Dist
Own Generation	78.76	-	-
Purchased Electricity	13.46	-	-
R&M	3.10	4.30	3.55
Staff	5.29	7.34	10.64
Financing	7.07	9.80	8.09
Depreciation	-	-	-
Provision for Doubtful Debts	-	-	7.30
TanESCO CIP	5.38	11.51	4.34
Other Expenses	9.54	5.46	7.68
ROE	-	-	-
Tax	-	-	-
Total for All Revenue	122.60	38.41	41.60
Percentage for All Revenue	61%	19%	21%

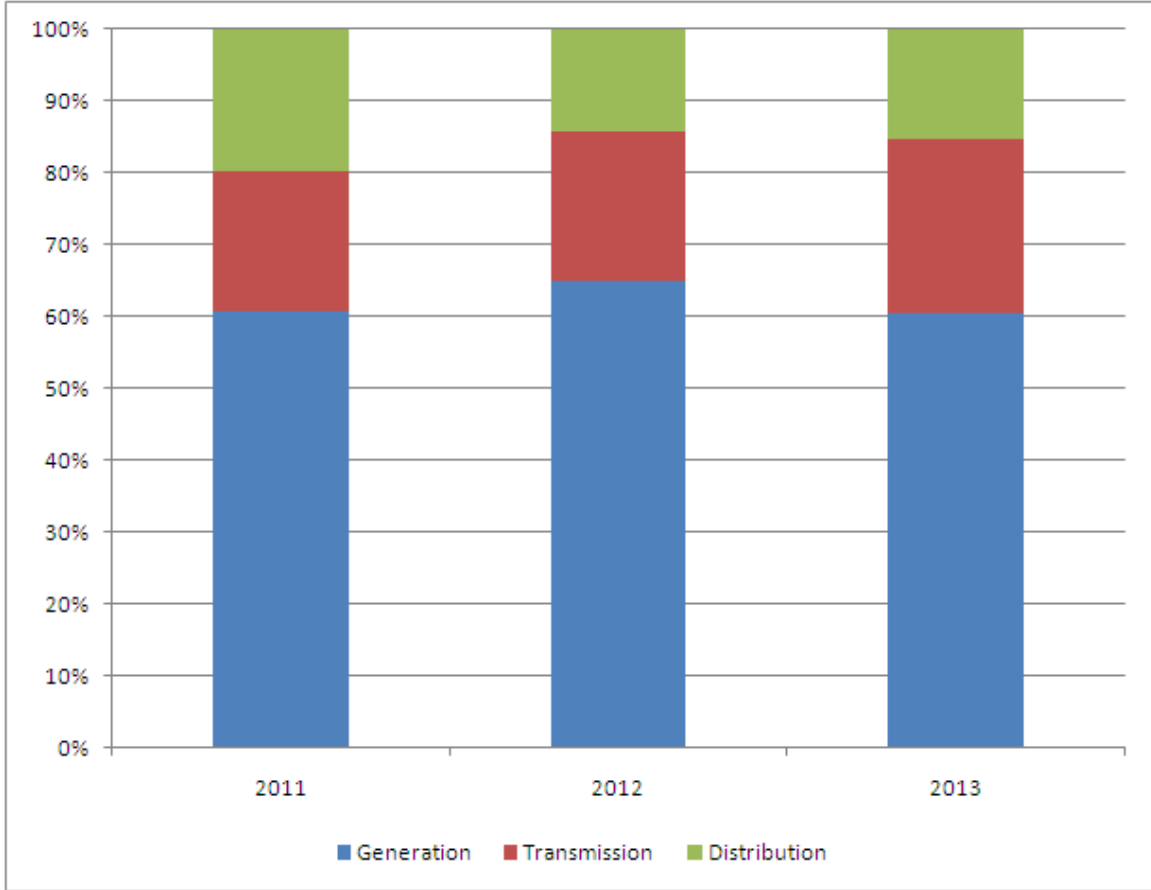
Table 32 – Strategic Business Unit COS per Expense Sub-Category 2013

	2013		
	Gen	Trans	Dist
Own Generation	64.22	-	-
Purchased Electricity	21.09	-	-
R&M	7.14	10.75	6.99
Staff	5.20	7.84	9.55
Financing	6.37	9.60	6.24
Depreciation	6.11	6.69	6.35
Provision for Doubtful Debts	-	-	7.10
TanESCO CIP	4.05	7.39	1.88
Other Expenses	10.56	6.52	7.57
ROE	-	-	-
Tax	4.07	1.59	1.49
Total for All Revenue	128.82	50.38	47.17
Percentage for All Revenue	57%	22%	21%

Table 33 – Strategic Business Unit COS Summary 2011-2013

Tariff	2011	2012	2013
Generation	60.5%	64.9%	60.4%
Transmission	19.6%	21.0%	24.2%
Distribution	19.9%	14.2%	15.4%

Figure 14– Proportional SBU 2011-2013



## 8 Key Performance Indicators (KPIs)

### 8.1 TANESCO's Balanced Score Card

In TANESCO's Corporate Business Plan a number of KPIs are stated. Those that are foundational to the COSS have been incorporated into Table 34 below and are marked with an \*.

### 8.2 COSS KPIs

In addition, KPIs relating to staff productivity, financial and operational performance have been added. Annual targets for all KPIs from 2010/2011 to 2014 have also been added to each KPI.

