Special Paper 10/3

The Tanzanian Energy Sector:

The Potential for Job Creation and Productivity Gains Through Expanded Electrification

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RESEARCH ON POVERTY ALLEVIATION

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Abbreviations

ADF	African Development Fund
CBO	Community-based organisation
DARESCO	Dar es Salaam Distribution Electric Supply Company
EPP	Emergency Power Project
EWURA	Energy and Water Utilities Regulatory Authority
FRP	Financial Recovery Plan
GDP	Gross Domestic Product
GEF	Global Environment Facility
HBS	Household Budget Survey
ICT	Information and communication technologies
ILO	International Labour Organization
IPTL	Independent Power Tanzania Limited
JICA	Japanese International Cooperation Agency
JESR	Joint Energy Sector Review
MCC	Millennium Challenge Corporation
MDGs	Millennium Development Goals
MEM	Ministry of Energy and Minerals
MKUKUTA	Mkakati wa Kukuza Uchumi na Kupunguza Umaskini Tanzania
MPIP	Medium-Term Public Investment Plan
MTEF	Medium-Term Expenditure Framework
NBS	National Bureau of Statistics
NGO	Non-Governmental Organisation
NSGRP	National Strategy for Growth and Reduction of Poverty
PER	Public Expenditure Review
PPP	Private-Public Partnership
PSRS	Power Sector Reform Strategy
PSMP	Power System Master Plan
REA	Rural Energy Agency
REF	Rural Energy Fund
REPOA	Research on Poverty Alleviation
SMEs	Small and medium enterprises
TAC	Trade Advisory Committees
TANESCO	Tanzania Electric Supply Company
TDV	Tanzania Development Vision
TEDAP	Tanzania Energy Development and Access Expansion Project
TShs	Tanzanian Shillings
VETA	Vocational Education Training Authority
WB	World Bank
ZECO	Zanzibar Electric Power Corporation
ZSFPC	Zanzibar State Fuel and Power Corporation
SADC	Southern African Development Community
NVTD	National Vocational Training Division
VTC	Vocational Training Centre
URT	United Republic of Tanzania

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Executive summary

For the past decade (2000-2009), Tanzania's economy has registered an average annual growth rate of 6.6%, largely due to growth in mining, construction and some services sub-sectors, notably tourism and communications. There has been modest structural change in the economy; the contribution of agriculture to GDP declined from 30% in 1998 to 24% in 2008. The annual average rate of growth of agriculture was 3.3% during the 1990s and about 4% over the last decade.

The role of the energy sector (electricity and gas) in the economy extends beyond its direct contribution to GDP, which is still low at 1.6%. The sector has a significant impact on the performance of the economy as a whole, particularly in manufacturing and other commercial sectors. The adverse effect on power generation and the subsequently increased costs of doing business as a result of droughts during 1992/93, 2005/06 and 2009, clearly indicate the negative influence of low and unreliable energy supplies on national economic growth and development.

The protracted and prolonged reform agenda in the energy sector characterised by a series of policies, plans and strategies over the last two decades has not yielded the required rate of electrification necessary to drive productivity gains to reduce poverty and lead to the achievement of national goals and targets. This is in large part due to a lack of public funding allocated for the rehabilitation, upgrading and expansion of electricity infrastructure, and poor targeting of electrification projects.

More widespread, reliable access to electricity in the agricultural sector can:

- Encourage investment in agro-processing;
- Add value to local production;
- Reduce costs of small-scale operators, who now must rely on diesel-powered equipment; and
- Improve agricultural productivity, for example, through greater access to irrigation technology.

Similarly, the reliable provision of power facilitates businesses' access to more productive technologies and reduces operating costs. Access to electricity has been shown to increase productivity in micro and small businesses by between 100% and 200% in other countries. In large businesses, similar productivity gains are achieved. Industries which use diesel generators during power outages may see a reduction in energy expenditures by as much as 80%, depending on the local cost of diesel fuel. Moreover, reliable provision of electricity encourages the use of new production technologies, including greater use of information and communication technology (ICT).

Improved access to electricity creates jobs, both directly and indirectly. Directly, jobs would be created in the energy sector for engineers, technicians, artisans and manual labourers for the expansion of the national grid. Indirectly, jobs would be created through business startups, and increased productivity in businesses would lead to the hiring of more employees. These effects have been realised in many countries through targeted interventions and careful fiscal management of electrification.

The Government of Tanzania has set the goal of connecting 500,000 households to the national grid over the next five years. This study estimates that if this plan is implemented, over one million jobs could be created directly and indirectly over the next five years. This productive employment would help reduce the number of working poor and reduce the high incidence of poverty. In 2007, 33.6% of Tanzanian households lived below the basic needs poverty level, and the number of working adults (people aged 15 years and older) living in poor households was over 5.6 million, 30% of the labour force. Creation of productive employment is required for Tanzania to achieve its target of a reduction in poverty to 19.5%, and will need to play a central role in the second phase of MKUKUTA, the national growth and poverty reduction strategy. Electrification could represent a key driver of employment growth by increasing productivity and the demand for labour, thereby generating higher earnings and household incomes.

MKUKUTA II and the Medium-Term Public Investment Plan should explicitly and strongly address the strategic role of energy in accelerating growth, creating jobs and meeting the targets of poverty reduction by 2015 and 2025. The Government should lead the implementation of the Power System Master Plan (PSMP) and Rural Electrification Master Plan to expand electrification to 20% of the population by 2015 and 50% by 2025. Adequate, strategically targeted, budgetary resources and strong public-private partnerships will be needed for the development and implementation of generation projects identified in the PSMP in order to achieve the targets in expanded coverage.

The challenge of accelerating the rate of electrification must also address the management of energy, both conservation and efficiency in production, transmission and usage. Energy audits have shown that major energy losses are caused by use of sub-standard power equipment and poor power factor and lighting systems, old equipment, use of inefficient air conditioners and transparent glass. A sustained effort for conservation and efficient energy use needs to be embedded in national guidelines and legislation, including building regulations.

Investment in electricity needs to be prioritised by focusing on the economic benefits of electrification and its potential to create jobs. To do this, the Rural Energy Agency will need to complete the Rural Electrification Master Plan (REMP) as soon as possible and make the criteria for selection of areas for electrification publicly available. The REMP needs to be informed by a baseline analysis of the potential economic returns; expansion of coverage should commence in the most economically viable areas with subsequent connections extending from those locations.

Load promotional measures are necessary to encourage increased use of electricity for productive purposes which will sustain energy sector growth and facilitate economic growth and poverty reduction. Load promotion strategies could be done through national awareness raising, but the most effective campaigns will be community-based, utilising local resources and local leaders, and educating people about how electricity can benefit their areas. Greater access to loans or other forms of capital should be made available to facilitate investments in electricity, particularly for grain mills and irrigation.

Labour Supply for Sustained Electrification
Tanzania faces challenges in ensuring its labour force is well prepared for the opportunities that are expected to emerge from electrification. There are immediate shortages of skilled electricians required to ensure that the electricity generated is accessible to businesses and households, and that electricity is safely installed and appliances maintained.

The main constraint to ensuring labour force preparedness is the lack of quality technical training available through the system of public and private vocational training centres. Despite considerable increases in budgetary allocations and direct aid projects from a wide range of donors, progress is slow. This could partly be due to the lack of prioritisation of fields of training that are in high demand, such as electricians, and in part because of the broad approach to financing the Vocational Education and Training Authority. More strategic focus is required, including upgrading and increasing the number of trainers. Partnerships, undertaken on a large-scale, to improve and increase training opportunities could begin to address the short-term immediate need, and accelerate improvements in skills. New approaches are urgently needed. Public-private partnerships to expand electricians' training should be encouraged, as demand for electrification clearly outstrips the capacity of the labour force to respond.

Comprehensive technical support will need to be provided to revamp the electrical curriculum, extend it to those areas which are due to get electricity (with staggered extension), and ensure that it is offered to Trade Test I level in those places. In addition, further training options should be offered to create a cadre of master craftspeople. A review of the skills levy is also needed. It now provides funding only to VETA. A financial plan should be developed that will allow for public subsidies to be directed to vocational training which is offered also by the private sector and religious organisations. Tax breaks might be offered to companies that provide staff training and professional development.

A cohesive programme of support is needed to assist graduate electricians to access micro credit and tools when they enter the workforce. The reintroduction of formalised, recognised apprenticeships for artisans would allow them to refine and adapt their skills to the workplace under mentoring.

Expanding electrification will make a major contribution to improving productivity for Tanzania, and becoming an electrician is an excellent opportunity for young Tanzanians to secure a good livelihood in a professional trade that is in high demand. Public, private and donor resources would be well spent in strengthening the labour force accordingly.

Strengthening Information for Policy and Management
An effective monitoring and evaluation framework on electrification and energy development for the Ministry of Energy and Minerals and affiliated institutions is required to ensure effective information-sharing and collaboration with other Government ministries, departments and agencies (MDAs), development partners, energy developers and other stakeholders. A baseline study should be conducted to have credible, high quality and inclusive energy and electricity statistics. Further study is also needed on the linkage between electricity and energy development and job creation and productivity growth to deepen understanding for effective policy and operational outcomes.

1 Introduction

Over the past two decades, Tanzania, like other sub-Saharan countries, has been striving to improve the prospects for development through rigorous and wide-ranging reforms in virtually all sectors of the economy. The reforms have included economic liberalisation with an explicit space for the private sector.

Tanzania has registered steady growth in aggregate GDP of about 6% (3% above population growth) due to the relatively sustained reform effort, but this growth has not significantly reduced household poverty. The Household Budget Survey 2007 reported that 34% of Tanzanians lived below the basic needs poverty line and 17% below the food poverty line, representing a small decline of 2 percentage points in both measures since 2000/01. Because of population growth, the absolute number of people living below basic needs poverty has increased from 11.4 million in 2000/01 to 12.9 million in 2007 (NBS, 2009). That aggregate GDP growth has not engendered a more substantial fall in poverty largely due to the continued lack of productive employment.

To achieve the goals of the Tanzania Development Vision 2025 including the reduction in basic needs poverty incidence to 19.5%, a growth strategy is needed which identifies a limited set of growth drivers and provides the requisite resources to ensure their full development. The perspective embodied in the draft Medium-term Public Investment Plan (MPIP) for 2010-2015 is that significant progress in reducing poverty and enabling Tanzania to realise the aspirations of Vision 2025 can be achieved through improvement of infrastructure (MoFEA, 2009). This study attests that the energy sector and expansion of electrification should be accorded priority as a critical driver of multi-sectoral growth through improved productivity, job creation and broad-based socio-economic development.

1.1 Objective of the Study

The main objective of this study is to provide insights into the dynamic linkages between expansion of the national electricity grid and off-grid alternative/renewable sources of electricity and job growth and productivity. The study also seeks to assess the public resources required by the energy sector to galvanise sustained economic performance and attain poverty reduction targets.

The role of energy as an enabler of Tanzania's development has not been adequately articulated. A recent study on the employment potential of the energy sector and the challenges faced by young Tanzanians in becoming qualified electricians in Mtwara (Samji, Nsa Kaisi & Albee, 2009) identified the urgent need for further research into the multi-dimensional impact of the development and expansion of the national electricity grid and rural electrification on meeting Tanzania's goals of growth, productive employment and reduction of poverty. This study follows up on the recommendations made in the Mtwara study and examines the issues raised at the national level. The report addresses the following major research questions:

- *What are the estimated impacts on employment and productivity gains from the various plans, programmes and strategies of electrification through the expansion of the grid and off-grid sources of electricity? What changes in productivity can be estimated? What changes in the numbers and types of jobs (both direct and indirect) can be expected? What are the main labour constraints (skills gaps, labour constraints for business development) that are likely to emerge, and how might these be tackled?*

- *What are the budget implications for sustainable development of the energy sector in Tanzania? Do public allocations match what is required by the sector, including vocational and skills training? What suggestions may be made for Medium-Term Expenditure Frameworks and adjustments and accommodation in future Plan/Budget Guidelines?*

1.2 Methodology

The study was initiated by the ILO in response to the 2009 study on the demand for electricians in Mtwara Region. It was undertaken as a joint venture between REPOA and SkillsGap International; REPOA completed the sections on the energy sector, supply and development of electricity, and public expenditure, SkillsGap focused on the demand for labour and electricity, and labour supply constraints.

The team began with the collection of documents and reports related to electricity and labour: policy documents, historical perspectives and secondary data including comparative studies from other countries of productivity gains from electricity. A full literature review of the electricity sector was undertaken, as was a review of provision of vocational skills training. Interviews were conducted with key informants at national level, including government officials, training institutions and the private sector (see Annex A for the list of people interviewed). Information from the Mtwara study was also used. As gaps in information were identified, follow-up interviews and answers to questions by email were solicited.

The first full draft of the report was discussed at a round table of primary stakeholders organised by REPOA on 18 May 2010. Comments from the discussions were incorporated, and a review process was undertaken prior to publication of this revised report.

1.3 Limitations of the Study

By far the biggest obstacle to the study was the lack of up-to-date data and information to answer the research questions outlined above. Many of the data sets required were incomplete, and in some instances the data exist but were not accessible or available for a variety of reasons, including websites not working to officials having no authority to release the requested information. In other instances, statistics over time (in order to measure change) are not available, or were not collected until quite recently.

Estimation of the indirect effects of growth in the energy sector in generating jobs and growth in other sectors of the economy was a particularly challenging aspect of the analysis. This is a complex undertaking, entailing the application of input-output techniques to calculate the indirect effects of the energy sector on GDP and labour multipliers in the rest of the economy. Unfortunately, for this current study, an up-to-date input-output model of the Tanzanian economy is still under construction.

1.4 The Need For Productive Employment

Over the past two decades, many developing economies, including Tanzania, have embarked on major economic and social reforms that have put them on higher and more sustainable growth paths. In too many cases, however, these transformations have yet to lead to major improvements in labour market outcomes, with high or even increased unemployment, in particular among young people, as well as under-employment in low productivity work among adults.

Since labour is often the main – if not the sole – asset of the poor, a process of growth that has not been associated with strong job creation has had limited impact on reducing poverty and exclusion. Such unfavourable consequences weaken popular support for needed reforms. It is not surprising, therefore, that the World Commission on the Social Dimension of Globalisation (2004) called on policy makers in developing countries as well as donors and international organisations to put employment at the centre of national development strategies. This call has become louder in the wake of the negative impact on jobs created by the global economic crisis. Job-rich growth strategies are now the top priority in many countries.

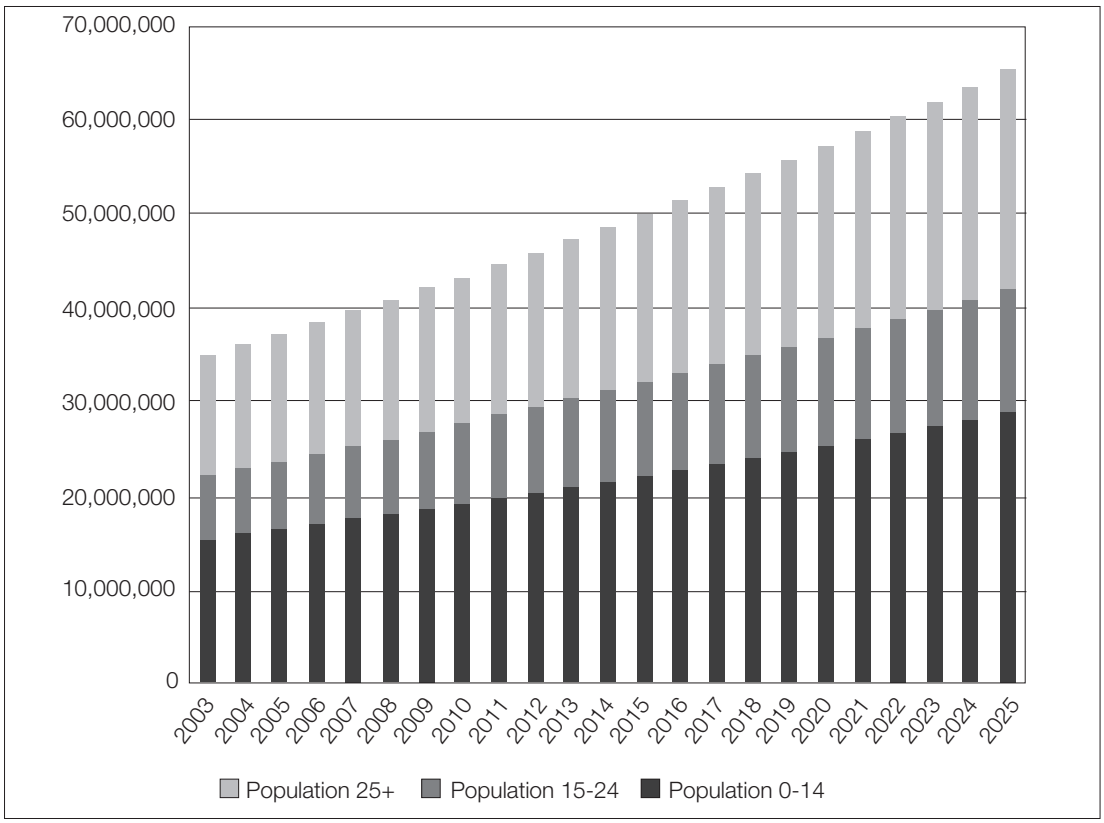
1.5 The Dual Challenge: Youth Employment and Productivity Gains

While the Tanzanian economy over the past decade has generated employment for almost all labour force participants, unemployment among young people, especially in urban areas, and low productivity, remain major challenges. Figure 1 shows population projections for Tanzania and the growing number of young people over the period 2003 to 2025. Tanzania is still in the early stages of demographic transition[1] and its population is very young. Children under 15 years accounted for 44% of the population in 2002. Current projections for the period up to 2025 show a steadily increasing youth population; as a share of the total population, the age group 0-14 years only starts to decline in 2017 (World Bank, 2009). The growth of the labour force, potentially a positive driver of the economy, could become a negative force if employment opportunities do not keep pace, and if instability from rising youth unemployment emerges. Unemployment (per the national definition) at 11.7% in 2006 is a critical labour market concern in Tanzania, especially amongst young people 15-24 years of age in urban areas, where unemployment is far higher at 24.5%. Employment policy in Tanzania needs to increase the employability of young people and to expand opportunities for them to engage in the growing domestic private sector (World Bank, 2009).

