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**CONSULTANCY SERVICES TOWARDS THE
JOINT ENERGY SECTOR REVIEW (JESR)
FOR 2011/12 FOR MAINLAND TANZANIA
Final Report**

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Abbreviations

ASIP	Annual Survey of Industrial Production
BPTC	Bulk Procurement Technical Committee
COSS	Cost of Service Study
DP	Development Partner
EDPG	Energy Development Partners' Group
EPP	Emergency Power Plan
ESCAP	Energy Sector Capacity Assistance Project
EWURA	Energy and Water Utilities Regulatory Authority
FiT	Feed in Tariff
FYDP	Five-Year Development Plan 2011/12 – 2015/16
GBS	General Budget Support
GDP	Gross Domestic Product
GVA	Gross Value Added
HFO	Heavy Fuel Oil
IPP	Independent Power Producer
ISIC	International Standard Industrial Classification
JESR	Joint Energy Sector Review
JESWG	Joint Energy Sector Working Group
Km	kilometer
KPA	Key Policy Action
kV	kilo Volt
LCGP	Least Cost Generation Plan
LRMC	Long Run Marginal Cost
MAED-1	Model for Analysis of Energy Demand
MCA-T	Millenium Challenge Account – Tanzania
MCC	Millenium Challenge Corporation

MEM	Ministry of Energy and Minerals
MoF	Ministry of Finance
MPSA	Model Production and Sharing Agreement
MTEF	Medium Term Expenditure Framework
MTP	Medium Term Plan
MW	Mega Watt
NBS	National Bureau of Statistics
NDC	National Development Council
OPM	Oxford Policy Management
PAF	Performance Assessment Framework
PIC	Petroleum Importation Coordinator
PO-PC	President's Office Planning Commission
PSMP	Power System Master Plan
PSR	Power Systems Research Inc.
Q1	First Quarter
Q2	Second Quarter
Q3	Third Quarter
Q4	Fourth Quarter
RBA	Rapid Budget Analysis
REA	Rural Energy Agency
REF	Rural Energy Fund
RET	Renewable Energy Technology
SAM	Social Accounting Matrix
SDDP	Stochastic Dual Dynamic Programming
SMART	Specific, Measurable, Achievable, Relevant and Timed
SPM	Single Point Mooring
SPP	Small Power Projects

tcf	trillion cubic feet
TANESCO	Tanzania Electricity Supply Company
TIC	Tanzania Investment Centre
TPA	Temporary Process Action
TPDC	Tanzania Petroleum Development Corporation
TRA	Tanzania Revenue Authority
TZS	Tanzanian Shillings

1 Introduction

The Joint Energy Sector Review (JESR) is the key element for coordination, planning and financing of the energy sector. It establishes a common basis for monitoring the performance and for setting the priorities of the energy sector. The Ministry of Energy and Minerals (MEM) in collaboration with Development Partners (DPs) have been facilitating JESRs since 2007. The exercise is carried out annually to give a general overview of the sector performance to the public and private stakeholders involved in the energy sector and generate inputs for the General Budget Support (GBS).

In line with the approach used in previous JESRs, MEM, through funding from the Millennium Challenge Account – Tanzania, engaged the consultancy team from Oxford Policy Management (OPM) and Economic Consulting Associates to review overall performance of the energy sector since the last JESR, the implementation of the energy policies and strategies, sector governance and financing structure. The consultancy team reports to the Permanent Secretary of the Ministry of Energy and Minerals (MEM) and the Director for Energy Projects MCA-T.

The overall objective of the JESR is to review: (i) the overall performance of the energy sector since the last review; (ii) the implementation of energy policies and strategies; and (iii) the sector governance and financing structure.

2 Overall Sector Review

2.1 Introduction

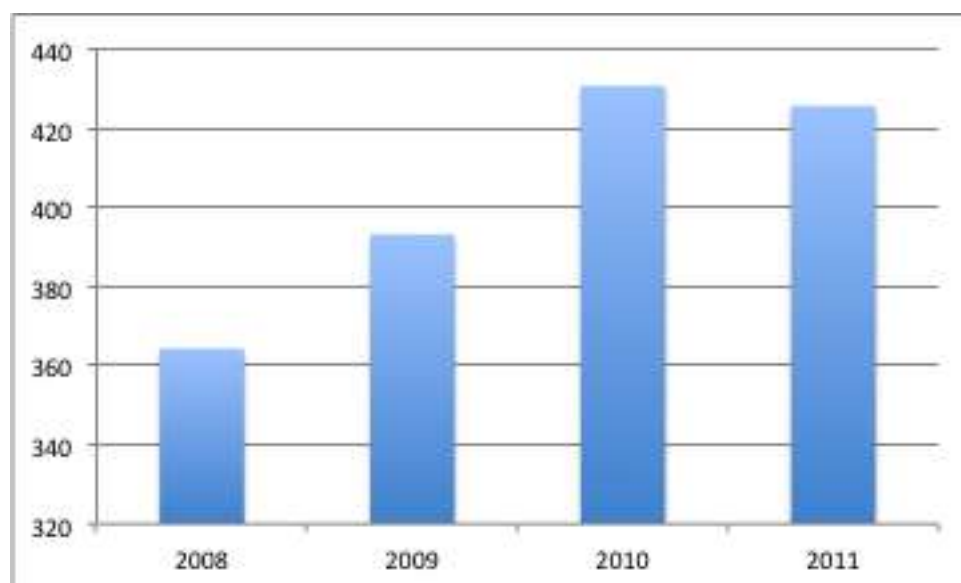
In May 2011 the Ministry of Finance made the following assessment of the energy sector's role in economic development.

“Energy is a critical prerequisite for all sectors of the economy. It is an essential service whose availability and quality can determine the success or failure of development endeavours (sic). The importance of energy as a sector in the national economy cannot therefore be overemphasized.

“... shortage in power supply, unreliability and high costs of energy have caused major disruptions in economic activities, thus reducing economic growth as well as the competitiveness of the economy. There is no doubt that problems facing the energy sector have detrimental effects not only to the attainment of sector performance and the rapid resolution of energy problems, but also to the prospects of rapid progress in economic transformation and accelerated growth. This is why the Government is making concerted efforts to stabilize, boost capacities, and increase energy supply to accommodate the growing needs of the economy.” Ministry of Finance (2011:58)

Electricity gross value added (GVA) declined by 1.2 per cent in 2011 from TZS 430 billion (constant 2001 prices) to TZS 425 billion, see Figure 2.1

Figure 2.1 Electricity gross value added 2008-2011 in constant 2001 prices (TZS billions)



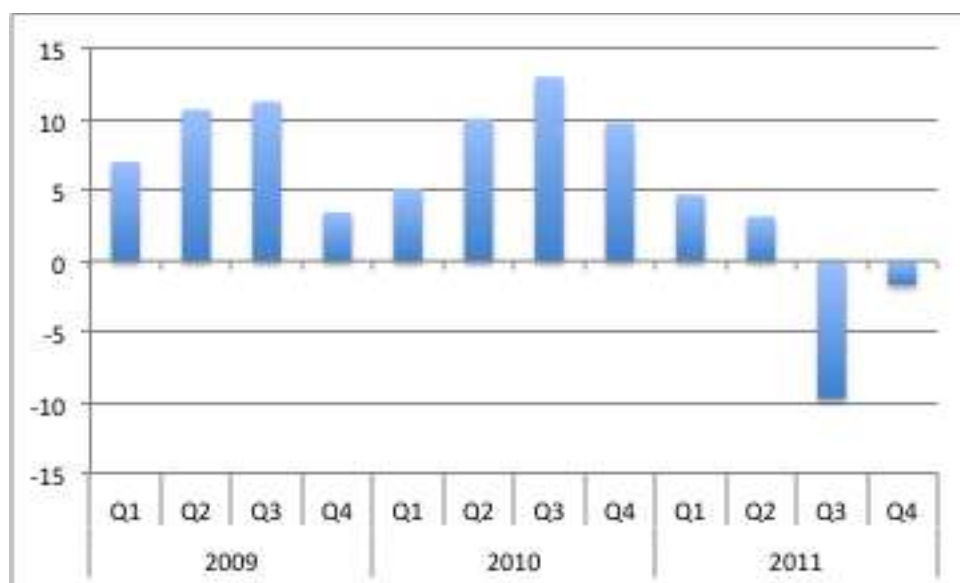
Source: calculation from National Bureau of Statistics (2012)

Note: “Electricity” here includes gas and water.

The principal cause of the decline was a fall in hydro electricity generation in the second half of the year. In Q3 electricity GVA was nearly 10 per cent lower than in the previous year and was 2.7 per cent lower in Q4 (compared to Q4 2010). The last time there was a year-on-year fall in quarterly

electricity GVA was in Q4 2006 (-7.5 per cent) and the fall for the whole year had been 0.5 per cent. The impact of the water shortage in 2011 was significantly greater than in 2006.

Figure 2.2 Year on year change in electricity sector value added at constant 2001 prices by quarter 2009 - 2011 (per cent)

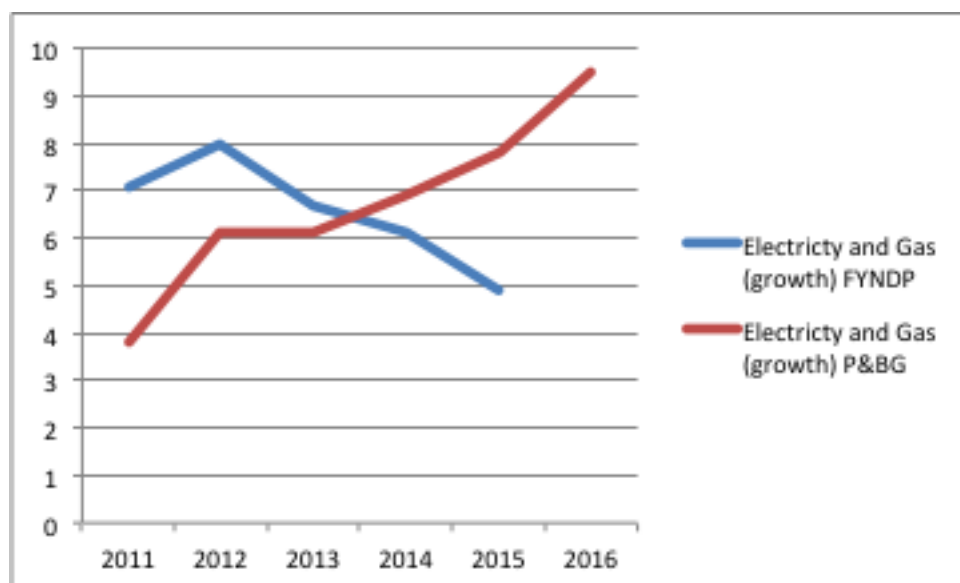


Source: calculation from National Bureau of Statistics (2012)

Note: "Electricity" here includes gas and water. The table cannot be adjusted since no quarterly series is available for electricity and gas.

In the Plan and Budget Guidelines for 2012/13, the MoF revised the forecasts for electricity [and gas] sector growth made for the Five Year Development Plan 2011/12–2015/16 (FYDP) following the decline in hydro-production caused by rain shortages in catchment areas as shown in Figure 2.3.

Figure 2.3 Growth Rates for Electricity and Total Gross Value Added 2008-2016 in FYDP and Plan and Budget Guidelines (annual percentage change)



Source: FYDP and MoF 2012

The projected acceleration of growth (relative to the FYDP projections) reflects “government efforts to implement measures aimed at addressing the current power crisis by installing additional gas-turbines to complement the hydro power generation.” MoF and POP 2012:13).¹

2.2 Performance Assessment Framework and the Energy Sector

The implementation of the Government’s MKUKUTA II is supported by some Development Partners through the provision of General Budget Support in line with principles and terms set out in a Partnership Framework Agreement (May 2011 which include an annual review of GBS support based on a Performance Assessment Framework (PAF). The JESR provides inputs into that annual review. The PAF takes specific account of developments in the energy sector through outcome indicators and temporary process actions. The technicalities of the GBS process are not readily accessible to stakeholders other than MEM and its development partners but they are nonetheless very relevant for the JESR process, not least as they have some influence on perceptions of the performance of the energy sector.

This relevance is apparent when one considers that in the 2011 Annual GBS Review, made in November 2011, the Energy Sector Review was rated as unsatisfactory. This actually means that the performance of the energy sector was rated as unsatisfactory: it was not an assessment of the quality of the review process. The reasons for the unsatisfactory rating were that one “temporary process action” and two of three “outcome indicators” were not achieved in the timeframe set in the PAF. In addition one outcome indicator could not be assessed. The “temporary process action” was the construction of a 100 MW gas-fired power plant in Dar es Salaam and the Heavy Fuel Oil (HFO) fired 60 MW in Mwanza. Both plants had been originally expected to reach overall completion by end October 2011. The ‘outcome indicators’ were the total electricity capacity

¹ Other assumptions include implementation of the Rural Energy Master Plan and enhancing private sector participation in power generation to meet the growing demand for power in the country.

installed and the availability of electricity generation capacity in MW and utilization in percentage terms. The 2011 targets had been 1,087 MW of installed capacity and a utilization rate of 85%. Actual capacity availability at the point in time measured for the PAF purposes was 1,220 MW but utilization was at 60%. The outcome indicator that was not assessed was percentage of population with access to electricity. The reason it was not assessed was because “a methodology for defining access was not in place”. (Annual GBS Review 2011:15-16)

MEM’s responsibility for timely installation of new generation capacity is one shared with its agency TANESCO but also with the contractors building the plants. Its responsibility for the delivery of the two generation plants is primarily one of ensuring timely and full availability of budget resources for TANESCO to pay for the plants; beyond that it has no control and only an indirect and hard-to-specify influence over delivery timing. Delivery of the two power plants was already behind schedule when the 2011 PAF was drawn up. The TPA should have focused on the actions that were required by MEM and its agency to facilitate timely implementation. If that sort of measure is to be used for PAFs there should be much more detailed specification of the necessary actions required of MEM. In infrastructure projects of that sort that means going into the detail of the project implementation plan to find the necessary planning, budgeting and funding actions by MEM and the actions it can and should take in its role as sole shareholder and a board member of TANESCO.

The electricity plant utilization rate, especially where hydropower generation is significant, can only very remotely be influenced by MEM, if at all beyond providing budgetary resources for capacity charges and fuel purchases where litigation technicalities and/or TANESCO’s cash flow leave no better immediate alternative.

The absence of a methodology for defining access was not a good reason not to assess access to electricity as it improving access is a core goal of energy policy and is a target for both MKUKUTA II and the Five Year Development Plan as well as in MEM’s own Medium Term Plan which has been monitored and regularly reported on. Strictly speaking, the problem for the PAF was that there are various and vague definitions of access being used by different stakeholders and so there is no agreed indicator for the PAF for which a measurement method could be set. In that sense and respect it was the PAF that was unsatisfactory. Indicators should be SMART – specific, measureable, achievable, relevant, and timed. The indicator failed on specificity and measurability. The result should be a PAF TPA to draw up a SMART access indicator. MEM, with support from MCA-T, has now commissioned research for this.

In addition, during the GBS review the DPs expressed concern that there were significant fiscal risks related to the Energy Emergency Plan.² There are fiscal risks associated with the EPP, and there the same risks for the sector as a whole: explicit and implicit contingent liabilities from MEM’s agencies and the risks associated with private sector investment in a strategic infrastructure sector like energy. The first step in risk management is risk identification. MEM and its DPs should explore ways to identify the fiscal risks in the sector in consultation with the Ministry of Finance. This is part of good public financial management and would be something that MEM would benefit from in presenting its case to the Cabinet through the planning and budgeting process for budgetary resources that the sector requires for the implementation of policy and the delivery of the national development plan. MEM’s case in making funding requests could be strengthened through reference to the Rapid Budget Analysis (RBA) presented at the Annual GBS Review which indicated that the budgetary allocations for energy were weakly aligned to its policy priority and the lower allocation to energy (in the original 2011/12 budget) may have had implications for the required growth momentum. (Annual GBS Review 2011:23). The RBA presentation also

² GBS Annual Review: 4

highlighted the key issue of establishing strategic partnerships with the private sector to fill resource gaps for capital investment and the need to raise more resources for public sector investment from cost recovery tariffs in the energy sector. (Annual GBS Review 2011:23).

The PAF for 2012 includes the Energy Sector Review as an underlying process indicator and the assessment criteria have been agreed between MEM and its DPs. It has also set the four steps in formulation of an energy subsidy policy by August 2013 as a Key Policy Action. The outcome indicators for the PAF remain installed generation capacity, plant availability, and population with access to electricity.

The Key Policy Action is underway with some slippage in process timing but not to an extent that should delay the desired outcome and ultimate timing. This focus on a policy action is an improvement to the PAF as it relates to the energy sector as it deals with something, which is central to MEM's mandate and responsibility and entirely within its control and for which it can reasonably be held to account.

The outcome indicators remain problematic for the reasons discussed above. Installed capacity should be met. In 2012, total installed capacity has increased to 1,333 MW, but plant capacity was lower at 45%. While this has been pulled down significantly by lower utilization of hydropower generation capacity (largely due to poor rainfall), gas utilization alone is still 71%. Finalisation of a definition of electricity access is unlikely in time for the PAF review. MEM and its DPs should use the opportunity of the stakeholders' workshop to consider what the appropriate outcome indicators for the sector should be.

In terms of the PAF for next year, an obvious and SMART Key Policy Action would be completion of a Gas Policy by MEM by June 2013 with additional steps showing stakeholder consultation processes.

3 Electricity Sector Review

3.1 Electricity sub-sector achievements in 2011/12

In 2011/12 the following developments occurred in the electricity sub-sector.³

1. 422 MW of generation capacity were added under the Emergency Power Plan (out of a planned total of 572 MW. The capacity additions were from Symbion 137 MW, Aggreko 100 MW, IPTL 80 MW and Ubungu Gas Plant II 105 MW.
2. A 1.9 MW diesel powered generator was installed and commissioned in Songea township.
3. A 1.9 MW diesel power generator was installed in Sumbawanga township.
4. Four generators, each 1.25 MW, were installed in Ngorongoro District Headquarters.
5. Diesel Generators were installed and distribution networks constructed in Kasulu and Kibondo Districts; 2 x 1.25MW generators in Kasulu and 2 x 1.25MW generators in Kibondo.
6. The Mawengi 300kW mini hydro plant in Ludewa, Njombe came on power in November 2011 and now provides electricity to more than 300 households.
7. Six villages were electrified: Zuzu Village in Dodoma Region; Songwa Village in Shinyanga Rural District; Ipinda Kilimani in Mbeya; Utiga in Makambako; Kilole Mzee in Tanga; and Itoju in Kagera.
8. Construction of the 35 km long 33 kV power line connecting Mtwara and Msimbati was completed.
9. 33kV lines extending the grid to Mgwashi (21km) and Mbwewe (23km) were completed.
10. A 300W solar panel and a 1kW wind mast were installed in the Community Development College at Msaginya in Rukwa.

3.2 Electricity Demand and Supply

The 2011 JESR noted a lack of comprehensive forecasting of energy demand and a planning process which did not take sufficient account of a downside scenario of poor hydrology. This lack of quality information was a driver of the energy supply crisis and of the requirement for the EPP. On the demand side, it appeared that the estimates of national demand were not based on annual assessments, but on a projection from a historical assessment of demand.

There have been significant improvements to the planning process following the 2011 JESR. During the stakeholder interview process this year the consulting team was able to consult closely with staff from TANESCO on the way that demand and supply forecasts are made. It is clear that continuing refinements of the demand forecasting process are being made and the results of these will be reflected in the PSMP update for 2012. MEM has created a power system planning team and has established a process to integrate power system planning into MEM's annual policy-

³ MEM (2012 [June]: 8-9) and further detail provided by MEM.

strategy-planning and budgeting updating processes. The planning team is composed of staff from MEM, TANESCO, REA, TPDC, MOF, TBS, PC-PO and EWURA. MEM leads the team. The PSMP update will be finalised in December 2012. This is later than proposed in last year's review, but results from the planning process will be available to meet the timings of the budget preparation calendar.

There have been technical improvements in the forecasting of supply with the use of new models and techniques beginning to be put in place.

3.2.1 Demand Forecasting

TANESCO is currently using a combination of trend analysis and an econometric modelling approach to prepare its forecast of electricity demand.

The inputs for this come from a collection of different sources:

- Field visits and industry surveys around the country, focusing on current consumption and expectations for the next five years, identifying areas of high load growth evidenced by new factory construction, and new major loads (e.g. mines), while making a differentiation between normal growth and unusual loads. This is crosschecked against previous studies, identifying differences and reasons for those differences.
- Discussion with the Tanzania Investment Centre (TIC) about the expected development of new major electricity consumers. Where possible TANESCO follows this up by contacting the new consumers, asking for their assumptions on electricity usage. These assumptions are tested by TANESCO.
- Economic data from the Bank of Tanzania, the Planning Commission, and Tanzania Confederation of Industries to give a broader picture of load growth.

The methodology derives an annual peak demand output, by tariff category and by load centre, for the short-term (up to 5 years), medium-term (5-10 years) and long-term (10-25 years). TANESCO is then able to use as the basis for its generation planning – total available generation capacity must be able to meet this forecast peak demand, plus a reserve margin of 20%. While this approach is able to generate an upper limit to the generation requirement, it is not able to give an indication of what mix of peak and base load generation capacity is required, nor give any support to despatch planning through an understanding of the demand profile during each day, week, month and year.

In the past few months, TANESCO has begun transitioning to a more detailed modelling approach using a more formal modelling tool called MAED-1 (Model for Analysis of Energy Demand). This tool will be able to take the same inputs as used under TANESCO's current approach, but will increase the detail of the outputs to include hourly demand forecasts, so that demand can be identified as base and peak load. MAED-1 is already in use and TANESCO is developing its understanding of it. The full benefits of this additional tool will be seen in next year's PSMP update.

Demand forecasting can be strengthened by making estimates of unconstrained demand in addition to constrained demand. TANESCO's currently planning currently focuses on the constraints presented by generation capacity this will be augmented by identification of transmission and distribution constraints to demand as the new planning process develops.

3.2.2 Supply forecasting

TANESCO is currently using a detailed approach to modelling and forecasting its supply. Inputs are derived primarily from TANESCO's own generation expansion plans. Previous PSMP reports have identified long lists of potential generation opportunities, across a range of energy sources (e.g. hydro, natural gas, coal, geothermal, solar, wind), sizes, locations and completion dates. Information is also sourced from various other stakeholders in the generation sector, including Independent Power Producers (IPPs); the National Development Corporation (NDC), which is involved in the development of coal and now wind generation; and the Rufiji Basin Development Authority, which is looking into development opportunities in its territory, including Stiegler's Gorge and other sites.

Each identified project opportunity has a desk officer within TANESCO with responsibility for managing updates to the project. This applies for projects being developed by TANESCO and by IPPs, as all projects need to be simulated in the generation modelling. However, TANESCO does not currently have an integrated project management system with timely reports on the status of all projects, or which can be accessed by other relevant stakeholders, e.g. MEM, EWURA, TPDC, and REA.