Objective	KPI	2010	2011	2012	2013	2014
Increase access to electricity*	New customer connections	100,000	100,000	100,000	100,000	100,000
Increase reliability – SAIFI (220/132/66kV)*	Trips/Feeder/Month	<2	<2	<2	<2	<2
Increase reliability –SAIFI (33/11kV)*	Trips/Feeder/Month	<2	<2	<2	<2	<2
Increase reliability – SAIDI (33/11kV)*	Minutes/Feeder/Month	<2	<2	<2	<2	<2
Increase reliability – CAIDI in DSM, ARSH, KLMJR & MWZA (220/132/66kV)*	Minutes	<1	<1	<1	<1	<1
Increase reliability – Voltage Variation (220/132/66kV)*	%	± 10%	± 10%	± 10%	± 10%	± 10%
Increase reliability – Voltage Variation in DSM, ARSH, KLMJR & MWZA (33/11kV)*	%	± 5%	± 5%	± 5%	± 5%	± 5%
Decrease Transmission Losses*	% of energy sent out lost	5.3%	5.2%	5.1%	5.0%	4.4%
Decrease Distribution Losses*	% of energy sent into MV grid lost	19.7%	18.5%	17.2%	15.9%	14.6%
Optimal Collections Rate*	% of billed	96%	96%	96%	96.6%	96.6%
Increase Staff Productivity	Customers per employee	157	172	188	203	219
Improve Financial Performance	% of full COS recovery	n/a	83%	82%	93%	94%
Improve Financial Performance	% of full depreciation recovered	n/a	0%	0%	82%	100%
Improve Financial Performance	Minimum DSCR	n/a	1.15	1.15	1.15	1.15
Improve Financial Performance	Eliminate Financial Losses	n/a	0%	0%	0%	0%
Improve Operational Performance	% of international R&M standard recovered	n/a	25%	50%	100%	100%

#### 8.2.1 Transmission Losses

The TANESCO system experiences transmission losses greater than the standard industry practice of 2.9%. As a consequence, additional generation is required, a cost that is reflected in the relatively high energy cost.

Addressing transmission losses will result in, all things being equal, lower generation requirements which will lower the generation cost as well as reducing the likelihood of the occurrence of load-shedding.

It is recommended that TANESCO endeavours to achieve transmission losses of 5.2% in 2011. With 2011 sales forecast at 4,913 GWh and assuming distribution losses of 19.7%, TANESCO's transmission losses under the status quo scenario (5.3%) are projected to equate to 269 GWh compared to 275 GWh at 5.2% a reduction of 6 GWh. At an average generation cost of 71.3 TSh/kWh this would equate to savings of TSh 427.8m.

In order to achieve this KPI significant expenditure will be necessary through both the CPI and the R&M budget. If the 2011 tariff is not sufficient to cover both of these items then the attainment of this KPI is unlikely to occur. Indeed, it is likely that transmission losses will *increase* due to asset depreciation if adequate funding through the CPI and R&M budget is not delivered through the tariff.

### **8.2.2 Distribution Losses**

Distribution losses of 19.7% occur in the TANESCO system, greater than the standard industry practice of 11.4%. As with transmission losses, additional generation is required as a result and this also is reflected in TANESCO's relatively high energy cost. If TANESCO can reduce its distribution losses this will place downward pressure on the tariff and reduce demand on the generation system, lowering the likelihood of load-shedding.

It is proposed that TANESCO continues towards its target of distribution losses of 11.4% of energy fed into the MV. For this to occur it is TANESCO would need to achieve distribution losses of 18.5% in 2011. With 2011 sales forecast at 4,913 GWh TANESCO's distribution losses under the status quo scenario (19.7%) are projected to equate to 1,275.1 GWh compared to 1,174.1 GWh at 19.7% a reduction of 101 GWh. At an average generation cost of 71.3 TSh/kWh this would equate to savings of TSh 7,199m.

In order to achieve this KPI significant expenditure will be necessary through both the CPI and the R&M budget. If the 2011 tariff is not sufficient to cover both of these items then the attainment of this KPI is unlikely to occur. As with transmission losses, there is the real possibility that distribution losses could *increase* if the 2011 tariff is not adequate to fund the CPI and R&M necessary.

### **8.2.3 Customer Connections**

As in 2007-2010 TANESCO is aiming for an additional 100,000 customer connections in 2011. Although TANESCO did not achieve its targets in previous years, additional expenditure/capacity and outsourcing through the CIP will increase the likelihood of this KPI being met.

### **8.2.4 Customers per Employee**

Based on 2008 data, TANESCO only had 130 customers per employee, well below its target of 250. As can be seen in Table 28, the number of TANESCO customers has risen steadily from 2001 to 2008 representing an almost 60% increase over this seven year period. It is encouraging to see that the number of staff employed to serve these customers has decreased over this time, a reduction of over 1,000 employees or 15.5% of the 2001 workforce. These two factors have had a profound impact on the customer to staff ratio seeing it almost double from 69 in 2001 to 130 in 2008.

Table 28– TANESCO Customer and Staff Numbers 2001-2008

	2001	2002	2003	2004	2005	2006	2007	2008
Customers	450,947	485,995	513,703	550,863	585,773	635,310	667,490	718,853
Staff	6,540	6,433	4,996	4,857	4,783	4,665	4,695	5,527
Customer:Staff Ratio	68.95	75.55	102.82	113.42	122.47	136.19	142.17	130.06

Given that it is projected that an additional 100,000 customers will be added each year the primary focus of TANESCO should be the careful management of staff increases. The net total of TANESCO employees could only increase from the current (2009) 5,550 to 5,935 in 2016 if this target was to be achieved. It is recognised that TANESCO has ambitious expansion plans and that under normal circumstances this would require many additional staff. However, TANESCO management must endeavour to find ways to operate more efficiently in order to achieve its goals

Table 29– TANESCO Customer and Staff Numbers 2009-2016

	2008	2009	2010	2011	2012	2013	2014	2015	2016
Customers	718,853	783,873	883,873	983,873	1,083,873	1,183,873	1,283,873	1,383,873	1,483,873
Staff	5,527	5,550	5,638	5,710	5,770	5,821	5,864	5,902	5,935
Customer:Staff Ratio	130.06	141.24	156.78	172	188	203	219	234	250

### 8.2.5 Repairs and Maintenance

TANESCO's expenditure on R&M has been well below industry standard levels of 12% of revenues with significant impact on transmission and distribution losses. The 2001 -2008 expenditure compared to total revenues is outlined in Table 30 below.