The high level of age dependency, with its fiscal implications and the pressure on families to care for large numbers of young, presents a major challenge in Tanzania. In the labour market, the number of new entrants begins to decline only in 2017 as a result of fewer births (World Bank, 2009). In households dependent on subsistence agriculture, large families are considered important given the rudimentary nature of production processes. Without an improvement in production methods, many rural households may be unlikely to reduce the number of children they choose to have even if fertility were within their control.

[1] Fertility rates have declined from 6.3 in 1991-92 to 5.7 in 2004-05; infant and child mortality rates have declined from 115 to 95 and from 192 to 154 between 1988 and 2002, respectively (NBS & ORC Macro, 2005; NBS, 2003).

Figure 1: Population Projections, 2003-2025



Source: World Bank, 2009

Improving people's productivity is the second major challenge for Tanzania. Most people work long hours, produce mainly basic commodities or trade low-value goods, and receive low earnings. This results nationally in an adult population who work but live below the national poverty line. These "working poor" are mainly rural and young urban dwellers.

In 2007, the number of working adults (people aged 15 years and older) living in poor households was over 5.6 million, 30% of the labour force (ILO, 2010) (Table 1). Labour market projections, assuming age-specific labour force participation rates remain unchanged, indicate that Tanzania's labour force will grow by 4.8 million from 2007 to 2015. To achieve the national target of a reduction in poverty to 19.5%, the number of working poor must be reduced. Productive job creation must, therefore, play a central role in the country's poverty reduction strategy. Electrification could be a key driver of growth and employment through increasing productivity and the demand for labour, potentially generating higher earnings and household incomes.

Table 1: People in Productive Employment and the Working Poor, 2000 and 2007

	2000	2007	Change 2000 to 2007
Working Adults in Non-Poor Households	10,348,535	12,709,912	2,361,377
Working Adults in Poor Households ("working poor")	4,985,637	5,620,099	634,462
Total Labour Force*	**15,807,011**	**18,701,889**	**2,894,878**

Note: The total labour force also includes the number of unemployed

Source: ILO, 2010

Labour productivity in Tanzania is growing slowly, by an estimated 3.3% to 3.5% annually. Some sectors hold promise in terms of increasing productivity, but their expansion and intensification requires major improvements in basic infrastructure such as electrification. Industries, manufacturing and construction have the highest productivity of labour, but their ability to expand and absorb more workers is challenged by the lack of infrastructure. The service and manufacturing sectors have been able to absorb a significant and increasing portion of the work force, but the productivity of these workers has stagnated. This is concerning, and may indicate gaps in skills, wages and/or working conditions. Mining and construction have seen gains in both labour productivity and jobs during the past decade (53% and 8% respectively), but from a very low base of less than 2% of the overall labour force (ILO, 2010).

Agriculture, the sector that absorbs by far the greatest proportion of the labour force, has had a slow but steady rise in labour productivity of 2.8%. It remains the least remunerative sector in the economy (NBS, 2009), constrained largely by the lack of added value. Over the last decade there has been only a slow shift away from agriculture's labour absorption and contribution to GDP, which was 25.8% in 2007, but the sector is changing. There are signs of decline in subsistence agricultural production (0.5%) and simultaneous "monetarised" agriculture increases since 2006.

What could these trends mean for the future? It is likely that if overall economic growth continues, agriculture will become increasingly monetarised and labour will shift further to services (8.3% of the labour force in 2006 and rising), construction and manufacturing. The challenge will be to improve productivity in all sectors – agriculture, services, manufacturing and construction – to increase earnings and improve conditions of work in rural areas and the urban informal economy. Infrastructure such as electrification and road networks will be essential for increasing productivity. Without productivity increases, job numbers may continue to improve but there is unlikely to be any significant reduction in poverty. The experience of the past decade could continue unabated. To reduce poverty, investment in education and training demanded by the labour market is essential.

The next chapter looks at the development of the energy sector and its implications for growth and productive employment.

2 The Power sector in Tanzania: Energy Resources, Institutional Evolution, Policies and Performance Assessment

2.1 Energy Sources and Supply

The main source of energy in Tanzania is biomass (fuel-wood and charcoal) which accounts for about 85% of total energy consumption. More than 80% of energy derived from biomass is consumed in rural areas. Approximately 10% of total energy consumption is supplied from commercial sources (petroleum, hydropower, natural gas and coal), while electricity accounts for 6% of total energy consumption. So far, few alternative energy resources – mini-hydro, wind, coal, solar and geothermal – have been commercially exploited despite their potential availability in the country (MEM, 2009). A brief history of the institutional evolution of electricity supply in Tanzania is provided in Annex B.

Power generation has been growing at an annual average rate of 6%, contributing an annual average of 1.8% of GDP for the period 2000 to 2009. Electricity generation through the national grid increased from 2,539 GWh in 2000 to 3,834 GWh in 2009, an average annual increase of 4% (Table 2). Thermal energy has increased its share of the total, while the amount of electricity generated through hydro has fluctuated between 1,439 GWh and 2,722 GWh. Natural gas began to be utilized for power generation in 2004 after the construction of a pipeline of 232 kilometres (Songo Songo to Dar es Salaam). SONGAS is operating the plants with installed capacity of 190 MW in Dar es Salaam.

Table 2: Trends in Selected Indicators of Electrification in Tanzania, 2000 to 2009

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Peak demand (MW)	430	465	475	506	509	552	603	653	694	755
Installed capacity (MW)	785	885	885	885	861	953	958	1,226	905	1,051
Generation (GWh)	2,539	2,797	2,912	3,207	3,390	3,665	3,588	4,212	4,422	3,834
- of which hydro	2,148	2,605	2,722	2,551	2,013	1,781	1,439	2,524	2,649	2,242
- of which thermal	391	192	190	656	1,376	1,884	2,149	1,688	1,773	1,592
Imports (Uganda, Zambia) (GWh)	27	28	34	41	46	50	61	60	52	41
Cumulative losses as % of generation	21	17	19	26	29	30	26	24	25	26
Number of customers	415,692	457,032	476,895	539,076	563,423	605,246	654,180	686,000	725,000	750,000
Electrification rate per population (%)	6.0	6.4	6.5	7.1	8	8.2	10	10.6	12	14

Source: TANESCO as presented in PSMP (TANESCO, 2009) and Joint Energy Sector Review reports (MEM, 2008; 2009).

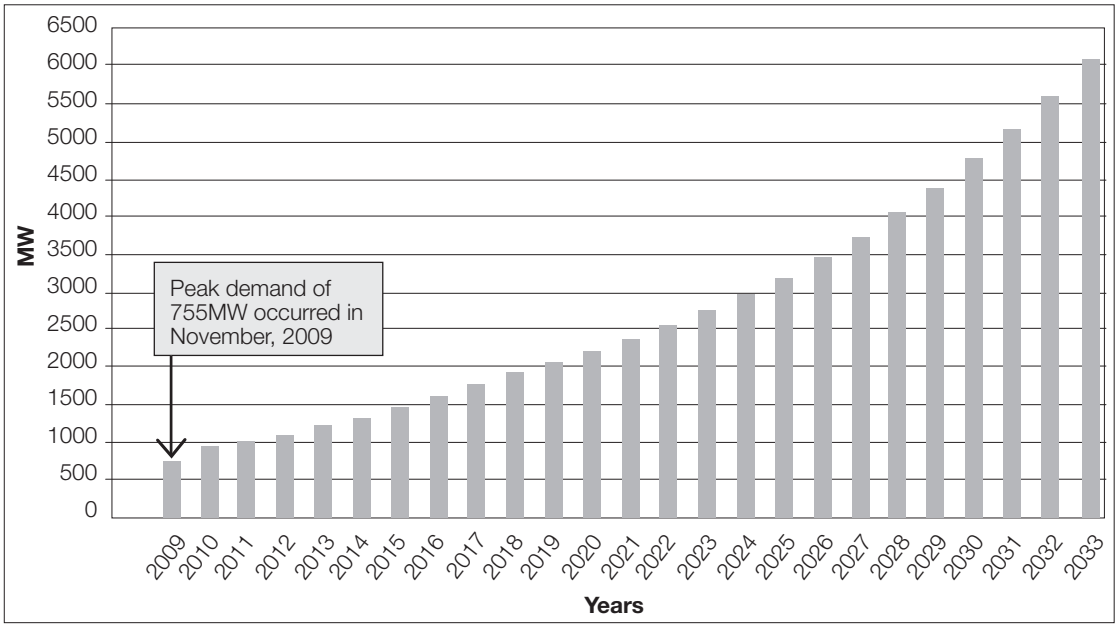
The national coverage of electrification of about 14% of all households (with more than 80% supplied in urban areas) is much below the MKUKUTA target of 20% by 2010 (MEM, 2009, p. 18).

This mixed performance is due to the following factors:

- Shortage of generation and reserve margin (load shedding had to be instituted in 1994, 1997, 2000, 2004, 2006 and 2009);
- A high level of system losses (estimated to be at 24% against the normal international industry practice of below 13%) due to technical losses from an aged network, inadequate maintenance and lack of investment for rehabilitation and upgrading;
- Prolonged period of under-investment (partly the result of the period between 1997-2005, when TANESCO, as other parastatal organisations, was scheduled for privatisation);
- Poor quality of supply with voltage fluctuations outside rated values and power outrages due to aged infrastructure and poor service delivery;
- Low power tariffs which cannot recover fully the operational and maintenance costs;
- High liquid fuel prices in the world market;
- Sub-optimal operation of the hydrothermal system, overuse of hydro systems; and
- Recurrent and un-envisaged breakdown of Songas gas turbines and TANESCO facilities.

Demand for power in future is expected to continue to grow. Figure 2 depicts the expected growth in demand for electrical power.

Figure 2: Power Demand Projections 2010-2033



Source: TANESCO, 2009

To meet this rising demand, there is potential from hydropower, natural gas and coal reserves. Hydropower potential is estimated at 4,700 MW. To date, only 560 MW has been developed – the equivalent of about 12% of the potential. Coal reserves are estimated at about 1,200 million tonnes, of which 304 million tonnes are proven. So far, an estimated 4,636 billion cubic feet (bcf) of natural gas has been discovered, out of which 1,661 bcf are exploitable. A total natural gas supply forecast covering the period 2009-2018 based on available reserves and resources gives a total maximum level of production of 405 million standard cubic feet per day, considered adequate to power gas-based power plants with a cumulative capacity of 2,025 MW by the year 2018.

2.2 Policy Perspectives

Since 1986, Tanzania has implemented macro-economic policies towards objectives of high growth and poverty reduction. Energy has an important role to play in achieving these objectives, but drought and high oil prices in different years have jeopardised progress. In 2006, prolonged drought undermined capacity to produce electricity from hydro systems. In 2008/09, high oil prices and low rainfall again negatively affected the nation's energy supplies. Specific energy policies have been developed to address the constraints in achieving reliable energy to meet the expected growing demand: National Energy Policy of 1992; Government Policy Framework of 1999; and National Energy Policy of 2003. Details of these policies are provided in Annex C.

The 2003 policy is premised on market liberalisation and wide ranging socio-political-economic reforms. In line with these objectives, the following milestones have been achieved:

- An industry regulator, the Energy and Water Utilities Regulatory Authority, became operational in 2006 to undertake oversight functions and promote private sector investment;

- Enactment of the Rural Energy Act of 2005 enabling the Rural Energy Agency (REA) and Rural Energy Fund to become operational in 2007 with responsibility for promoting efforts to expand access to electricity services to people living in semi-urban and rural areas;

- A new Electricity Act was enacted in 2008 to guide to all players in the industry;

- The new Power System Master Plan of 2009 was put in place to guide the Government and private sector in implementing the least-cost development plan to meet electricity demand over the short, medium and long term; and

- The preparation of the Power Sector Reform Strategy to assist the Government to restructure the country's electricity supply industry which was required to support the entry of the private sector, participate in regional electricity trading and improve the performance of the power sector.

2.3 Plans, Programmes and Projects for Revitalising Performance of the Sector

Several specific plans, programmes and projects have been drawn up to address constraints to accelerating electrification. They include: TANESCO's Financial Recovery Plan (FRP), rural electrification programme, Tanzania Energy Development and Access Expansion Project (TEDAP), Electricity V electrification programme, Mtwara Electricity Project, and energy projects under the Millennium Challenge Corporation (MCC) Programme. They are outlined below.

2.3.1 TANESCO Financial Recovery Plan (2006-2010)

Critical deliverables under the TANESCO Financial Recovery Plan, which has been endorsed by the Government for implementation, are annual growth of 15% and connecting 100,000 new customers each year. Achieving these targets is premised on the Government's financial support and its commitment to facilitate the following measures:

- Turn-around activities of TANESCO;
- Investment, including in increased permanent generation;
- Leased generation;
- TANESCO's debt restructuring;
- SONGAS Limited's debt refinancing;
- Conversion and acquisition of Independent Power Tanzania Limited (IPTL);
- Hydrology management in catchment areas; and
- Tariff adjustment as required.

Implementation of the FRP has registered some success, though the IPTL conversion and acquisition has not been achieved and substantial capital injection is still needed. TANESCO's revenue collection has improved. The Capital Investment Programme of five years (estimated at US $1.3 billion) which was to complement the FRP has not effectively taken off despite submission to the Government and Development Partners at various fora in the last three years. However, resources have been mobilised from syndicated sources to finance debt overhang, and marginal increases have been recorded in electrifying households, industries and commercial centres.

TANESCO requires substantial financial resources not only for operation and maintenance costs but also for rehabilitation of aged infrastructure and installation of new facilities if it is to become an efficient and cost effective commercial entity. The Medium-term Public Investment Plan 2010/15 offers an opportunity for TANESCO to be accorded priority in the allocation of budgetary resources and financing through a planned sovereign bond for infrastructure development.

2.3.2 Rural Electrification Programme and Financial Allocations

The underlying principles embodied in the Rural Energy Act of 2005 (URT, 2005) are that:

i) Supplying modern energy to rural areas promotes growth in economic production and productivity as well as social services;

ii) Promoting, facilitating and supporting modern energy services in rural areas will enable sustainable development to be achieved;

iii) The role of Government in rural energy service provision is that of a facilitator of activities and investments by private and community entities and this role shall be managed through the Rural Energy Agency (REA), an independent institution but one that is accountable to Government; and

iv) Facilitation of rural energy provision shall be in the form of financial support for the capital costs of investment, technical assistance for project preparation, training and other forms of capacity building.

The REA commenced operations in 2007. It is charged with the responsibility to promote and facilitate access to modern energy services in rural areas by providing grants and subsidies through the Rural Energy Fund (REF) to rural energy projects, as well as to collaborate with private sector actors, NGOs, CBOs and Government agencies in mobilising resources to achieve the objectives of electrification embodied in Vision 2025, MKUKUTA and the Millennium Development Goals (MDGs).

In its first two years, the REA has largely focused on establishing itself institutionally by recruiting requisite human resources, putting in place operational frameworks and supporting rural electrification projects in five district headquarters, Kilolo (Iringa region), Kilindi (Tanga region), Mkinga (Tanga region), Uyui (Tabora region), and Bahi (Dodoma region), and four commercial areas, Mto wa Mbu villages (Arusha), Matema Beach Kyela (Mbeya), Chief Oswald Mang'ombe Secondary School (Musoma) and Ngage B Simanjiro (Manyara) with budgetary allocation amounting to TShs 9 billion.