When a project has reached a degree of certainty, a feasibility study is either prepared or requested from the IPP developer, incorporating all costs (construction costs, development costs, grid connection costs, operating and maintenance costs, fuel costs, financing, drawdown profile), plus a risk analysis e.g. financial risk, operating risk, delays, fuel costs, load factor, capacity outage. This information is used as the basis for the modelling of generation planning, and in particular for the optimisation of the timing of development planning.

TANESCO's core generation modelling tool is called SDDP (Stochastic Dual Dynamic Programming), and is developed by Brazilian firm Power Systems Research Inc⁴. The tool is designed for hydrothermal system planning, and takes the data from project feasibility studies as inputs, simulating the effects of each separate generation plant, including such things as the timing of development and reductions in capacity. The model will also show the effects of differences in capital, operating and maintenance, and financing costs on the aggregate market costs, both short-run and long-run. As a model designed with particular consideration of hydro generation, it also considers rainfall and river flows, with the ability to simulate the effects of changes in flows on the overall market costs of generation. With this information, the model can give recommended despatch schedules for generation, although this is not necessarily of so much immediate relevance in Tanzania while there are prior concerns over the sufficiency of existing capacity.

TANESCO runs another modelling tool alongside SDDP called OptGen, also developed by PSR, and which supports SDDP modelling. OptGen simulates different generation planning scenarios, using the same input data as used in SDDP, to determine the optimum sequence for the development of projects detailed in SDDP to meet demand with an agreed reserve margin, known as the Least Cost Generation Plan (LCGP). To do this, OptGen takes the historical breakdown of demand over previous years and forecasts it based on the overall growth used in the forecasting models, as until TANESCO begins using MAED-1, it is not able to break down its demand forecasts into the detail required for OptGen (particularly the long-run forecasts of peak and base load demand) to determine the optimal mix of generation based on the forecast demand and the generation options available. The ranking is essentially based on the Long-Run Marginal Cost (LRMC) of each of the development options, for peaking and base load demand. The LRMC of the system (measured at different voltage levels as well as for the system as a whole) is the

⁴ For further information, please refer to www.psr-inc.com.br.

discounted cost associated with the least cost investment sequence. When using OptGen in this way, TANESCO runs multiple development scenarios, simulating risk factors such as delays in projects, changes in any of the associated costs, inflow uncertainties, emission constraints, capacity constraints and other features, to become fully informed as to the optimal development programmes under multiple conditions.

The development plan generated by OptGen is then fed back into SDDP, and used to create the Load Forecast Report, which is approved by TANESCO's senior management before being incorporated into the PSMP update process. Once this data is included in SDDP, TANESCO is able to identify its requirements for transmission backbone and distribution expansion (grid connection of generation is included in generation planning). With all this information integrated into SDDP, the model is able to generate detailed estimates of system marginal costs, including a breakdown of generation, transmission and distribution marginal costs, and also hydro reservoir requirements.

Tables 3.1 and 3.2 present information provided by MEM and TANESCO on the historic, short and medium-term power generation plans, the current status of each development, where applicable, and the current transmission upgrade plan to 2031.

Table 3.1 Historic and Short and Medium Term Power Generation Plan

Install	Plant	Retire	Fuel	Capacity (MW)	Remarks
1968	Nyumba ya Mungu	--	Hydro	8	
1975	Kidatu	--	Hydro	204	
1988	Mtera	--	Hydro	80	
1995	New_Pangani	--	Hydro	68	
2000	Kihansi	--	Hydro	180	
	Dodoma	2015	IDO	7.44	
2002	TegetaPTL	2022	HFO	90	
2004	Songas1	2024	Natural Gas	38.3	
2005	Songas2	2025	Natural Gas	110	
2006	Songas3	2026	Natural Gas	37	
2007	Ubungo_G-1	2027	Ubungo Gas	102	
2009	Tegeta_G	2029	Natural Gas	43.65	
2010	TANWAT		Biomass	2.75	SPP sales 1 MW to the Grid
	TPC		Biomass	20	SPP sales 2.5 MW to the Grid
2011	Aggreko-U	2012	GO	50	The two plants Ubungo 50MW and Tegeta 50MW are available will be retired after expiration of the one year contract in October 2012
	Aggreko-T	2012	GO	50	
	Symbion I	2013	JET-A1	60	The 112 MW plant is available and will be retired after expiration of the contract
	Symbion II	2013	GO	52.5	
2012	Symbion205-DOM	2013	GO	55	Both 50MW plant at Dodoma and 50MW plant at Arusha are available (operating)
	Symbion205-ARS	2014	GO	50	

Install	Plant	Retire	Fuel	Capacity (MW)	Remarks
	MwanzaIDO		IDO	60	All 10 units of generating sets have been manufactured, assembled and shipped; expected date of arrival at site is end of September 2012.
	Mtwara (18)		Natural Gas	18	
2013	Symbion205-DAR	2014	GO	100	
	Ubungo_G-2	2031	Natural Gas	105	Plant is fully in commercial operation, however Fichtner Consultant expert in turbine gensets arrived on 22nd August 2012 to participate in the investigation of GTG3 breakdown
2014	Symbion205-DAR	2015	Natural Gas	100	
	Sao Hill		Biomass	10	SPP to sale 10 MW to the Grid; delays due to review of capacity of forestry resources to support plant
	Kilwa Energy		Natural Gas	210	
	Jacobsen		Natural Gas	150	Project negotiation is ongoing between Government and lenders
	Kinyerezi 240-I	2033	Natural Gas	120	Contract has been signed and all project documents have been sent to the Ministry of Finance for Financial Closure Arrangement
Kinyerezi 240-II	2033	Natural Gas	120		
2015	Ngaka I		Coal	120	Intra Energy has submitted Draft PPA to TANESCO for review and comments
	Wind I		Wind	50	Evaluation of the technical proposal for procurement of transaction advisor completed and revised evaluation report submitted to the secretary Tender Board for deliberations
	Mchuchuma-I		Coal	50	Own Use; Government of Tanzania and Chinese Company have signed MoU, and the project is now in the initial development stages
2016 (and beyond)	Mgololo COGEN		Biomass	30	
	Kinyerezi III		Natural Gas	300	TANESCO advised CMEC (Chinese EPC Contractor) to implement the project in two phases, first phase being 300 MW dual fuel simple cycle power plant and 220 kV transmission line from Kinyerezi to Ubungo/Kimara. Phase two is to construct 400 kV transmission line from Kinyerezi – Chalinze – Morogoro – Dodoma. EPC contract has already been signed, negotiations with lenders are at an advanced stage.
	Hale		Hydro	21	
	TANESCO Coal		Coal	500	
	Kiwira		Coal	200	MEM has tasked State Mining Corporation (STAMICO) to develop the project

Year	Plant	Area	Source	MW	STATUS
2012	Mwanza MS Diesel	Mwanza	Diesel	60	All 10 units of generating sets have been manufactured, assembled and shipped; expected date of arrival at site is end of September 2012.
	Sao Hill - Cogen	Iringa	Biomass	10	The project is still at initial stages
	Semco (70)	Tanga	Diesel	70	Awaiting No objection from the Government
	Ubungu EPP	Dar es Salaam	Gas	100	Plant is fully in commercial operation, however Fichtner Consultant expert in turbine gensets arrived on 22nd August 2012 to participate in the investigation of GTG3 breakdown
	Symbion	Dodoma & Arusha	Diesel	105	Both 50MW plant at Dodoma and 50MW plant at Arusha are available (operating)
2013	Mgololo - Cogen	Iringa	Biomass	30	The project is still at initial stages
	Jacobsen - Kinyerezi	Dar es Salaam	Gas	150	Project negotiation is ongoing between Government and lenders
	Retire Aggreko	Dar es Salaam		-100	The two plants Ubungo 50MW and Tegeta 50MW are available will be retired after expiration of the one year contract in October 2012
	Semco (70)	Tanga	Diesel	70	
	Barge	Dar es Salaam	Gas	42	Cancelled
2014	Kinyerezi (240)	Dar es Salaam	Gas	240	Contract has been signed and all project documents have been sent to the Ministry of Finance for Financial Closure Arrangement
	Retire Symbion	Dar es Salaam	Gas	-112	The 112 MW plant is available and will be retired after expiration of the contract
	Ngaka I	Mbinga	Coal	120	Intra Energy has submitted Draft PPA to TANESCO for review and comments
	Somanga Fungo	Kilwa	Gas	210	PPA Negotiation ongoing
2015	Kinyerezi III	Dar es Salaam	Gas	300	TANESCO advised CMEC (Chinese EPC Contractor) to implement the project in two phases, first phase being 300 MW dual fuel simple cycle power plant and 220 kV transmission line from Kinyerezi to Ubungo/Kimara. Phase two is to construct 400 kV transmission line from Kinyerezi – Chalinze – Morogoro – Dodoma. EPC contract has already been signed; negotiations with lenders are at an advanced stage.
	Developer to be identified	Mkuranga	Gas	150	The project is still at initial stages
	Mchuchuma - Liganga	Ludewa	Coal	50	Government of Tanzania and Chinese Company have signed MoU, and the project is now in the initial development stages
	Wind I	Singida	Wind	50	Evaluation of the technical proposal for procurement of transaction advisor completed and revised evaluation report submitted to the secretary Tender Board for deliberations

Install	Plant	Retire	Fuel	Capacity (MW)	Remarks
2016	TANESCO 500	Sumbawanga	Coal	500	
	Mchuchuma - Liganga	Ludewa	Coal	150	Government of Tanzania and Chinese Company have signed the MoU, and the project is now in the initial development stages
	Kiwira	Mbeya	Coal	200	MEM has tasked State Mining Corporation (STAMICO) to develop the project
2017	Mchuchuma - Mufindi	Ludewa	Coal	100	Government of Tanzania and Chinese Company have signed the MoU, and the project is now in the initial development stages
	Mchuchuma - Liganga	Ludewa	Coal	150	Government of Tanzania and Chinese Company have signed the MoU, and the project is now in the initial development stages
	Somanga Fungo	Kilwa	Gas	110	To be developed after successful implementation of the previous project (210MW)
	Rusomo Falls	Ngara	Hydro	30	Funding solicitation ongoing
2018	Malagarasi	Kigoma	Hydro	45	Draft concept note for the project submitted to Swedish Embassy for possible funding. The Embassy has requested ToR for procurement of project advisor. Preparation of the ToR is in progress
	Mchuchuma - Mufindi	Ludewa	Coal	100	Government of Tanzania and Chinese Company have signed MoU, and the project is now in the initial development stages
	Ngaka II	Mbinga	Coal	100	Intra Energy has submitted Draft PPA to TANESCO for review and comments
2019	Ngaka III	Mbinga	Coal	200	Intra Energy has submitted Draft PPA to TANESCO for review and comments
2020	Solar PV plant	Dodoma	Solar	60	Inputs to RfP has been submitted to TANESCO Procurement Management Unit for review and Tender process initiation so that other investors with same technology could be invited to bid for similar capacity as is in this project
2021	Rumakali	Makete	Hydro	520	The government (MEM) extended the MoU with M/s Zarubezhstroy
2022	Solar PV plant	Shinyanga	Solar	60	Inputs to RfP has been submitted to TANESCO Procurement Management Unit for review and Tender process initiation so that other investors with same technology could be invited to bid for similar capacity as is in this project
2023	Ruhudji	Njombe	Hydro	358	a) Process of land acquisition and water permit has started; site visit report submitted b) Site visit by Sithe Global with their consultants M/s MWH together with TANESCO team took place 10th -15th August 2012. Review meetings were held on 16 and 17 August 2012 at TANESCO Head headquarters

Install	Plant	Retire	Fuel	Capacity (MW)	Remarks
	Kakono	Karagwe	Hydro	53	Evaluation of the financial proposals has been completed and a combined evaluation (technical and financial) for carrying out feasibility study also completed
	Mpanga	Kilomboro	Hydro	144	MoU signed between GoT and Sino Hydro Corporation of China (No more information)
2024	Stiegler's Gorge I	Rufiji	Hydro	300	Negotiations between Governments of Tanzania and Brazil on possible financing of the project ongoing
	Mchuchuma - Mufindi	Ludewa	Coal	100	Government of Tanzania and Chinese Company have signed MoU, and the project is now in the initial development stages
	Masigira	Makete	Hydro	118	NORAD has agreed with TANESCO request for funding of feasibility study

Source: MEM and TANESCO information provided for the JESR.

Table 3.2 Transmission Projects

Year	Transmission network additions	Distance (km)
2009	132KV Musoma - Nyamongo	100
2012	132KV Ubungo – Mtoni Interconnector	46
2014	220KV Kimara - Kinyerezi	2x7.5
	400KV Iringa - Shinyanga	647
	220KV Makambako – Songea	250
	220KV Bulyanhulu - Geita	55
2015	220KV Wind Project - Singida	10
	400KV Singida – Arusha – Nairobi	501
	400KV Mbeya - Iringa	292
	220KV Somangafungu - Kinyerezi	230
2016	220KV Kiwira - Mbeya	100
	400KV Ruhudji - Mufindi	100
	220KV Nyakanazi – Kigoma	280
	400KV Dar es Salaam to Tanga	451
	400KV Ruhudji - Kihansi	150
2017	220KV Nyakanazi - Rusumo	95
	220KV Geita – Nyakanazi	133
	220KV Rusumo – (Kyaka) Bukoba	168
	220KV Mtwara to Somangafungu	600
2018	400KV Rumakali - Mbeya	150
	400KV Rumakali - Makambako	200
	220KV Kigoma - Sumbawanga	485

Year	Transmission network additions	Distance (km)
2020	400KV Stiegler's Gorge – Dar es Salaam	200
2021	330KV Pensulo - Mbeya	700
2024	400KV Ngaka - Makambako	200
2025	400KV Mchuchuma - Mufindi	200
2027	220KV Kakono – Rusumo	150
2028	220KV Mpanga – Kihansi	40
2029	220KV Masigira - Makambako	180
2030	220KV Ikondo (Mnyera) - Mufindi	150
2031	220KV Taveta (Mnyera) - Ikondo	5

Source: MEM and TANESCO information provided for the JESR

3.2.3 Improvements to the planning process

Concerns have been raised by stakeholders that the information supplied by TANESCO has not given sufficient clarity of the development programme TANESCO is seeking to implement, in particular in relation to a break-down of all costs involved (e.g. operating and maintenance, capital expansion and financing costs), and a risk analysis of the various options available. Given the detail of the modelling that TANESCO undertakes, it appears that these concerns are matters of information management. The creation of a national team to manage the power sector planning process provides the basis for proper information management. This initiative puts in place the requirements of the 2008 Electricity Act for power system expansion planning by MEM and TANESCO (as the System Operator).

The challenge now is to ensure that the planning process has timely and full information on the status of projects from project identification through agreements with IPPs under Memoranda of Understanding, the various project preparation stages including feasibility studies, environmental and social impact assessments, Power Purchase Agreements, licensing, and financing agreements so that the expected delivery dates of generation, transmission and distribution additions shown in the annual updates of the PSMP are accurate and provide a reasonable basis on which various stakeholders can plan their own activities and fulfil their specific responsibilities. For MEM these include public expenditure planning and budgeting and for EWURA these include fulfilling regulatory obligations in respect of ensuring a least cost approach is used for system expansion and that tariffs are set on the basis of full cost information.

The effect of the changes to the management of the electricity sector planning process should be fully visible to all stakeholders from the first quarter of 2013 when the update of the PSMP is publicly available and is reflected in MEM's five year medium term plan document. Stakeholders should expect to see a re-phasing of some of the timings for system expansion presented in the Tables 3.1 and 3.2 especially in the short term plan. The convention in the PSMP is that infrastructure additions shown for a particular year are assumed to be operational in the January of the year shown. So, for example, the Sao Hill biomass project would be considered to be on power in January 2012. Given the reported status of the projects being at an initial stage these dates would be expected to change in the next update of the PSMP and are likely to be moved out to 2015 and 2016.

3.2.4 Tariff setting

Regulated tariffs are the primary way in which TANESCO receives its revenue. EWURA's approach to setting the tariffs which TANESCO is able to charge is based on allowing TANESCO to recover the costs it would incur in generating, transmitting and distributing electricity, including all appropriate overhead and financing costs, under the assumption that it is operating efficiently. Therefore if TANESCO is not able to cover its costs with the tariff allowed by regulation, then it can imply either that the tariff is not a fair reflection of the costs TANESCO is incurring, or that TANESCO is not operating as efficiently as it could be⁵.

Over the past five years, TANESCO has presented three tariff review applications to EWURA, in 2007, 2010 and 2011 (the latter being particularly in relation to the Emergency Power Plan). Table 3.3 shows details of the tariff increase requests and approvals.

⁵ There may be other reasons why TANESCO is still not able to cover its own costs, but in this discussion we focus only on the ability of the tariff to cover the true costs of service.

Table 3.3 TANESCO tariff review applications and EWURA approvals from 2007 to 2012⁶

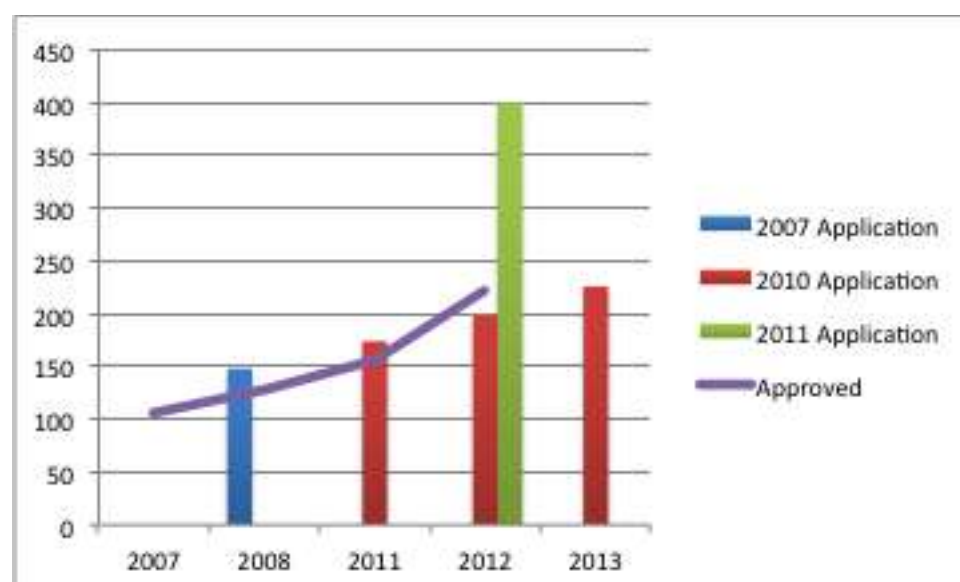
Tariff	Component	2005 Actual	2006 Actual	2007 Application				2008 Granted	%	2011 Request	%	2010 Application				2013 Request	%	2011 Emergency Application			
				2007 Actual	2008 Request	%	2008 Request					%	2010 Request	%	2011 Request			%	2012 Request	%	2012 Request
D1	Domestic Low Usage	Basic Charge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
			Energy Charge	38	38	40	56	40%	49	22.5%	60	22%	60	22%	68	13%	78	15%	153	155%	60
	Penalty – high usage	Energy Charge	115	121	128	179	40%	156	21.9%	226	45%	195	25%	261	15%	297	14%	497	155%	273	40%
T1	General Use	Basic Charge	1,700	1,785	1,892	2,649	40%	2,303	21.7%	3,109	35%	2,738	19%	3,538	14%	4,030	14%	3,106	13%	3,841	40%
		Energy Charge	95	100	106	148	40%	129	21.6%	174	35%	157	22%	198	14%	226	14%	400	155%	221	40%
T2	Low Voltage Supply	Basic	6,300	6,615	7,012	9,817	40%	8,534	21.7%	11,521	35%	10,146	19%	13,111	14%	14,933	14%	25,875	155%	14,233	40%
		Energy	63	66	70	98	40%	85	21.4%	112	32%	94	11%	127	14%	145	14%	240	155%	132	40%
		Demand (kVA)	6,900	7,245	7,680	10,752	40%	9,347	21.7%	13,715	47%	12,078	29%	15,608	14%	17,777	14%	30,802	155%	16,944	40%
T3	High Voltage Supply	Basic	6,300	6,615	7,012	9,817	40%	8,534	21.7%	11,521	35%	10,146	19%	13,111	14%	14,933	14%	25,875	155%	14,233	40%
		Energy	58.5	61	65	91	40%	79	21.5%	100	27%	84	6%	114	14%	130	14%	212	152%	118	40%
		Demand (kVA)	6,400	6,720	7,123	9,972	40%	8,669	21.7%	11,753	36%	10,350	19%	13,375	14%	15,234	14%	26,395	155%	14,520	40%
Source:		2007 App. p13	2007 App. p13	2007 App. p13	2007 App. p15	OPM calcs	2010 Order notice	OPM calcs	2010 App. p7	OPM calcs	2010 Order notice	OPM calcs	2010 App. p7	OPM calcs	2010 App. p7	OPM calcs	2011 App. p7	OPM calcs	2011 Order notice	OPM calcs	

Sources: TANESCO and EWURA application and order documents, OPM calculations

⁶ Tariffs for Zanzibar consumers have not been included in this table as they are not as relevant for the comparative analysis

An example of these applications and approvals is represented graphically in Figure 3.1, which is for the T1 General Use Energy Charge.

Figure 3.1 Tariff applications and approvals for T1 General Use Energy Charge (TZS)



Sources: TANESCO and EWURA application and other documents

Figure 3.1 highlights clearly that there have been regular disparities between the tariffs, which TANESCO calculates as being necessary to cover its costs of service and the actual tariffs permitted by EWURA. While this does not suggest that either TANESCO's or EWURA's calculations are not cost-reflective, it reinforces the view that there are regular inconsistencies in the methodology used for tariff calculation between TANESCO and EWURA. On the understanding that EWURA's tariff-setting process is focused solely on cost recovery, these inconsistencies may be due to the concerns raised about the detail of information requested by EWURA and provided by TANESCO. Detailed discussion of the process for tariff application and approval for the Emergency Tariff in 2011/12 is covered in the Section below.

Figure 3.1 also highlights the significantly greater costs TANESCO believed it was likely to incur in 2011/12, primarily as a result of the EPP. In the 2010 tariff application, TANESCO calculated that it would require a tariff of TZS 198/kWh for 2012. However, under its emergency tariff application in 2011, TANESCO requested an application of TZS 400/kWh, 102% higher than the tariff it requested for 2012 in the 2010 application. This suggests that the costs that TANESCO believed it would incur as a result of the EPP were significantly greater than the costs it had assumed were reasonable a year earlier.

The relative levels of tariff approvals across customer categories also changes the cross-subsidies between consumer categories both in nominal terms and in real terms over time. Table 3.4 below presents the approved tariffs for all customer categories in 2007 and 2011/12, and the annual growth rate of each.