While an immediate rise from current levels to benchmark levels could be considered beneficial to TANESCO and Tanzania as a whole, it is unlikely that the utility has the capacity to spend such funds in an advantageous way. Inline with the Alternative Scenario proposed in Section 6, KPIs have been devised to ensure that TANESCO spends an adequate but non-excessive level on R&M.

### 8.2.6 Financial Performance – Breakeven

It is imperative that TANESCO's revenues are raised to meet adequate COS levels as well as reductions in some areas of expenditure. When budgeted expenditure is matched to COS revenues TANESCO's financial health will improve. This will protect both the GOT's equity share in the utility and the future performance of TANESCO.

### 8.2.7 Financial Performance - DSCR

As a condition of the Syndicated Loan it is essential that TANESCO's DSCR reaches the 1.15 threshold. Failing to do so could result in the government guarantee being called into effect. This would increase TANESCO's risk profile to future lenders, with the potential for interest rates and loan tenors to become less favourable. With almost TSh 3,000 billion of borrowing proposed over the 2011-2013 period it is essential that EWURA sets tariffs adequate to meet TANESCO's COS and that the utility also ensures its expenditure is matched to its COS.

It is important to note that if a multi year tariff is approved by EWURA, it is not recommended that KPIs are used as instruments to determine if the next year's tariff increase is granted. If for whatever reason TANESCO was to fail to achieve in one of its KPIs, failing to allow the following year's tariff increase as a response would be illogical. If for example TANESCO failed to achieve its distribution loss target of 17.2% in 2012, and the required 13.9% was thus downgraded to 12.5% TANESCO would then have *less* funds to 'catch up' on its unachieved losses and those required in the 2013.

What would be more logical, and more effective, would be to tie the achievement of KPI targets to remuneration or bonuses of senior management staff to ensure they see that each respective department undertakes all practicable steps to achieve their own KPIs.