Relatively bigger facilitation and promotion of rural electrification projects began in financial year 2008/09, earmarking TShs 87.1 billion to cover 22,490 customers in villages in about 37 districts in 15 regions: Arusha, Kigoma, Rukwa, Mbeya, Manyara, Mwanza, Mara, Morogoro, Kilimanjaro, Kagera, Tanga, Shinyanga, Coast, Dodoma and Tabora. The specific projects funded by the REF to be implemented beginning in the financial year 2008/09 are listed in Annex D, indicating their location, costing and expected number of customers. These projects are in four categories:

i) Electrification of four district headquarters (Kasulu, Kibondo, Ngorongoro, Nkasi);

ii) Completion of projects which had been initiated by TANESCO but which could not be completed due to lack of funds (Chunya, Hanang, Mwanza, Mbeya Rural);

iii) New electrification projects (Kisarawe, Sengerema); and

iv) Extension and improvement of completed projects (Urambo, Kiteto, Babati).

Most of these projects are for supplying electricity to schools, health and water facilities, commercial centres and households. However, a few of the projects are intended to supply electricity to direct production activities such as ginneries. It is also noteworthy that the earmarked funds do not include financing electricity generation in districts off the national grid.

The main challenge facing the REA/REF is the high expectation and demands of rural communities and stakeholders amidst a constrained availability of funds. It is estimated that electricity projects already identified will require a total of about TShs 1.2 billion to implement them (REA, 2008, p.13). During 2008/09, the Government through the REA/REF provided finance for only 19.2% of the requirement for the projects listed above, for which implementation periods range from 6 to18 months.

In addition to extensions of the national grid, the REA has identified 17 off-grid projects eligible for subsidies. They include 13 small hydro-power projects, 2 biomass cogeneration projects (TPC and Sao Hill), and 2 biomass gasification projects (Mafia and Mkonge Energy). It is expected that these projects have a capacity to generate 48.4 MW and provide new connections to 8,400 customers. The expected cost to implement these projects is estimated at TShs 154.57 billion (REA, 2008, p.15).

Other important challenges include limited capacity, including of the private sector, to undertake rural energy projects, and increased project costs largely on account of delays in project execution resulting from procurement procedures.

Clearly, the challenge for rural electrification is enormous requiring sustained commitment and synergic engagement of the Government, TANESCO, REA/REF, private developers, communities and households.

2.3.3 Tanzania Energy Development and Access Expansion Project

TEDAP is co-funded by the World Bank for US$ 105 million (from the International Development Association) and the Global Environment Facility (GEF) for US$ 6.5 million. The objectives of the project are to improve the quality and efficiency of electricity service provision in Tanzania, and to establish a sustainable basis for the expansion of energy access (MEM, 2009).

The project has three components:

i) Urgent investments in TANESCO's transmission and distribution grid network in Dar es Salaam, Arusha and Kilimanjaro (US$ 86 million);

ii) Institutional support to the REA and developing and testing new off-grid electrification approaches (US$ 22.5million); and

iii) Technical assistance (US$ 3 million).

The first component involves upgrading transmission and distribution systems, on-grid access expansion connecting 25,000 new customers, and commercial and institutional capacity development, including the creation of a special service for high value customers aimed at improving TANESCO's revenues and reducing system losses. The objective of the

second component is to increase access to electricity in rural and peri-urban Tanzania for productive enterprises and service delivery facilities (e.g., health, education), and to establish a functioning institutional framework for commercially oriented, sustainable service delivery for rural electrification, exploiting Tanzania's renewable energy potential.

The project's design is impressive. However, its objectives might not be fully attained in light of the magnitude of the challenges facing TANESCO and the REA in generating the financial resources required and developing the necessary human resources for upgrading and expanding the national grid and meeting demands for off-grid rural electrification.

2.3.4 Electricity V

The objective of this project is to secure, improve and extend the sustainable supply of electricity to economic enterprises and households in rural towns, district headquarters and peri-urban areas in Mwanza, Shinyanga, Arusha and Dar es Salaam regions (MEM, 2009). The total cost of the project amounts to US$ 50 million and is funded by the African Development Fund (89% of the project cost).

The components of the project are:

i) Construction of distribution networks (Magu-Bariadi, Kwimba, Arusha MV rehabilitation, Bukombe, Namanga and Longido, Kinondoni North, Kinondoni South, Ilala, Temeke);

ii) Rehabilitation of four substations in Dar es Salaam (Sokoine, Msasani, Factory Zone III, Ubungo) and Njiro (Arusha);

iii) Technical assistance for a master plan for the distribution system in ten regions, for a Supervisory Control and Data Acquisition System (SCADA), for the revaluation of TANESCO's assets, and for project engineering, supervision and management.

2.3.5 Millennium Challenge Corporation Programme

The US Millennium Challenge Corporation is providing a grant of US$ 206 million to finance the following projects aimed at improving quality, reliability and increased supply of electricity:

i) Transmission and distribution systems rehabilitation and extension in six regions of Tanga, Mwanza, Dodoma, Iringa, Morogoro and Mbeya (US$ 89.7 million);

ii) Construction of Malagarasi hydropower station and distribution in Kigoma region (US$ 53.7 million); and

iii) Construction of an interconnector marine cable to Zanzibar (US$ 63.1 million).

The rehabilitation and extension of transmission and distribution system will provide electricity to 41,271 new customers and improve power supply to 14,257 customers in the six regions. The Malagarasi hydropower project will supply electricity to several villages in Kigoma region with a target of 6,230 new customers. The marine interconnector cable will enhance the capacity to transmit electricity to Zanzibar by 100 MW. The MCC energy projects are expected to have a significant impact on stimulating growth and development via enhanced agricultural production and agro-processing, mining and mineral processing, and delivery of quality social services.

2.3.6 Mtwara Energy Project

After the discovery of natural gas at Mnazi Bay, a private company, Artumas Group initiated the Mtwara Energy Project aimed at providing an initial capacity of 12 MW to supply electricity to Mtwara and Lindi regions. Since December 2006, electricity has been supplied to customers in the two regions by utilising a capacity of 5 MW. During 2008/09, an agreement between the Government and Artumas was put in place to facilitate expansion of the project to construct infrastructure for power generation, transmission and distribution to more areas in the two regions, including the construction of a transmission line to connect the townships of Nyangao, Masasi and Lindi. This expansion of the project will increase access to electricity from 17,000 to 45,000 households, as well as to industries and small-scale enterprises.

In addition, a large power project is in the pipeline to install a generation facility with a capacity of 300 MW with a transmission line which will link the power plant to the national grid. It is envisaged that the facility will not only boost the growth potential of the two regions but also contribute significantly to wider access to electricity nationally.

3 Strategic Power Sector Development in the Medium and Long Term, 2010-2025

Beyond specific plans and projects, a strategic direction is needed to guide the development of the energy sector. Accordingly, the Ministry of Energy and Minerals has developed a Power Sector Reform Strategy and TANESCO has prepared a Power System Master Plan (2010-2033).

3.1 Power Sector Reform Strategy

The Power Sector Reform Strategy (PSRS) has been prepared for approval by the Government (MEM, 2009). Its overarching objectives, commensurate with the National Energy Policy of 2003, are to:

- Create a sector that will support national development goals;
- Establish an efficient energy production, procurement, transmission, distribution and end-use system in an environmentally sound and sustainable manner;
- Create a financially and commercially viable sector;
- Attract more private sector investments to the sector; and
- Ensure availability of reliable and affordable energy supplies.

In drawing up this strategy, Tanzania has had the opportunity to draw on lessons learned throughout Africa and from international best practice regarding market structure (i.e., degree of competition), industry structure (i.e., degree of unbundling), regulatory framework, and approach to past liabilities.[2]

For Tanzania, it has been established that the following broad reforms are needed:

- Enhancement of performance, including reduction in technical and commercial losses and an improved level of service to customers;
- A sustained investment drive to improve the quality of services as a precondition for improved cost recovery through tariff increases;
- A gradual move towards cost-reflective tariffs, phasing out subsidies;
- Encouraging entry into the sector by private entities, especially in generation, so that competition is introduced with the prospect of lowering prices to consumers and meeting forecasted power demand over the medium and long term;
- Expansion of access to electricity to new customer groups in peri-urban and rural areas as set in MKUKUTA;

[2] This refers to decisions about how to treat the past liabilities of, for example, a publicly owned utility when entering into a reform process and possible restructuring.

- Promotion of cross-border and regional electricity trading to ensure secure electricity supply; and

- Creating public awareness about the need for reform of the power sector.

3.2 Power System Master Plan, 2010-2033

The Government through TANESCO has prepared a Power System Master Plan (2010-2033) which sets out a plan for generation expansion and transmission. It establishes the capacity needed to meet the expected demands for power for the effective functioning and development of the economy. Map 1 shows the extent of coverage and the planned expansion of the national grid.

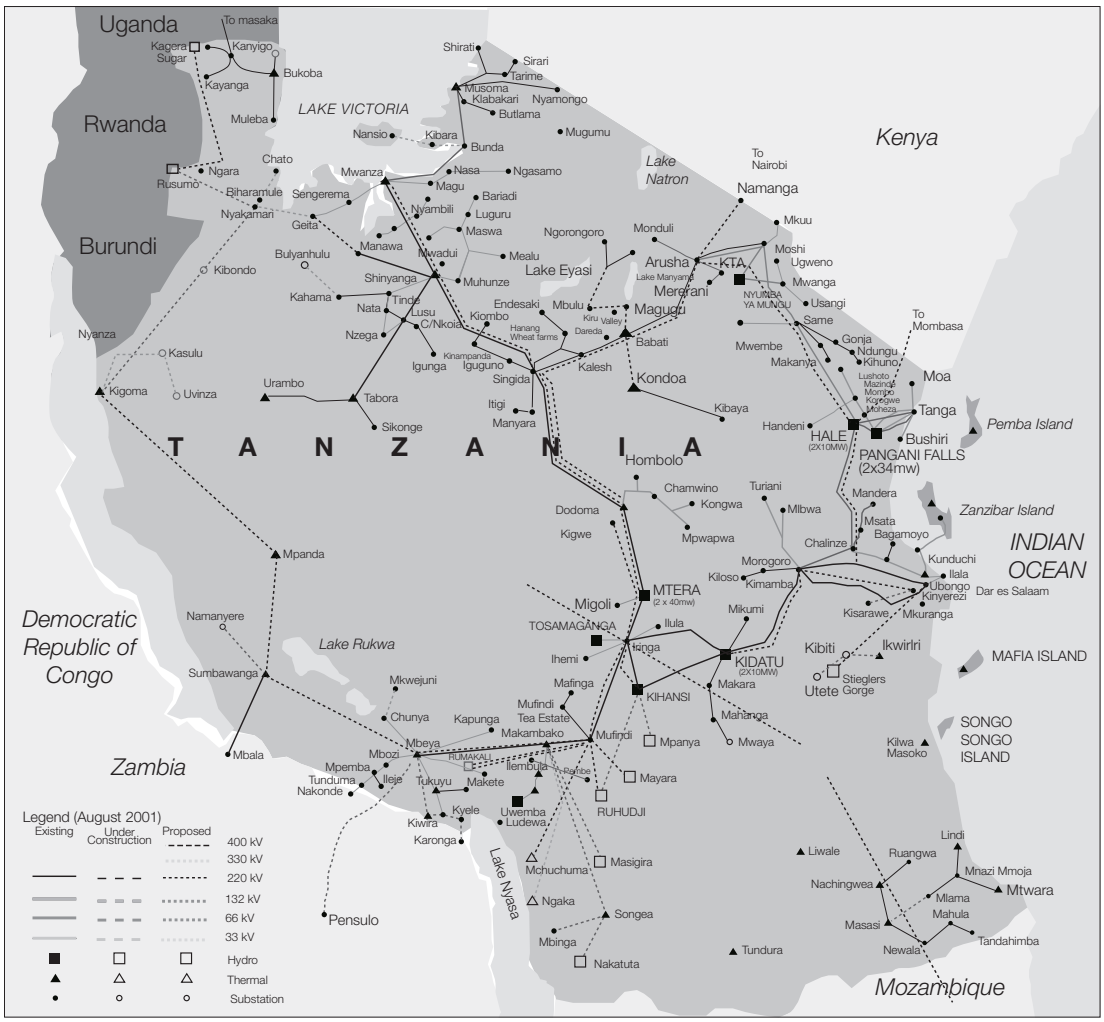
The Master Plan provides in the short term, 2010-2015, for projects which include the Ubungo gas-fired Emergency Power Project (EPP) (100 MW), Mwanza diesel plant (60 MW), wind in Singida (50 MW), Kiwira coal-fired plant (200 MW), Kinyerezi gas-fired plant (240 MW), Rusumo Falls hydro plant (21 MW) and Interconnector I Z-T-K (200 MW). From these projects, a total generating capacity of 871 MW (almost the current peak) will be added to the national grid at an estimated total cost of US$ 1,566 million. It is expected that the Government will fully finance the Ubungo, Mwanza, Rusumo and Interconnector I projects. The other projects will be financed by the private sector or through PPP arrangements.

In the medium term, 2016-2021, additional generating capacity of 1400 MW will come from relatively cheaper sources, mostly hydro (Ruhudji, Malagarasi, Rumakali, Stiegler's Gorge I) and natural gas (Mnazi Bay, Mtwara Artumas), and Interconnector II will be installed.

In the long term, 2023-2033, total generating capacity of 2,700 MW will be added to the grid from hydro (Stiegler's Gorge II and III, Kakono, Mpanga, Masigira, Ikondo-Mnyera, Taveta-Mnyera), amounting to 1,702 MW, and coal (Ngaka, Mchuchuma I and II, Nyasa coal) amounting to 1,000 MW.

The full list of projects with their planned capacity, cost, commercial operational date and resources used is included in Annex E. Implementation of the Master Plan, and especially the provision of reliable power in rural communities, will depend critically on commercial, business usage rather than domestic usage. Electricity provides business opportunities which can drive growth and create wider user bases. Assessing the potential of expanded and more reliable energy supplies in raising productivity and creating employment is the subject of the next chapter of this report.

Figure 3: Current and Planned Coverage of the National Electricity Grid



4 Productivity Gains and Job Creation from Electrification

Electricity is a leading driver of growth and development. While there is much research on how electrification leads to social gains, particularly in rural areas, there are fewer studies that examine the economic benefits of investing in electricity. This section seeks to show that electrification results in significant productivity gains and productive job creation. Increased investment in electrification is a critical component needed to spark growth in productive employment within urban and rural populations.

Over 75% of Tanzania's labour force works in the agricultural sector, rising to over 88% in rural areas, but agricultural productivity has stagnated in recent years (World Bank, 2007a, p. 81). While 69% of farmers report a surplus in crops which are sold for household income, the remaining 31% of farmers operate solely at subsistence level or with a deficit. Furthermore, the volatility of world food and commodity prices coupled with the concentration of Tanzania's labour force in agriculture creates a highly vulnerable socio-economic environment. Increased agricultural productivity would help to raise the income of Tanzanian farmers and reduce food prices for urban consumers, while a more diversified economy would better protect the Tanzanian labour force from fluctuations in world prices of agricultural commodities.

Electricity has the potential to drive both sides of this economic equation. Electrification can increase agricultural productivity, boost productivity in many sectors and generate new employment. The cross-cutting impact of electricity makes it a leading enabler and driver of Tanzania's future growth.

Because it is difficult to quantify the impact of electricity on productivity and jobs, this study draws from analysis in neighbouring sub-Saharan African countries and developing countries in Asia as well as empirical studies on Tanzania's rural and urban labour market to estimate the gains that Tanzania could expect. Electricity is revealed to be a major driver of growth, particularly when electrification is targeted to maximise productivity and employment.

4.1 Productivity Gains

The provision of electricity without any complementary inputs has been shown to lead to productivity gains, but these gains can be significantly increased through additional incentives. This section outlines the potential gains in productivity in agriculture, micro and small businesses, and large industries. Intervention by the government can stimulate demand, promote the use of electricity for productive purposes and decrease the marginal costs of electricity which can make electrification sustainable and even profitable.

4.1.1 Agriculture

Growth in agriculture is not yet sufficient to meet sector targets, nor to reduce rural poverty. Many countries that have maintained agricultural growth year-on-year have done so in two ways: technological changes which have increased labour outputs and added value, and provision of subsidies for fertilisers and other inputs. Such subsidies have been shown to increase land productivity in countries such as Malawi and Rwanda. Given Tanzania's abundant land, labour-saving technological innovations will help increase agricultural production, helping to reduce rural poverty (World Bank, 2007a). In other countries, labour-saving innovations have included the use of improved machinery, but if energy is too expensive or unreliable, the use of machinery may be too costly. The reliable provision of

electricity can make mechanisation in agricultural production and processing much more viable. Evidence from Thailand and Kenya support this premise.