Table 3.4 Tariff levels and growth rates 2007-2012 (TZS)

	Tariff	Component	2007 Approved Tariff	2011/12 Approved Tariff	Growth rate per annum
D1	Domestic Low Usage	Energy Charge	40	60	8.4%
	Penalty – high usage	Energy Charge	128	273	16.4%
T1	General Use	Basic Charge	1,892	3,841	15.2%
		Energy Charge	106	221	15.8%
T2	Low Voltage Supply	Basic	7,012	14,233	15.2%
		Energy	70	132	13.5%
		Demand (kVA)	7,680	16,944	17.1%
T3	High Voltage Supply	Basic	7,012	14,233	15.2%
		Energy	65	118	12.7%
		Demand (kVA)	7,123	14,520	15.3%

Sources: TANESCO and EWURA application and order documents, OPM calculations

Table 3.4 presents evidence that consumers paying the Domestic Low Usage tariff (or ‘Lifeline Tariff’, up to 50 kWh per month) have had consistently lower increases in their energy charge than all other consumers. This reflects a cross-subsidy from one customer group to another.

Over this same five-year period, consumer price inflation in Tanzania has been at 11.4% per annum⁷. This suggests that the real cost of electricity for consumers paying the Domestic Low Usage tariff has been declining over time, while consumers paying all other tariffs have had increases in real terms in the cost of electricity of between approximately 1.3% and 5.7%.

Emergency Tariff January 2012

In the past 12 months, the circumstances of the Emergency Power Plan have required TANESCO to seek an Emergency Tariff adjustment in order to cover the additional costs of the plan. This application incorporated the costs TANESCO believed it was not covering under the existing tariff structure. Some of the features of the discrepancy between TANESCO’s initial estimates of the appropriate adjustment and EWURA’s eventual decision are pertinent for this discussion.

During its early deliberations, TANESCO submitted alternative development scenarios, with a different selection of projects highlighted as forming the basis for its costs to service its customers. Alternatives were presented as TANESCO had difficulty with the degree of certainty it was able to place on the costs, scale and timing involved in certain projects being developed by IPPs under MoUs or otherwise. While these situations are not ideal, they have the potential to arise with generation development, and minimising their impact is a part of the project cycle management process. However, they become more problematic when information is not passed on to the regulator in a timely manner, and the tariff setting process is at least temporarily obstructed while the information asymmetry is resolved. More particularly, and more within TANESCO’s ability to resolve, is the issue of information supply. This is something which EWURA and TANESCO should be able to resolve between them in conjunction with and under the leadership of MEM especially now that there is a national team in place to manage the power sector expansion plan. TANESCO has very detailed information on its LCGP. It should now be possible for EWURA to have full and

⁷ Source: IMF World Economic Outlook Database, October 2012. End of period consumer prices for 2006 and 2011.

timely access to that information and so ensure that it has full information when considering tariff applications.

EWURA is currently undertaking a Cost of Service Study (COSS), with the assistance of independent consultants, to determine TANESCO's current costs of providing its electricity service, for the purposes of setting appropriate tariffs which reflect its efficient costs and reflect consumer interests. It should be noted that the COSS in its current form has been based significantly on the updated five-year development plan. The COSS analysis has involved discussions with TANESCO on its costs, which should allow for appropriate adjustment of the information in the 2011 PSMP update in completing the study.⁸ This requires careful attention from the national team dealing with the PSMP update process.

The International Monetary Fund has twice put the issue of tariff setting as a structural benchmark for reviews of its Policy Support Instrument. The current benchmark for August 2012 is: "Regulatory authority [EWURA] completion of cost of service study for the power utility, TANESCO, and implementation of any findings in regard to the power tariff regime." (IMF 2012 :23). Whilst the underlying macroeconomic rationale given for this, that it "addresses" contingent liabilities by ensuring financial viability of TANESCO, is sensible since the contingent liabilities and associated fiscal risks of the Government in respect of TANESCO are significant and growing, the setting of an expectation of regulatory action in an agreement between the Government and a key national development partner is not in line with institutional arrangements for sector governance and in particular the mandate and hence independence of the regulator. Moreover, as important as it is to set cost reflective tariffs, that would not and should not necessarily remove the contingent liabilities. Even with cost reflective tariffs it is unlikely that even with a re-capitalisation of TANESCO that lenders working with TANESCO would not seek guarantees from its shareholder.

3.2.4.2 Small Power Producer (SPP) Tariffs

SPP tariffs⁹ for main grid supply were set by EWURA at TZS 192.37 for 2012, a rise of 26 per cent from 2011. Supply of energy from small renewable generators to the main grid were set by EWURA at TZS 192.37 for 2012, a rise of 26 per cent from 2011¹⁰.

The SPP tariff is set as the moving three-year average of the simple average of the long run marginal cost of generation (including taxes on investments and fuel) and the cost per kWh of avoided generation.

The main drivers of the increase in 2012 were a 12 per cent depreciation of the TZS/USD exchange rate applied to the LRMC calculation and a 153 per cent increase in the cost of thermal generated electricity produced and bought by TANESCO based on an assumed 74 per cent increase in the delivery of thermal generation to the TANESCO grid giving an increase of 47 per cent in the recognised kWh cost of avoided generation.

⁸ EWURA is currently reviewing its approach to setting tariffs; in future, it envisages identifying appropriate tariffs for each of the generation, transmission and distribution of electricity, rather than a single tariff covering all costs. While TANESCO will retain the right to charge for the three separate tariffs for the immediate future, the exercise will give greater clarity to both TANESCO and EWURA as to where TANESCO's major cost exposures lie.

⁹ This is the base tariff. There is an adjustment for wet and dry season supply of -10 per cent and +20 per cent respectively.

¹⁰ This is the base tariff. There is an adjustment for wet and dry season supply of -10 per cent and +20 per cent respectively.

The costs of thermal generation for 2012 were estimated, using the information provided to EWURA by TANESCO, in its emergency tariff application, as total capacity charges of TZS 288 billion¹¹ (including capacity charges for the EPP of TZS 116 billion and IPP capacity charges of TZS 137 billion). The share of fuel and variable operations and maintenance costs in the kWh cost of thermal generation was calculated to be 66 per cent up from 56 per cent in 2011 with a corresponding change in the share of capacity charges.

Table 3.5 Small Power Producer tariffs 2008-2012

TZS/kWh

	2008	2009	2010	2011	2012
SPP Main Grid	100.4	96.11	110.13	121.13	152.4
SPP Mini Grid		334.83	368.87	380.22	
Price Cap adjustment %		6.41		8.78	9.68

Source: Calculation from EWURA Orders

3.2.5 Subsidies

Another of the major adjustments EWURA has made in assessing the emergency tariff application, and will continue to apply, including in the COSS, is for subsidies TANESCO receives from the GoT, be they explicit or implicit. Adjustments already made by EWURA have included loans from the GoT to TANESCO, which were converted into grants, and subsidies and tax exemptions for fuel costs. Other adjustments are made for Government payment of the debts of TANESCO without seeking recompense from TANESCO. As with the efficient costs of service, a study is currently being carried out by independent consultants on the range of explicit and implicit subsidies being applied through the power sector, particularly within TANESCO's accounts. Therefore, this discussion will not seek to analyse the various subsidies, but defer to that report.

The challenge set down by the subsidies being paid to TANESCO is that EWURA adjusts calculations of the true cost of service to accommodate them, meaning that tariffs only recover those costs not already covered by the subsidies. The Government should be aware of the accompanying increase in tariffs if it were to remove all subsidies, particularly the implicit ones. If the Government were to set out much more explicitly what subsidies it wished to provide TANESCO, or provide electricity consumers, EWURA will be able to make much more straight-forward adjustments to the tariffs, allowing TANESCO to recover the full costs of service through the tariffs it charges customers. This should then give a more accurate picture of where operational and financial challenges within TANESCO lie, and give it a greater opportunity to improve its financial health.

3.2.6 TANESCO's revenues and financial health

As already noted, TANESCO's main source of revenue is the regulated tariff it is allowed to charge by EWURA. EWURA seeks to base this on fair operating costs, but has difficulty in obtaining accurate, timely, reliable and sufficiently detailed information from TANESCO to assess these. If the tariffs that EWURA sets are ultimately not based on a proper assessment of TANESCO's

¹¹ Calculated using exchange rates as per EWURA's tariff order.

costs, it runs the significant risk of not recovering sufficient revenue to be financially viable. While it is acknowledged that setting fair tariffs will give assistance to TANESCO's financial health this observation is claiming that this is the only measure that may be taken to restore it.

A full review of TANESCO's financial health is beyond the scope of this discussion, but it is sufficient to highlight the role that cost-reflective tariffs can play in this, and the implications of fair tariffs not only for TANESCO's financial health, but also for the development of the wider power system.

As TANESCO is currently the purchaser of electricity generated for grid transmission by IPPs and SPPs, these entities have to factor appropriate counter-party risks, including the financial health of TANESCO, into their investment decisions. If the private entity's due diligence process identifies the counter-party as a financial risk, it will likely either absorb the risk itself, or not carry out the generation project.

If the IPP or SPP decides to absorb the risks itself, it will have to price that risk into any negotiation it has with TANESCO and EWURA. As with the guarantee, this will mean the price will be passed on to consumers through a higher tariff. This is an avoidable cost if TANESCO's financial health were to be restored.

Where projects are not carried out, there will be implications for the overall LCGP process through a reduction in the development options available (for capacity which will connect to the grid), which will likely lead to more costly options, and higher tariffs to cover these, or continued supply shortfalls which impose a huge cost on the economy. For projects which are off-grid, the implications will be more directly felt by a smaller group of potential customers, who are likely to be the rural poor, who do not get access to a reliable supply of electricity.

The state of TANESCO's financial health also has implications for the discussion of its potential unbundling into separate generation, transmission and distribution (and potentially supply) businesses. One argument for retaining the present structure at least *pro tem* is that creating an internal operational and accounting separation while remaining under single ownership will allow more detailed analysis of where there is a mismatch between revenues and expenses, highlighting specific opportunities for improved financial management. This is the approach, which EWURA is heading towards with its design of different cost and tariff analyses for each of the generation, transmission and distribution businesses within TANESCO. A further argument, which is complementary to the first, is that before the different aspects of TANESCO's business can be opened to private sector competition (a step beyond creating an electricity market), TANESCO must be restored to a state where it is able to transmit and distribute electricity efficiently, so that its financial position is not a hindrance to further development.

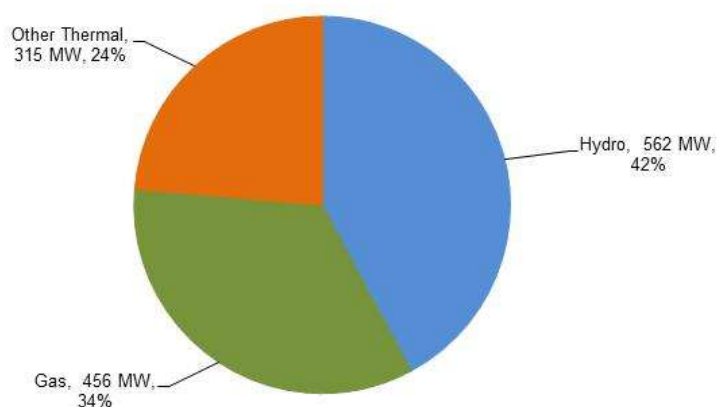
3.2.7 Unconstrained demand levels

In the 2011 JESR, it was observed that demand levels were potentially overestimated, and therefore led to overestimates of the required supply capacity. The rationale for such high estimates, and in particular, high growth rates in maximum demand (from 955 MW in 2011 to 1,884 MW in 2015, an annual average growth rate of 18.5%) was the expected development of new mining operations.

3.2.8 Generation mix

As of mid-2012, Tanzania's total installed capacity was 1,333 MW¹². The mix of power generation is 42% hydro, 34% natural gas and 24% other thermal, as illustrated in Figure 3.2. Planned future capacity additions are detailed in Section 3.2.2. The 'Other Thermal' category is primarily made up of diesel plants contracted under the Emergency Power Plan, plus the IPTL HFO plant. As discussed in Section 3.2.2, the choice of generation mix is developed to fit the forecast demand profile, particularly the different profiles of base load and peaking demand.

Figure 3.2 Fuel shares of installed Capacity as at June 2012



Source: TANESCO information provided for this assignment

3.2.9 Capacity utilisation and power outages

The utilisation of installed capacity is measured as the total kWh generated by a particular generation plant divided by the total potential kWh that could be generated if that plant was run constantly at full capacity over the same period. There are a variety of possible reasons for plant capacity not being fully utilised:

- Poor hydrology in hydropower plant giving insufficient water to run the turbines
- Insufficient availability of fuel for thermal plants, owing to weaknesses in the fuel supply chain, or an inability to meet the costs of fuel
- Intentional shut-down where the costs of running the plant exceed the revenues generated, e.g. due to high fuel costs, or an inability to meet costs
- Planned and unplanned (faults) maintenance of plant
- Insufficient demand to run plant (should only apply to peaking plant and capacity held in reserve)
- Load shedding, when demand exceeds available supply and services are cut temporarily to ensure system stability, leaving some plant idle despite the high underlying level of demand

¹² Does not include Ubungo 2

Table 3.6 records the total generation of each of the generation units for the 12 months to June 2012, as well as the unserved energy (from load shedding, faults and maintenance) for the same period.

Table 3.6 Power generated and Unserved Energy for the year to June 2012 (GWh)

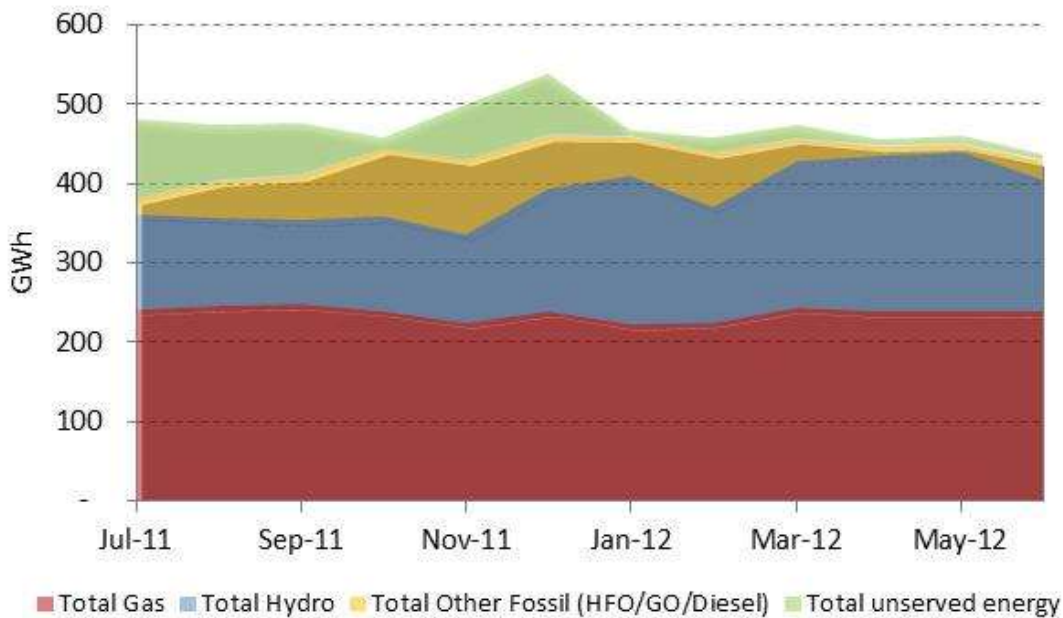
Plant	Installed Capacity (MW)	July	August	September	October	November	December	January	February	March	April	May	June	Total
Kidatu	204	33.9	33.1	34.2	34.0	41.6	65.5	75.8	61.6	82.4	80.3	69.5	65.5	677.4
Kihansi	180	64.5	54.0	47.5	46.8	38.7	56.9	58.7	45.4	57.9	73.9	82.6	57.4	684.3
Mtera	80	6.7	9.0	9.8	11.0	15.2	15.5	21.5	26.7	26.7	24.2	20.7	27.4	214.3
Hale	21	-	-	-	-	-	-	-	0.7	3.8	4.0	6.2	2.4	17.0
New Pangani Falls	68	12.9	12.7	11.5	24.8	14.2	14.8	28.9	8.7	11.6	12.1	20.4	11.7	184.3
Nyumba ya Mungu	8	2.5	2.4	2.0	2.0	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.7	23.5
Uwemba	1	0.1	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2.3
Total Hydro	562	120.6	111.4	105.1	118.8	111.7	154.8	187.0	145.0	184.4	196.6	201.5	166.3	1803.1
Songas	189	110.8	116.6	106.3	106.6	94.5	109.2	117.8	113.2	119.2	120.2	122.9	123.9	1,361.2
Ubungo Gas Plant 1	102	49.9	45.8	49.5	51.1	55.1	59.5	27.9	34.9	62.4	60.0	59.1	56.5	611.8
Tegeta Gas Plant	45	30.8	31.2	28.1	24.0	27.4	31.1	30.3	29.4	28.6	26.8	25.1	28.0	340.9
Symbion Ubungo Gas / Jet A1 ¹³	120	50.3	52.8	64.6	58.0	47.8	40.1	46.4	49.0	34.3	31.1	31.2	31.4	537.0
Total Gas	456	241.8	246.4	248.5	239.8	224.9	239.9	222.4	226.4	244.6	238.2	238.3	239.9	2851.0
IPTL	103	18.6	45.7	48.7	41.0	47.7	30.1	34.3	40.2	27.7	12.2	6.5	21.3	373.9
TanESCO Diesel Units	7	0.6	0.4	0.7	0.2	0.8	0.1	0.0	0.5	0.5	0.3	0.3	0.2	4.6
Ubungo Diesel - Aggreko	50	-	-	7.5	30.0	20.0	13.4	10.2	15.2	-	-	-	-	96.4
Tegeta Diesel - Aggreko	50	-	-	-	14.5	25.0	14.5	4.3	12.2	-	0.5	3.6	1.1	75.7
Dodoma Diesel - Symbion	55	-	-	-	-	-	7.9	1.3	0.0	-	-	-	-	9.2
Total Other Thermal (HFO/GO/Diesel)	315	19.2	46.1	57.0	85.7	93.5	66.0	50.2	68.0	28.2	12.9	10.3	22.6	559.8
Total System	1333	381.6	403.9	410.5	444.3	430.1	460.7	459.6	439.4	457.2	447.7	450.1	428.8	5213.9
Load shedding		89.6	63.7	51.0	4.1	63.7	1.1	1.3	9.1	6.5	1.6	0.5	0.2	292.5
Faults		9.1	3.1	12.6	5.6	3.1	62.1	2.8	3.7	6.6	3.2	2.7	3.5	118.1
Maintenance		0.8	2.0	0.8	2.4	2.0	14.1	3.2	6.1	3.0	3.1	5.5	3.9	46.9
Total Unserved Energy		99.6	68.8	64.4	12.1	68.8	77.2	7.3	19.0	16.1	7.9	8.7	7.5	457.5

Source: TANESCO information provided for this assignment

¹³ The fuel used in the Symbion Ubungo Plant may be either Gas or Jet A1, if the gas supply is insufficient. The data of this breakdown have not been provided.

The capacity contracted under the EPP is included within the 120MW of Symbion’s Ubungo Gas / Jet A1 plant, and in all the plant under the ‘Other Thermal’ category with the exception of TANESCO’s diesel units. These data are represented graphically in aggregated form in Figure 3.3.

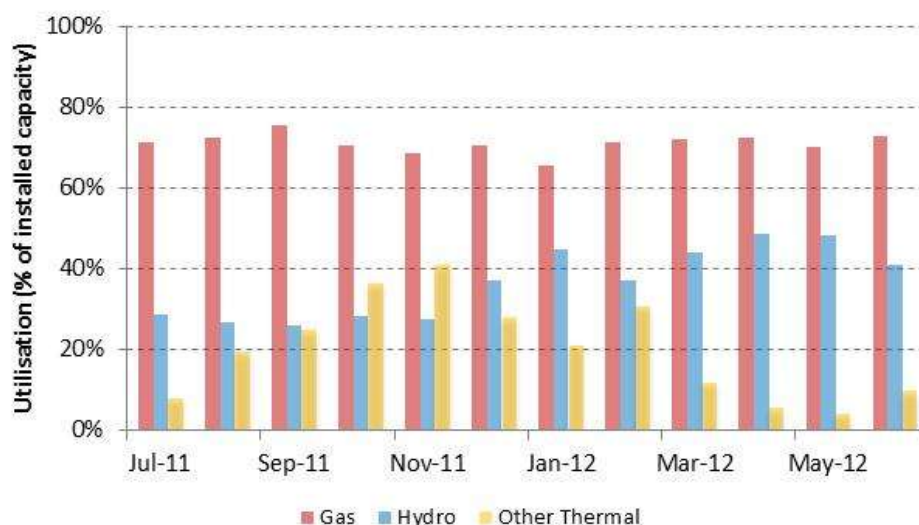
Figure 3.3 Power generated and Unserved Energy for the year to June 2012 (GWh)



Source: TANESCO information provided for this assignment

For more detailed analysis, it is useful to understand the utilisation of the installed capacity. From the date presented in Table 3.6, Figure 3.4 shows the utilisation of installed capacity for the 12 months to June 2012.

Figure 3.4 Utilisation of Installed Capacity for the year to June 2012¹⁴



Source: TANESCO information provided for this assignment

Some general trends may be observed from these data above. Firstly, low hydropower utilisation (due largely to poor hydrology) in the early part of the period is likely to have been a significant contributor to load shedding, as the energy generated was insufficient to meet the existing demand. With the exception of November 2011 (which appears somewhat of a spike), the requirement for load shedding was reduced from around October/November once the EPP became active. From March 2012 onwards, water volumes returned to more favourable levels and utilisation increased, allowing for a reduction in the more expensive (in marginal cost terms) EPP generation plants in approximately the same magnitude as the load shedding earlier in the period.

The observed levels of utilisation for the hydropower capacity are to be expected given the poor hydrology prior to and during the period. Even under optimal hydrological conditions, hydropower capacity may not run much above 50% if it is being used as peaking plant.

Utilisation of the gas capacity is also mostly as it might be expected. The Songas, Ubungo 1 and Tegeta plants are consistently generating at a level around 80-90% of their capacity, which is a standard level of utilisation for gas plants, even when being run as baseload plant – while a plant may be 100% operational, it requires being shut down or running at reduced capacity from time to time for planned maintenance. The utilisation of Symbion’s Ubungo plant reduced to around 36% by the end of the period. This level is unlikely to be due to planned maintenance, but given the lack of requirements for load shedding, it implies that there was insufficient demand for this plant to run, in addition to the financial and physical fuel constraints. At the same time, the Other Thermal plants were being reduced, with the exception of IPTL, which ran at around 29% in June 2012.

¹⁴ Utilisation is calculated as the total kWh generated per unit over 12 months divided by the potential kWh which that plant could generate if running constantly for 12 months. This is then multiplied by the MW of capacity available for all units in that category to give total MW utilised and unutilised. The percentage refers to a proportion of total installed capacity.