## Attachments

**Attachment 1 – Capital Investment Program**

**Attachment 2 - Financial Model Summary Sheet – Base Case**

**Attachment 3 - Financial Model Summary Sheet – Alternative Case**

## Attachment 1 – Capital Investment Program

Name of Project	Project Group	Asset Class/ OPEX Line	Funding	Amount (Tshs)	2011 TSH m	2012 TSH m	2013 TSH m	2014 TSH m
Tanga Distribution Network Expansion - MCC	MCC Projects	Distribution Systems	MCC Grant	11,730,000,000.00	4,692.00	4,692.00	-	-
Tanga Substations - MCC	MCC Projects	Distribution Systems	MCC Grant	8,290,630,868.00	3,316.25	3,316.25	-	-
Morogoro Distribution Network Expansion - MCC	MCC Projects	Distribution Systems	MCC Grant	20,650,000,000.00	8,260.00	8,260.00	-	-
Morogoro Substations - MCC	MCC Projects	Distribution Systems	MCC Grant	5,041,520,228.00	2,016.61	2,016.61	-	-
Iringa Distribution Network Expansion - MCC	MCC Projects	Distribution Systems	MCC Grant	15,335,000,000.00	6,134.00	6,134.00	-	-
Iringa Substations - MCC	MCC Projects	Distribution Systems	MCC Grant	2,326,336,648.00	930.53	930.53	-	-
Dodoma Distribution Network Expansion - MCC	MCC Projects	Distribution Systems	MCC Grant	20,335,000,000.00	8,134.00	8,134.00	-	-
Dodoma Substations - MCC	MCC Projects	Distribution Systems	MCC Grant	4,298,407,632.00	1,719.36	1,719.36	-	-
Mbeya Distribution Network Expansion - MCC	MCC Projects	Distribution Systems	MCC Grant	4,810,000,000.00	1,924.00	1,924.00	-	-
Mbeya Substations - MCC	MCC Projects	Distribution Systems	MCC Grant	3,163,075,000.00	1,265.23	1,265.23	-	-
Mwanza Distribution Network Expansion - MCC	MCC Projects	Distribution Systems	MCC Grant	28,920,000,000.00	11,568.00	11,568.00	-	-
Zanzibar Cable Interconnector - MCC	MCC Projects	Transmission Systems	MCC Grant	83,070,000,000.00	33,228.00	33,228.00	-	-
132kV Ubungo - Mtoni Interconnector - MCC	MCC Projects	Transmission Systems	MCC Grant	11,780,600,000.00	4,712.24	4,712.24	-	-
Five(5) Substations in Dar es Salaam	TEDAP Projects	Distribution Systems	World Bank Funds - TEDAP	15,172,300,000.00	3,034.46	-	-	-
Transmission Lines in Dar es Salaam	TEDAP Projects	Distribution Systems	World Bank Funds - TEDAP	7,573,800,000.00	1,514.76	-	-	-
KIA & Arusha 132/33kV S/Station (Ex-NDF)	TEDAP Projects	Transmission Systems	World Bank Funds - TEDAP	7,017,400,000.00	1,403.48	-	-	-
New substations in Dar es Salaam	TEDAP Projects	Distribution Systems	World Bank Funds - TEDAP	10,504,000,000.00	2,100.80	-	-	-
Rehabilitation of 33/11kv substations in Dar es Salaam	TEDAP Projects	Transmission Systems	World Bank Funds - TEDAP	3,172,000,000.00	634.40	-	-	-
New Substations in Arusha and Kilimanjaro	TEDAP Projects	Distribution Systems	World Bank Funds - TEDAP	11,856,000,000.00	2,371.20	-	-	-
33 and 11kV OHL in Dar, Arusha and Kilimanjaro	TEDAP Projects	Distribution Systems	World Bank Funds - TEDAP	8,797,652,500.00	1,759.53	-	-	-
Low loss high voltage distr. System in designated area	TEDAP Projects	Distribution Systems	World Bank Funds - TEDAP	6,500,000,000.00	1,300.00	-	-	-
Consultancies on LL HVDS - planning, design, bid documentation	TEDAP Projects	Distribution Systems	World Bank Funds - TEDAP	390,000,000.00	78.00	58.50	39.00	-
Connection of 25,000 new customers (supply and install,	TEDAP Projects	Distribution Systems	World Bank Funds - TEDAP	13,000,000,000.00	2,600.00	1,950.00	1,300.00	-
Replacement of 60,000 credit meters by prepaid meters (supply	TEDAP Projects	Distribution Systems	World Bank Funds - TEDAP	3,900,000,000.00	780.00	585.00	390.00	-
Centralized Call Center for Dar es Salaam	TEDAP Projects	Distribution Systems	World Bank Funds - TEDAP	260,000,000.00	52.00	39.00	26.00	-
High Value Customer Cell - HV, LV Customers, Other Large	TEDAP Projects	Distribution Systems	World Bank Funds - TEDAP	130,000,000.00	26.00	19.50	13.00	-
Installation of Solid State Meters, with Remote Metering, for 1800	TEDAP Projects	Distribution Systems	World Bank Funds - TEDAP	2,860,000,000.00	572.00	429.00	286.00	-
Incorporation of a Commercial Management System (CMS) to	TEDAP Projects	Distribution Systems	World Bank Funds - TEDAP	1,625,000,000.00	325.00	-	-	-
Consultancy services for incorporation of CMS (including	TEDAP Projects	Distribution Systems	World Bank Funds - TEDAP	130,000,000.00	26.00	19.50	13.00	-
Incorporation of a Technical Service Management System	TEDAP Projects	Distribution Systems	World Bank Funds - TEDAP	910,000,000.00	182.00	136.50	91.00	-
Consultancy services for incorporation of TSMS (including	TEDAP Projects	Distribution Systems	World Bank Funds - TEDAP	130,000,000.00	26.00	19.50	13.00	-
Incorporation of a Resource Management System (RMS) to	TEDAP Projects	Distribution Systems	World Bank Funds - TEDAP	780,000,000.00	156.00	-	-	-
Consultancy services for incorporation of RMS (including	TEDAP Projects	Distribution Systems	World Bank Funds - TEDAP	130,000,000.00	26.00	19.50	13.00	-
Supervision of TEDAP Online Investment & Project Management	TEDAP Projects	Distribution Systems	World Bank Funds - TEDAP	6,500,000,000.00	1,300.00	975.00	650.00	-
Capacity Building (World Bank)	TEDAP Projects	Distribution Systems	World Bank Funds - TEDAP	700,000,000.00	140.00	-	-	-
Succession Plan Consultancy	TEDAP Projects	Distribution Systems	World Bank Funds - TEDAP	110,000,000.00	22.00	22.00	22.00	-
Learner Management Systems	TEDAP Projects	Distribution Systems	World Bank Funds - TEDAP	130,000,000.00	26.00	-	-	-
TANESCO FOE Partnership	TEDAP Projects	Distribution Systems	World Bank Funds - TEDAP	20,000,000.00	4.00	4.00	4.00	-
Energy Rationalization and Demand Response - DSM	IDA Projects	Distribution Systems	IDA - Songsongo - Grant	260,000,000.00	52.00	39.00	26.00	-
National Dispatch Load Center - UBUNGO (G & T)	IDA Projects	Distribution Systems	IDA - Songsongo - Grant	1,040,000,000.00	208.00	156.00	104.00	-
Overall Systems Operations Study - Reactive Power	IDA Projects	Distribution Systems	IDA - Songsongo - Grant	715,000,000.00	143.00	107.25	71.50	-
Distribution SCADA for Dar es Salaam ( till Bid Documents)	IDA Projects	Distribution Systems	IDA - Songsongo - Grant	910,000,000.00	182.00	136.50	91.00	-
Training Needs Assessment for TANESCO	IDA Projects	Distribution Systems	IDA - Songsongo - Grant	260,000,000.00	52.00	39.00	26.00	-