Thailand's rural electrification process began in 1972. The demand for electricity in specific villages was assessed and then provided. If actual consumption of electricity in those villages fell short of the estimates, the government implemented load promotion strategies to encourage the productive use of electricity. The most successful of these strategies involved encouraging people to switch from diesel to electric motors in rice mills, to use irrigation pumps, and to use other motorised equipment in household industries. The government offered no subsidies for the switch, but informed targeted industries that switching to an electric engine could reduce operating costs significantly. The reduced operating cost depended critically on the relative price of electricity compared with fuel prices. In the case of rice mills, such a switch was shown to reduce operating costs by a minimum of 20%. Through these strategies, Thailand helped promote productive uses of electricity to increase agricultural productivity, encouraging growth as well as reducing the price of electricity for household use in those villages (Tuntivate & Barnes, 2007).

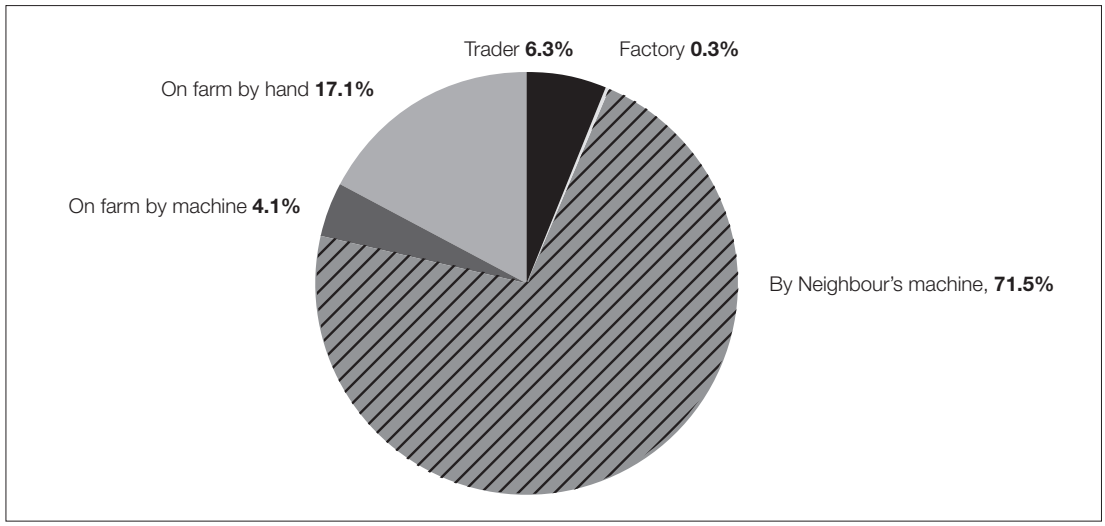
The Mpeketoni Energy Project in rural Kenya supplied electricity through a diesel-powered micro-grid to Mpeketoni village with a population of around 30,000. Analysis of data over the course of 14 years shows significant productivity gains in multiple areas of the local economy, with agriculture being a major beneficiary. Villagers noted that before electricity was available, only two tractors were available for rent to farmers from Witu, which was over 100 km away. The demand for tractors required that farmers made reservations over a year in advance. More importantly, farmers were reluctant to use tractors and other machines in Mpeketoni, as in the event of a mechanical breakdown, it would require travelling over 100 km to Witu for repairs. Within a few years of electrification, the number of mechanics in Mpeketoni had increased, and as a result over a dozen tractors were then available to rent locally for farmers. The use of tractors and other machines increased agricultural productivity, and the provision of electricity made the use of such machines a viable option for rural farmers (Kirubi, Jacobson, Kammen, & Mills, 2009).

There is evidence of transformation occurring in rural Tanzania as well. The Rural Energy Agency in Tanzania has funded a small number of preliminary projects, and has found that in dry regions where electricity has been provided to pump water, the agricultural impact has been immediate. Within a few months, REA was able to see more land being used to grow food, and the spillover effects into the local economy due to electrification were obvious within a year. The rate of impact, of course, differs from region to region depending on a multitude of factors, but increases in agricultural productivity due to electricity were certainly reflected in these areas of Tanzania.

Strategies for increasing agricultural productivity through electrification in Tanzania are likely to include grain mills and irrigation pumps. The 2002/03 Agricultural Census in Tanzania reported that 89% of all crop-growing households processed their products, maize being the main processed crop. Over 86% of these households produced flour/meal from maize and over 71.5% of crop-growing households reported using a mill for processing (NBS & MAFS, 2006a). The Household Budget Survey 2007 reported that the average distance from a rural household to a grain mill was 2.5 km (NBS, 2009). An increased number of grain mills through electrification would benefit both mill operators as well as rural residents through time saved in travelling shorter distances. Furthermore, the second most common

processing method is “on-farm by hand” (17.1%), suggesting that electrification could be exceptionally beneficial to many people, especially rural women, who undertake the burden of manual grain processing at household level (Figure 4).

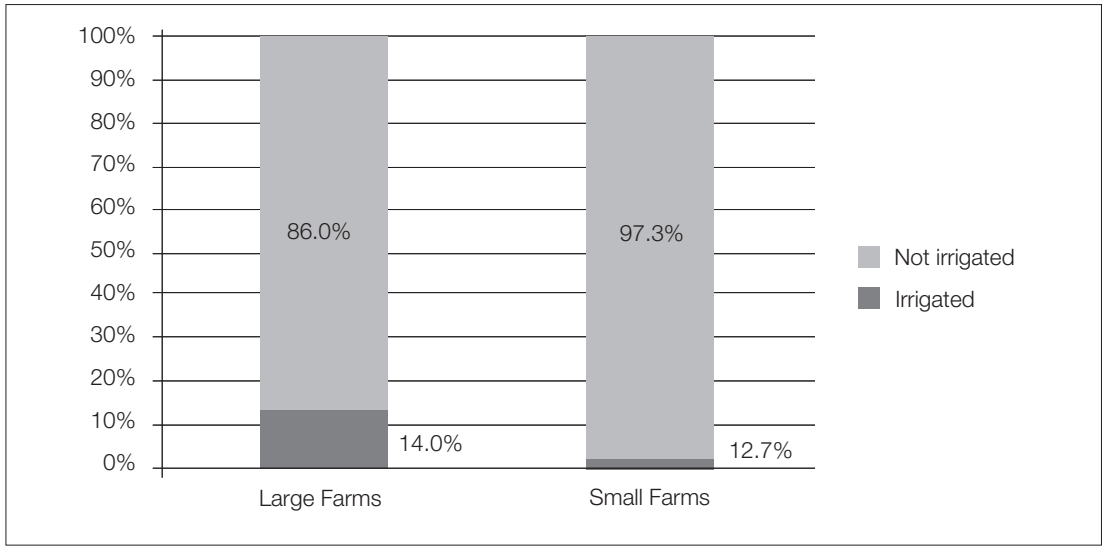
Figure 4: Percentage of Households Processing Crops, by Method, 2003



Source: NBS et al., 2006a

A very small proportion of all farms use irrigation: 2.7% of small farms and 14% of large farms (Figure 5). Potential productivity gains through efficient provision of electricity for irrigation are significant. Rural electrification strategies which have focused on grain mills and irrigation pumps in Thailand, India, and Bangladesh have proven highly successful and may be a viable option for Tanzania.

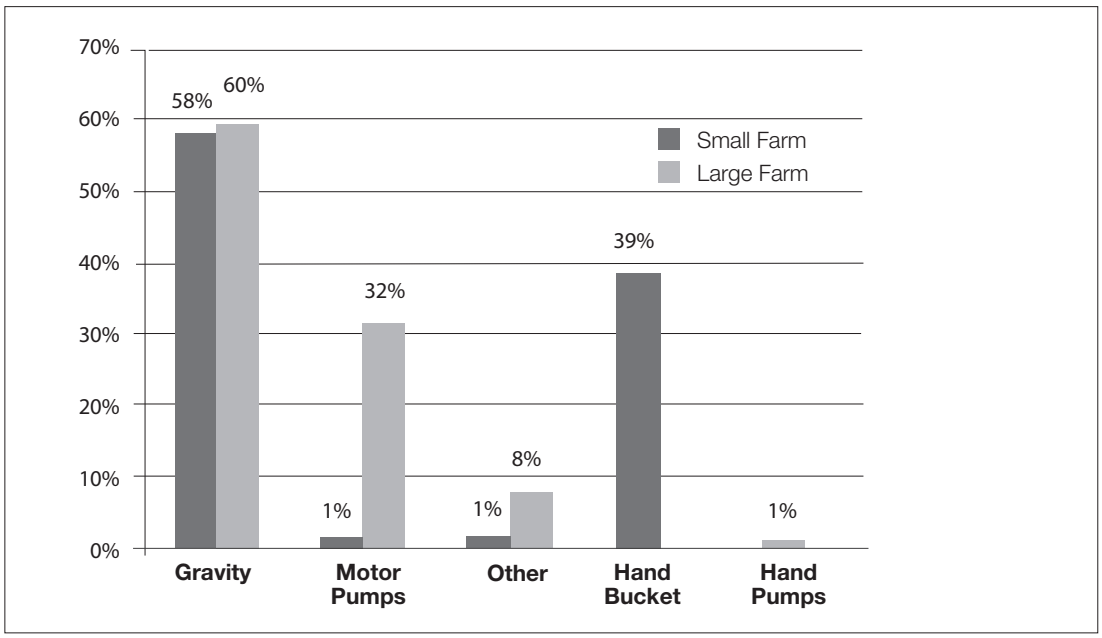
Figure 5: Percentage of Farms Using Irrigation, by Farm Size, 2003



Sources: NBS et al., 2006a; 2006b

By method of irrigation, over 58% of small farms use gravity-fed irrigation and 39% use hand buckets (Figure 6). Motorized pumps are utilised by only 1% of small farms compared with 32% of large farms. Sixty per cent of large firms use gravity to irrigate their land. With electrification, productivity gains can be achieved, particularly for farms in dry areas or where gravity-fed irrigation is irregular and unreliable.

Figure 6: Source of Irrigation Water by Size of Farm



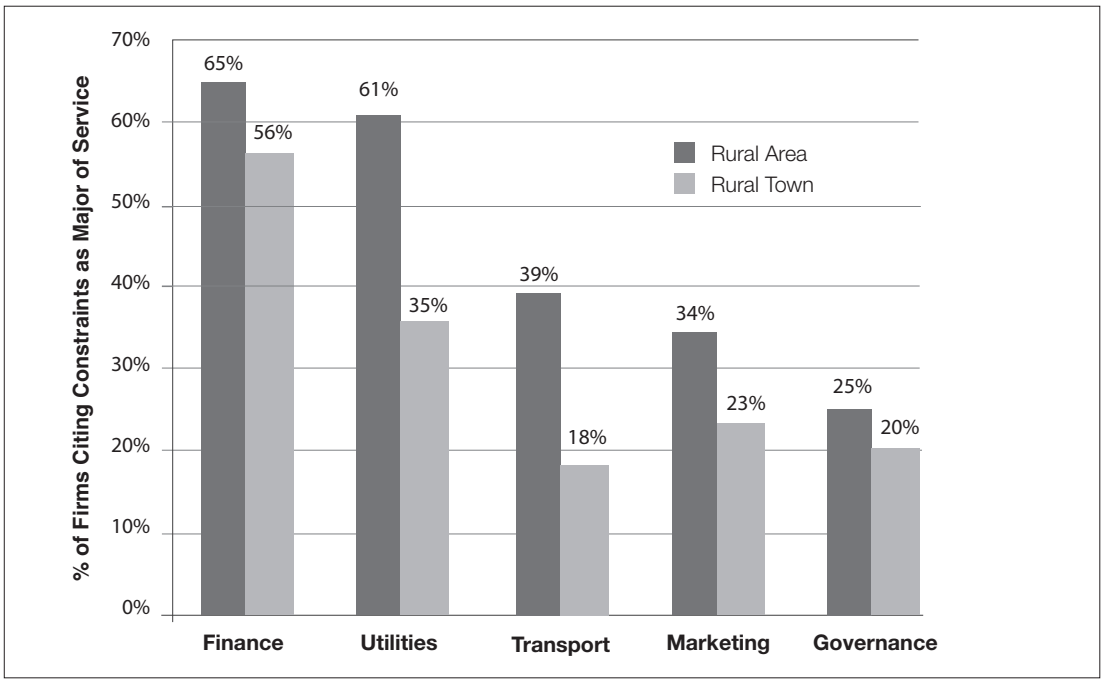
Sources: NBS et al., 2006a; 2006b

Further, the World Bank found that over 77% of start-up capital for rural SMEs in Tanzania comes from income generated through agricultural activities. Therefore, increasing the efficiency and productivity of agriculture in rural Tanzania will help provide resources for new investments in SMEs and other activities helping to diversify the rural labour market.

4.1.2 Small and Medium Enterprises

A survey of rural businesses found that the two leading constraints to growth of rural businesses in Tanzania are lack of access to finance and electricity (Figure 7).

Figure 7: Top 5 Constraints to Growth in Rural Tanzania 2005



Source: Rural Investment Climate Survey Pilot, Tanzania, 2005

Researchers evaluating the Mpeketoni Energy Project in Kenya measured the impact of electrification on small businesses (Kirubi et al., 2009). Electricity allowed businesses to use power tools, electric sewing machines, electric irons, and other tools and equipment to enhance productivity. By measuring the amount of time it took for workers to produce each item before and after electrification, the study found that business productivity increased by between 100% and 200% depending on the item being produced. The study also found that prices fell by 15% to 25%, consumption increased, and revenues for businesses increased by between 20% and 70% (Table 3).

Table 3: Productivity Gains for SMEs in Kenya Due to Electricity, 2009

Business and Product	Without Electricity			With Electricity		Impact Indicators	
	Time to Produce / worker	Unit Price (Kenyan Shillings)	Time to Produce / worker	Unit Price (Kenyan Shillings)	Increase in Productivity/ worker	Reduction in Price / Unit	Increase in Gross Revenue / day
Carpenters							
Stool	6 hours	350	3 hours	300	100%	14%	70%
Coffee table	3 days	1,700	1 day	1,500	200%	12%	20%
Bed	2 days	4,500	1 day	4,000	100%	11%	70%
Tailors							
Men's trousers	4 / day	600	8 / day	500	100%	17%	70%
Women's dress	4 / day	250	6 / day	200	50%	20%	20%
School uniform	5 / day	200	10 / day	150	100%	25%	50%

Source: Kirubi et al., 2009

Beyond direct gains due to electricity, the study in Kenya also found many indirect benefits of electricity for businesses. Carpenters were able to produce larger, more expensive items that were impossible to make without electric tools, such as wardrobes and wall-units. Tailors were able to save over an hour of work per item by using electric irons as opposed to charcoal irons.

Studies in Mozambique and the Kilimanjaro region of Tanzania also showed that rural electrification directly contributes to increased productivity in small enterprises. In rural Mozambique, the provision of electricity dramatically reduced the operating costs of mills and cotton factories. Prior to electrification, the mills and factories surveyed spent 600,000,000 Mt (US$21,818) and 15,000,000 Mt (US$545) per month, respectively, on diesel. After electrification, the enterprises switched to electric motors and the amount spent on electricity per month dropped to 150,000,000 Mt (US$5,455) and 3,000,000 Mt (US$109) per month respectively. Furthermore, electric engines were less likely to break down and the supply of electricity was more reliable than the supply of diesel (Akesson & Nhate, 2006).

In Mahango, Foo and Lyasongoro villages in Kilimanjaro, electrification led to the start-up of enterprises such as furniture manufacturers, tailors, welding workshops and grain mills which used electricity directly in production. For enterprises that had existed prior to electrification, productivity increased through the use of machines, and working hours increased made possible through electric lighting. For grain mills in particular, the use of more efficient electric engines rather than diesel provided an increase in output and a reduction in cost. Residents of these areas appreciated the benefits of electricity, but they also complained that the unreliable nature of the electricity limited its use, particularly in SMEs (Maleko, 2005).