3.2.10 Evaluation of the Emergency Power Plan

The analysis in the previous section suggests that the requirements for emergency power supplied through the EPP to eliminate load shedding were broadly met. However, it is worth considering the question raised in the 2011 JESR as to whether it was necessary to contract additional capacity of the scale that the EPP introduced, given the low utilisation of the Other Thermal capacity even during the period when hydrology remained poor. The EPP-contracted capacity had a maximum monthly utilisation of 46% in November, but since February 2012, it has not been utilised at more than 20% of its capacity¹⁵. In addition, there was unutilised capacity in the existing Symbion Ubungo Gas/Jet A1 plant and the IPTL HFO plant. If these two plants were more fully utilised (i.e. up to 85-90% over a month), the capacity that was ultimately supplied by other thermal plants could have been supplied solely by TANESCO's diesel plants, which would have removed any need for the Aggreko and Symbion plants to be run. It is acknowledged that some contingency would still be needed for continued poor hydrology and reserve capacity, however greater consideration could have been made of the costs of load shedding (direct and indirect) as an alternative to the costs of contracting the additional EPP capacity.

TANESCO incurred liabilities (through capacity charges) for this contracted capacity regardless of whether it was used for generation. It is currently paying approximately TZS 27 billion per month in capacity charges, which when estimated on a per kWh basis for the different plants based on actual utilisation equates to approximately 20c/kWh for Aggreko's rented diesel plants, or 340c/kWh for Symbion's rented Jet A1 plants in Arusha and Dodoma (owing to utilisation rates of 0% and 2% respectively for the 9 months from October 2011)¹⁶.

Incurring additional costs which were not related to the costs to serve existing customers from the capacity which was utilised (as the power was not required) is likely to have contributed to TANESCO's significant requirement for an emergency tariff increase (which TANESCO assessed as being at 155%, but was approved by EWURA at 40%) and a commercial loan to support the obligations. The implications of this are:

- TANESCO's consumers are paying tariffs higher than should have been necessary, and
- TANESCO has incurred debts that require a commercial loan for funding. Given this loan has not been contracted, it is unclear how TANESCO has been funding these expenses, if it has been paying them at all. Without data from TANESCO, it is not possible to answer this question definitively.¹⁷

These points highlight not only the implications of the planning process which did not place enough weight on a downside scenario based around poor hydrology restricting the utilisation of the hydropower generation capacity, but also the weaknesses of the EPP planning process which contracted expensive generation capacity which was ultimately not utilised.

¹⁵ This estimation includes the existing gas power from Symbion as this has not been separated in the data provided by TANESCO. This means the estimate is likely to be biased upwards.

¹⁶ The estimates of actual capacity charges per kWh are calculated by firstly estimating the total monthly capacity charge for the Aggreko and Symbion plants, based on EPP document information. The document provides a cost in USc/kWh, which is assumed to be based on 85% capacity utilisation, which can generate the total monthly cost. This is then allocated across the average actual kWh generated by these plants over the nine months from October 2011 (once the EPP was fully contracted).

¹⁷ Sector stakeholders will have seen press reports that TANESCO has been increasing its trade creditors.

3.2.11 Demand and Supply for 2012-2013

MEM's priorities as set out in the budget for 2012/13 are focussed on supporting increased and reliable power supply in particular: (i) power stabilisation in Dar es Salaam; (ii) increasing capacity through diverse power generation sources; and (iii) enhancing electrification of district headquarters and rural areas.

3.2.12 Electricity contribution to GDP

Currently available statistics for the contribution of the electricity sub-sector to GDP do not allow an identification of the electricity sub-sector separate from other sectors, including the gas sub-sector.

For the purposes of national accounting, the National Bureau of Statistics (NBS) aggregates the individual categories of the International Standard Industrial Classification (ISIC) into 21 sections. Section D35 includes Electricity, gas, steam and air conditioning supply. For the calculation of gross domestic product the NBS uses 15 categories of which category E is electricity, gas and water supply.

In the 2010 National Accounts the sector "Electricity, Gas and Water Supply" covers all establishments engaged in the generation, distribution and transmission of electricity and gas. It also includes production and distribution of water to various consumers. However, the small-scale electricity generated in the country by individuals/households such as solar energy (and also the 300MW of standby generation) is not captured due to lack of data.

In the Annual Survey of Industrial Production (ASIP), the NBS seeks data from economic units, which engage under single ownership or control in one, or predominantly one kind of economic activity at a single physical location i.e., an individual firm, mine, factory or workshop. For forms that cannot provide separate data the enterprise is used as the unit of enquiry. The information collected, in addition to general information, includes: employment, labour costs, inputs/purchases, output, inventory of working capital and expenditure on fixed assets. The data is used to: (i) generate information on the contribution of the industrial sector to the overall economy; (ii) compute the national accounts estimates; and (iii) construct input-output tables and assess. Section C of the industrial sector comprises electric power generation, transmission and distribution.

The most recent published report on the ASIP that is available on the NBS website (<http://www.nbs.go.tz>) is for 2008. A key conclusion of that report was that electricity account for over 60 per cent of the energy costs of manufacturing industry and that one of the major problems facing manufacturing industry was the poor quality of power supply. Ministry of Industry, Trade and Marketing (2008:75).

The information used by the Ministry of Finance in its assessments of the contribution of the "electricity" sector indicates a contribution of the order of 1.7 to 2 per cent of GDP. It is not clear what is included in the definition of electricity. Gas and petroleum extraction are treated as mining and quarrying activities. Whether gas processing and transportation through pipelines is included as an extraction item requires review.

In its analytical tables for the 2010 National Accounts, the NBS shows a contribution of electricity and gas (and not including water) of 1.8 per cent of GDP.

During the course of stakeholder interviews, the NBS has indicated that it will seek in future to provide disaggregated estimates of electricity and gas gross value added. This will be done in conjunction with the re-basing of constant price national accounts estimates to 2010.

NBS has provided the review with the input-output table and social accounting matrix used for national accounts estimates. A preliminary assessment shows that electricity enterprises were not separately identified from all utilities in the 2000 Social Accounting Matrix so there is unlikely to be much information that can be usefully obtained on electricity and gas contributions to GDP. In the 1992 Input–Output table, production and distribution of electricity was identified as a distinct account (65). Gas was not identified. The Input-Output table is now 20 years old and cannot be meaningfully used to draw conclusions as to the inter-relationships of the electricity sub-sectors with other economic activities in 2012.

4 Petroleum and Natural Gas Review

4.1 Action items from 2011 JESR Report

This section addresses points raised in the 2011 JESR Report which are not covered in more detail in sections pertaining to the terms of reference for the 2012 JESR.

4.1.1 Implement bulk national procurement of liquid fuels

Following on from the 2011 JESR, the GoT has formed the Bulk Procurement Technical Committee (BPTC), with its secretariat based at EWURA. Organisations that contribute members of the BPTC are TPDC, Tanzania Revenue Authority (TRA), and MEM (also providing the Chairperson), Ministry of Transportation and private oil companies. The BPTC meets once a month, with a role to determine the liquid fuel needs of the country, and to report to the GoT once per month, particularly if there are issues that require the GoT's attention.

The forecast for liquid fuel needs is taken by the Petroleum Importation Coordinator (PIC), which has as its members all petroleum trading companies engaged in supplying Tanzania. The PIC determines a pre-qualified shortlist of companies, and then coordinates the tendering, evaluation, purchasing arrangements, and monitoring of prices. The ultimate supply of liquid fuels may be sourced from multiple companies, each coordinating their own share, but through this single contact point. If the PIC doesn't perform to the satisfaction of the BPTC, it can take on the coordination role itself.

Since the implementation of these arrangements, supply more closely matches demand, the quality of the fuel imported has improved, and prices have stabilised. Pricing arrangements are now much more transparent, and single pricing in the contracts has meant pump prices are also more open.

EWURA will conduct a Study on Establishment of Wholesale and Retail Margins in the Tanzania Petroleum Downstream industry. The procurement process is ongoing the study will take about 2 months to complete and so it could be available in mid 2013.

4.1.2 Support research into alternative transport fuels

TPDC has stated that there is still confusion in the approach being taken with respect to alternative transport fuels, due in part to the multiple actors involved, which include the Ministries of Energy, Agriculture, Land and Investment, even since the coordination role was given to MEM. A task force has been set up to strengthen the institutional framework for biofuels, with support from SIDA and NORAD. The first role of the task force is to set up guidelines for investors interested in making investments into the sector.

Companies have already expressed interest in utilising sugar for ethanol production, and palm oil. The GoT is participating actively in a project with Petrobras on blending ethanol and gasoline. Early research into this opportunity found that the gasoline imported into Tanzania already contained high levels of ethanol due to illegal mixing off-shore, and therefore there was little opportunity for Petrobras to contribute its own mixing programme. Following this, Petrobras began discussions with the major oil companies to promote the importation of purer fuel oil, with ethanol blending being undertaken on-shore in Tanzania. However, this process has been halted following the expansion and setting up of the bulk procurement arrangements.

4.2 Gas supply

4.2.1 Background

Tanzania has known of its gas reserves for at least a couple of decades, but in the past 12 months in particular, significant offshore exploration activity has increased markedly, and vast reserves of natural gas have been found. At the time of writing, estimates of the total reserves were thought to be around 30 tcf, and there is the potential for this volume to increase.

Existing exploration has occurred under the Petroleum Exploration and Production act of 1980, which sets out the terms for the Model Production and Sharing Agreement (MPSA). However, TPDC, MEM and other parties have identified that the Act, associated Policy, and the MPSA are not sufficient to deal with the scale and complexity that is associated with managing such vast reserves of natural gas. As such, MEM, with TPDC, is reviewing the legal and policy frameworks around Tanzania's petroleum and gas industry in order to create an environment that is more appropriate for the landscape in which Tanzania now finds itself.

4.2.2 Policy and legislation for gas supply

MEM and TPDC are currently in the process of reviewing and redrafting existing documents, and preparing new ones. The two major documents currently being developed are the Natural Gas Policy, and the Natural Gas Act. The process is led by MEM.

A workshop was held in Bagamoyo for the week of 3-7 September, involving various stakeholders in a general discussion on upstream issues, including representatives from MEM, TPDC, and the Planning Commission. Following this week, a new Petroleum Policy for Upstream was drafted, for approval by the Permanent Secretary and Senior Management of MEM, before being distributed more widely to stakeholders for a consultation process.

The initial focus is on upstream activities. Giving due consideration to downstream issues, even at this stage, is important for the development of appropriate upstream action plans. This is important too even if downstream issues may be considered more appropriate for the Natural Gas Utilisation Master Plan (NGUMP). Every unit of natural gas extracted will have a direct impact on Tanzania downstream, whether it is used domestically in Tanzania, or exported, meaning Tanzania is the beneficiary of the sale of natural gas. Understanding the downstream drivers of the use of both gas and the proceeds from the sale of gas will determine the rate at which the known gas reserves are utilised, and can also influence the process for the continued exploration for additional reserves, which are critical upstream issues. At this stage, it is not necessary to have details around downstream options in the policy, but simply an explanation of how these will be addressed.

The exercise to draft the new upstream legislation is running concurrently with the drafting of the new policy. By running the exercises concurrently, MEM can firstly ensure that the documents align, and secondly expedite the development of the legal framework without additional delays. MEM is being supported in the drafting of both the policy by Tanzanian consultants in REPOA. MEM has scheduled the presentation of the new legislation to Parliament in February 2013.

The preparation of the National Gas Utilisation Master Plan is also being carried out at the moment. This plan will formulate more clearly the detailed approach that MEM, TPDC and other relevant stakeholders will take to establish the appropriate mechanisms for development of the gas resources. The process for developing the plan is being managed by MEM, and carried out internally within Tanzania, with technical assistance being provided by international consultants. By the time the legislation is presented to Parliament, the NGUMP should be in its final stages.

While the halt on granting exploration licenses is in place, TPDC is reviewing the MPSA, to be agreed with parties engaging in exploration. In the 2011 JESR, it was noted that the existing MPSA (from 2008) perhaps left too much room for negotiation with exploration companies. Given their experience in negotiating such contracts, such companies had the potential to push the balance of the negotiation more in their own favour than TPDC might have wished. The review of the MPSA will look to tighten the areas that have been deemed too open. The revised MPSA should be available by the end of 2012, and its use should coincide with the next round of licensing.

4.2.3 Discussion

Tanzania's natural gas reserves, the policy and legal frameworks, and the government's capacity to manage the significant changes that are likely to arise, have come to the fore in the last year and are under discussion with various stakeholders, including within the GoT and its development partners. These discussions also include contacts with very experienced private sector partners keen to engage MEM in the development of Tanzania's resources, for which MEM has taken steps to design an appropriate legal and policy framework, and for which MEM would like assistance. What is critical for the benefit of MEM in the immediate term, and for Tanzania more broadly, is that development partners in particular coordinate their approaches to MEM for offer assistance. A coordinated approach will not only give focussed support to MEM, but will also allow the development partners to channel their limited resources better. The Joint Energy Sector Working Group is the ideal forum for development partners to discuss this issue with MEM.

In October 2012 a Petroleum and Gas Conference will be held in Dar es Salaam which will focus on benchmarking the institutional, policy, legal and regulation framework, raising awareness of developments in the sector, and prospects of the upstream, midstream and downstream investments and development in the oil and gas industry in Tanzania.

One of the action points from the 2011 JESR focused on continued petroleum exploration, which can be taken to include natural gas. It is clear that exploration has continued, with significant results. A positive additional note is that TPDC announced a request from MEM that the start of 4th Tanzanian Offshore Licensing Round 2012 be delayed until after the Government has been presented with the new gas policy. Gas sub-sector achievements in 2011/12¹⁸

An EPC agreement was signed for the construction of gas processing plants at Songo Songo and Mnazi Bay and a pipeline from Mnazi Bay via Somanga Fungu to Dar es Salaam.

Five Production Sharing Agreements have been signed (Rukwa, Kyela, Block 8, Kilosa, and Pangani) with Heritage Oil, Swala Energy (with Otto Energy), and Petrobras,

4.2.4 Gas sub-sector priorities for 2012/13

MEM's gas sub-sector priorities for 2012/13 are:

- Gas policy and legislation;
- the finalisation of the National Gas Utilisation Master Plan; and
- the construction of the natural gas pipeline from Mtwara to Dar es Salaam.

¹⁸ MEM (2012 [June]: 9

4.3 Capacity Building in Petroleum and Natural Gas

MEM is aware that exploitation of the recent gas discoveries will place significant demands on it and its agency TPDC to manage the major changes to the sector and indeed the whole economy that will come about. In order to address the challenge of ensuring the necessary organisational competence and to meet the related demands for new and newly skilled human capacity two new capacity building programmes have been initiated with development partners.

The Energy Sector Capacity Assistance Project (ESCAP) programme is project being developed in partnership by the World Bank and MEM. The scope of that agreement is being finalised to ensure an appropriate balance between the provision of external technical assistance and capacity building.

The World Bank's project appraisal documents indicate that ESCAP will assist the government to strengthen its capacity (i) to manage development of its natural gas resources in an efficient, transparent, accountable, and sustainable manner and (ii) to enhance the government's capacity to implement large and complex power generation projects on a PPP basis.

On the former point, the ESCAP programme is seeking to engage on sector policy development, education on the nature of the gas industry, safety and environmental policy, the Gas and PPP Acts, clearly defining roles and responsibilities, and institutional capacity building, including MEM, TPDC, EWURA, NEMC, OSHA and TANESCO, and selected educational institutions.

The second programme is at an earlier stage. The EU is funding a study to analyse the needs for capacity building in the gas sector, and is expecting to make further investment in capacity building through higher education, including engineering schools.

The GoT has also announced its own support for capacity building in the sector, providing support through MEM for higher education training, in partnership with TPDC and different institutes of higher education through Tanzania. At present, TPDC provides teaching services to the universities through some of its employees, operating in addition to their roles with TPDC. Funding for these activities is also coming from private companies and other development partners (e.g. NORAD).

4.4 Natural Gas contribution to GDP

As explained in 3.2.7, the gas sub sector contribution to GDP cannot be separated from that of the electricity sub-sector. In 2010, the two sub-sectors combined were estimated by NBS to contribute 1.8 per cent of GDP.

As noted in Section 4.2, estimates of Tanzania's Natural Gas reserves have increased significantly in the last 12 months. Any estimate of the contribution should analyse the current contribution and the expected contribution given the recent discoveries. Given the rate at which the estimates of total reserves are changing, a degree of flexibility in the assessment should be included.

A useful assessment of the contribution of Natural Gas to Tanzania's GDP should be contained in the Gas Master Plan. Among the expected uses of Natural Gas would be gas-to-power, industrial and domestic supply, and export to neighbouring countries and the international market. Therefore, Natural Gas can make both direct and indirect contributions to GDP, both of which can be analysed. The 2012 JESR will seek to review with the National Bureau of Statistics the existing estimates of the contribution of Natural Gas to Tanzania's GDP.

5 Renewable Energy

5.1 Progress review

The 2010/11 JESR set out the following action items for the rural and renewable energy sector.

1 Government to invest more in promotion of renewable energy sources: *Action: Next review of the Medium Term Expenditure Framework (MTEF) Q3 2011/12. Responsibility: MEM.*

2 Follow up on research for development of large-scale geothermal energy for electricity generation and utilise existing capacity in national research and higher learning institutions. *Action: After receipt of research reports. Responsibility: MEM - Task Force on Geothermal Energy.*

3 Scale-up of renewable energy technologies that have projects proved to be technically feasible and economically viable and beneficial to the society. *Action: In line with next update of MEM's Strategic Plan Q3 2011/12. Responsibility: MEM - Assistant Commissioner, Energy Development*

4 Follow up on implementation of large-scale wind power projects: *Action: Immediate. Responsibility: MEM Directorate of Policy and Planning and Assistant Commissioner - Renewable Energy.*

5 Promote demand side management through energy efficiency and energy conservation: *Action: Implement existing proposals from 2011/12. Responsibility: MEM - Assistant Commissioner, Renewable Energy and Director of Policy and Planning*

6 Improve availability of hydropower through research and scientific-based resource management. *Action: In line with review of national energy policy. Responsibility: MEM - Assistant Commissioner Energy Development and Director Policy and Planning.*

7 Encourage large-scale growers of oil seed for biodiesel to build processing plants in order to promote the use of biodiesel in the country. *Action: In line with next update of Strategic Plan. Q3 2011/12 Responsibility: MEM - Assistant Commissioner, Renewable Energy and Director of policy and Planning.*

8 Support research in ocean energies: *In line with next update of MEM's Strategic Plan Q3 2011/12. Responsibility: MEM - Assistant Commissioner, Energy Development*

9 Facilitate further technical support to companies that are involved in the manufacture of renewable energy equipment such as small wind turbines and small water turbines. *Action: Ongoing activity. Responsibility: REA.*

10 Rural Energy Master Plan: This is to cover all forms of rural energy, but a primary motivation of the Plan is to prioritize rural electrification investments. There is a consensus that a *full-scale rural energy study is needed to prioritize investments properly, and also to explore the potential for renewables, including biomass and initiatives under GoTs SAGOT plan.* In line with contemporary thinking about a Master Plan, this should provide a guiding framework (strategy) rather than being a rigid implementation plan. When under pressure to implement sub-economic schemes, the RE Master Plan will be important in allowing REA to point to a well formulated basis for the promotion and approval of investments. The Rural Energy Master Plan should take into account the current EU-funded project entitled "Integrated Rural Electrification Planning" which is developing tools and methodology for REA and other stakeholders to carry out a participatory and strategic

electrification planning in 4 regions (Morogoro, Lindi, Dar es Salaam and Tanga). *Target date for REA to complete negotiations for funding and commence procurement of consultants: December 2011. RE Master Plan study itself to be completed within a year.*

11 Finalisation of the Biomass Energy Strategy (solid & gaseous). Action: Finalization of Biomass Energy Strategy (BEST) by next year.

5.1.1 Government to Invest More in Promotion of Renewable Energy Sources

Two major ongoing programmes that show how the government is addressing investment in renewables are the TEDAP/SSMP project and the National Biogas Programme. MEM has budgeted more than TZS 200 million to construct biogas digesters for public institution such as prisons, schools, and hospitals. MEM has done reconnaissance surveys in collaboration with TANESCO under MEM's budget and identified more than 10 sites that can be developed.

In solar PV, there has been an increase in applications especially in rural areas. Two projects on awareness and capacity building were completed. The UNDP-supported Transformation of Rural PV Market in Tanzania Project was completed in 2010 and a Sida/MEM Solar PV Project was completed in 2012. The two projects have contributed a lot in increasing the use of PV in Tanzania. For the entire country, the capacity of solar PV systems installed as Solar Home Systems (SHS) increased from 100kWp in 2005 and 5MWp in 2012.

There are no centralised utility solar PV systems installed yet. One investor wants to generate a total of 40MW; 5MW in each station in Kigoma starting with 5MW. Others have shown interest but have not gone far. The key constraint is tariff levels that will cover the costs. Potential investors want to sell electricity generated from solar PV at USc 20 /kWh. TANESCO sells electricity at 11 Cents/kWh. Also investors want to be paid in USD not TZS. Another challenge is that of competition with grid extension. A review of Standardised Power Purchase Agreements (SPPA) is ongoing to address these issues. The Renewable Energy Feed-In Tariff (REFIT) is under review by EWURA.

The role of REA is to promote development of rural energy projects including renewable energy resources. REA have started with Rural Energy Prospectus rather than Rural Energy Master Plan. An Integrated Rural Electrification Planning Project funded by EU, still ongoing with achievements in Morogoro, Pwani, Tanga and Lindi regions.

REA advises MEM on policy issues related to rural energy, for example, reduction of electricity connection of fees by 70% on average (from TZS 450,000 to 180,000). This new rate will start to be applied in January 2013. Another policy advice is the reduction of electricity connection cycle to 30 days. Also REA provides subsidies that enable low-income people to have access to modern energy. For example, anyone who connects power while the contractors are on site pays only the VAT component of the connection fees. They also get four pieces of CFLs.

5.1.2 Follow Up on Research for Development of Large-Scale Geothermal Energy

MEM is implementing some activities geared to the development of geothermal energy in Tanzania, with assistance of BGR of German. Surface exploration has been conducted in one area. In the mid 1970, 15 sites were investigated. The BGR project is in Songwe in Mbeya region. Samples were taken to Germany for analysis. Three locations were identified for drilling in April 2012. It is planned to drill two wells in October 2012. The budget that has been allocated for these activities in the 2012/13 Budget is enough to drill the two wells. The drilling will still be for investigation. It is not yet clear what the potential of these sites will be but one estimate of the potential of a site at Kiwira is of the order of 100MW.

There are plans to construct a geothermal power plant in the near future. MEM has is seeking funds from drilling production wells up to generation of power. MEM is preparing proposals for interested financing organisations for sites in Mbeya and Rufiji. There are potentially many other sites. It is unlikely that geothermal energy will be produced with 5 years.

In early 2012, MEM formed the National Task Force for Geothermal Energy Development The Task Force has nine members from MEM (Chair), GST (Secretary), TANESCO, REA, TAREA and UDSM. The Task Force is responsible for advising the government on the promotion and development of geothermal energy resources for the power production. The duties of the Task Force include but are not limited the following:

1. To review and recommend an appropriate institutional framework for promotion of geothermal development;
2. To develop the legal framework for development of geothermal resources;
3. To develop proposals for national capacity building for geothermal resource development;
4. To develop strategies for promotion of research and development in geothermal energy resources and technology;
5. To sensitize energy stakeholders including the public on geothermal resources; and
6. To develop road map for geothermal development in the country.