## Attachment 1 – Capital Investment Program (continued)

Implementation of Capacity Building	IDA Projects	Distribution Systems	IDA - Songsongo - Grant	650,000,000.00	130.00	97.50	65.00	-
IPTL Conversion to Gas at Tegeta	CIP Projects	Thermal Generation	IDA - Songsongo - Grant	25,473,589,742.56	5,094.72	5,094.72	-	-
IPTL Conversion to Gas Consultancy	CIP Projects	Thermal Generation	IDA - Songsongo - Grant	2,361,134,791.88	472.23	-	-	-
IPP Strategy Study (Jointly With EWURA)	CIP Projects	Thermal Generation	IDA - Songsongo - Grant	1,375,000,000.00	275.00	-	-	-
Demand Side Management Study	CIP Projects	Distribution Systems	IDA - Songsongo - Grant	125,125,000.00	25.03	-	-	-
New Power system masterplan study	CIP Projects	Transmission Systems	IDA - Songsongo - Grant	1,810,000,000.00	362.00	362.00	-	-
Wayleave Village Electrification Scheme	CIP Projects	Distribution Systems	IDA - Songsongo - Grant	19,080,000,000.00	3,816.00	-	-	-
400kV Iringa - Shinyanga - Double circuit	CIP Projects	Transmission Systems	World Bank IDA - 100% loan	934,545,500,000.00	233,636.38	327,090.93	280,363.65	93,454.55
Electricity V Project	CIP Projects	Distribution Systems	AfDB	64,000,000,000.00	19,200.00	25,600.00	19,200.00	-
Makambako Songea 132kV T/Line	CIP Projects	Transmission Systems	SIDA	91,427,104,722.79	36,570.84	54,856.26	-	-
North-West Grid Extension Study	CIP Projects	Transmission Systems	SIDA	570,000,000.00	114.00	171.00	285.00	-
Simanjira/Ukerewe Power supply	CIP Projects	Distribution Systems	SIDA	9,000,000,000.00	1,800.00	-	-	-
Urambo & Serengeti districts Power supply	CIP Projects	Distribution Systems	SIDA	10,000,000,000.00	2,000.00	-	-	-
Ubungu - Oysterbay 132kV Transmission 8 km line	CIP Projects	Transmission Systems	JICA	7,442,416,085.21	1,488.48	-	-	-
JICA Training	CIP Projects	Distribution Systems	JICA	5,000,000,000.00	1,000.00	1,000.00	1,000.00	-
Kiyungi Substation Extension & Kiyungi - Njiro 132kV, T/line	CIP Projects	Transmission Systems	EXIM Bank of KOREA	33,750,000,000.00	6,750.00	8,437.50	6,750.00	-
Upgrading and construction of 2x30MVA, 132/33kV for five (5)	CIP Projects	Transmission Systems	Government of Finland	64,580,000,000.00	12,912.00	25,824.00	9,684.00	-
Rehabilitation & Expans. of 33/11kV S/Stations in DSM, Coast &	CIP Projects	Distribution Systems	Government of Finland	95,434,000,000.00	19,086.80	23,858.50	19,086.80	9,543.40
Improvement of Power supply reliability & replacement of meters	CIP Projects	Distribution Systems	DBSA	158,353,350,000.00	31,670.67	47,506.01	39,588.34	-
LKHP Environmental Management	CIP Projects	Transmission Systems	TANESCO funds	500,000,000.00	100.00	81.49	54.33	-
Establishment of Live line centre and tools and equipment	CIP Projects	Transmission Systems	TANESCO funds	1,000,000,000.00	500.00	217.32	-	-
Upgrade of Kipawa transmission line for 2nd conductor	CIP Projects	Transmission Systems	TANESCO funds	500,000,000.00	200.00	108.66	-	-
Expansion of optical fibre network to cover phase 11	CIP Projects	Transmission Systems	TANESCO funds	5,000,000,000.00	2,500.00	1,629.87	1,086.58	-
Optical Fibre Cable Consultancy Phase II- Project Supervision	CIP Projects	Transmission Systems	TANESCO funds	30,000,000.00	3.00	3.26	1.63	-
Supply, customise and Install Hydro-thermal Scheduling and	CIP Projects	Transmission Systems	TANESCO funds	913,390,080.38	228.35	248.12	-	-
Frequency Load shedding and Islanding Scheme	CIP Projects	Distribution Systems	TANESCO funds	771,747,073.88	192.94	209.64	-	-
Hale Generator rehabilitation	CIP Projects	Hydro Generation	TANESCO funds	3,617,934,400.00	1,808.97	982.80	982.80	-
Transmission line Rehabilitation	CIP Projects	Transmission Systems	TANESCO funds	30,000,000,000.00	3,000.00	3,259.75	-	-
Tools and equipments	CIP Projects	Distribution Systems	TANESCO funds	10,000,000,000.00	2,000.00	-	1,086.58	-
New Electrical workshop at Kindondoni, Dodoma incl. W/shop	CIP Projects	Transmission Systems	TANESCO funds	7,166,588,518.00	1,791.65	1,168.06	778.71	-
Motor vehicles	CIP Projects	Distribution Systems	TANESCO funds	52,000,000,000.00	7,800.00	5,650.23	5,650.23	5,652.40
Installation of Var compensation plants at Arusha, Tanga, Dar es	CIP Projects	Distribution Systems	TANESCO funds	37,500,000,000.00	7,500.00	-	-	-
Replacement of obsolete control protection and switchgear	CIP Projects	Distribution Systems	TANESCO funds	25,000,000,000.00	6,250.00	6,791.14	6,791.14	6,793.75
Service Line Cost within (30 m) for 100,000 Customers	CIP Projects	Distribution Systems	TANESCO funds	55,000,000,000.00	11,000.00	11,952.41	11,952.41	-
Outsourcing for 100,000 Customers (Supply & Install)	CIP Projects	Distribution Systems	TANESCO funds	100,000,000,000.00	20,000.00	21,731.65	21,731.65	-
New Projects for 100,000 Customers (CWO)	CIP Projects	Distribution Systems	TANESCO funds	50,000,000,000.00	10,000.00	10,865.82	10,865.82	-
Procurement and installation of Integrated Security Management	CIP Projects	Distribution Systems	TANESCO funds	2,800,000,000.00	550.00	651.95	597.62	-
Transmission Office Equipment	CIP Projects	Transmission Systems	TANESCO funds	210,000,000.00	42.00	45.64	45.64	-
Competency Based Management	CIP Projects	Distribution Systems	TANESCO funds	100,000,000.00	33.00	-	-	-
Partnership with Uganda National Water and Sewerage	CIP Projects	Distribution Systems	TANESCO funds	200,000,000.00	66.00	-	-	-
Major Rehabilitation for Mtera hydro Power Plant	CIP Projects	Hydro Generation	TANESCO funds	20,250,000,000.00	6,075.00	4,400.66	-	-
Upgrading of Hydro plants (Kidatu and NYM)	CIP Projects	Hydro Generation	TANESCO funds	30,000,000,000.00	9,000.00	9,779.24	3,259.75	-
Replacement of Control System at NPF	CIP Projects	Hydro Generation	TANESCO funds	800,000,000.00	440.00	43.46	-	-
Major Repairs on Kihansi Dam access road	CIP Projects	Hydro Generation	TANESCO funds	500,000,000.00	25.00	-	-	-
Compensation for New Projects - 100,000 customers	CIP Projects	Distribution Systems	TANESCO funds	5,000,000,000.00	2,000.00	2,173.16	1,086.58	-
Integrated ERP System	CIP Projects	Distribution Systems	TANESCO funds	20,250,000,000.00	6,075.00	4,400.66	-	-
CONSULTANCY SERVICES FOR ISMS - For COYSEC	CIP Projects	Consulting	TANESCO funds	200,000,000.00	-	108.66	108.66	-
CONSTRUCTION OF NEW OFFICE - MBEYA REGIONAL	CIP Projects	Land and Buildings	TANESCO funds	850,000,000.00	-	277.08	277.08	369.58
Construction of domestic water treatment plant - For KIDATU	CIP Projects	Land and Buildings	TANESCO funds	500,000,000.00	4,000.00	4,000.00	4,000.00	4,000.00