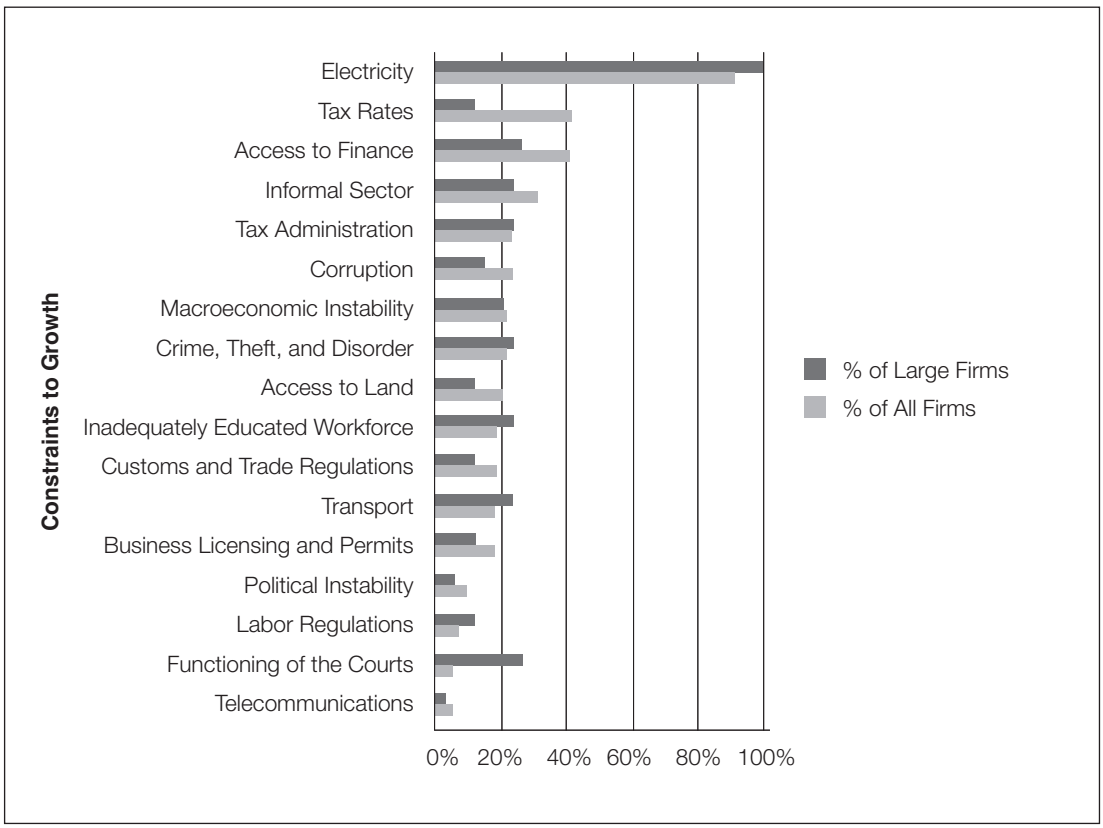
4.1.3 Large Industries

All large industries require electricity in some form to function, but on-grid electricity in Tanzania has been unreliable so the majority of firms use diesel generators to stabilise their power supply during outages. However, assuming similar daily use for operations and at 2009 diesel prices in Tanzania, these generators cost 3 or 4 times more for electricity than on-grid power. Gains from reliable electrification for large firms, therefore, will not come from increased productivity so much as reduced operating costs.

In a World Bank survey of enterprises, which examined large manufacturing firms (100 employees or more) in the five largest towns in Tanzania, 88% of the firms reported experiencing power outages ten times per month for an average of seven hours each time and suffering an 11% loss in total sales. In the month prior to the survey, 94% of firms had experienced at least one power outage. On average, firms experienced nine power outages in the previous month. To cope with this, 91% of the firms owned or shared a generator which increased the cost of electricity by an average of TShs 42 million per annum per firm (World Bank, 2006).

Not surprisingly, electricity was cited as a severe or major constraint to growth by 100% of the surveyed large firms. Compared to 16 other potential constraints including transportation, telecommunication, access to finance, education and competition from the informal sector, electricity was identified as a severe constraint to growth more than twice as frequently as any other factor (Figure 8). Lack of electricity limits technological innovation, reduces productivity and efficiency, and minimises the value added.

Figure 8: Major and Severe Constraints to Growth in Tanzania Enterprises



Source: World Bank, 2006

4.2 Job Creation

Aside from productivity gains, electricity is also a major growth driver through job creation. As the supply and reliability of electricity increases, there will be an increased demand for skilled professionals, including electricians, technicians and engineers, in the energy sector. Indirectly, electrification will lead to increased investment, new jobs in new sectors, increased household demand for electricity, and numerous new employment opportunities.

The analysis below indicates that the potential for direct and indirect job creation from expansion of the national grid could exceed one million over a five-year period. This includes an estimated 33,235 direct jobs in the energy sector. The total figure of one million jobs is calculated on the basis of connecting 100,000 households per year. Indirect jobs are created through increased demand for services related to electricity as well as business start-ups. Given the impact electricity has on all sectors of the economy and labour market, this number may well be a conservative estimate.

4.2.1 Direct Employment Opportunities in the Energy Sector

Within the energy sector, expansion of the national grid will lead to new jobs directly related to electricity generation and provision. These jobs include technicians and engineers who build and maintain the national grid. TANESCO estimates that one engineer is required for

every 7,450 customers.[3] Based on TANESCO's ratio, it is estimated that 247 high-skill positions (e.g., electrical engineers) and 6,410 medium-skill jobs (e.g., installation technicians and other engineers) would be created annually through expansion of the national grid to connect 100,000 households per year. Over five years, some 33,285 direct jobs would be created.[4] While these direct employment opportunities are significant, they pale in comparison to the indirect employment opportunities afforded by electrification.

4.2.2 Indirect Employment Opportunities

Electrification will encourage investment from large domestic and foreign firms across all sectors of the economy which will create jobs. Perhaps more significantly, though, electrification will increase demand for items like refrigerators, electric fans, radios, and any number of other electrical goods. As demand for these goods increases, demand for complementary services such as repairs and installation will also increase, creating more employment opportunities.

Analysis of the Central Registration of Establishments in Tanzania suggests that there is greater business growth and job creation in areas that have access to the national grid, compared with areas not connected. Of all registered enterprises with more than five employees, 82% are located in regions of Tanzania which have access to the national grid. When broken down by the number of employees, almost all businesses which employ more people are located in regions with electricity (Table 4). Furthermore, the increase in the number of employees from 2007 to 2009 is 20 percentage points higher in regions with electricity compared with regions without electricity. These data strongly indicate that businesses form more readily in areas where there is access to on-grid electricity. This is, of course, not the only factor leading to business creation; regions connected to the national grid also tend to be more densely populated and have better transport infrastructure. However, since unreliable supply of electricity is the number one constraint for business growth in Tanzania, it is reasonable that businesses opt to establish where electricity is provided.

Table 4: Business Growth in Regions With or Without On-Grid Electricity Access in Tanzania

	Average Percentage Increase of Employees in Businesses, by Size, 2007-2009						
	5 to 9	**10 to 19**	**20 to 49**	**50 to 99**	**100 to 499**	**500+**	**TOTAL**
Regions with grid	66%	43%	37%	18%	13%	33%	52%
Regions without grid	51%	18%	13%	3%	1%	31%	32%
	Percentage of Businesses by Size in Regions With or Without Electricity, 2009 *						
	5 to 9	**10 to 19**	**20 to 49**	**50 to 99**	**100 to 499**	**500+**	**TOTAL**
Regions with grid	81%	82%	85%	87%	88%	90%	82%
Regions without grid	19%	18%	15%	13%	12%	10%	18%

Note: * Total number of businesses in 2009 = 52,189

Source: NBS, Central Registration of Establishments, 2007-2009

[3] From TANESCO's quarterly report, January 2010 (internal document)

[4] Calculations assume constant job growth via direct employment as high-skill positions will need to monitor and maintain the grid once installed, and manual laborers would most likely remain employed to continue grid expansion throughout communities.

Assuming that access to electricity is critical to the establishment of businesses and the number of employees hired, an estimate of employment gains due to electricity can be projected using the difference in the number of jobs in registered enterprises between regions with electricity and without electricity. Of all private, for-profit businesses in Tanzania, the difference in total employment per business in regions with and without electricity is significant. In regions without access to on-grid electricity, the majority of businesses employ between 1 and 4 persons and the average number of persons employed in all businesses is 4.9. In regions with access to on-grid electricity, excluding Dar es Salaam, the average number of persons employed in businesses is 11.8 people. So, not only are more businesses started in regions with on-grid electricity, but their average number of employees is almost two and a half times higher (Table 5).

Table 5: Employment in Businesses in Regions With and Without Access to On-Grid Electricity, 2009

	Average Number of Employees	Number of Private, For-Profit Businesses	Total Employment	Number of Regions	Employment per Region
Regions with grid*	11.8	18,582	219,268	13	16,867
Regions without grid	4.9	10,603	51,955	7	7,422

Note: * excluding Dar es Salaam
Source: NBS, Central Registration of Establishments, 2009

There are seven regions with no access to on-grid electricity in Tanzania and thirteen with access, not including Dar es Salaam. Between 2007 and 2009, the difference in the number of employees in newly established businesses between regions with on-grid electricity and those without on-grid electricity was over 9,400 jobs per region (Table 5).

Following this logic, a rough estimate of indirect jobs created through business creation sparked by expanding the national grid to regions not now served by the grid would be 9,400 jobs per region. Efforts of TANESCO to increase the reliability and availability of electricity will also have job creation effects in regions that currently have access.

Thus, on a national level, it is possible that between 15,000 and 60,000[5] jobs could be created by expanding the national grid, depending on the rate of expansion and the extent to which regions without electricity are targeted. Taking into account the additional possibilities of improved reliability and access to electricity in areas connected to the grid but with poor transmission and distribution systems, electricity could create far beyond 200,000 indirect jobs over five years. Assistance from government and NGOs to provide incentives for business start-ups would help maximise this number.

Increased electricity use from businesses as well as households will also increase the demand for electricians, mechanics and other jobs related to the services that electricity enables. With the provision of electricity, it is significantly cheaper for businesses and households to use common electrical commodities in their day-to-day activities (Table 6).

[5] Note: Range given is an estimate assuming that not all 7 regions would be connected in the same year and that a number of other factors influence job creation, so the maximum 9,400 jobs/region * 7 regions = 65,800 jobs would probably be an overestimate.

Table 6: Potential Household Savings Via On-Grid Electricity

	Time / Day (Hours)	Electricity Used in One Month (KWh)	Cost / Month Using On-Grid (TShs 85 /KWh)	Cost / Month Using Diesel Generator (TShs 415 /KWh)	Savings Via On-Grid Electricity
Radio	4.0	2.4	204	996	792
Toaster	0.5	9	765	3,735	2,970
Electric Iron	0.2	6	510	2,490	1,980
Washing Machine	0.5	15	1,275	6,225	4,950
Water Boiler	0.5	18	1,530	7,470	5,940
Tube Lights (10)	6.0	72	6,120	29,880	23,760
Television	8.0	72	6,120	29,880	23,760
Cooker / Oven	3.0	315	26,775	130,725	103,950
Refrigerator	18.0	108	9,180	44,820	35,640
Air Conditioning	6.0	270	22,950	112,050	89,100
Electric Kettle	0.5	15	1,275	6,225	4,950
Ceiling Fan	6.0	18	1,530	7,470	5,940
Deep Freezer	18.0	162	13,770	67,230	53,460
Stereo	2.0	7.2	612	2,988	2,376

Notes: Costs for diesel energy production estimated from various studies. Costs for on-grid production utilise REA tariff scheme for medium load users. For household use only, savings are greater.
Source: TANESCO brochure "Efficient Use of Energy, 2009"

The 2007 Household Budget Survey showed that ownership of televisions in rural Tanzania has increased from 0.2 percent in 2000/01 to 1.8% in 2007. Given an estimated number of rural households at 6,583,000[6], then in eight years roughly 115,000 televisions were purchased in rural Tanzania.

Mtwara provides an example of the fast-growing market for electrical goods. There, 45,000 houses are to be connected to the grid over the next three years (Samji et al., 2009). If one-quarter of those houses purchases a TV, there would be 11,250 more televisions in Mtwara. If one-in-ten of those households were to purchase a refrigerator and one-in-twenty purchase an electric stove, 4,500 refrigerators and 2,250 electric stoves would be installed for household use. There would be a corresponding increase in demand for appliance stores with shop assistants, service and repair technicians, and business ancillary services. The increased demand for electricity has the potential to transform the business and labour market in Mtwara.

Demand for all services that come with the use of electricity presents new job opportunities. The Engineers Registration Act seeks to maintain a ratio of 1 engineer to 5 technicians to 25 artisans in its training related to electrification. Given the previous projection of 6,657 direct jobs created in TANESCO through expansion of the national grid per 100,000 households per year, demand for technicians should increase by 33,285 jobs and demand for artisans will increase by 166,425 jobs per year. In total, over five years assuming 100,000 households are connected per year, over 990,000 indirect job opportunities could be created through the increased demand for technicians and artisans alone.

[6] Rural population = 31.6 million based on 4.8 people per household in Tanzania (HBS 2007)

4.3 Indirect Benefits of Electrification

Electrification provides major benefits to the education and health sectors, as evidenced in studies in Mozambique and Philippines. Rural health centres with access to regular refrigeration of medicines, lighting, tools and computers to manage services significantly improve the health outcomes of patients and at reduced cost. Schools in rural villages with electricity also observe better performance from students. In Mozambique, both of these effects have been observed. Rural health units in Ribáue were better able to treat emergency cases, the laboratory functioned more effectively, vaccines were able to be stored for longer, and the reputation of the health service improved in the community resulting in higher usage.

In addition, there is a well-documented correlation between access to electricity and reduction in fertility rates which leads to significant health benefits and poverty reduction. In a rural area of the Philippines, the decline in fertility from 46 to 30 births per thousand women of reproductive age was attributed to rural electrification (Herrin, 1979). Similarly, longitudinal, micro-level demographic data in Brazil over 40 years shows a strong and statistically significant correlation between declining fertility rates and electrification throughout the country (Potter, 2002). This decline is primarily attributed to longer working hours and also to the spread of television which displayed images of more "modern" families with only one or two children.

Electrification allows people to study, work or socialise longer into the evening. Education improved in Ribáue and Iapala, Mozambique as a result of electricity. Immediately after electrification, night classes were organised for grades 6 through 12 resulting in a significant increase in the number of women able to attend classes and an increase in the number of adults attending. Performance at the local school also improved. Before electrification, the performance of students in grades 1 through 3 was rated at 71%. Eighteen months after electrification, performance was 82% and after five years with electricity it was 96%. The school administration attributes this improvement to electricity to students being able to do homework in the evenings and to the school offering night classes to better prepare students for day lessons. Schools also gained access to computers and copy machines which helped augment the quality of education (Akesson, 2006).

4.4 Demand for Electricity

The present demand for electricity is suppressed due to insufficient and inefficient supply. According to the HBS 2007, 12% of households in Mainland Tanzania have access to on-grid electricity. Dar es Salaam has the highest access with 55% of households connected compared with only 2.5% of rural households. These data do not include access to off-grid generation of electricity, such as diesel generators or micro-hydro plants. Almost all (92%) of electrified rural households consume less than 50 kWh per month, costing TShs 2,450 per month using TANESCO's tariff pricing scheme. The mean monthly household expenditure in rural Tanzania in 2007 was TShs 82,715 (NBS, 2009, Ch. 6, Table 1.1).

At the household level, research by the Ministry of Energy and Minerals found that:

- 93% of rural households expressed a desire for electricity;
- 62% reported that they would be willing to pay up to TShs 10,000 per month, with the remainder of households willing to pay double or triple that amount; and

- 22% of all non-electrified households and 18% of rural non-electrified households used a private generator for electricity (MEM, 2005).

The MEM study suggests that at least 75% of rural households are both willing and able to pay for electricity. Meeting this demand, however, faces two major hurdles. First, TANESCO does not charge tariffs equal to the cost of producing electricity, so it is operating at a loss. The present generation cost for TANESCO is estimated at close to 70 TShs/kWh but the current tariff charged is 50 TShs/kWh, which is below the market price and world prices for energy (TANESCO, 2006). It has been suggested that TANESCO increase the tariff by between 40% and 50%, which would decrease demand unless subsidies were offered.[7] Second, the extensive costs of providing electricity to rural areas via the national grid are far higher than the returns offered from household consumption alone. Increasing the productive use of electricity in rural areas can help increase demand for electricity, stabilise electricity use through day and night, and make rural electrification much more cost effective.

4.5 Realising the Benefits of Electrification

There are clear economic benefits to electrification, but those benefits will not be realised without strategic management and targeted public investment. Rural electrification is expensive, and social benefits alone will not provide the financial returns necessary to sustain investment in electricity. Two factors are of utmost importance to ensure that the productivity and job-creation benefits of rural electrification are maximised.

First, there must be a focus on rural and peri-urban areas which will most readily adopt electricity for use in productive businesses and industries. Resources are scarce, so areas which can provide the greatest economic returns should be electrified before others. Targeting economic activities in areas which show potential for growth with electricity will increase returns to public investment, helping to subsidise future electrification of less economically productive areas.

Second, load promotion strategies and community education are critical to accelerate usage of electricity in rural areas. These strategies should focus on productive sectors of the labour market. Increased productive use of electricity will provide increasing financial returns to electricity providers, while also encouraging activities which lead to growth and poverty reduction.

Sections 4.6 and 4.7 will outline good practices from rural electrification strategies in other countries to highlight some of the issues Tanzania needs to consider as it moves forward. The Rural Energy Agency and TANESCO have considered some of these strategies, but they are not yet sufficiently reflected in policy or practice.

4.6 Targeting with a Baseline Load Assessment

A comprehensive baseline study needs to be conducted to assess the demand for electricity in villages throughout the country based on the number of households, the

[7] Tariff pricing suggestions are being discussed. A World Bank representative has suggested that 40%-50% is being perceived as an appropriate increase.

number and types of businesses, and other demographic and natural resource indicators. Baseline data can be analysed to identify villages expected to make the most productive use of electricity in the shortest time. Some countries have even placed revenue requirements on villages, helping to promote the productive use of electricity even before electrification. This was effective in Bangladesh where the baseline load assessment was used to set a minimum threshold of potential electricity use based on the number of households and types of businesses. If villages did not meet that minimum threshold, then the government would not bring the electric grid to their village (see Box 2).