The Task Force reports to the Permanent Secretary of MEM. The task force is expected to complete its assignment within two years. The Task Force Action Plan includes development of a geothermal development plans in line with Power System Master Plan and the assessment of temperature gradient in Songwe geothermal field.

5.1.2 Scale-Up of Renewable Energy Technologies

UNDP is implementing an ambitious programme on “Sustainable Energy for All (SE4ALL)”, which was launched by the UN after the RIO summit in 2012. The programme aims at providing modern energy services for all by the year 2030. It identifies gaps, national plans and investment required. Tanzania is among the first tier countries. UN is ready to invest to bridge the gap, double renewable energy contribution, improve efficiency and achieve access to energy for all.

Ongoing projects being supported and implemented by UNDP are the small grants projects; low energy/efficient energy project. UNDP is working with MEM on scaling up of renewable energy projects. It has given USD 1 million to develop a USD 10 million project. Through other initiatives MEM will be able to bundle all potentials. The USD 1 million is for initiation and planning. UNDP is in the process of recruiting a Technical Advisor, who is an experienced energy expert to advise MEM and develop the projects.

UNDP and AfDB are implementing a USD 50 million programme for co-funding Scaling up of Renewable Energy Projects (SREP). They are negotiating with MEM to see which projects can be scale up. The objective of SREP is to support transformative and substantial investments for countries to move towards an economically viable, low carbon development pathway by utilizing renewable energy. AfDB is supporting the Government in development the SREP Investment Plan.

SREP requires that its funding is significantly leveraged. SREP will, in particular, require significant private sector investment/engagement. A delegation comprising AfDB, World Bank and IFC visited

Dar es Salaam in September 2012 to discuss with the Government the modalities for the SREP and agree on the scope and preparation timing of SREP IP that the Government has to submit to the SREP Sub-committee in order to firm up funding. The delegation met key stakeholders in Tanzania, to inform them about the SREP program and seek their views on renewable energy development priorities, experiences and challenges, what is required to transform these priorities to investments. The delegation also met with private sector actors to hear their views on priorities and issues on renewable energy development that the SREP IP should consider that are of importance to the private sector.

The Tanzania Domestic Biogas Programme (TDBP) is a national programme in the framework of African Biogas Partnership Program (ABPP). Tanzania is one of the thirteen countries in Africa that are implementing the programme. It is financed by various donors including the Netherlands government. HIVOS and SNV are the leading organisations. SNV provides advisory services, capacity building and networking. The main national implementing agent is CAMARTEC. It has partners in different regions called Local Capacity Builders (LCB). The programme started in 2011 and is to end in 2013. MEM was the chair of National Steering Committee. The project agreement requires government to contribute 8 per cent of project costs, but this has yet to materialise.

The funding arrangements require payment direct from the Treasury and not through MEM's budget. Funding from HIVOS is straight to project. MEM is seeking to change these arrangements in order for it to fulfil its proper role. Despite these funding issues the programme has recorded some success. Already 3,500 plants have been installed. The target was to install 12000 plants in four years i.e. 2009-2014. In the year 2011/2012, 1,500 plants were constructed. The target is to install 12,000 biogas plants. To date 3500 plants have been installed.

The challenge in the first year was the difficulty in mobilization. The programme has now picked up. It would probably not reach the target but a Phase II is under consideration. The programme promotes private sector development for sustainability and use market based dissemination, distribution policy linkage and development. The National Biogas Committee is chaired by the Commissioner of Energy and Petroleum. The Committee is not very active. The government has not fulfilled its financial commitment. This is one of the reasons for not reaching target. The programme operates on subsidies (12%). The cost of a household plant is TZS. 1.2 million. The user is responsible for the purchase of materials. The subsidy is on labour, and it is paid to the contractor after commissioning. The programme also links potential users with micro financing institution e.g. Mwangi Community Bank in Kilimanjaro region has lent approximately TZS 10 million to biogas plants users. The government through MoF signed a contract with HIVOS. The government has not contributed any funds to the project. Community banks are more interested than commercial banks.

CAMARTEC have made inputs in research and development by introducing the use of interlocking bricks for construction of the digesters and the Solid State Digesters (SSD) for arid and semi-arid area. Private sector involvement is through the contractors. The programme starts with new contractors or convinces existing contractors to deal with biogas plants construction. The programme requires having a policy on how to register small contractors and on waiver of tax on accessories for biogas plants e.g. cookers, lamps, engines. New design of digesters using plastic tanks (SIMGAS) has been introduced as urban model for biogas plants, utilizing solid bio waste. This is a joint effort between Simba Plastics and a Dutch company.

The Solid Biomass Energy Programme focuses on improved cook stoves, biomass briquettes, and the charcoal value chain, including governance and accountability. In cook stove technology, the programme is exploring how the industry can be viable.

The Integrated Renewable Energy Services Programme is a pilot project in the lake zone. The project will work on existing all renewable energy technologies e.g. solar, briquettes, etc. as one stop centre. The project includes market intelligence covering suppliers/enterprises, demand/users including NGOs and district government. SNV is currently piloting one private sector led intervention.

Mini-Grids Based on Micro Hydropower Sources to Augment Rural Electrification in Tanzania (GEF4 Project)

A UNIDO/GEF project on mini hydro was launched in June 2012. The project will run for four years. The stakeholders involved are: MEM, Division of Environment in the VPO, REA, TANESCO, CoET-UDSM, and private sector enterprises who are the executing agencies. UNIDO's cooperating agency is REA. The financing arrangements for the projects are as shown in Table 5.1.

Table 5.1 Financing Arrangements for GEF4 Project

Project Inputs	USD
UNIDO inputs (In-cash)	80,000
GEF inputs	3,350,000
Support cost on GEF contribution (10%)	335,000
Counterpart inputs	
• Rural Energy Agency (In-kind and Cash)	7,000,000
• Andoya Hydro Electric Power Company (In Cash)	2,500,000
• Behindertenhilfe Neckar-Alb (In-cash)	112,500
• Ministry of Energy and Minerals (In-kind)	36,000
• College of Engineering and Technology (In-kind)	50,000
Grand Total	13,463,500

This project will develop micro/mini hydropower based mini-grids in Tanzania to increase access to rural electrification. It will reduce GHG emissions resulting from the use of traditional energy sources. Micro/mini hydropower will substitute the GHG intensive diesel generators in areas where there is no electricity. Tanzania possesses substantial proven technical potential for generating power using small-scale hydropower particularly in highland headwater catchments. The potential for small-scale hydropower accounts for about 300-500 MW, of which, only around 24 MW has been developed so far. Wide development of micro/mini hydropower has not been realized, despite its potential and available opportunities. This is due to various reasons including lack of proper institutional structure to support the development of small hydropower schemes, lack of technical expertise, high cost and difficulties in sourcing and importing equipment and lack of local manufacturing capabilities/facilities.

This project aims at addressing most of these barriers by establishing a platform for the development of small-scale hydropower in the country. The activities will include:

1. Conducting detailed feasibility studies for the demonstration sites,
2. Building of capacity for the stakeholders in developing micro / mini hydropower based mini-grids and
3. Developing viable business model for micro / mini hydropower based mini-grid and
4. Demonstration of micro / mini hydropower plants for a cumulative capacity of at least 3.2 MW.

The project is expected to strengthen the policy, regulatory and institutional framework and supporting the micro/mini hydropower based mini-grid systems in Tanzania. The project is also expected to build necessary human and institutional capacities at all levels in order to achieve the scientific, engineering and technical skills and also the infrastructure which are necessary for the design, development, fabrication, installation and maintenance of micro / mini hydropower plants.

The proposed micro/mini hydropower based mini-grids to be setup under the project are expected to bring global benefits by reducing around 335,658 t CO₂e directly and around 2,685,185 t CO₂e indirectly, which otherwise would have resulted from the use of diesel generators, as it is the most common electricity source in Tanzania.

5.1.3 Follow Up on Implementation of Large-Scale Wind Power Projects

There are no large wind power generations that have yet started. Only small installations in institutions and households are happening. Two large companies have shown interest. They have planned to start generation in 2013 and 2014. One of the companies, Geo Wind Power (Originated from Power Pool East Africa - PPEA), has entered a joint venture with NDC and TANESCO and has managed to get loans from Exim Bank of China. The company is owned by Tanzanian Government (51%) which is contributed by TANESCO (25%) and NDC (26%) and PPEA (49%). A study on mapping of Wind Power is being coordinated by TANESCO. A company, Wind East Africa plans to generate 100MW then increase to 200MW. This is an IPP. Both companies will be generating in Singida region. Wind East Africa is a joint venture between JB, Six Telecoms and Aldwych (already generating wind in Kenya).

5.1.4 Improve Availability of Hydropower

This action point required specific actions to be taken to improve availability of hydropower through research and scientific-based resource management. There was no specific action that was mentioned by any of the stakeholders interviewed to address this action point. However, it is known that some projects, research and development, and higher learning institutions in the country and abroad are involved in scientific resource management studies, training and research. Two training workshops took place during the review period.

A workshop on sustainable hydropower development in Arusha in November 2011 was run by the International Centre for Hydropower (ICH), Trondheim, Norway in collaboration with the Centre for Environmental Design of Renewable Energy (CEDREN), focusing on 'Hydrological Risk'. This workshop was for the East African region and drew participation from other neighbouring African countries including Kenya, Uganda and Ethiopia. Most of the participants came from the energy sector including TANESCO, KenGen and KPLC and research and higher learning institutions including UDSM and Makerere University in Uganda. Experts from the Department of Water Resources Engineering at the University of Dar es Salaam were also involved in organising the workshop and as resource persons. The workshop included field activities in the nearby Nyumba ya Mungu Hydropower Plant.

The Department of Water Resources Engineering in collaboration with the Professorial Chair in Water Resources Management at the College of Engineering and Technology, University of Dar es Salaam organized a two-week on "Monitoring Floods and Drought in African River Basins".

5.1.5 Encourage large-scale growers of oil seed for biodiesel to build processing plants

The action point was to encourage large-scale growers of oil seed for biodiesel to build processing plants in order to promote the use of biodiesel in the country. Companies are producing bio diesel

from jatropha, mostly in Arusha region. There is a project at MEM which started in 2010 for two years. It has now been renewed for two years. Liquid biofuels production in Tanzania is still a controversial issue not least in terms of implications for food security. The building of large scale processing plant is not encouraged at the moment as the government does not encourage large-scale production of oil seeds.

5.1.6 Support Research in Ocean Energies

There has been no any specific action on this from public sector stakeholders. This does not seem to be a priority for the Government, at least for the time being. The only research work that is known to have been undertaken is the ongoing PhD research in the Department of Mechanical and Industrial Engineering, University of Dar es Salaam that was reported in JESR 2011. However, it is important to note here that South Africa is in the process of building the first ocean energy power plant in Durban.

5.1.7 Technical Support to Local Manufacturers of Renewable Energy Equipment

This action point was to facilitate further technical support to companies that are involved in the manufacture of renewable energy equipment such as small wind turbines and small water turbines.

Ministry of Natural Resources and Tourism (MNRT) have supported the development and installation of a 15kW cross flow turbine for Matombo in Morogoro region. Arusha Technical College has been contracted for development of 15 sites in Arusha. Space Engineering has been supported to procure a 24kW gasification plant from India and its installation in Kongwa district. Thereafter such plants are to be manufactured locally.

5.1.8 Rural Energy Master Plan

This is to cover all forms of rural energy, but a primary motivation of the Plan is to prioritize rural electrification investments. There is a consensus that a full-scale rural energy study is needed to prioritize investments properly, and also to explore the potential for renewables, including biomass and initiatives under GoT's SAGOT plan. In line with contemporary thinking about a Master Plan, this should provide a guiding framework (strategy) rather than being a rigid implementation plan. When under pressure to implement sub-economic schemes, the Rural Energy Master Plan will be important in allowing REA to point to a well-formulated basis for the promotion and approval of investments. The Rural Energy Master Plan should take into account the current EU-funded project entitled "Integrated Rural Electrification Planning" which is developing tools and methodology for REA and other stakeholders to carry out a participatory and strategic electrification planning in 4 regions (Morogoro, Lindi, Dar es Salaam and Tanga).

REA has started with a Rural Energy Prospectus rather than Rural Energy Master Plan. The Norwegian government has agreed to fund. They have prepared ToR and invited tenders. IED of France has won the tender and they have started the process in September 2012. The Rural Energy Prospectus will define energy resource, activities, potential actor and areas to be funded. It will cover the whole of mainland Tanzania.

5.1.9 Finalisation of the Biomass Energy Strategy

Finalisation of Biomass Energy Strategy (BEST) has been delayed. The 1st meeting took place on 31st July 2012. An Inception Report from the Consultant was discussed on 4th September 2012. The project was to start in March 2012. It is supported by the European Union Energy Initiative Partnership. The project has three phases namely the inception report phase, communication

strategy phase, and Draft BEST and Policy Framework phase. The BEST document is now expected in June 2013.

5.1.10 New Developments: Medium Renewable Energy IPPs

Mkonge Energy Systems Co. Ltd. (MeS)

Katani Limited in collaboration and Bio-Energy Berlin GmbH (BEB) have developed the world's first commercial sized biogas/electricity/fertiliser plant from sisal waste at its Hale Estate and has abundant potential biomass wastes originating from sisal decortication processes to produce more than 5 MW of electricity from its estates. Katani Ltd. owns two sites at its Ngombezi Estate with a hydro potential of 11 MW and is running a 300 KW plant at Hale Estates. Each project of Hale, Ngombezi 1, Mandera and Mwelya will be formed with MeS and other investors in a Special Purpose Vehicle for the project. MeS shares will emanate from acquisition of Assets of Ngombezi 1 hydropower assets, Mandera, Mwelya and the Hale biogas electrification site respectively.

MeS was formed as an investment vessel to oversee development of renewable energy projects in Katani entities, Tanzania and Africa as a whole covering biomass, solar, wind, hydro and geothermal power plants. The company will sell electricity to the sisal estates, local community and the national grid. MeS owns three hydropower sites (Mandera 8MW, Ngombezi 1 2.2MW and Ngombezi 2 1.6MW) in one Estate of Ngombezi and also is endowed with 5 potential sites for biogas electrification in the Katani owned Estates of Hale, Ngombezi, Mwelya, Magunga and Magoma with an already established 300KW sisal biogas plant in Hale. These lands have been transferred from Katani Limited to MeS for the intended purpose of renewable energy development. There are also pipeline projects that are not yet in the custody of MeS but initial processes for hydropower development have been initiated along Kiwira River (Kiwira 1 8MW and Kiwira 2 6.4MW, Ruhuhu river (Masigira - 118MW) and Ruvuma river (Nakatuta 1 - 9MW and Nakatuta 2 - 9.2MW).

Frontier Investment Management (FIM), Denmark has signed Term Sheet with MeS (Initial document for loan/ partnership management). FIM have a wind site at Makambako. They have contributed US\$ 10.1 million. The total cost of Kiwira 1 and 2 (14.6 MW) is USD 35 million.

Sao Hill Investment Biomass Power Plant

The Standardised Power Purchase Agreement (SPPA) process began in 2008, with the Electricity Act 2008. An application was made to EWURA by Green Resource for license. Also an application was made to TANESCO to purchase power (Letter of Intent). The SPPA was signed in February 2010 and provisional license was issued by EWURA for 30 months from July 2010. Green Resource reports quarterly to EWURA and TANESCO, under terms of SPPA licensing which enables TANESCO to update the project in the PSMP.

The provisional license is for a 15MW (Combine Heat and Power (CHP)). There was good progress towards securing financing of the project until June 2011. Indofoor (Finnish consultancy) released a report in April 2011, which stated that there would be an acute shortage of wood, especially at Sao Hill, by 2017. The company is investigating ways of securing the required wood supply before the project can proceed.

MAPEMBASI Hydropower Company

MAPEMBASI Hydropower Company plans to generate 10MW of micro hydro in Njombe. The Company's shareholders are Njombe Resources and the Diocese of the Roman Catholic Church. Good progress has been made. Most of the technical studies are complete. These include technical assessment, EIA, feasibility studies (hydrology, geology and sedimentation). Also permits have been secured. A Letter of Intent from TANESCO has been obtained whereby the company

will sell 98% of the power generated to TANESCO under an SPPA. The remaining 2% will be sold to the surrounding community of 5 villages with 5,000 households. REA/TEDAP can provide performance grants of USD 250/500 per connection and approval has been obtained. MAPEMBASI is a seed project for small hydro. It has obtained a no objection form PoA. Mapembasi is 26,000 tonne of CO₂ per annum project.

The total project value is USD 29 million. Financial closure should be reached in the first week of November 2012. Financing arrangement for the project is through bank loans and foreign equity partners. The project is on one site with three turbines each with a capacity of 3.5MW. The total potential of the site is 15MW but it is limited to 10MW in order to comply as a Small Power Producer. The company has all land permits, water permits and EIA certificates. The World Bank requires a "Compensation Action Plan/Resettlement Plan" for the transmission line. The main challenges faced by the company are that tariffs are paid in TZS (the developers are concerned about exchange rate risks) and in processing CDM applications.

5.2 Recommendations for Renewable Energy Development

In the light of the assessment of the achievement of action items from last year's review, the consulting team, after consulting with key stakeholders makes recommendations for how best to develop the renewable energy sector in Tanzania taking into account of the government's national and sector development plans as follows.

5.2.1 Government to invest more in promotion and scale-up of renewable energy technologies

*Action: Next review of the Medium Term Expenditure Framework (MTEF) Q3 2012/13.
Responsibility: MEM.*

5.2.2 Expedite the development of large-scale geothermal power plants for electricity generation

*Action: After receipt exploratory drilling.
Responsibility: MEM - Task Force on Geothermal Energy.*

5.2.3 Align properly actors in the renewable energy sub-sector to be able to fully utilise presented by the different big projects such as SE4ALL, SREP, etc.

*Action: Immediate.
Responsibility: MEM*

5.2.4 Expedite the implementation of large-scale wind power projects

*Action: Immediate.
Responsibility: MEM*

A key issue for renewable energy development is progress towards completion of the Singida Wind Power projects in the PSMP. These are now scheduled to come on power in 2015 and 2016 (in January of each year)

5.2.5 Promote demand side management through energy efficiency and energy conservation

*Action: Implement existing recommendations from 2012/13.
Responsibility: MEM*

5.2.6 Support training of personnel to serve the growing renewable energy industry

*Action: Immediate.
Responsibility: MEM*

5.2.7 Conclude discussions and introduce REFIT to promote the development of renewable energy resources

*Action: Immediate.
Responsibility: MEM*

5.2.8 Increase the level technical support to companies that are involved in the manufacture of renewable energy equipment such as small wind turbines and small water turbines to match the demand

*Action: Ongoing activity.
Responsibility: REA.*

5.2.9 Finalize and Utilize Rural Energy Prospectus

*Action: Prospectus approved by second quarter of 2013.
Responsibility: REA*

5.2.10 Finalise the Biomass Energy Strategy (BEST)

*Action: Finalization of Biomass Energy Strategy (BEST) by June 2013.
Responsibility: MEM*

5.2.11 Cook Stove Standards

*Action: Gazetting of Cook Stove Standards by June 2013.
Responsibility: MEM*

5.2.12 Biofuels Policy

*Action: Finalization Biofuels Policy by June 2013.
Responsibility: MEM*

5.2.13 Biofuels Act

*Action: Finalization of Biofuels Act by June 2013.
Responsibility: MEM*

5.2.14 Hydro ecological zoning

Action: Finalization of hydro ecological zoning by June 2013.

Responsibility: MEM

6 Sector Policy and Strategy

6.1 Review of developments in policy and strategy

The JESR 2011 made three recommendations with respect to policy and strategy.

Consultants' Recommendation: *A review and update of National Energy Policy should be made which ensures that there is clear policy direction for all sub-sectors in energy. This should ensure completeness and coherence of sub-sector policies. If separate sub-sector policies are deemed appropriate by MEM these should be prepared in parallel. The policy documents should explicitly address energy subsidies and identify supporting legislative actions (laws and regulations) Action: By end 2011 (in order to guide next PFM Cycle) Responsibility: Minister for Energy*

The review of national energy policy is underway. MEM's policy focus is currently on the design of Gas Policy but it is also in the process of reviewing the National Energy Policy in parallel.

Consultants' Recommendation: *A comprehensive listing of policy, strategy, plans legislation, regulation and guidelines should be compiled. These should be accessible by stakeholders in printed form and through the Internet. To achieve this they should be posted on the relevant agencies web sites. MEM's websites should show a full listing BUT should not have all the documents available through its page rather having links to the relevant agency websites where the download can be obtained. This ensures that the agency responsible maintains its website and MEM can over see that this is done. On completion of the listing a test should be made that the downloads can be made from outside – perhaps by an NGO stakeholder. Action: October. Responsibility: MEM.*

No comprehensive listing has been provided.

Consultants' Recommendation: *All legislation should be preceded by a policy paper. If this has not been done a policy paper 'explaining' the Act should be prepared. Few stakeholders find laws accessible documents to read. Action: 2011. Responsibility: Assistant Commissioner Gas and Petroleum.*

This recommendation has been adopted. The Gas Policy is being prepared in advance of the legislation (albeit with a lay draft of the law being prepared in parallel).

6.2 Review of Developments in Policy and Strategy

6.2.1 Review and Update of National Energy Policy

*Action: By end 2011 (in order to guide next PFM Cycle)
Responsibility: Minister for Energy*

A review and update of National Energy Policy should be made which ensures that there is clear policy direction for all sub-sectors in energy. This should ensure completeness and coherence of sub-sector policies. If separate sub-sector policies are deemed appropriate by MEM these should be prepared in parallel. The policy documents should explicitly address energy subsidies and identify supporting legislative actions (laws and regulations)

6.2.2 Listing of Policy, Strategy, Plans Legislation, Regulation and Guidelines

Action: October.

Responsibility: MEM.

The action point was that a comprehensive listing of policy, strategy, plans legislation, regulation and guidelines should be compiled. These should be accessible by stakeholders in printed form and through the Internet. To achieve this they should be posted on the relevant agencies web sites. MEM's websites should show a full listing BUT should not have all the documents available through its page rather having links to the relevant agency websites where the download can be obtained. This ensures that the agency responsible maintains its website and MEM can over see that this is done. On completion of the listing a test should be made that the downloads can be made from outside - perhaps by an NGO stakeholder.

MEM has updated its website with legislation.

6.2.3 Rural Electrification Master Plan

REA procured a consultant in June 2012 to undertake the preparation of the Rural Electrification Master Plan. This will feature in the next year's revision of the PSMP. because of different time limits. The exercise is financed by the Norwegian government.

Rural Energy Prospectus

REA is preparing Rural Energy Prospectus. It will cover the whole of mainland Tanzania.