## Attachment 1 – Capital Investment Program (continued)

Computer and printers for entire company - Laptops, desk tops & MOTOR VEHICLES - SMGA For ALL BUs	CIP Projects	Office Equipment	TANESCO funds	1,000,000,000.00	200.00	325.97	-	-
Somanga housing complex - For Somanga	CIP Projects	Motor Vehicles	TANESCO funds	1,500,000,000.00	2,000.00	3,000.00	4,000.00	4,000.00
Accounting system - ERP For SMGA	CIP Projects	Land and Buildings	TANESCO funds	4,403,561,822.94	1,761.42	2,392.42	-	-
Compensation for Backbone	CIP Projects	Office Equipment	TANESCO funds	6,000,000,000.00	1,000.00	1,000.00	1,000.00	3,000.00
VOLTAGE IMPROVEMENTS TO VARIOUS REGIONS - For	CIP Projects	Distribution Systems	TANESCO funds	24,570,000,000.00	9,828.00	10,678.93	5,339.47	-
Contruction of new District Offices (Mbalizi, Mbozi, Tabata, Distribution substation glavel filling	CIP Projects	Distribution Systems	TANESCO funds	21,331,279,162.81	7,465.95	6,953.46	-	-
Split Unit Air conditioners for H/O and Regions	CIP Projects	Land and Buildings	TANESCO funds	3,900,000,000.00	-	2,118.84	2,118.84	-
Construction of access road towards water pump station	CIP Projects	Distribution Systems	TANESCO funds	500,000,000.00	-	271.65	271.65	-
Construction of tank for garberg collection & disposal for Kidatu	CIP Projects	Office Equipment	TANESCO funds	150,000,000.00	-	81.49	81.49	-
Medical waste Incinerator group A TS10 For Despensary waste	CIP Projects	Land and Buildings	TANESCO funds	150,000,000.00	-	81.49	81.49	-
Purchase of fuel separators for Bihalamulo, Tunduru, Masasi	CIP Projects	Land and Buildings	TANESCO funds	10,000,000.00	-	5.43	5.43	-
Construction of 2 new junior staff houses - Nyumba ya Mungu	CIP Projects	Land and Buildings	TANESCO funds	30,000,000.00	-	16.30	16.30	-
Purchase of safes for various BUs	CIP Projects	Thermal Generation	TANESCO funds	480,000,000.00	-	260.78	260.78	-
Electrification of villages in Kilimanjaro Region	CIP Projects	Hydro Generation	TANESCO funds	120,000,000.00	-	65.19	65.19	-
Electrification of villages in Manyara Region	CIP Projects	Office Equipment	TANESCO funds	150,000,000.00	-	81.49	81.49	-
Electrification of villages in Tanga Region	CIP Projects	Distribution Systems	REA	7,277,270,560.38	4,803.00	-	-	-
Electrification of villages in Coast Region	CIP Projects	Distribution Systems	REA	2,978,327,827.33	1,965.70	-	-	-
Electrification of villages in Morogoro Region	CIP Projects	Distribution Systems	REA	1,604,579,157.32	1,059.02	-	-	-
Electrification of villages in Dodoma Region	CIP Projects	Distribution Systems	REA	7,712,455,661.52	5,090.22	-	-	-
Electrification of villages in Singida Region	CIP Projects	Distribution Systems	REA	11,665,431,387.12	7,699.18	-	-	-
Electrification of villages in Mbeya Region	CIP Projects	Distribution Systems	REA	4,184,196,000.40	2,761.57	-	-	-
Electrification of villages in Rukwa Region	CIP Projects	Distribution Systems	REA	6,561,102,784.74	4,330.33	-	-	-
Electrification of villages in Tabora Region	CIP Projects	Distribution Systems	REA	4,299,939,093.65	2,837.96	-	-	-
Electrification of villages in Kagera Region	CIP Projects	Distribution Systems	REA	4,530,933,471.35	2,990.42	-	-	-
Electrification of villages in Mwanza Region	CIP Projects	Distribution Systems	REA	8,790,131,477.41	5,801.49	-	-	-
Electrification of villages in Mara Region	CIP Projects	Distribution Systems	REA	9,915,544,109.40	6,544.26	-	-	-
Electrification of villages in Shinyanga Region	CIP Projects	Distribution Systems	REA	3,334,833,574.12	2,200.99	-	-	-
Generators two each for Songea, Mpanda, Biharamulo and Ngara	CIP Projects	Distribution Systems	REA	4,446,838,622.73	2,934.91	-	-	-
KINYEREZI 240MW gas fired plant	CIP Projects	Distribution Systems	REA	6,448,953,924.89	4,256.31	-	-	-
Mnazi Bay 300MW Power Generation	CIP Projects	Thermal Generation	Government contribution	57,600,000,000.00	22,147.20	-	-	-
Mwanza Thermal Plant 60MW	CIP Projects	Thermal Generation	Chinese Funding	68,500,000,000.00	-	30,825.00	37,675.00	-
Ubungo Gas Fired Plant 100MW	CIP Projects	Thermal Generation	Chinese Funding	328,800,000,000.00	-	-	147,960.00	180,840.00
Kiwira Coal Fired Plant Phase I 200MW	CIP Projects	Thermal Generation	Government contribution	67,830,000,000.00	40,698.00	27,132.00	-	-
Seventeen new generating sets	CIP Projects	Thermal Generation	Government contribution	108,528,000,000.00	65,116.80	43,411.20	-	-
Rusumo Falls Hydro Plant 21MW	CIP Projects	Thermal Generation	Chinese Funding	274,000,000,000.00	-	164,400.00	109,600.00	-
400kV HVDC From Mtwara to Singida/Arusha	CIP Projects	Thermal Generation	Government contribution	56,000,000,000.00	22,960.00	-	-	-
Morogoro-Chalinze-Hale-Moshi-Arusha 400kV T/Line	CIP Projects	Hydro Generation	Government onlending to Tanesco	51,834,533,333.33	-	5,183.45	18,660.43	17,623.74
Wind Energy Project (extension of project)	CIP Projects	Transmission Systems	Chinese Funding	394,560,000,000.00	-	78,912.00	157,824.00	157,824.00
Mafia wind study	CIP Projects	Transmission Systems	Chinese Funding	411,000,000,000.00	-	82,200.00	123,300.00	123,300.00
220kV Kiwira - Mbeya	CIP Projects	Consulting	Government contribution	68,000,000.00	34.00	-	-	-
400kV Singida-Arusha - Nairobi	CIP Projects	Consulting	Government contribution	45,200,000.00	20.79	-	-	-
400kV Iringa - Mbeya	CIP Projects	Transmission Systems	Chinese Funding	12,805,000,000.00	1,920.75	1,280.50	640.25	-
330kV Pensulo - Mbeya (700km)	CIP Projects	Transmission Systems	Government contribution	107,639,350,000.00	-	-	-	-
220kV Geita-Nyakanazi - Rusumo	CIP Projects	Transmission Systems	Government contribution	65,292,500,000.00	-	-	-	-
				35,654,134,475.92	-	-	-	-
				29,195,400,000.00	-	-	-	7,705.16