The baseline assessment would also allow for monitoring the performance of electrified villages. A minimum threshold of economic and financial return should be set based on all the demographic and economic information gathered about each village. By defining such a threshold, villages which begin to dip below the expected returns can be targeted with load promotion strategies which would increase revenues to providers.

The central issue is that expanding electricity coverage should be based on the economic viability of electrification, putting productivity, job creation and growth at the centre of a rural electrification strategy. An example from Thailand is provided in Box 1.

Box 1: Thailand's Rural Electrification Strategy

Thailand's Provincial Electricity Authority (PEA) used three quantitative steps and a final qualitative assessment to identify rural villages which would provide the most benefit from electrification and at the least cost. First, provinces were evaluated based on aggregate socio-economic indicators including information on health, education and poverty. Valuing these indicators helped determine how many villages per province would be electrified, and Thailand used a formula to favour the more advanced provinces first. Next, household survey data was collected to predict the amount of actual and potential electricity used in villages. Estimates were then totalled and more villages in districts with the highest actual and potential electricity use were electrified. Third, the PEA ranked villages based on proximity to the grid, village size, productive uses of electricity in various industries, and the number of public infrastructure facilities. Finally, a qualitative assessment was undertaken of the top ranked villages based on high economic returns and low costs to insure the viability of the selection.

After electrification, the PEA continued to monitor villages based on the estimated demand for electricity. In villages which underperformed, load promotion strategies were undertaken to increase the productive use of electricity. These strategies were developed by Load Promotion Teams which were sent to villages to assess the best options for increasing electricity use. One of the most common strategies employed was convincing rice mill operators to switch from diesel motors to electric motors, which significantly improved mill efficiency and revenue while increasing electricity use in the village.

Source: Tuntivate & Barnes, 2007

In its first year, Tanzania's REA completed rural electrification projects in four ways. First, it electrified district headquarters which had not previously been connected to the national grid. This was done under the assumption that electrifying district centres would lead to electricity trickling out into the surrounding rural areas, but so far this result has not been realised. Second, the REA completed some projects which TANESCO had failed to complete due to limited funding. Third, proposals for funding from development partners for rural

electrification projects were prepared. Fourth, areas which stood to benefit the most from the productive use of electricity were selected for electrification.

Initial assessments of rural electrification from MEM, TANESCO and the African Development Bank identified potential customers, cost per connection and net present value per connection in 92 villages across Tanzania. These studies showed that the costs associated with electrifying villages vary widely, so prioritisation is essential. The calculations show that a combination of subsidy and customer contribution above the tariff revenue of between US$116 and US$555 per customer are required to make the projects economically viable (MEM, 2004). These costs make rural electrification seem expensive, but the studies do not take into account the rapid returns that targeting productive industries can provide to rural electrification projects.

4.7 Load Promotion Strategies and Monitoring Mechanisms

Following from the baseline assessment, load promotion strategies will be critical to rapidly increase the productive use of electricity and ensure the financial viability of rural electrification. Promotion strategies should specifically target industries which show the most potential for growth in rural areas. By promoting the productive use of electricity, net revenues of villages will increase as will the mean incomes of villagers, thus helping increase and stabilise the demand for electricity. The three most common enterprises for targeting in other countries are:

- motorised irrigation pumps for agricultural producers;
- grain mills; and
- small, household industries.

Further analysis and pilot programmes should be implemented to assess their efficacy. Also, many countries have engaged local communities to identify the growth drivers made possible through electricity. Targets that take into account variations between economies in rural communities could be most successful.

Load promotion strategies can be implemented in all electrified villages, but they are essential in villages which fail to meet the baseline assessment of demand. Such a strategy will help mitigate the financially draining effect that unproductive electrification can have. Therefore, an effective monitoring strategy is also necessary. An example of load promotion in Bangladesh is given in Box 2.

Targeting and load promotion strategies have not required significant financial incentives in most countries, rather the focus has been on educating villagers on the profitability of using electricity. One example is the use of electric motors in grain mills which can operate 20% more efficiently than diesel engines and provide an immediate increase in income to millers who choose to switch. Similar quick gains are possible in many enterprises, and people have readily switched to electricity when the gains are made clear to them. It should be noted, though, that access to finance is a critical complement to the success of such strategies, since most rural residents lack the capital for the electrification of their enterprises.

Box 2: Load Promotion in Bangladesh

Bangladesh faced the challenge of making rural electrification possible in a country with widespread rural poverty. The Rural Electrification Board (REB) employed strategies to minimise the costs of rural electrification while maximising the rural demand for electricity. Strategies to minimise costs included using single-phase lines for initial connections and minimising distances covered by secondary distribution systems to reduce loss.

To increase demand, REB promoted the productive use of electricity in rural areas by encouraging rice milling, irrigation and household power looms. The need for electricity to be used productively was reflected in the REB requirement to meet certain revenue requirements prior to electrification. For Bangladesh, the extremely low average domestic use of electricity made the promotion of productive electricity use essential to the REB's success.

Source: Waddle, 2007

5 Skilled Labour Supply for Electrification

5.1 The Supply and Quality of Labour in Tanzania

In Tanzania, 24% of the population 15 years and older has no formal education and over half have completed only primary school (NBS, 2009). Despite this, aspirations are high. Most job-seekers would prefer to work in the government, private sector or parastatal agencies which account for only 14.5% of total employment and a small proportion of new employment opportunities (Samji et al., 2009). Opportunities are growing, particularly in the private sector which has seen increases of 15% from 2001 to 2006. However, this figure includes the informal sector and disguises the need for more formal private sector jobs. Informal sector jobs do not produce significant multiplier effects and are seldom productive enough to enable earnings beyond poverty levels.

However, will a poorly educated workforce be able to take up opportunities in the formal private sector, if they become available? Evidence suggests that a primary school education is no longer sufficient to obtain gainful employment for the poor. Global developments in technology have increased demand for skilled labour, and jobs previously held by primary school leavers are now being filled by secondary school graduates. In 2007, the percentage of pupils who completed primary school was 78%, of whom 68% proceeded to secondary school. However, only 38% of these entrants passed the Form IV exams (Divisions 1-3), and just a quarter of Form VI graduates progressed to tertiary education (RAWG, 2007). Of the nearly 800,000 entrants to the labour market in Tanzania each year, few are entering after successfully completing either secondary or tertiary education.

The demand for school leavers with more than primary education, and with skills relevant to demands in the private sector, is increasing in Tanzania. In a World Bank study, over 20% of Tanzanian firms (large and small) listed an uneducated labour force as a major constraint to doing business in the country (World Bank, 2006). This is true in many sectors, including the energy sector where direct and indirect job opportunities are expanding. Expansion of electrification requires skills, beyond basic education, and often of a vocational training level.

Research has shown that technological change from electricity increases the demand for skilled labour. Without skills training, such changes in technology can increase inequality (Acemoglu, 2002). While there will be increased demand for employment in most sectors, electrification can create a phenomenon of machines replacing manual labour, and if those manual labourers do not have sufficient technical skills to adapt to the changed market, they risk becoming unemployed. Intervention in the form of education, skills training, and work force development strategies are necessary to avoid inequalities arising. Professional trades in Tanzania offer many potential job opportunities, and the demand and opportunities for vocationally and technically skilled graduates is increasing generally, and specifically for electricians. Yet the Tanzanian education system seems ill-prepared to equip its young people with the expertise to meet this demand.

5.2 Vocational Education

A history of major changes in vocational and technical education in Tanzania is included in Annex F. In brief, beginning in 1994, a new Vocational Education and Training Act was enacted to under which the Vocational Education Training Authority (VETA) was established, financed by a payroll levy on the private sector. VETA's objectives were to:

- Provide vocational education and training opportunities and facilities

- Establish a quality vocational education and training (VET) system that meets the needs of the formal and informal sectors, one which is cost efficient and decentralised regionally
- Promote on-the-job training in industry, including apprenticeships and skills updating
- Balance the supply and demand for skilled labour in wage and self employment in both rural and urban areas
- Promote access to training for disabled groups
- Secure adequate and stable financing for vocational education and training
- Support the improvement of quality and the productivity of the economy by providing short custom-made courses to meet in-service training needs
- Promote a flexible training approach and teaching methodologies
- Establish and manage vocational institutions including teacher-training colleges.

The Act of 1994 also stipulated the establishment of Trade Advisory Committees (TACs) that were intended to give the private sector more voice in determining the utilisation of training resources and to make training more demand driven. However, the Act did not give the TACs the authority, status or representation to ensure their effectiveness; eight out of ten members of the VET Board are from government ministries, trade unions and NGOs, which do not represent the private sector labour market. The private sector is taxed for the development of VET through the payroll levy yet only 23% of the 12,000 companies in Tanzania actually are liable for payment (DFID, 1999). Additionally, 90% of the revenue collected is used in government-run to VETA centres which cater to only 7% of vocational and technical graduates in Tanzania, Most students are enrolled in private, NGO and faith-based facilities.

In 1995, the Education and Training Policy was developed. In parts, it overlaps with the Vocational Education and Training Act of 1994. For example, the Act mandates VETA to coordinate and harmonise technical education and training, while the 1995 policy gives this function to the National Council for Technical Education (NACTE) (VETA, 2007). In 1996 the Technical Education and Training Policy was endorsed by the Government with the objectives of:

- Enhancement of the application of science and technology in economic development;
- Establishment of an appropriate legal framework and regulations for rationalisation and development of technical education;
- Facilitation of the development of both public and private technical institutions;
- Fulfillment of manpower requirements for technical personnel;
- Promotion and encouragement of women's participation in technical education; and
- Attainment of a healthy balance among the technical cadre of 1:5:25 (ratio of engineers to technicians to craftspeople).[8]

[8] www.moe.go.tz

The 1996 policy also calls for an expansion of vocational teacher training facilities, bearing in mind the low enrolment capacity of the sole vocational teacher training facility at Morogoro, which has received little financial or technical support since 1998.

The VET Act and the Education and Training Policy, while welcome, raise concerns about the lack of separation between VETA's role as a regulator and financier of vocational training, and its role as a training provider (DFID, 1999). VETA centres, which benefit from the payroll levy, are not responding to the needs of the labour market, particularly for artisanal and professional skills development, including electricians. Another concern is the decline of the apprenticeship system, which deteriorated with the privatisation of parastatals, where many students had been placed. Apprenticeships now exist only informally, and no certificates are issued for completed apprenticeships (Nubler, Hofmann & Greiner, 2009).

VETA has introduced some changes including the implementation of labour demand surveys to address training needs; the introduction of modular training, covering both technical and commercial modules; and the introduction of short-term courses for employed persons. VETA also introduced what it considers to be Competency-based Education and Training (CBET) in some centres, which focuses on ensuring that trainees have achieved a pre-determined practical competence in the occupation that they are being trained for. While this type of training is certainly required in vocational trades, it is a more expensive training methodology as it requires workshops and other materials for training. It has not been made the standard mode of operation in all VETA centres, many of which do not offer CBET training.

An additional challenge has been the recent transformation of polytechnic colleges into universities, thereby creating more demand for academically focused education (leading to degrees), as opposed to practical vocational and technical skills training for professional trades, such as electricians, mechanics and carpenters. This has led away from the creation of cadres of master craftspeople (as per the European model). The only educational options available to vocational trainees, who would like to advance in their fields, are academic programmes rather than skills-based technical education. Anecdotal evidence suggests that this has led to a decreased supply of expert artisans in particular fields including electricians, despite high demand for trade expertise.

Large companies with foreign direct investment in sectors such as mining, industry and tourism have set up their private training facilities, and in some cases have access to regional facilities (especially in the case of multinationals). Training offered by these companies is usually spurred by the introduction of new production technology, new management or the introduction of information technology. Many companies link employee advancement to training which they offer, or organise, themselves. Information on expenditure on the training offered by companies is very dated. Data from 1996 indicate that the median amount of training expenditure for those enterprises that offered courses was US$14,900, and averaged US$22 per employee. More recent data is required because in countries where there is a premium on training, such as in Japan, training expenditures usually make up 3-5% of total business turnover (DFID, 1999).

5.3 VET Courses and Graduates

The creation of VETA has been central to the expansion of training in basic trades by non-State actors including the private sector. This has been the case especially at artisanal levels. As shown in Table 7, the top 10 trade courses accounted for 80% of enrolments in 2007. However, these figures should be used with caution as the number of places and courses available is not determined by market demand but by the availability of teachers and facilities for training.

Courses are regulated and certified by VETA and all training organisations are registered by VETA, including those run by faith-based organisations and the private sector, and the relatively few centres operated by VETA itself. Training is offered in different vocational trades (see Annex G for a full list) as long courses (over one year in duration) and short courses. In 2008, a total of 110,000 students were enrolled (MoEVT, 2009). VETA offers the option of vocational examinations with, or without, enrolling in courses. This enables artisans that may have completed their formal training elsewhere to be certified. VETA courses have been consistently oversubscribed, in part because of the limited opportunities for education and skills development beyond primary school.

Graduates who pass their Trade Tests receive national certification from VETA which enables them to legally operate in the open market. No foreign certification is allowed in Tanzania (unlike in Zimbabwe, where British and South African certification are options).

Many graduates of VETA particularly in the most technical trades, such as electricians, join informal apprenticeships where they receive practical training and know-how from 'master' craftsmen. Others complete their informal apprenticeships and then sit for trade testing with VETA in order to be able to practice their trades. VETA itself does not provide any certification for apprenticeships, nor does it offer/facilitate apprenticeships for students.

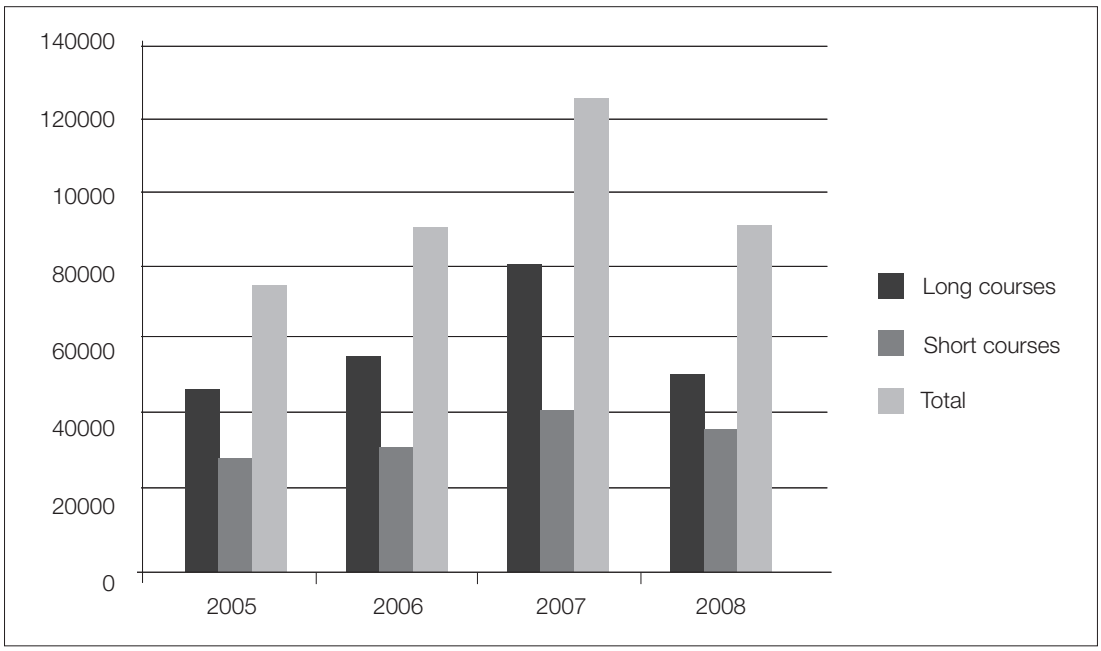
Table 7: Top 10 Trade Courses by Percentage Growth in Numbers of Graduates, 2005-2007

	Trade	2005	2006	2007
1	Tailoring	9,279	9,839	18,852
2	Motor Vehicle Mechanics	6,749	8,242	13,794
3	Carpentry and Joinery	4,872	4,662	5,320
4	Domestic Electrical Installation	4,001	4,662	4,354
5	Computer Applications	3,736	4,975	6,797
6	Secretarial	2,455	3,239	7,310
7	Masonry and Bricklaying	2,360	2,637	2,907
8	Welding and Fabrication	1,812	2,101	3,716
9	Food Preparation	1,619	2,003	2,230
10	Hotel Management	1,316	2,683	1,898
	Total	**38,199**	**46,075**	**67,178**
	All Graduates	**48,889**	**58,818**	**83,816**
	% age share of All Graduates	**78%**	**78%**	**80%**

Source: VETA, 2009

While the years 2005-2007 saw significant increases in the numbers of vocational graduates, 2008 saw a 28% fall across all types of courses, with long courses showing the largest decrease of 36%, or some 30,000 graduates (Figure 9). The reasons for these sudden increases and decreases are unclear.