6.2.4 Biofuels Policy

A Biofuels Policy document is planned to be sent to cabinet through inter-ministerial Technical Committee. Currently it is at the stage of receiving comments from stakeholders.

Biofuels Act

A draft Biofuels Act has been prepared and MEM will finalise this once the policy document is approved.

6.2.5 Hydro ecological zoning

Hydro ecological zoning is going on to identify areas where biofuels crops should be grown.

6.2.6 Clean Development Mechanism Energy Generation Projects

Last year's JESR provided a set of action points in relation to the use of the Clean Development Mechanism (CDM).

Review the Existing Institutional Frameworks

Action: In line with next update of Strategic Plan Q3 2011/12.

Responsibility: MEM - Assistant Commissioner, Renewable Energy.

JESR 2011 recommended a review of existing institutional framework for handling environmental issues related to energy projects with a view to improve/streamline coordination of government actors in order to build synergy and avoid duplication in line with the national state of environment. There has been no progress in the review of existing institutional framework.

The Environmental Management Act (EMA) 2008 requires every ministry to establish Environmental Management Units (EMU) headed by Environmental Management Coordinators. The Environmental Management Unit (EMU) was formed in MEM in 2007 to carter for the entire

ministry. Previously, it used to be under the Department of Minerals. The unit is not fully staffed. One staff member deals with the energy sector. The main duties of the unit are: (i) to conduct environmental inspections in order to give certificates; (ii) review Environmental Management Plans (EMP) of large projects; and (iii) participate in strategic environmental assessment e.g. bio-fuels. The Unit coordinates issues related to climate change for MEM with the Vice President's Office (VPO) e.g. climate change adaptation in energy policy. The opinion of MEM is that DNA has cumbersome procedures. CDM issues are handled entirely by VPO although MEM may be invited to sit in the Committees. MEM recognises that there are problems with DNA as is too busy, but only two projects have been registered so far and companies have had applications pending for years. It has been suggested that the DNA should be made independent. However, any change to the institutional framework for management of CDM applications, would involve a review of the Environmental Management Act of 2004.

UNDP has developed a USD 4.9 million project to strengthen capacity of in climate change governance in mainland Tanzania. The project aims at strengthening the institutional framework for climate change. The project will provide an opportunity for Tanzania to learn from other countries such as the Philippines, which has formed a Climate Change Commission (CCC). Some African countries including Zambia, Namibia and Kenya have followed the Philippines' example.

The opinion of the DNA is that the institutional framework for climate change is not a problem: the core problem is insufficient resources, human and financial, to conduct activities related to climate change.

Bottlenecks in Processing Clean Development Mechanisms Applications

Action: Immediate.

Responsibility: MEM - Assistant Commissioner, Renewable Energy

The action point was for MEM to liaise with the Environmental Assessments Section in the Department of Environment, with a view to remove bottlenecks in processing Clean Development Mechanisms applications.

The only registered CDM project remains the Mtoni Dampsite Methane Capture Project. At a national level the DNA has given no objection to many projects. CDM discussions in the VPO involve MEM. They are part of the committee which approves application for CDM. The opinion of the stakeholders is that DNA alone cannot be blamed for any shortcomings in the processing of CDM applications. The role of VPO is to compile the submissions and discuss with the other stakeholders. The National CDM Committee includes members from TANESCO, MEM, Ministry of Land and Settlements, and Ministry of Natural Resources and Tourism. MEM through the EMU has been liaising with the Environmental Assessment Section at the VPO.

In the energy sector, TANESCO has many potential projects but no submission has been made. The VPO is willing to assist in developing CDM documents as it did in the case of the Mtoni Dampsite Project. Stakeholders claim that the key problem in the entire CDM application process is lack of transparency on the part of investors and that some CDM project applications do not allow for a wide sharing of benefits. One instance was reported of an IPP making CDM application after contracting with TANESCO. DNA imposed a condition to share the proceeds between the government the IPP and the local communities.¹⁹ In the case of the Mtoni Dampsite Project, the Dar es Salaam City Council is getting a share of the proceeds.

¹⁹ The IPP no longer operates.

The VPO issued the National CDM Investors Guide in 2004 and a Handbook in 2007. The key issue that needs to be addressed is on how CDM proceeds should be distributed and invested in Tanzania. The main problems are lack of transparency and lack of expertise. DNA seeks to ensure a fair distribution of proceeds and protects the national interest. It ensures that the Sustainable Development component is adequately addressed.

Green Resources started processing CDM application but it is on hold at the FCC at the preliminary application stage. The application process has been smooth, as Green Resource is very familiar with carbon credits, etc. It is only on hold because of the delays in confirming volumes of wood supply an audit has been done and approved.

Capacity in National Research and Higher Learning Institutions

Action: Immediate.

Responsibility: MEM - Assistant Commissioner, Energy Development and Director of Policy and Planning

The action point was for MEM to support and make effective use of the existing capacity in national research and higher learning institutions in addressing climate change issues, energy sector planning and projects implementation. There has not been any report of specific action in towards this action point. However, it is the case that some staff members of these institutions work with various government and non-governmental and international organisations and committees.

Capacity Building of Energy Sector Personnel on Climate Change Issues

Action: Immediate

Responsibility: MEM – Environment Unit

This was envisaged to be done primarily through national universities. Through the EMU under MEM, capacity building on CDM issues and procedures for calculating Carbon Emission Reductions (CERs) has been conducted for personnel from some key organisations, with support from the Swedish Environmental Agency (STEM). Phase I of the project, which lasted 2009/10 included personnel from MEM, TANESCO, REA, EWURA and TaTEDO. MEM has applied for Phase II this can proceed once SIDA has completed its evaluation of Phase I.

Another capacity building activity developed in 2011 and 2012 is the Africa Sustainable Energy & Climate Change Capacity Building Project. This is a Korean cooperation plan with developing countries in the field of energy and reducing industrial GHG gases based on sharing Korea's experience for promoting sustainable development. The Korea Energy Management Corporation (KEMCO) is the implementing body for promoting capacity building in the areas of sustainable energy, climate change, CDM and carbon finance.

The project period will run from July 2012 to June 2013. The project purpose is to enhance the CDM, carbon finance and climate change mitigation capacity in. Target nations are Tanzania, Zambia, Mozambique and Ethiopia. The project budget is KRW 300 million (EUR 200,000). The focus is on capacity building and knowledge sharing for sustainable energy.

New Initiatives in Climate Change Mitigation and Adaptation

In addition to these action point related initiatives there have been new initiatives in climate change mitigation and adaptation. These are described briefly as follows.

Low Carbon Efficient Energy and Climate Change Mitigation

This four-year UNDP financed project will start in January 2013. A total of fifteen districts have been identified to be covered by the project. A survey is underway to select ten districts for implementation. A consultant will advise MEM in project implementation.

Low Emission Capacity Building Programme Tanzania

The VPO has been granted USD 600,000 for the Low Emission Capacity Building Programme Tanzania. Tanzania one of six African countries participating in this the second round of the programme. The EU and Australian government are financing the programme.

NAMAS and Policy Development on Low Emission Green Growth Pattern

UNDP is also supporting the National Appropriate Mitigation Action (NAMAS) and policy development on low emission green growth pattern which includes green growth mapping in Tanzania.

Mainstreaming of Climate Change in Implementation of Development Plans

UNDP is advocating the mainstreaming of climate change in the implementation of development plans. It also provides climate change financing to the government through MoF to the tune of USD 300,000 per annum to develop and operationalize national, centralized climate change financing and for dialogue and to develop some initiatives on climate change. It also provides USD 300,000 per annum to NEMC for awareness on climate change issues. The aim is to build a small unit at NEMC for awareness on climate change.

Aggregating of Small Projects for CDM Application

REA is undertaking a programme aimed at aggregating small projects for CDM application.

Energy Conservation Efficiency and Demand Side Management

The Energy Efficiency portfolio in MEM is fully under the Renewable Energy Section. In 2011, the Ministry formed the Energy Efficiency Group to prepare standards and Energy Efficiency Act and Regulations. Nothing has been done to date and the Group has not met due to financial constraints. The activity was not budgeted for and not given priority. In the financial year 2012/13, the Ministry has made a limited budgetary provision that will initiate some activities. Members of the Energy Efficiency Group include MEM, TANESCO, TBS and UDSM.

6.3 Electricity Sector Policy

In the last year's review stakeholders agree an Action item to address the outstanding issue of electricity sector restructuring. The Electricity Act of 2008 required a Cabinet paper to have been presented and finalised in 2009. Stakeholders took the view that the delay was creating uncertainty in the sector and so a clear government position should be set out. The target date for action was March 2012. There has been no formal progress on this issue in terms of a Cabinet Paper. The current approach by MEM is to prepare its own restructuring strategy document.

6.4 Electricity Subsidy Policy

Action item: formulate a clear national policy on subsidies to and within the electricity sub-sector:

This was a recommendation of last year's JESR. It has also become a key policy action for the PAF 2012.

The 2011 JESR highlighted the complicated situation of subsidies that occur in Tanzania's electricity sector. These subsidies included both macro-level subsidies, such as the supply of fuel for the IPTL plant by the Government, as well as consumer-level subsidies. Earlier in 2012, terms of reference were issued, and a consultant engaged to review the subsidy policies and activities that currently exist in the sector.

The importance of a clear subsidy policy is well recognised by MEM, its Development Partners, and other stakeholders. There has been some slippage in the completion of the action point in terms of the timings set in the 2010/11 JESR in respect of formulating a subsidy policy. The terms of reference for the study were broader in scope than envisaged at the time of the last JESR with a significant data collection and validation element and so the original dates had to be reconsidered.

Formulation of an energy subsidy policy is a Key Policy Action under the Performance Assessment Framework for the General Budget Support. The first stage in the delivery of this action was to prepare an analytical study forming basis for drafting of an energy subsidy policy. The study is due to be finalised in September 2012. The PAF requires that this review verify completion of four stages in the preparation of the study. Table 6.1 provides information on progress of the study against the four stages in the PAF.

Table 6.1 PAF assessment method agreed at sector level for Energy Subsidy Study

Step	Due completion Date	Date completed	Comments
ToR for consultant finalised	31 st January 2012	9 th March 2012	
Contract for consultancy work signed	31 st March 2012	10 th July 2012	
Draft Report completed	31 st July 2012		The signed contract stipulated that the draft report should be completed within 150 days of 10 th July, i.e., 7 th December 2012. A first interim report was submitted on 21 st September 2012, for stakeholder review.
Stakeholders' inputs documented	31 st August 2012		The signed contract stipulated that the draft report should be completed within 164 days of 10 th July, i.e., 21 st December 2012.

The consultants presented an Inception Report on 27th August 2012. In that report the consultants indicated a tentative deliverable schedule for 4 further reports as follows.

The first interim report was delivered on 21st September covering issues of: (i) defining and measuring access and (ii) a review of power sector demand and supply.

Second Interim Report was to be delivered on 28th October covering issues of: (i) customer willingness and ability to pay, (ii) review of current subsidy mechanism, and (iii) effectiveness of the current subsidy mechanism.

Draft report to be delivered on 7th December 2012 dealing also with issues of: (i) constraints to the expansion of electricity access, (ii) a cross-country comparison of best practices in subsidy systems, and (iii) recommendations for a comprehensive, economically rational, and commercially sustainable subsidy policy.

A final report will be delivered within two weeks of the receipt of comments on the Draft Report. This is unlikely to be before January 2013.

MEM will use the study to inform the preparation of its proposals for an energy subsidy policy that are, according to the PAF targets to be complete by end September 2013 and an energy subsidy policy is to be in place by September 2014.

Although the delivery of the deadline for the final stage of documentation of stakeholders' inputs set in the PAF for 31st August is likely to be missed by 4 months, delivery of a draft report in December still allows time for MEM to factor in the analysis and recommendations of the study in its policy review for the preparation of the Medium Term Expenditure Framework for the 2013/14 budget year and beyond. In addition it should still be feasible for MEM to complete its proposals for an energy subsidy policy by September 2013 as required for PAF and GBS purposes.

6.5 Electricity Sector Strategy and Planning

The key development in electricity sector strategy and planning has been the change in planning processes with MEM taking the lead in co-ordinating the planning process involving key stakeholders including TANESCO, REA, and EWURA.

6.6 Private Sector Electricity Generation

In recent years, the GoT has promoted increasing participation in electricity generation by the private sector. Because of its limited capacity to develop generation capacity with its own funds, this will continue to be pursued.

The GoT intends to develop the Ruhudji Hydro Power Project (HPP), a 358 MW hydropower scheme to generate 2,000 GWh of electricity per annum, in the private sector. The project cost is estimated to be over USD1 billion and the project was confirmed by the PSMP 2009 being the next least cost major hydropower project in Tanzania. The World Bank is supporting the development of including through its proposed "TZ- Ruhudji HPP Guarantee and SIL" project. The project concept was prepared in July 2011 and the World Bank has decided to continue with the preparation of the project. It is expected that the appraisal stage of project preparation will be completed by the end of February 2014 and that if the appraisal is positive the project could be approved by the World Bank Board in June 2014.

The project will be implemented by a "special purpose vehicle" Ruhudji SPV and TANESCO.

The private sector is particularly closely involved in the development of electricity generation from renewable sources, such as wind power, solar and bio diesel.

Kidatu Hydro Power 200MW (initially 100 MW) financed by GoT (equity subscription in TANESCO), World Bank and Sweden loans to TANESCO (direct and GoT guaranteed and on-lent

from GoT), also financed by CIDA. Second stage extension to 200MW financed by KfW and EEC and a further equity contribution from GoT.

Mufundi Paper Mills plans to produce 35 MW of electricity from wood residues. The company needs 20MW for its own production and will sell the excess to TANESCO.

A major new private sector investor in power generation is Symbion Power LLC.

IPTL was an earlier private sector investor in electricity generation. The company is now in receivership but continues to generate electricity. The future ownership of the generating assets has yet to be decided.

Tancoal Energy Limited is a joint venture between National Development Corporation (30%) and Intra Energy (Tanzania) Limited (IETL) (70%), a 100% owned subsidiary of Australian publicly listed company Intra Energy Corporation.

Tancoal Energy signed a Memorandum of Understanding with TANESCO. The power station is planned to connect to a new 132kV transmission line and supply electricity to Songea and the local region, as well as into the Tanzanian national grid. Tancoal expects to supply approximately 400,000 tonnes of coal per annum to the power station. Recent indications from the Tanzanian Government are that TANESCO will increase the size of the transmission line to 220kV, thereby allowing an increase in generation capacity to 200MW (increasing coal production to approximately 750,000 tonnes of coal per year). Intra Energy Annual Report (August 2012).

NuEnergy Gas (Tanzania) Limited (NuEnergy is a wholly owned subsidiary of NuEnergy Gas Limited (an Australian publicly listed company). NuEnergy is seeking to prove the presence of unconventional gas (coal bed methane or shale) in Tancoal's deep, uneconomical coal sequences.

Negotiations have commenced for a Power Purchase Agreement with TANESCO for a mine mouth coal fired power station and the Government has confirmed construction of a transmission system to Songea to evacuate electricity production. The proposed 200MW power stations will each consume approximately 750,000 tonnes of coal per year. The power stations will be modular and able to be duplicated to meet future needs.

In March 2012, TANESCO bought a private sector 18MW power plant and transmission and distribution lines in Mtwara from Wentworth Resources Limited (a public company listed in Norway and the UK) and its wholly owned subsidiary Umoja Light Limited. The power plant was bought for USD 13.5 million plus USD 584,000 for related materials and equipment. The remaining amount of USD 675,000 is expected to be settled by TANESCO in the second half of 2012. TANESCO was assigned the rights and obligations from the Interim Gas Sales Agreement for gas supply from the Mnazi Bay Concession operated by Wentworth.

The transmission and distribution activities of Umoja Light connecting the villages along the 33kV Mtwara-Msimbati line were taken over by TANESCO in Q1 2012. Umoja had completed these connections in November 2011 using funds from the Tariff Equalisation Fund, a special purpose GoT fund for promoting business activity, and the company's own resources. In February 2012, TANESCO, MEM and Umoja Light Limited agreed to that the cost of historical operations in respect of the Mtwara Energy Project carried out by Umoja Light Limited are to be refunded. An independent audit of the USD 11.43 million of costs incurred by the company between 2004 and 2011 and of assets with a net book value of USD 7.417 million. It was agreed that an audit, carried out by an independent auditors to be jointly appointed by the parties, will be undertaken during 2012. A total of USD 11.43 million of historical costs incurred by the Umoja between 2004 and 2011, using the company's own funds, will be subject to audit and will possibly require

reimbursement in whole or in part by TANESCO. Capitalised property, plant and equipment assets with a net book value of USD 7.417 million will also be audited and subject to a process of settlement to be completed by the end of 2012.

Wentworth's reasons for the sale and assignment were to concentrate resources on exploration and exploitation of its oil and natural gas resources. In 2012, Wentworth increased its interests in the Mnazi Bay Concession through an acquisition of exploration and production interests from Cove Energy (a UK listed company now owned by PTT Exploration and Production of Thailand). TPDC and Maurel & Prom (listed in France) who are also investors in the Mnazi Bay Concession had pre-emption rights on the acquisition: Maurel & Prom exercised those rights while TPDC did not and maintains its 20 per cent interest in development and production.

Small Power Project Developers

The Small Power Project programme was launched in 2008. It focuses on the development of small power plants that use renewable resources with exportable (to the main grid or a mini grid) capacities ranging from 100kW to 10MW.

Kilombero Sugar Company²⁰, in Kidatu Morogoro, generates electricity for its own use and has applied for a generation licence to sell excess capacity to TANESCO under an SPP Agreement.

Table 6.2 Summary of SPP Developers

SPP NAME	TECH NOLOGY	SELL CAP. MAX (MW)	LOCATION	LOI DATE	LOI NO.	SPPA Signed	COD
TANWAT - Njombe	Biomass	1.5	Grid connec.	-	Biomass/SPP/2009/01	17.09.2009	15.06.2010
TPC - Moshi	Biomass	9	Grid connec.	-	Biomass/SPP/2009/02	06.10.2009	13.09.2010
Mwenga - Mufindi	Hydro	3	Grid connec.	-	Hydro/SPP/2010/03	19.01.2010	31.07.2012
Ngombeni - Mafia Island	Biomass	1.5	Off Grid	-	Biomass/SPP/2010/04	19.01.2010	31.12.2012
Sao Hill - Mufindi	Biomass	6	Grid connec.	-	Biomass/SPP/2010/05	26.02.2010	June. 2014

Table 6.3 SPP Letters of Intent

SPP NAME	TECH NOLOGY	SELL CAP. MAX (MW)	LOCATION	LOI DATE	LOI NO.	SPPA Signed
Mapembasi - Njombe	Hydro	10	Grid connec.	25.06.2010	Hydro/SPP/2010/07	
AHEPO - Mbinga	Hydro	1	Off Grid	22.09.2010	Hydro/SPP/2010/08	
EA-Power - Tukuyu	Hydro	10	Grid connec.	07.02.2011	Hydro/SPP/2011/09	

²⁰ Kilombero Sugar Company is 100 per cent owned by Illovo Sugar Limited of South Africa, which is majority owned by Associated British Foods.

St. Agnes - Songea	Hydro	7.5	Off Grid	05.07.2011	Hydro/SPP/2011/10	
Kikuletwa II Kilimanjaro	Hydro	7	Grid connec.	28.10.2011	Hydro/SPP/2011/12	
KMRI - Tunduru	Biomass	0.45	Off Grid	28.10.2011	Biomass/SPP/2011/13	Jul-12
Darakuta Mini Hydro	Hydro	0.88	Grid connec.	10.01.2012	Hydro/SPP/2012/14	
Mofajus - Mpanda	Hydro	1.2	Off Grid	27.04.2012	REC/MIL/03/2012	
Symbion-KMRI-Kigoma	Biomass	5	Off Grid	15.05.2012	Biomass/SPP/2012/17	
TOTAL CAPACITY		64.03				

7 Sector Financing

7.1 Introduction

This section describes some aspects of sector financing in 2011/12 and 2012/13. It concentrates on the Government's budgets and expenditures for the energy sector. This includes some financing provided by the Government's Development Partners.

7.2 Composition of the Government's budgets and expenditures in the energy sector

7.2.1 Identifying the energy sector budget

The 'energy sector' budget is managed mainly through the Ministry of Energy and Minerals (MEM) (Budget Vote 58) and in part through the Ministry of Finance (MoF) (Vote 50).

Under these votes the sub-votes that include energy sector items are:

- MEM management sub-votes 1001 to 1009
- MEM energy: Sub-Vote 3001
- MoF energy related Sub-Vote 1007

MoF's budget includes energy-related items because the Millennium Challenge Account – Tanzania (MCA-T) is managed by the MoF Accounting Officer in accordance with an agreement between the Government of Tanzania and the Millennium Challenge Corporation.

The MEM management sub-votes and the MoF energy-related sub-vote are not exclusively energy sector items. The MEM management sub-votes relate also to the minerals sector. The MoF sub-vote relates also to the transport and water sectors and includes items within the sub-vote that relate to management of both the energy-related and 'non-energy' items within the sub-vote.

In order to present the energy sector budget, the non-energy items in the sub-votes need to be extracted. This requires some assumptions about the share of energy-related management expenditures in those sub-votes. The simplest way of doing this is to allocate some of the management expenditures to the energy sector budget by assuming that management expenses are simply proportionate to the share of purely energy expenditures in the total of non-management expenditures in each of Vote 58 and sub-vote 50-1007.

The energy items in sub vote 50-1007 are three projects, numbered and named in the budget as:

- 3142 Zanzibar Interconnector
- 3143 Construction of Malagarasi Power Station
- 3144 Rehabilitation and Extension of TANESCO Distribution System

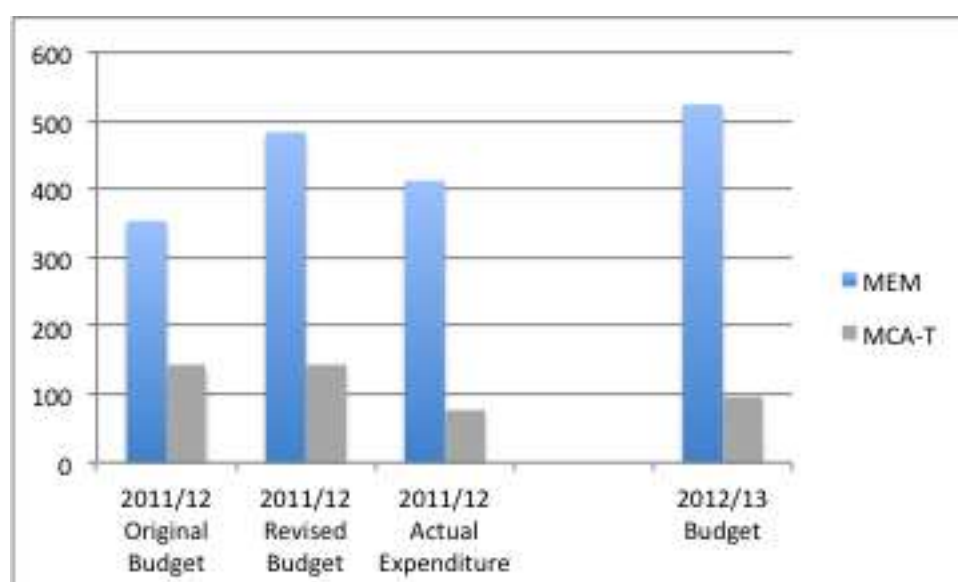
Table 7.1 shows the original and revised 2011/12 budgets for the energy sector, the actual expenditure for 2011/12 and the budget for 2012/13 for projects and management expenses managed by MEM and MCA-T.