## Attachment 2 - Financial Model Summary Sheet – Base Case

COS - TSh/kWh	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Own Generation	5.1	4.1	7.7	13.0	6.6	20.5	18.6	21.6	20.3	24.0	58.0	78.8	64.2	75.9	
Purchased Electricity	2.4	18.2	43.5	58.9	68.2	87.4	76.4	58.6	55.5	38.3	13.3	12.9	21.1	22.5	
Total Generation	7.5	22.3	51.2	71.9	74.8	107.9	95.0	80.2	75.8	62.3	71.3	91.7	85.3	98.4	
R&M	3.6	2.9	3.4	3.6	2.2	3.4	3.4	4.3	19.5	21.1	22.5	24.7	22.5	25.8	
Staff	6.4	5.1	4.9	6.8	7.6	22.7	22.2	26.5	26.3	24.6	24.0	23.3	22.6	24.2	
Financing	7.7	55.2	67.5	31.6	1.6	2.6	3.9	8.9	16.9	28.3	28.3	25.0	22.2	33.2	
Depreciation	19.9	19.5	18.2	10.7	10.2	11.3	9.5	10.6	14.0	13.1	13.6	16.4	23.3	29.8	
Provision for Doubtful Debts	14.3	1.1	4.4	1.4	5.2	-	-	-	6.1	6.8	7.5	8.2	6.4	7.4	
TanESCO CIP	47.0	43.7	41.0	38.7	36.3	34.5	30.0	28.9	0.8	38.9	25.5	21.2	13.3	3.7	
Other Expenses	8.5	5.2	11.6	10.6	5.2	30.3	28.9	16.9	17.7	19.2	20.8	22.7	24.6	26.7	
ROE	-	-	-	-	-	-	-	-	-	-	5.1	12.5	15.7	16.1	
Tax	-	-	-	-	-	-	-	-	-	-	-	4.9	2.2	1.7	
Total	114.7	154.9	202.4	175.3	143.2	212.7	192.8	176.3	177.0	214.3	218.6	250.5	238.2	266.9	
<b>Less Revenue from other sources</b>															
Grants and Subsidies	-	7.6	8.7	40.1	15.6	19.9	34.3	9.9	5.7	4.1	3.7	3.2	2.9	2.8	
Non Electricity Sales Related Customer Payments	2.9	3.8	3.0	3.8	4.6	2.2	2.7	20.1	12.6	16.7	16.1	15.4	14.9	15.8	
Other Income	-	-	4.6	12.4	11.4	10.7	10.7	4.1	5.9	1.6	1.5	1.4	1.4	1.5	
Total	2.9	11.4	16.3	56.3	31.7	32.8	47.7	34.1	24.1	22.4	21.3	20.1	19.1	20.0	
<b>Average Tariff Required</b>	<b>111.9</b>	<b>143.5</b>	<b>186.1</b>	<b>119.0</b>	<b>111.5</b>	<b>179.9</b>	<b>145.1</b>	<b>142.2</b>	<b>152.9</b>	<b>191.9</b>	<b>197.3</b>	<b>230.4</b>	<b>219.1</b>	<b>246.9</b>	
Rate of CPI Inflation		7.3%	5.6%	4.6%	5.9%	6.7%	6.4%	13.5%	10.8%	8.7%	8.7%	8.7%	8.7%	8.7%	
	52.9	52.9	57.1	60.5	63.4	67.4	72.2	77.2	89.2	100.0	108.7	118.1	128.3	139.4	
<b>Average Tariff Required 2010 Terms</b>	<b>211.3</b>	<b>270.9</b>	<b>325.8</b>	<b>196.8</b>	<b>175.9</b>	<b>266.9</b>	<b>200.9</b>	<b>184.3</b>	<b>171.4</b>	<b>191.9</b>	<b>181.6</b>	<b>195.2</b>	<b>170.8</b>	<b>177.1</b>	
<b>Choose Scenario:</b>											2011	2012	2013	2014	
<b>Base Case</b>											COSS Tariff Required	197.3	230.4	219.1	246.9
											GWh Sold	4,913	5,564	6,280	6,440
											Tariff Revenue Required	969,417	1,282,005	1,375,803	1,589,830
											Annual Year on Year Increase	66.1%	16.8%	-4.9%	12.7%
											EBITDA TSh per kWh	62.3	55.0	45.4	52.4
											DSCR	2.20	2.20	2.04	1.58
<b>Recalculate</b>															