Figure 9: Numbers of VET Graduates by Year (Long Courses)



Sources: MoEVT, 2009; VETA, 2009

Evidence in Table 8 illustrates that more densely populated regions have higher levels of economic activity and a higher supply of graduates each year. These include Arusha, Dar es Salaam, Kilimanjaro, Mbeya and Mwanza. Regions with lower population levels, and lower levels of economic activity have many fewer graduates of vocational training, and include Kigoma, Manyara, Rukwa, Ruvuma and Tabora. It is notable that of the four regions with the lowest number of VET graduates, three are not connected to the national electricity grid.

Table 8: VET Graduates by Region, 2005-2007

Region	Training Capacity	2005	2006	2007	Cumulative 2005-2007	% of Total Graduates
Arusha	2,959	6,173	7,797	13,462	27,432	14%
Coast/Pwani	40	1,030	1,719	2,226	4,975	3%
Dodoma	1,153	1,653	1,612	2,455	5,720	3%
Dar es Salaam	22,312	11,308	15,482	19,959	46,749	24%
Iringa	3,468	2,004	2,014	3,779	7,797	4%
Kagera	718	2,500	2,444	4,363	9,307	5%
Kigoma	568	286	522	348	1,156	1%
Kilimanjaro	3,359	4,223	4,654	8,450	17,327	9%
Lindi	-	1,332	1,302	1,527	4,161	2%
Manyara	1,285	331	1,660	1,371	3,362	2%
Mara	520	1,001	989	2,331	4,321	2%
Mbeya	1,045	3,730	3,801	4,516	12,047	6%
Morogoro	1,373	1,248	1,072	1,816	4,136	2%
Mtwara	703	2,499	1,975	3,338	7,812	4%
Mwanza	1,458	3,046	4,480	5,232	12,758	7%
Rukwa	225	1,134	570	952	2,656	1%
Ruvuma	1,573	1,066	1,217	1,153	3,436	2%
Shinyanga	608	950	1,681	1,032	3,663	2%
Singida	499	799	961	1,520	3,280	2%
Tabora	450	691	908	756	2,355	1%
Tanga	1,061	1,885	1,958	3,230	7,073	4%
Total		**48,889**	**58,818**	**83,816**	**191,523**	**100%**

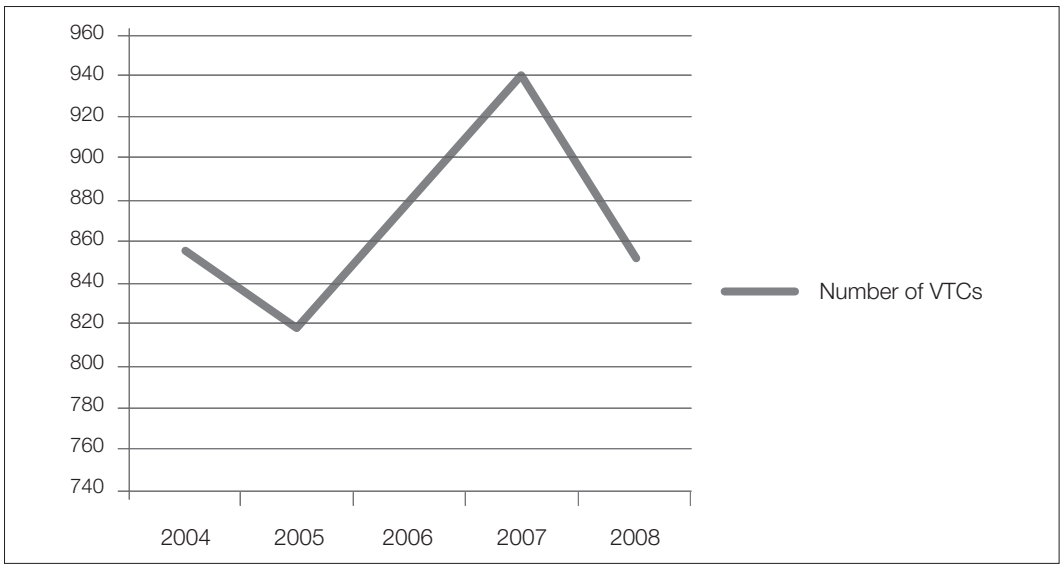
Source: VETA, 2009

5.4 Vocational Education Outside of Centres Operated by VETA

Vocational training centres operated by organisations outside of those run directly by VETA train the vast majority of skilled trades-people in the country. VETA-run centres represent only 2% of all training centres and 7% of enrolments (Table 9). Figure 10 shows the number of vocational training centres from 2003 to 2008. It should be noted that it is unclear why more than 105 vocational centres were closed or deregistered from 2007 to 2008.

All vocational training centres must be registered with VETA. VETA's responsibilities include inspection of centres for adherence to guidelines before registration is granted, and continued inspection of facilities and courses. In reality however, private training providers remain largely unregulated, mainly because VETA does not have the capacity to inspect them. Little is known about the quality of training provided outside of VETA centres, as most technical support to vocational training has been to VETA centres and not to non-State providers.

Figure 10: Number of Vocational Training Centres, 2004 to 2008



Source: MoEVT, 2009; VETA, 2009

The types of private and non-governmental organisations offering vocational and technical training include:

- Faith-based trade schools, which began operating in the country during the colonial period. They offer 3-4 year courses which combine training and production (in order to offset some of the training expenses). These organisations are usually affiliated to faith groups and receive subsidies and technical support. Many of these trade schools also offer their graduates toolkits or facilitate access to microfinance, so that they gain a stronger foothold in their trades.

- The private sector owns and operates the largest number of vocational training centres in Tanzania. The number of private centres grew by approximately 10% in the years 2007-2008; 14 new training centres were established, representing 66% of all new training centres in that period. Most private vocational centres offer secretarial, commercial or catering courses, as opposed to technical trades such as carpentry, masonry and electrical installation. This is in part due to the costs involved in setting up centres with workshops and equipment. Most private training centres aim to improve competitiveness in the private sector, particularly in the areas of new management techniques and use of information technologies.

- Folk Development Colleges under the Ministry of Community Development, Gender and Children were initially established along the model of the Swedish Folk High Schools to train people in rural areas. They offer literacy and vocational skills training. However, as curricula have been developed centrally, the colleges have not adapted to the specific needs of communities. They have only recently introduced courses leading to trade tests.[9]

[9] www.veta.go.tz

5.5 Enrolment Trends in Vocational Training

Overall enrolment in vocational training has increased by 80% over the 12-year period between 1995 and 2007 (Table 9). The largest numbers of students enrolled are in faith-based and private sector training centres. VETA centres have had a stagnant/ declining share of enrolment, down from 8% in 1995 to 7% in 2007, despite VETA continuing to be the sole beneficiary of the skills and development levy.

Vocational training centres operated by faith-based organisations provided 38% of places in 2007 and have more than doubled their enrolment numbers over the period since 1995. Private sector training centres provided 35% of places in 2007 and this has grown by 177% over the same period. Enrolments in Folk Development Colleges have increased substantially, albeit from very low levels, and provided only 13% of student places in 2007.

Table 9: Enrolment of Students by Ownership of Training Centres, 1995 and 2007

Ownership	1995		2007		Growth, 1995 to 2007
	Enrolment	Percentage of total	Enrolment	Percentage of total	
Government ministries	1,840	4%	11,277	13%	610%
Faith-based organisations	14,600	31%	32,043	38%	219%
NGOs	10,309	22%	5,494	7%	- 53%
Private	16,440	35%	29,082	35%	177%
VETA	3,500	8%	5,920	7%	69%
Total	**46,689**	**100%**	**83,816**	**100%**	**80%**

Source: DFID, 1999; VETA, 2009

While VETA-owned centres make up only 2% of all centres and 7% of students enrolled, they have the largest number of graduates per centre, averaging 282 graduates per centre in 2007 (Table 10). This likely indicates large classes and very low teacher to student ratios which will affect learning. Other centres tend to have considerably fewer enrolments per site.

Table 10: Enrolment by Ownership of Centres, 2007

Ownership	Number of VTCs	Enrolment	Output per Centre
Government ministries	147	11,277	77
Faith-based organisations	270	32,043	119
NGOs	163	5,494	34
Private	337	29,082	86
VETA	21	5,920	282
Total	**938**	**83,816**	**89**

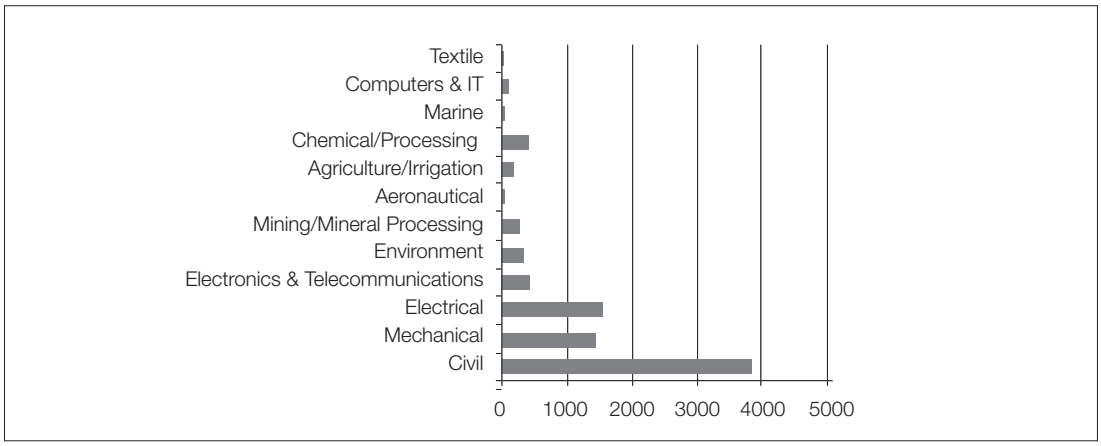
Source: VETA, 2009

5.6 Labour Supply and the Energy Sector

Engineer electricians are the highest trained cadre in the electrical trades in Tanzania. However, overall engineers in Tanzania are very few. Registered engineers include only those with higher tertiary education degrees in engineering. These numbers do not include technicians or artisans who have been trained and certified by VETA or other vocational training centres.

As at December 2008, the total number of engineers registered was 8,408. Of the total, 45% were civil engineers, while only 18% (1,559) were electrical engineers (Figure 11).

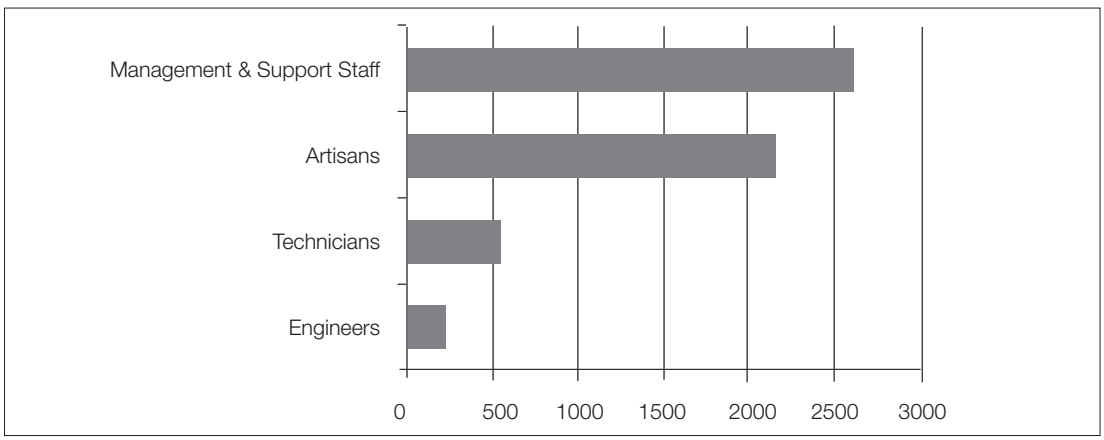
Figure 11: Registered Engineers by Discipline, December 2008



Source: Engineers Registration Board, Registration Statistics 2008

Of the 1,559 registered electrical engineers, TANESCO employs 228 (15%).The data available did not allow for further exploration into how many registered electrical engineers outside of those employed by TANESCO are practicing their trade. As Figure 12 shows, engineers form a small proportion of the total complement of TANESCO's technical staff.

Figure 12: TANESCO Technical Employees by Grade, 2009



Source: JICA interviews 2010

The Engineers Registration Act was amended in 2008 and now includes technicians certified by the three main technical institutes in the country: Dar es Salaam Institute of Technology, Mbeya Technical Institute and Arusha Technical Institute. Registration of graduates from these three institutions is expected to commence in March 2010, and will provide more accurate information about the numbers and skill levels of technicians in the country.

Before 1997, training of electricians by TANESCO was done in two large facilities in Kidatu and Morogoro. These centres conducted training for staff as part of internal professional development. These facilities were closed down when TANESCO was slated for privatisation in 1997, and the physical facilities were re-allocated by the government. The Morogoro facility was given to the Muslim University for its campus. Now that it has become clear that TANESCO will not be privatised, the company has begun to explore professional development again, and aims to set up smaller centres in Dar es Salaam as an initial step in expanding staff training. This is being supported by JICA (Box 3).

Box 3: JICA Support to TANESCO Training, 2009-2014

JICA's capacity building support to TANESCO includes a large component of tailor-made training for TANESCO's technical staff. The full complement of 2,935 technical staff will be reached both directly and indirectly. The training will be based on a training of trainers (ToT) methodology, with master trainers trained at the new Dar es Salaam Training Centre, who will then train staff back in their respective regions.

It is intended that JICA experts will work together with TANESCO's training department to design and deliver the relevant training materials required for each position. Discussions have been held with VETA so that nationally recognised certificates will be provided to staff who complete courses.

5.7 VETA Curriculum and Instructors for Electricians

Curriculum for artisanal electricians (the levels below electrical engineers) is provided by VETA. It is divided into three levels for electrical installation (see Annex H for full details) with Level 1 being the most advanced. The course content includes:

- Trade Test III: bench work, electrical joints, simple electrical circuits, power supply circuits, drafting and operationalising wiring
- Trade Test II: installing cable enclosures, installing switch gears and protective devices, electrical maintenance
- Trade Test I: installing machines, managing resources

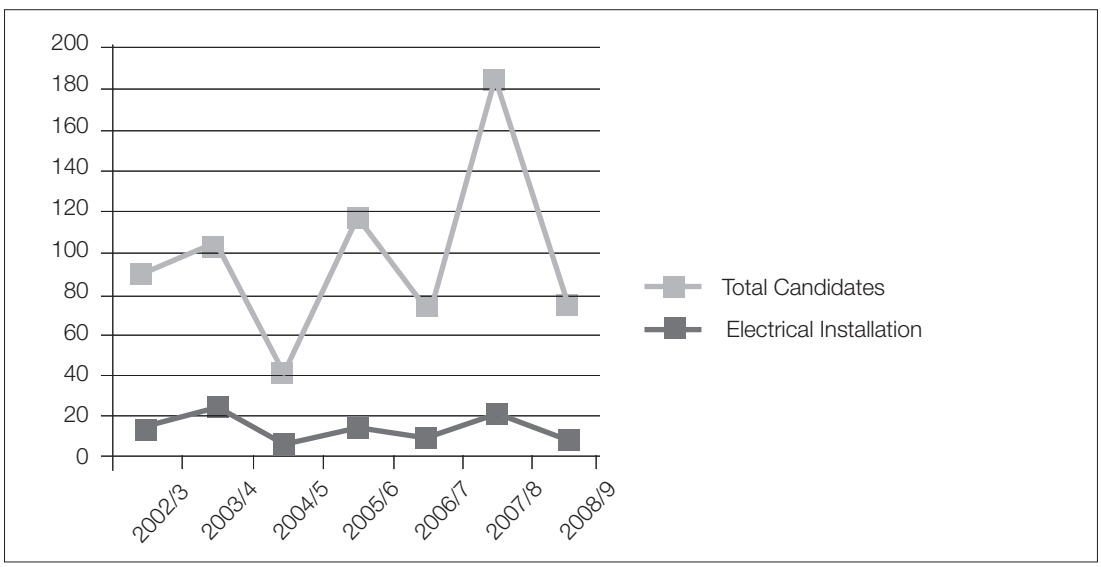
Progression up the levels involves greater complexity, and the final level includes management of equipment, finances and other resources. VETA does not have a job placement programme, nor does it facilitate access to finance or to toolkits to enable electricians to start their own businesses.

To become a vocational instructor, candidates must either have passed Form IV exams or Trade Test 1 at VETA. The Morogoro Vocational Teacher Training College has the capacity to train up to 80 instructors on-site a year, yet has only five full-time instructors. Of the five instructors, two hold Master's degrees and three hold Bachelor's degrees in education. The

student to teacher ratio is fairly impressive at 16:1, but, when the range of courses on offer is taken into account (between 19-21 different courses), it is difficult to understand how trainers can be providing adequate guidance given their small number and the range of courses for which they provide instruction. Given that the course content varies between fairly simple offerings (such as secretarial and book-binding) to more complex subjects including electrician training, agro-mechanics and refrigeration, the capacity of just five trainers to achieve high quality outcomes is questionable, regardless of their level of motivation.