Table 7.1 Administrative classification of the energy sector budget (TZS millions)

	2011/12 Original Budget	2011/12 Revised Budget	2011/12 Actual Expenditure	2012/13 Budget
MEM	353,237.9	483,286.4	411,965.0	523,556.2
MCA-T	141,856.6	141,943.0	75,818.0	95,058.4
Total	495,094.5	625,229.4	487,782.9	618,614.5

Source: Authors' calculations from data files for Rapid Budget Analysis

Figure 7.1 shows the original and revised budgets and actual expenditure for 2011/12 and the budget for 2012/13 for central government managed by MEM and MCA-T.

Figure 7.1 Energy sector budgets and expenditure 2011/12 and budget for 2012/13 (TZS bilions)


Source: Authors' calculations from data files for Rapid Budget Analysis

7.2.2 Energy sector projects and management budgets and expenditure

Table 7.2 shows the composition of the energy sector budgets and expenditure in terms of energy projects and energy management and the latter as a proportion of budgets and expenditure on energy projects.

Table 7.2 Energy projects and management budgets and expenditure 2011/12 and budget 2012/13 (TZS millions)

	2011/12 Original Budget	2011/12 Revised Budget	2011/12 Actual Expenditure	2012/13 Budget
Energy Projects	473,931.1	594,925.5	463,275.1	594,389.4
MEM	337,064.1	458,058.5	390,375.8	503,875.0
MCA-T	136,867.0	136,867.0	72,899.2	90,514.4
Energy Management	21,163.4	30,303.9	24,507.9	24,225.1
MEM	16,173.8	25,227.9	21,589.1	19,681.1
MCA-T	4,989.6	5,076.0	2,918.8	4,544.0
Total	495,094.5	625,229.4	487,782.9	618,614.5
Energy management as percentage of energy projects	4.5%	5.1%	5.3%	4.1%
MEM	4.8%	5.5%	5.5%	3.9%
MCA-T	3.6%	3.7%	4.0%	5.0%

Source: Authors' calculations from data files for Rapid Budget Analysis

The original 2011/12 budget for the energy sector was increased in order to provide additional financing for the sector including for the Emergency Power Plan. Table 7.3 shows the reallocations made to revise MEM's budget in 2011/12. Part of the reallocations was to MEM management and so only a proportion of that is allocated to energy management, due to the apportioning assumption for these expenditures.

Table 7.3 Reallocations to and within MEM budget 2011/12

Type	Sub-vote	Item	Description	TZS millions	Source
Recurrent	3001	229927	Capacity Charges	69,000.0	Treasury Contingencies
Recurrent	1005	229922	Consultancy Fees	10,000.0	Inter-ministry
Recurrent	2001	270843	State Mining Corporation	4,200.0	MEM Virement
Development	3001	3147	Emergency Power Plants	57,826.8	Treasury Contingencies
Development	3001	3176	Natural Gas Dev. Songosongo & Mnazi Bay	-4,200.0	MEM Virement
Total				136,826.8	

Source: Authors' calculations from data files for Rapid Budget Analysis

The original budget for 2011/12 for the energy sector was increased by TZS 130.1 billion from TZS 495 billion to TZS 625.2 billion.

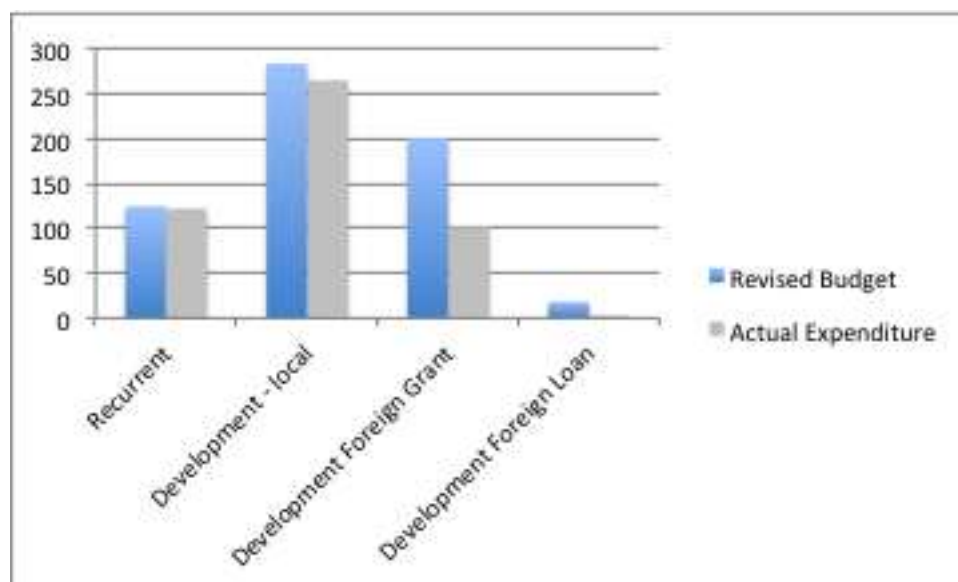
Actual expenditure in 2011/12 was TZS 487.8 billion, 78 per cent of the revised budget and 98.5 per cent of the original budget. Table 7.4 and Figure 7.2 show that TZS 22 billion of the apparent TZS 137 billion underspend (16 per cent) was locally funded expenditure. TZS 115 billion of the apparent underspend was foreign, predominantly grant, financed.

Table 7.4 Energy sector recurrent and development revised budget and actual expenditure 2011/12 (TZS millions)

	2011/12 Revised budget	2011/12 Actual expenditure	Difference	%
Recurrent	124,413.2	121,443.9	-2,969.3	-2.4%
Development	500,816.2	366,339.0	-134,477.2	-26.9%
Local	282,866.2	264,363.3	-18,502.9	-6.5%
Foreign Grant	199,758.4	101,381.8	-98,376.6	-49.2%
Foreign Loan	18,191.6	593.9	-17,597.7	-96.7%
Total	625,229.4	487,782.9	-137,446.5	-22.0%

Source: Authors' calculations from data files for Rapid Budget Analysis

Figure 7.2 Energy sector revised budget and actual expenditure 2011/12 recurrent and source of development funds (TZS bilions)



Source: Authors' calculations from data files for Rapid Budget Analysis

The energy sector budget for 2012/13 is 1 per cent lower than the revised budget for 2011/12, but 25 per cent higher than the original budget for 2012/13.

The reallocations in 2011/12 were predominantly for the financing of the Emergency Power Plan to cover the additional capacity charges and to finance the completion of the project 3147 – Emergency Power Plants.

7.2.3 Economic Classification of the energy sector budgets and expenditures

Table 7.5 shows an economic classification of the energy sector budgets and expenditure for 2011/12 and budget for 2012/13.

Table 7.5 Economic classification of the energy sector budgets and expenditure 2011/12 and budget for 2012/13 (TZS millions)

	2011/12 Original Budget	Reallocations	Revised Budget	Actual Expenditure	Actual/ Revised	2012/13 Budget
PE	2,466.5	1,240.3	3,706.8	3,429.8	92.5%	3,283.7
Goods and Services	172,690.8	98,576.9	271,267.7	216,597.9	79.8%	143,221.1
Fuel	7,285.8	23,861.3	31,147.0	31,147.0	100.0%	0.0
Maintenance	22,383.8	-5,733.3	16,650.5	13,751.8	82.6%	2,378.2
Current transfers	19,148.0	-6,820.6	12,327.4	10,377.6	84.2%	342,208.8
Equipment	114,978.5	18,092.4	133,070.9	130,486.4	98.1%	714.5
Infrastructure	148,858.4	1,417.9	150,276.3	75,555.1	50.3%	126,808.3
Other capital	7,282.7	-500.0	6,782.7	6,437.3	94.9%	0.0
Total	495,094.5	130,134.9	625,229.4	487,782.9	78.0%	618,614.5

Source: Authors' calculations from data files for Rapid Budget Analysis

Personnel Emoluments (PE)

These comprise payments to civil servants and non-civil service contacts; the latter relate almost entirely to 6754 MCA_T programme management. PE accounted for 0.6 per cent of the revised budget and although underspent was 0.7 per cent of actual expenditure in 2011/12. The PE budget is 0.5 per cent of the total energy sector budget for 2012/13.

Goods and Services

The 2011/12 budget for goods and services was increased by TZS 98.6 billion (57 per cent). Actual expenditure was 80 per cent of the revised budget.

A breakdown of goods and services budgets and expenditure is shown in Table 7.6. The bulk of the increase in the revised budget was increased provision for the payment of capacity charges related to the Emergency Power Plan.

Table 7.6 Breakdown of goods and services budgets and expenditure 2011/12 and budget 2012/13 (TZS milions)

	2011/12 Original Budget	2011/12 Revised Budget	2011/12 Actual Expenditure	2012/13 Budget
Capacity Charges	23,000.0	131,714.8	131,000.0	18,000.0
Studies	49,458.1	48,068.2	28,598.8	27,759.4
Consultancy Fees	24,014.8	31,210.5	20,074.9	31,474.1
Contractual Liabilities	14,381.4	13,981.4	13,200.0	0.0
Technical Service Fees	11,148.0	11,148.0	549.7	4,500.0
Compensations	35,694.0	17,731.0	11,428.9	40,000.0
Other goods and services (95 items)	14,994.5	17,413.9	11,745.5	21,487.6
Total	172,690.8	271,267.7	216,597.9	143,221.1

Source: Authors' calculations from data files for Rapid Budget Analysis

Fuel

The 2011/12 budget did not classify budgets for the purchase of fuel under the Emergency Power Plan under goods and services; it was variously classified as acquisition of strategic stocks and other commodities and the acquisition of intangible assets. Fuel is presented as separate item in Table 7.6 and in Table 7.7 which highlights these EPP related expenditures.

The revision of the 2011/12 budget increased the provision for capacity charges by TZS 109 billion and for fuel by TZS 24 billion a total of TZS 132 billion (21 per cent of the revised energy sector budget. Actual expenditure was just under the revised budget provision and 33 per cent of actual energy sector budget expenditure.

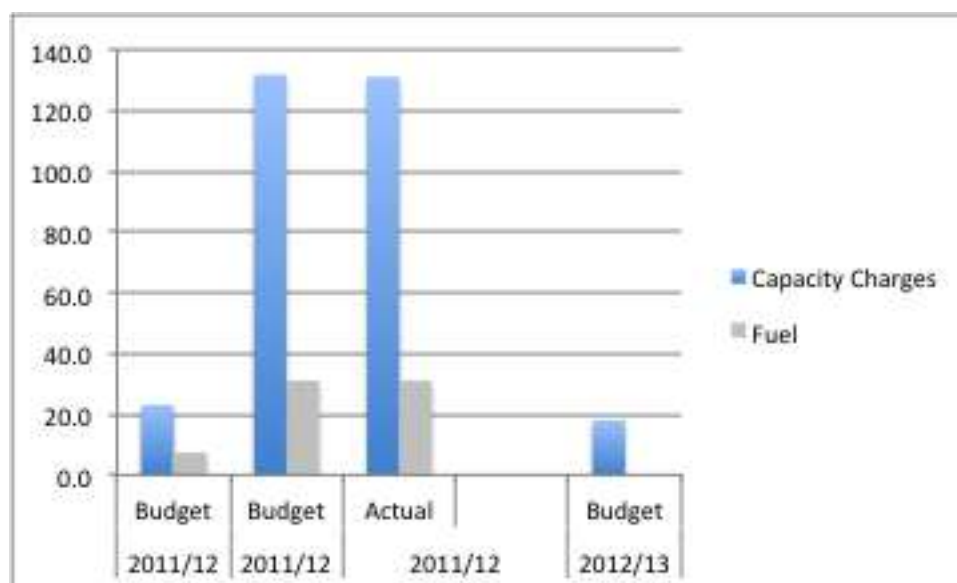
Table 7.7 Capacity charges and fuel expenses in MEM's budgets for 2011/12 and 2012/13 (TZS millions)

	2011/12 Original Budget	2011/12 Revised Budget	2011/12 Actual Expenditure	2012/13 Budget
Capacity Charges	23,000.0	131,714.8	131,000.0	18,000.0
<i>Recurrent</i>	18,000.0	87,000.0	87,000.0	18,000.0
<i>Development</i>	5,000.0	44,714.8	44,000.0	
Fuel	7,285.8	31,147.0	31,147.0	0.0
<i>Development</i>	7,285.8	31,147.0	31,147.0	
Total	30,285.8	162,861.8	162,147.0	18,000.0

Source: Authors' calculations from data files for Rapid Budget Analysis

The numbers reported in Table 7.7 for totals of capacity charges and fuel are presented in Figure 7.3. The capacity charges in the 2012/13 budget are the same as in the original budget for 2011/12 and relate to the Tegeta Plant.

Figure 7.3 Capacity Charges and Fuel budget and expenditure 2011/12 (TZS billions)



Source: Authors' calculations from data files for Rapid Budget Analysis

Studies relate to MCA-T projects; the underspend in 2011/12 relates to 3142 Zanzibar Interconnector.

Consultancy fees are paid in many projects. Actual expenditure for consultancy fees appears to have been only 64 per cent of the revised budget for 2011/12. The projects for which actual consultancy fee expenditure is recorded in the data files are locally and foreign funded through the exchequer system. The underspend might be accounted for by 'D' Funds not recorded directly in the Government's systems and for which a breakdown was not available for the review.

Contractual liabilities relate principally to the TEDAP project (TZS 13.4 billion).

Technical service fees relate almost entirely to 3110 TEDAP (TZS 11.1 billion)

Compensations are principally for land acquisition related to transmission projects. The large increase in 2012/13 includes TZS 30 billion for compensations related to the construction of the Mtwara- Dar es Salaam gas pipeline and TZS 10 billion for payments to people living near Ubungo.

Maintenance

In 2011/12 these expenditures were principally in relation to project 3113 REA and REF for electric cabling and 3176 Natural Gas (all local) not spent

Current transfers

From the information shown in Table 7.5 there appears to be a dramatic rise in current transfers in the 2012/13 budget compared to the previous year. The change is the result of a change in the way projects are classified in the budget. In 2012/13 payments from the Government budget to MEM's agencies (REA, TANESCO and TPDC) are no longer shown as projects' expenditure on

economic items such as goods and services, equipment or contractual liabilities, but rather as current transfers to the agencies. Table 7.8 shows these transfers by agency and the introduction of a category of TANESCO power projects.

This change in classification is in line with good PFM practice and reflects properly both the flow of funds and also the relative responsibilities of the Ministry of Energy and Minerals and those of its agencies. For next year's review an assessment of the application of those transfers by the agencies will require examination of the agency accounts.

Table 7.8 Current transfers to MEM's agencies 2011/12 and 2012/13 (TZS millions)

	2011/12 Original Budget	2011/12 Revised Budget	2011/12 Actual Expenditure	2012/13 Budget
Rural Electrification Agency	16,871.4	10,050.8	8,101.0	159,310.5
Tanzania Petroleum Develop Corporation	2,276.6	2,276.6	2,276.6	75,521.5
TANESCO power projects	0.0	0.0	0.0	106,586.9
Subscription to International Institut.	0.0	0.0	0.0	790.0
Total	19,148.0	12,327.4	10,377.6	342,208.8

Source: Authors' calculations from data files for Rapid Budget Analysis

Equipment

This is predominantly accounted for by acquisition of generators under 3147 Emergency Power Plants TZS 129.5 billion and TZS 0.5 billion for equipment for the rehabilitation of Hale Power Station. The 2011/12 budget was revised up by TZS 18.1 billion.

Infrastructure

The revised budget for infrastructure was apparently under-spent by TZS 74.6 billion. This is mostly accounted for by underspends in transmission and distribution projects for reasons explained in section 7.2.5.

Other capital

This classification is not used in the 2012/13 budget as a result of the changes in the way transfers to MEM's agencies are treated.

7.2.4 Sub-sector classification of the energy sector budget and expenditure

Although the Government has not yet introduced a programme classification to the budget as has been noted in previous JESRs it is relatively straightforward to present the budget in a programme/subsector style albeit with some overlap between sub-sectors.

Table 7.9 shows a sub-sector classification of the energy sector budget and expenditure for 2011/12 and of the budget for 2012/13, distinguishing between management and general energy (environmental management and climate change and adaptation), rural energy, generation, transmission and distribution and the gas sector, and the shares of these sub-sectors in total energy sector expenditures. Figure 7.4 shows these data for these subsectors other than management and general. 2012/13 shows a distribution of spending quite different from the previous year with a greater share for the gas sector and much reduced share for generation

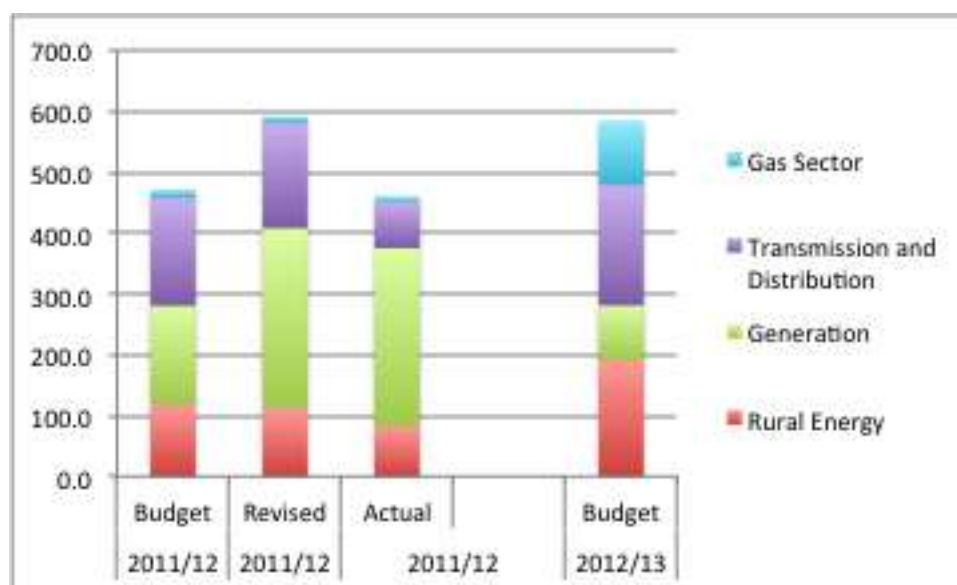
projects with the completion of the emergency power plants and the reduced funding for the operation of the additional generation capacity acquired under the Emergency Power Programme.

Table 7.9 A sub-sector breakdown of the energy sector budgets and expenditure 2011/12 and budget 2012/13 (TZS millions)

	2011/12 Original Budget	2011/12 Revised Budget	2011/12 Actual Expenditure	2012/13 Budget
Management and general	23,738.3	33,834.8	27,273.6	33,960.3
Rural Energy	117,820.6	112,500.0	82,281.8	190,241.5
Generation	162,890.7	295,678.7	292,726.4	90,887.9
Transmission and Distribution	176,995.3	172,466.3	76,724.6	198,003.4
Gas Sector	13,649.6	10,749.6	8,776.6	105,521.5
Total	495,094.5	625,229.4	487,782.9	618,614.5
Sub-sector shares in total (per cent)				
Management and general	5%	5%	6%	5%
Rural Energy	24%	18%	17%	31%
Generation	33%	47%	60%	15%
Transmission and Distribution	36%	28%	16%	32%
Gas Sector	3%	2%	2%	17%

Source: Authors' calculations from data files for Rapid Budget Analysis

Figure 7.4 Sub-sector budgets and expenditures 2011/12 and budget for 2012/13 (TZS billions)



Source: Authors' calculations from data files for Rapid Budget Analysis

7.2.5 Review of project budgets and expenditure by sub-sector

Management and general

Management and general budgets and expenditures are shown in Table 7.10. Recurrent and non-project development expenditures were 96 per cent of the revised budget, while project related expenditures were 37 per cent of the revised budget. The planned project for construction of MEM's Headquarters offices in the original budget for 2011/12 was dropped when the budget was revised and no provision for this was made in the 2012/13 budget.

Table 7.10 Management and general recurrent and project budgets and expenditure 2011/12 and budget 2012/13 (TZS millions)

		2011/12 Original Budget	2011/12 Revised Budget	2011/12 Actual Expenditure	2012/13 Budget
Recurrent and non-project development		12,488.5	25,085.8	24,066.3	23,843.9
6298	Institutional Support	670.0	470.0	0.0	4,370.0
6299	Project Monitoring and Co-ordination	860.3	1,864.2	91.0	571.5
6571	Environmental Management Act Implementation Programme	176.1	179.8	50.6	139.6
6574	MCA-T Programme Management	4,856.3	4,853.7	2,729.0	4,463.9
3150	MEM HQ Office Construction	3,413.9			
3151	Climate Change Adaptation and Mitigation	1,273.3	1,381.4	336.7	571.5
Total Management and general		23,738.3	33,834.8	27,273.6	33,960.3

Source: Authors' calculations from data files for Rapid Budget Analysis

Rural Energy

Rural energy budgets and expenditures are shown in Table 7.11. Overall recorded actual expenditure was 73 per cent of the revised budget. Of the 7 projects in this sub-sector only two recorded any significant expenditures and three projects recorded no expenditures.

Table 7.11 Rural energy sub-sector recurrent and project budgets and expenditure 2011/12 and budget 2012/13 (TZS millions)

		2011/12 Original Budget	2011/12 Revised Budget	2011/12 Actual Expenditure	2012/13 Budget
Recurrent transfer	REA	16,871.4	10,050.8	8,101.0	9,608.5
3102	New and Renewable Energies	5,365.6	3,565.6	100.0	9,276.0
3109	10th EDF Energy Programme	2,044.7	2,044.7	0.0	538.0
3110	Tanzania Energy Development and Access Project	26,760.0	25,060.0	13,924.7	10,500.0
3112	Rural Electrification Project	1,155.3	1,155.3	0.0	

3113	Rural Energy Agency and Rural Energy Fund	56,732.1	62,727.8	59,884.4	157,017.0
3146	Capacity Development REA	391.5	391.5	271.5	702.0
3156	Energising Rural Tanzania	8,500.0	7,504.2	0.0	2,600.0
Total Rural Energy		117,820.6	112,500.0	82,281.8	190,241.5

Source: Authors' calculations from data files for Rapid Budget Analysis

New and Renewable Energies 3102. This project recorded TZS 100 million of local expenditure and no foreign financed expenditure after a reduction of TZS 1.8 billion in the revised local budget.

EDF Energy Programme 3109. There was no record of expenditure in this foreign financed project.