Attachment 3 - Financial Model Summary Sheet – Alternative Case

COS - TSh/kWh	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Own Generation	5.1	4.1	7.7	13.0	6.6	20.5	18.6	21.6	20.3	24.0	58.0	78.8	64.2	75.9	
Purchased Electricity	2.4	18.2	43.5	58.9	68.2	87.4	76.4	58.6	55.5	38.3	13.3	12.9	21.1	22.5	
Total Generation	7.5	22.3	51.2	71.9	74.8	107.9	95.0	80.2	75.8	62.3	71.3	91.7	85.3	98.4	
R&M	3.6	2.9	3.4	3.6	2.2	3.4	3.4	4.3	19.5	21.1	4.8	10.9	24.9	29.0	
Staff	6.4	5.1	4.9	6.8	7.6	22.7	22.2	26.5	26.3	24.6	24.0	23.3	22.6	24.2	
Financing	7.7	55.2	67.5	31.6	1.6	2.6	3.9	8.9	16.9	28.3	28.3	25.0	22.2	33.2	
Depreciation	19.9	19.5	18.2	10.7	10.2	11.3	9.5	10.6	14.0	13.1	-	-	19.2	29.8	
Provision for Doubtful Debts	14.3	1.1	4.4	1.4	5.2	-	-	-	6.1	6.8	6.4	7.3	7.1	8.3	
TanESCO CIP	47.0	43.7	41.0	38.7	36.3	34.5	30.0	28.9	0.8	38.9	25.5	21.2	13.3	3.7	
Other Expenses	8.5	5.2	11.6	10.6	5.2	30.3	28.9	16.9	17.7	19.2	20.8	22.7	24.6	26.7	
ROE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Tax	-	-	-	-	-	-	-	-	-	-	-	-	7.2	8.6	
Total	114.7	154.9	202.4	175.3	143.2	212.7	192.8	176.3	177.0	214.3	181.2	202.0	226.4	261.9	
<b>Less Revenue from other sources</b>															
Grants and Subsidies	-	7.6	8.7	40.1	15.6	19.9	34.3	9.9	5.7	4.1	3.7	3.2	2.9	2.8	
Non Electricity Sales Related Customer Payments	2.9	3.8	3.0	3.8	4.6	2.2	2.7	20.1	12.6	16.7	16.1	15.4	14.9	15.8	
Other Income	-	-	4.6	12.4	11.4	10.7	10.7	4.1	5.9	1.6	1.5	1.4	1.4	1.5	
Total	2.9	11.4	16.3	56.3	31.7	32.8	47.7	34.1	24.1	22.4	21.3	20.1	19.1	20.0	
<b>Average Tariff Required</b>	<b>111.9</b>	<b>143.5</b>	<b>186.1</b>	<b>119.0</b>	<b>111.5</b>	<b>179.9</b>	<b>145.1</b>	<b>142.2</b>	<b>152.9</b>	<b>191.9</b>	<b>159.9</b>	<b>181.9</b>	<b>207.3</b>	<b>241.9</b>	
Rate of CPI Inflation		7.3%	5.6%	4.6%	5.9%	6.7%	6.4%	13.5%	10.8%	8.7%	8.7%	8.7%	8.7%	8.7%	
	52.9	52.9	57.1	60.5	63.4	67.4	72.2	77.2	89.2	100.0	108.7	118.1	128.3	139.4	
<b>Average Tariff Required 2010 Terms</b>	<b>211.3</b>	<b>270.9</b>	<b>325.8</b>	<b>196.8</b>	<b>175.9</b>	<b>266.9</b>	<b>200.9</b>	<b>184.3</b>	<b>171.4</b>	<b>191.9</b>	<b>147.2</b>	<b>154.1</b>	<b>161.6</b>	<b>173.5</b>	
<b>Choose Scenario:</b>											2011	2012	2013	2014	
<b>Alternative Scenario</b>											COSS Tariff Required	159.9	181.9	207.3	241.9
											GWh Sold	4,913	5,564	6,280	6,440
											Tariff Revenue Required	785,597	1,012,154	1,301,614	1,557,700
											Annual Year on Year Increase	34.6%	13.8%	13.9%	16.7%
											EBITDA TSh per kWh	53.8	46.2	61.8	75.3
											DSCR	1.90	1.85	2.78	2.27
<b>Recalculate</b>															