TEDAP 3110. The local budget was revised down by TZS 1.7 billion. Actual expenditure was 57 per cent of budget, principally on contractual liabilities TZS 13 billion with the underspend recorded against technical service fees. The budget shown for 2012/13 is less than the amount underspent in 2011/12.

Rural Electrification Project 3112. There was no expenditure recorded in this project in 2011/12. The foreign budget of TZS 115 million was for consultancy fees and the TZS 860 million local budget was for power lines. There is no budgetary provision for this project in 2012/13.

Rural Energy Agency and Rural Energy Fund 3113. This project is jointly funded by Sida which uses the government exchequer system. 95 per cent of the budget was spent principally on the acquisition and installation of power lines and the payment of related compensation. There is a significant up-scaling of the budget for this project on 2012/13.

Capacity Development for REA 3146 This project is exclusively foreign financed by Sida and actual expenditure was 70 per cent of the budgeted amounts for the provision of consulting services for capacity development in REA.

Energising Rural Tanzania 3156 This project recorded no actual expenditure in 2011/12. The major part of the budget TZS 6 billion had been for power lines, with the remainder for related consultancy fees.

Generation

Budgets and expenditure for generation related projects are shown in Table 7.12. Almost all of the expenditure in 2011/12 was for the Emergency Power Plan and the completion of the Emergency Power Plants begun in 2009/10 and 2010/11.

Table 7.12 Generation sub-sector recurrent and project budgets and expenditure 2011/12 and budget 2012/13 (TZS millions)

		2011/12 Original Budget	2011/12 Revised Budget	2011/12 Actual Expenditure	2012/13 Budget
3147	Emergency Power Plants	123,569.8	205,357.8	204,643.0	50,387.9
Recurrent	Capacity Charges	18,000.0	87,000.0	87,000.0	18,000.0
3148	Energy Facilities	255.2	255.2	0.0	

3153	Mnazi Bay 300 MW Development Project	18,540.0	540.0	540.0	
3158	Rehabilitation of Hale Hydro Power Station	2,525.7	2,525.7	543.4	4,500.0
3163	240 MW Kinyerezi Gas Fired Power Plant				5,000.0
3164	150 MZ Kinyerezi Gas Fired Power Plant				13,000.0
Total Generation		162,890.7	295,678.7	292,726.4	90,887.9

Source: Authors' calculations from data files for Rapid Budget Analysis

Transmission and distribution

The twelve projects that appear in the 2011/12 or 2012/13 budgets for transmission and distribution development are shown in Table 7.13. The apparent budget execution rate for projects in this sub-sector is 45 per cent.

The African Development Bank funded Electricity V project (3191) does not appear to have been overbudgeted as in previous years, but no expenditure was recorded in 2011/12 and the level of budget in 2012/13 suggests that the project has yet to start.

The multi-DP funded Iringa-Shinyanga Transmission Backbone project also recorded no expenditure in 2011/12 due to challenges in dealing for the first time with differences in DP procurement arrangements within a one project. The lessons have been learned and the project should proceed as planned from 2012/13.

For the purposes of this review of sector financing this project was also assessed in terms of the way it appeared in MEM's Medium Term Plan (MTP) / Medium Term Expenditure Framework (MTEF). Last year's review had suggested that MEM and the Energy Development Partners cooperation and dialogue processes could benefit from closer attention to the way future years' funding from DPs for existing and planned projects is presented in the MTP/MTEF. This transmission backbone project is presented in the MTEF with the same amounts for each year of the plan up to 2016/17 with funding indicated as coming from GoT, the World Bank and the African Development Bank only.

One of the challenges for improving/expanding distribution in Dar es Salaam has been land acquisition which is outside the direct control of MEM and TANESCO.

The apparent underspend on the Oysterbay Substation project did not arise as the project had been completed.

Table 7.13 Transmission and distribution sub-sector recurrent and project budgets and expenditure 2011/12 and budget 2012/13 (TZS millions)

		2011/12 Original Budget	2011/12 Revised Budget	2011/12 Actual Expenditure	2012/13 Budget
3120	Oysterbay Sub-station	799.1	799.1	0.0	
3121	132kV Makambako-Songea	8,013.5	8,013.5	3,110.7	9,500.0
3142	Zanzibar Interconnector	39,265.9	39,265.9	21,823.6	30,608.0
3143	Construction of Malagarasi Hydropwer Distribution	11,415.5	11,415.5	3,042.2	8,736.5

3144	Rehabilitation and Extension of TANESCO Distribution	86,185.7	86,185.7	48,033.4	51,169.8
3154	Improving Power Supply Reliability in Dar es Salaam	3,668.3	2,098.3	714.8	62,000.0
3155	Rehabilitation of Sub Stations and Transmission Project	9,039.0	6,100.0	0.0	3,000.0
3157	Iringa – Shinyanga Transmission Backbone Project	14,981.1	14,981.1	0.0	12,500.0
3159	Institutional Cooperation TANESCO	1,052.2	1,052.2	0.0	1,314.0
3166	North West Grid Extension 220kV				5,000.0
3167	Cross Border Electrification Marongo-Kikagati				12,000.0
3191	Electricity V Project	2,575.0	2,555.0	0.0	2,175.0
Total Transmission and Distribution		176,995.3	172,466.3	76,724.6	198,003.4

Source: Authors' calculations from data files for Rapid Budget Analysis

Gas sub-sector

The expenditure share of the gas sub-sector in the overall energy sector budget will increase significantly in 2012/13 with the start of the Mtwara-Dar es Salaam pipeline project and the payment of compensation from MEM's budget. The project itself is loan financed and does not appear in MEM's budget, although it is part of sector financing.

Table 7.14 Gas sub-sector recurrent and project budgets and expenditure 2011/12 and budget 2012/13 (TZS millions)

		2011/12 Original Budget	2011/12 Revised Budget	2011/12 Actual Expenditure	2012/13 Budget
Recurrent transfer	TPDC	2,276.6	2,276.6	2,276.6	12,521.5
3115	Petroleum Sub-sector development Project	3,000.0	6,500.0	6,500.0	
3162	Construction of Natural Gas Pipeline Mtwara - Dar es Salaam				93,000.0
3176	Natural Gas Development Songosongo & Mnazi Bay	8,373.0	1,973.0	0.0	
Total Gas Sector		13,649.6	10,749.6	8,776.6	105,521.5

Source: Authors' calculations from data files for Rapid Budget Analysis

In addition to the action items agreed in the review process, the 2010/11 JESR report, published by MEM, showed the following recommendations made by the consultancy team as part of the review exercise.

Consultant recommendation: In conjunction with the update of the Power Sector Master Plan (PSMP) and the recommended review of the MTEF, the sources of financing should be clarified, in advance of the annual review of the PAF and certainly in advance of the mid-year budget review in December.

This recommendation can be followed up now that MEM has taken on the leadership of the power sector planning process. The example of the transmission backbone project referred to above is a pertinent example of this continuing need.

Consultant recommendation: *The JESR should show a full listing of Government Loan and Equity holdings (stocks and flows and interest and dividend flows) in the energy sector – in both private and public sector bodies. MEM should seek this information from the Paymaster General and the Accountant General.*

This recommendation still stands. It is noted that it would require co-ordination with MoF and TANESCO. During the review process and in discussion on public financial management issues an additional point was made that for future JESR assessments of energy sector financing it would be helpful for stakeholders to see the outflow of funds for debt service of DP loans to the sector. These are currently recorded as expenditure by the Treasury, but can be shown as a memorandum item to the accounts of MEM.

7.2.6 2011/12 Budget Releases

In previous years there has been concern about the delay in the approvals of budget release requests made by MEM. Using data provided by MEM, in 2011/12 the average time between monthly applications and approval for releases of development estimates was 5 days (the longest period was 11 days). The average time taken between MoF approval and receipt of the release by MEM was 6 days, the slowest being 14 days. It has been suggested that release applications are only made when MEM knows that MoF is able to release funds. If this is the case then there is a serious flaw in the budget execution process.

7.2.7 2012/13 Budget

Recurrent expenditures

The recurrent budget for the MEM Energy Department is TZS 45.5 billion. Of this TZS 18 billion is for payment of capacity charges for power supply from IPTL. TZS 12.5 billion is a transfer to TPDC and TZS 9 billion a transfer to REA.

Development expenditures

The budget for 2012/13 separates development projects into 'strategic' projects and 'other' projects. This classification comes from the identification of projects which MEM and the Planning Commission sees as critical for the achievement of the objectives of the Five Year National Development Plan. This is a means of signaling priority for resource allocation in the event of unforeseen constraints on budget releases in the coming year.

The strategic projects for the energy sector are identified in collaboration with the Planning Commission that identifies core investment in this sector as being focused on increasing power generation capacity to produce 2,780 MW by 2015/16. Projects in the 2012/13 budget include the following:

Power Generation Projects

- a) 60MW Heavy Fuel Oil – Mwanza: The Government will continue with construction of 60 MW at Nyakato, Mwanza.
- b) 240 MW Kinyerezi gas fired plant: Kinyerezi 240 MW Project is planned to be implemented in the short term period 2011-2015 using natural gas.

The project is expected to commence in 2012 during which the following activities are to be implemented: completion of financial closure, preparation of excavation, completion of engineering activity, mobilization and installation of equipment.

c) 300 MW Mkuranga: The main activities are to facilitate, coordinate and monitor implementation of the reallocation and redesign of the 300 MW project. Specific new location is at Mkuranga.

d) Cross-border Electrification Project (Murongo – Kikagati)

Electrification of Murongo will involve construction of 0.4/33 kV, 6.25 MVA substation at Murongo and construction of 33 kV backbone transmission lines (ACSR 150 mm²) and T-off transmission line with total distance of 194 km and distribution network. The distribution network will cover 24 villages and Murongo township.

e) 150 MW Natural Gas Fired Project at Kinyerezi

The objective of the project is to improve power supply availability and reliability in the grid. The project involves installation of 150MW natural gas fired TANESCO own plant to be located at Kinyerezi Dar es Salaam. Project implementation shall start in 2012.

f) Construction of natural gas pipeline from Mtwara – Dar es Salaam

The objective of this project is to build two processing plants at Songo Songo and Mnazi Bay; with natural gas pipeline from Mnazi Bay (Mtwara) to Dar es Salaam and later to Tanga. The project will be implemented in three phases and facilitate supply of natural gas to meet increased demand in Dar es salaam and connect gas resources from gas field of Mnazi Bay, Songo Songo, Kiliwani, Mkuranga and others to be discovered within the pipeline corridor.

g) Establishment of Strategic Oil Reserve

The objective is to establish a National Fuel Reserve of refined petroleum products in order to ensure security of supply of refined petroleum products at all times and revival of oil trading operations through COPEC.

Construction and Upgrading of transmission and distribution system

h) Makambako – Songea 132 kV Transmission Line

The activities of the project will include; design, supply, construction and installation of the transmission sub-project, a 250km 132 kV transmission line from Makambako to Songea, three 132/33 kV substations, and the distribution sub-project, 900km 33 kV distribution lines with transformers, low voltage distribution networks and connections to about 8,500 customers and 650 street lights.

i) North-West Grid extension 220 kV

The objective of the project is extension of existing 220 kV line from Geita to Kigoma via Nyakanazi and extending it to Mpanda, Sumbawanga up to Mbeya in order to provide reliable power to the North Western parts of the country.

j) Iringa – Shinyanga 400 kV Transmission Line

The objective of the project is to upgrade the transmission line between Iringa and Shinyanga and improve power supply reliability to the North West Grid.

k) Kiwira Coal Mines and 200MW Power Project

The objective of the project is to expand the coalmine, establish a 200 MW coalmine mouth power plant and a 100 km 220 kV line from Kiwira to Mbeya. The project will develop an opencast coal mine to produce over 1.2 million tonnes of coal per annum.

l) Participation of the Government in Mnazi Bay and Songo Songo gas projects

The main objective of this project is to enable the Government through TPDC to use the opportunity provided in the PSA to increase its share of gas revenue by contributing up to 20% of the upstream development funds for Songo Songo and Mnazi Bay gas development projects. This will result into an increase of government profit share by 8% (for Mnazi Bay) and between 13–15% (for Songo Songo) depending on the level of gas sales. Funds required to be paid by TPDC since declaring its intention to participate at 20% in (2006) up to June, 2009 for development activities that has taken place in the Mnazi Bay and Songo Songo PSAs are:

Mnazi Bay gas development USD 26.7 million;

Songo Songo gas development USD 6.00 million

Total cost USD 32.7 million

Therefore, the total amount required for these projects is USD 32.7 billion.

m) Development of Natural Gas Utilization Master Plan

The natural gas master plan is in line to be completed in this financial year. This is a 25 years Plan therefore it will involve more discoveries which will result in expansion of gas use. The document will need review in the short term, medium term and long term and legalization process of the document.

n) Promoting investments in Renewable Energy Sources

The promotion of Renewable energy will involve the development of Biofuel as alternative to fossil fuels. Also promotion initiatives will cover the development/utilization of Biogas, Bio waste, Coal, LPG, Wind, Mini Hydro, Geothermal and Natural gas to reduce the dependence on biomass energy and imported fossil fuels.

8 2012 JESR Workshop

8.1 Proceedings of the workshop

The Joint Energy Sector Review Stakeholder's Workshop was held on 19th October in Dar es Salaam.

The workshop was opened by the Permanent Secretary of MEM and the Ambassador of Sweden. Presentations were prepared in close consultation with staff of MEM on the electricity, petroleum and gas, and rural and renewable energy sub-sectors and were delivered by the authors of this report.

Panel discussions and working group sessions were held. There were five working groups each of which discussed how the energy sector had performed in the previous year and reviewed the action items from last year's JESR and made proposals to the plenary session for action items to be followed in the coming year. The feedback from the working groups/panels is presented in the following sub-sections.

8.2 Renewable Energy Panel

Tanzania needs a Renewable Energy Policy. A separate national energy policy for renewables will catalyse the development of Renewable Energy Technologies (RETs). There will be strategies that will have to be realized to measure its impact. The current practice shows that planners and decision makers define "energy" as electricity in terms of MW only.

Incentives. The policy on Renewable Energy Feed in Tariffs (REFITs) will encourage local and international investors to invest in RETs. The current Feed in Tariffs (FiTs) support at most hydropower. The tariffs set cannot pay back the investments in RETs with exception of hydropower.

Tax credits for RET equipment. The Government should institute the tax incentives beyond solar and wind. Now, there more marketable technologies like solid biomass stoves and biogas. It is recommended that the Government offer tax incentives for the technologies of mini hydro, biogas digesters, magnets for small wind turbines, solid biomass stoves and briquettes.

Support local manufacturing of RETs. The Government should support local manufacturers with soft loans and grants to meet upfront costs like attaining technologies and land.

Industry regulations on energy mix. The Government should institute regulations to enforce the use of renewable energies in all possible industries. The industries of manufacturers and service providers should integrate RETs in the energy supply e.g. water heating. It can be extended to the government offices and social services like water supply, schools and dispensaries.

Awareness raising of renewable technologies. The understanding of RETs is still very low. The efforts of awareness raising should be continued. The awareness should be conducted to members of public, decision makers and planners. The government should cooperate with private societies that stand to promote the renewable energy technologies.

Challenges on RETs tax laws. The Government of Tanzania has offered tax exemptions on import duties and VAT for all solar equipment and wind turbines up to 30kW. TRA silently imposes taxes on the imported products. The exercise of TRA of imposing taxes discourage the current

increasing rate of uptake of solar and wind technologies. It is recommended that MEM raise this issue at a high level with the Ministry of Finance.

RETs product quality regulation. The supply of substandard products in the Tanzania market discourages the poor end users that are beneficiaries of RETs. MEM should engage with the relevant authorities to strengthen intervention in the supply chains.

Capacity building on RETs . There is not enough capacity in RETs at all levels. Efforts have to be continued in improving the situation. MEM should cooperate with the respective authorities like Ministry of Education and Vocational Training in scaling up the capacity building (planners and practitioners) at all levels.

Establish district council/regional energy desks. At the moment energy is managed at the national level only. As a result, there is a syndrome of defining energy as electricity, and MW dominate. It is recommended that energy desks are established at regional and district levels so that the local rural energy needs can be mainstreamed in the council plans. The district councils will be able to mainstream the programmes of promoting energy saving stoves and renewable energy systems for mechanical (water pumping) and direct electricity supply.

Streamline investment procedures: A ‘One Stop Shop’ At the moment there are a lot of government agencies dealing with one subject. The situation results in long elapsed times for processing permissions and high costs. For example, there are more than two agencies that have to approve environmental issues. This practice means more expenditure for investors. It is proposed that the Government institutes a one-stop shop for investors.

CDM Challenges in Tanzania DNA office in Tanzania has become decision-making agency instead of a facilitator for Tanzanians. There are projects that the DNA has rejected but the same projects were presented in other countries and they were recommended, and now they are being implemented. The RE Panel wondered how is this possible? The Panel recommended to restructure the capacity of DNA office and try another specialists hoping to bring a positive effect. The Panel found it to be shameful that only one CDM project has been approved.

Affordability and access Government should prepare a soft loan window for local RETs companies so that they can access credit to import the RE products massively so that the prices go down enabling the rural communities to access the technologies.

8.3 Petroleum sub-sector Panel

The feedback from the petroleum sub-sector panel was presented as shown in Table 8.1

Table 8.1 Petroleum subsector panel feedback for the JESR

Action points from JESR 2011	Addition to the JESR Document	Actions to be taken for sector development	Responsible institution (s)	Time line
Continued petroleum exploration	The government has initiated the formulation of Petroleum Policy	Formulation of sector specific plans and regulations to guide petroleum exploitation activities	MEM, TPDC, stakeholders	Draft policy should be in place by May 2013 Plans should be developed by December 2013
		Review the	MEM & TPDC	Should be done

		Petroleum (Exploration and Production) Act 1980 Review the MPSA		by December 2013
		Encourage local investment in upstream petroleum operations Encourage local companies to provide supply services to the upstream activities	MEM, TIC, TPDC,	Continuous process
Implementation of bulk national procurement of liquid fuels		Review the Bulk Procurement regulation. So that to avoid conflict of interest for Oil Marketing companies representatives who are also members of the PIC	EWURA, MEM	December 2013
Consolidate the agreement that has been reached on the price setting methodology	Procurement of the consultant who will conduct feasibility study for establishing current and future margins and its respective future adjustments is in process	EWURA should fast tract the feasibility study process	EWURA	December 2013
Support research into alternative transport fuel		Research and development activities studies should be funded and emphasized	MEM, TPDC	continuous
Capacity building		Diversified capacity development should be implemented immediately at all cadres	MEM, TPDC, EWURA, TANESCO, REA,	
Packages for		Since the industry	Ministry of Labour	Review the

Petroleum sector workers		is risky and highly skilled the salary should be harmonized with international standards		labour law by March 2013
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8.4 Electricity sub-sector panel

Electricity Sector Planning. The group commended efforts taken by the Ministry to establish a working group on PSMP. However, the group recommends:

- MEM should conduct a proper stakeholders' consultation during development of the PSMP
- MEM should develop SMART indicators to monitor PSMP implementation
- Development partners be included in the review of PSMP
- PSMP should indicate clearly which projects would be implemented under the IPP, PPP or government alone
- Decision makers should adhere with PSMP implementation by avoiding side projects

Demand Forecasts

- TANESCO's demand forecast should target to connect large consumers such as mines etc.
- Demand forecasts should be linked with town planning.
- Regional interconnections should be considered.
- Climate change should be factored in.

Demand side management (DSM)

- Government should institute public awareness programmes on DSM
- There is a need to develop a comprehensive DSM scheme
- Abolish VAT on DSM equipment/tools
- Enhance quality control for energy server lights such as CFL
- Introduce "Time of Use Tariffs"

Emergency Power Plants (EPP)

- Monitor implementation of PSMP in order to avoid EPPs
- Government should establish a mechanism (fund) to finance EPPs

- If an EPP is hired, its contract should not be more than two years

Electricity Tariffs

- Tariffs should be cost reflective
- Sustainable to attract investments

Electricity Sector Restructuring

- The Minister should take measures to implement Electricity Act, Cap. 131
- Restructuring should be with objectives and purposes
- Delay in implementing the Act creates uncertainty among sector players including future investors

Formulate a clear national policy on subsidies to and within the electricity sub-sector

- Government should develop a clear and transparent policy on subsidies
- Cost of Service Study (COSS) will address issues related to subsidies

Financial situation of the sector It was proposed that stakeholders be given an opportunity to discuss matters related to the financial situation of the sector.

8.5 Gas sub-sector panel²¹

The gas sub-sector panel made following observations and recommendation.

The performance of the gas sub-sector has been satisfactory and encouraging for the future. A development framework for the sector should be fast-tracked.

The panel recommended that there should be early engagement with all stakeholders on the gas policy and close co-ordination between the national policy and the master plan and that the Industrialisation Master Plan should incorporate the Natural Gas Utilisation Master Plan.

It was recommended that MEM should continue to promote exploration.

²¹ The rapporteur of the gas sub-sector panel did not provide a write up of the presentation as requested by the Commissioner of Energy. What is presented here is the result of notes taken by the consultants supporting the review.

8.1 Energy efficiency sub-sector panel²²

Only six of the workshop participants chose to join the panel.

The key issues raised in discussions were the importance of energy efficiency in government, noting that 30 per cent of energy demand can be saved by good housekeeping and the use of energy efficient appliances and motors.

A focus of action on energy efficiency should be dealing with technical losses.

8.2 Sector Performance Management 2012/13

Performance Assessment Framework indicators for the energy sector need careful attention to ensure that they can be SMART – specific, measurable, achievable, relevant and timed. This is especially the case for the outcome indicator of “% of population with access to electricity” that has been used in previous years and is also a key development plan and MKUKUTA indicator for MEM.

This is clearly a good outcome to wish to measure, but it is still an outcome. Although a target was set for this in the PAF on a year-by-year basis, it was not measured in the last PAF review as the method for measuring access has not been finalised or agreed. (Whilst only an outcome indicator in the PAF, the Government has set targets for electricity access. Any performance target should meet the SMART criteria. The target was relevant and timed but was neither specific nor measurable and so was not obviously achievable). Last year’s JESR addressed the issue of measuring energy access and pointed out that there is an agreed SADC measure of access. It should be expected that as a member of SADC, Tanzania would seek to measure access in this way. This need not be the only measure of access, if it is considered by energy sector stakeholders that an additional measure of access would be more relevant for the particular circumstances of Tanzania. In that case two measures could be used. The critical point at the moment is to agree on methods, investigate the data collection and collation requirements and then set up a system that can measure access with the required frequency.

This applies to other PAF indicators and the indicators and targets set by and for MEM and its agencies. However measured, increase in access will be improved by new customer connections by TANESCO. TANESCO’s management currently has an annual target for new connections agreed with the TANESCO Board and EWURA. Previous JESR’s have commented in detail on the achievement and critically on the achievability of this target. Any outcome indicator target set for access will have to drill down into the practical aspects of performance indicators for TANESCO and also REA.

²² The rapporteur of the energy efficiency sub-sector panel did not provide a write up of the presentation as requested by the Commissioner of Energy. What is presented here is the result of notes taken by the consultants supporting the review.

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