The vocational instructors' course is a 42-week programme covering communication methods, education methods, training methodology, workshop management and practical skills. As can be seen in Figure 13, enrolment at the Morogoro Centre has been erratic year-on-year for the last 7 years, with a low of approximately 40 trainee instructors in 2004/05, and a high of over 180 in 2007/08. The numbers of trainees enrolling for electrical installation has also fluctuated, although not to such an extreme.

Figure 13: Enrolment at Morogoro Vocational Teacher Training College, 2002/03 to 2008/09

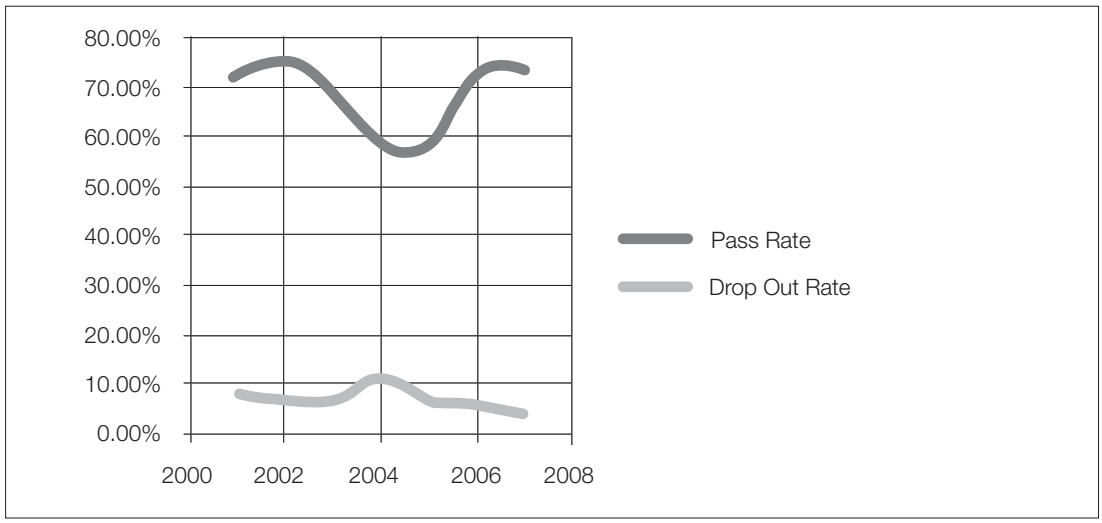


Source: VETA, 2009

5.8 The Quality of Vocational Education and Training

The average pass rate of VET students has been just over 60%, with a peak of 75% in 2002 and 2006/07, and a major dip to under 60% in 2004/05. This was also the year when enrolment at the Morogoro Centre dropped to a low of 40, and when the drop-out rate hit a high of 11% (Figure 14).

Figure 14: VETA Pass Rates and Drop-out Rates, 2001-2007



Source: VETA, 2009

Anecdotal evidence from VETA electrical graduates interviewed in Dar es Salaam in 2010 (all of whom had attended VETA-owned centres) indicate that they were reasonably pleased with the training received, and feel that it was relevant to their chosen trade. However, some respondents had proceeded to upgrade their VETA qualifications, while others became instructors at VETA. All of them felt that there was a need for them to keep up with the latest technologies in their fields, for which VETA had not prepared them. One graduate also highlighted that most of his class had not yet found employment:

"Out of my class of 25, only 10 of us have found work. The assumption is that the rest of us will become self-employed."

Electrical graduate, Dar es Salaam, 2010

In a tracer study of VETA graduates in Mtwara[10] in 2004, 17% of all graduates felt that the electrical courses at VETA were too theoretical, with a declining focus on practical skills, and 22% felt that the curriculum was outdated given rapid advances in technology. Of greater concern, over 10% of graduates claimed not to be competent in their trained vocation. Most graduates felt that the VETA workshops were ill-equipped, and that the Swahili medium of instruction was not useful, given that modern technology manuals are all written in English.

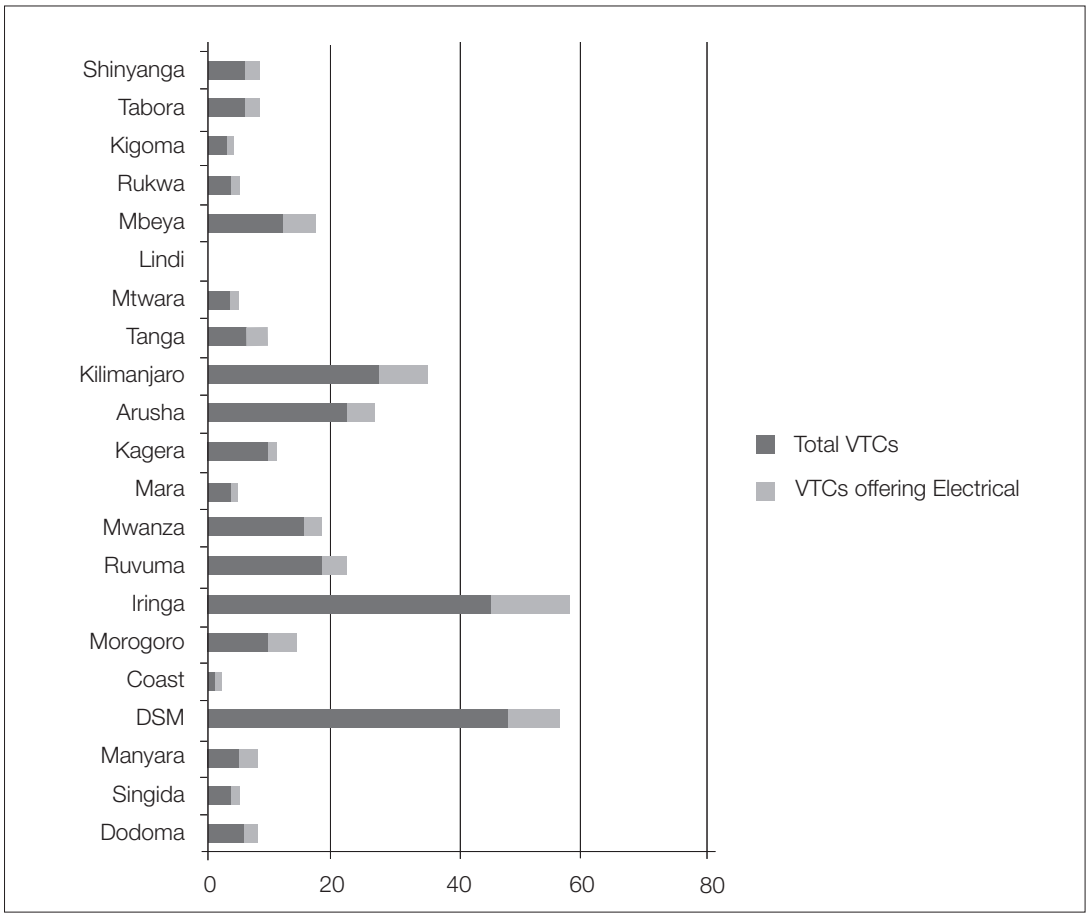
5.9 VET Electrical Courses

Nationwide, approximately 28% of the registered vocational training centres (VTCs) offer training for electricians. Electrical courses are offered at some centres in each region (Figure 15). Most regions, with the exception of Lindi where there is no VETA centre, have at least one VTC that provides training in electrical installation (usually domestic, not industrial).

[10] National tracer studies were unavailable at the time of writing, but are expected to be completed in June 2010

The largest number of centres offering electrical installation are located in Iringa region (13 out of 45 centres, or 29%). Iringa is also the only region where a three-year course on renewable energy is offered. The majority of the centres offering electrical training in Iringa are owned by faith-based organisations. Nationwide, 39% of centres offering electrical courses are run by faith-based organisations.

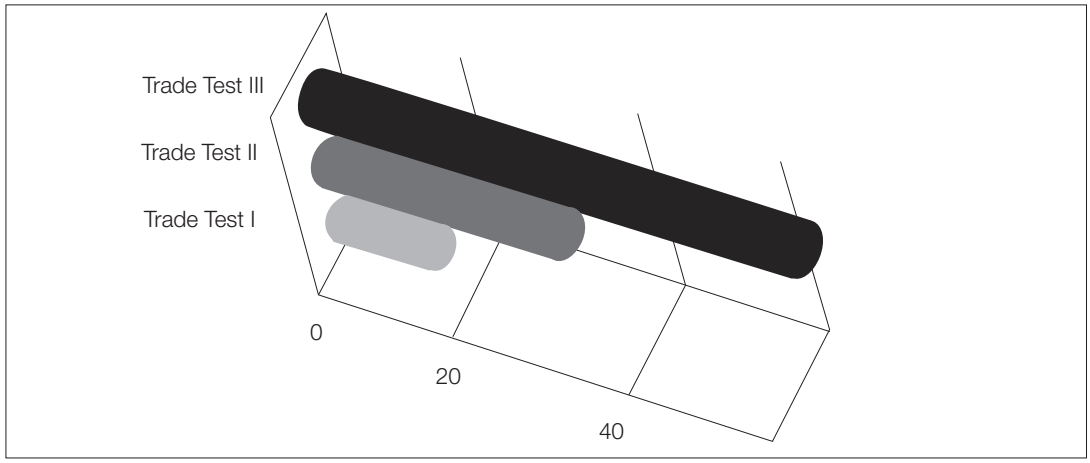
Figure 15: Electrical Courses Offered by Region, 2009



Source: VETA, 2009

Only a small proportion of VTCs offer Trade Test I, the highest artisanal qualification (Figure 16). According to the 2009 VETA Catalog, 12 regions have no access to advanced electrical training (Trade Test I) at all. The regions are: Singida, Dar es Salaam, Mara, Kagera, Kilimanjaro, Tanga, Lindi, Mbeya, Rukwa, Kigoma, Tabora and Shinyanga.

Figure 16: Numbers of VTCs and Trade Test Levels



Source: VETA, 2009

5.10 Financing for Education and Skills Development

Government budgetary allocations to the education sector as a whole have increased 12-fold in the last decade, from TShs 138,583 million in FY1999/2000 to TShs 1,743,900 million in FY2009/10. Over this period, the education sector budget increased from 11.9% of the national budget in 1999 to 18.3% in 2009, representing an increase in education spending from 1.9% to 5.8% of GDP (MoEVT, 2009).

The allocation for primary education and supporting services rose from 67% of the total education budget in 1999 to 75.5% in 2009, while technical, vocational and higher education have seen their shares fluctuate between 16.7% in 2004/05 and 26.2% in 2007/08 (Table 11). Since 1999, expenditure on technical and higher education and training increased by almost 1,200%. However, higher education in academic institutions accounted for the bulk of spending, not vocational and technical training.

Table 11: Budgetary Allocations to the Education Sector, 1999-2009 (in TShs Millions)

Financial Year	Primary Education and Supporting Services	% Share	Secondary Education	% Share	Teacher Education	% Share	Technical and Higher Education	% Share
1999/00	92,845	67.0	10,492	7.6	2,752	2.0	32,494	23.4
2000/01	144,658	66.3	21,453	9.8	5,261	2.4	46,679	21.4
2001/02	236,618	73.1	24,359	7.5	5,872	1.8	57,015	17.6
2002/03	289,718	73.0	29,876	7.5	6,646	1.7	70,540	17.8
2003/04	361,425	74.1	32,464	6.7	7,700	1.6	86,140	17.7
2004/05	322,196	63.8	92,045	18.2	6,189	1.2	84,315	16.7
2005/06	418,455	62.5	104,483	15.6	8,540	1.3	138,059	20.6
2006/07	618,534	64.5	119,987	12.5	10,439	1.1	209,859	21.9
2007/08	618,828	56.2	174,227	15.8	19,257	1.8	287,876	26.2
2008/09	966,633	67.6	133,058	9.3	25,250	1.8	305,431	21.4
2009/10	1,316,799	75.5	2,856	0.2	47,586	2.7	376,659	21.6

Source: MoEVT, 2009

In addition to national budget contributions, donor support for vocational and technical training has varied over the years. Table 12 lists major donors and activities since the 1970s. Much of the support has been for the construction/upgrading of training centres, although some technical support in capacity building has also been provided.

Table 12: Donor Support to VETA

Donor	Time Frame	Activity
UNDP/ILO	1970-1992	- Conversion of trade testing centre in Dar es Salaam to vocational training centre - Instructor, trade testing and apprenticeship development - Preparation of VET Act of 1974 - Staff development - Technical support and training
IBRD/ World Bank	1974-1984	- Construction of VTCs in Tanga and Mwanza - Construction of Vocational Teachers' Training College in Morogoro - Staff development
CIDA	1975-1978	- Establishment of Training Unit in Dar es Salaam
Swiss Aid/ Swiss Contact	1979-1990	- Technical support for conversion of motor vehicle mechanics trade to truck mechanics trade - Technical support for other trades - Staff development
SIDA	1977-1998	- Construction of VTC in Moshi - Refurbishment of VTCs in Tanga, Mwanza and Kihonda - Capacity building at headquarters - Technical support for trades
DANIDA	1978-present	- Construction of VTCs in Dodoma, Iringa and Mbeya - Refurbishment of Dar es Salaam VTC - Technical support to the establishment of the Labour Market Analysis Unit - Financial management system development - Pilot studies for CBET implementation
Irish Aid	1996-2002	- Conversion of Mikumi VTC to a regional VTC - Construction at Kihonda VTC - Technical support
JICA	1996-2002	- Technical support - Equipment, training and volunteers for Mtwara VTC
GTZ	1997-2002	- Technical support to informal sector training pilot programme - Technical support
OPEC	Current	- Construction and rehabilitation in Songea, Mikumi, Kagera, Olijoro, Mara and Dakawa
Korea	Current	- Construction of Lindi, Coast and Manyara VTCs - Equipment and tools for Kigoma VTC - Construction of ICT centre in Dar es Salaam

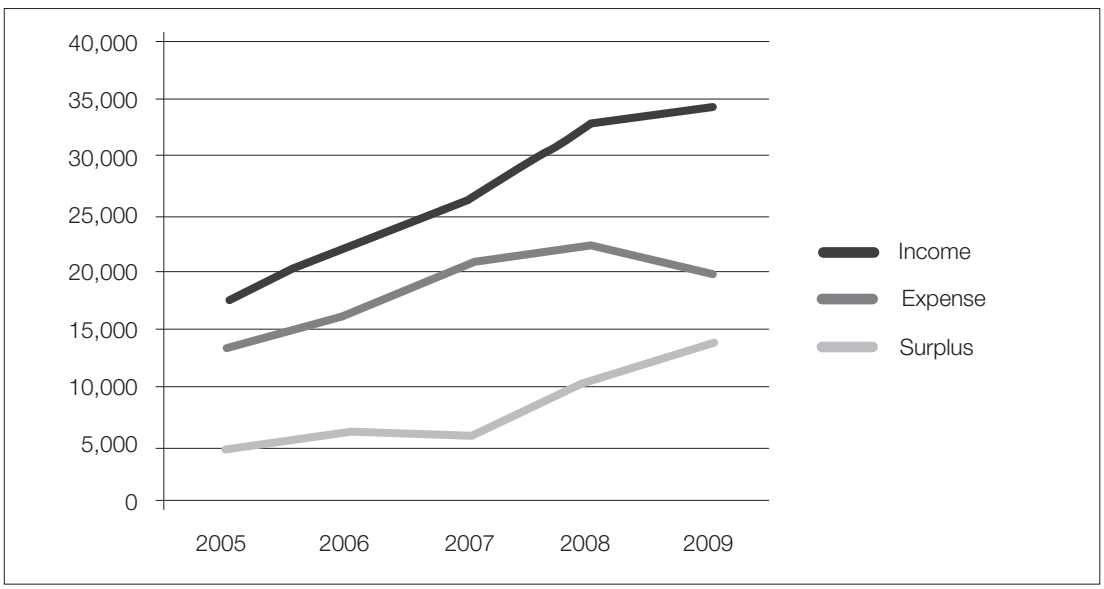
NUFFIC Netherlands	2005-2009	- Mainstreaming entrepreneurship in VETA curricula - Exploring distance learning for entrepreneurs
African Development Bank	1989-current	- Construction of printing school in Dar es Salaam - Construction of VTC for hospitality in Arusha - Construction of Singida VTC - Rehabilitation of Mpanda, Ulyankhulu, Tabora and Shinyanga VTCs - Equipment and tools - Construction of staff housing - Staff development

Source: VETA, 2007

The primary source of VETA funding is the mandatory 2% payroll levy on all companies with 6 or more employees. This levy is used to fund 80% of VETA's operational expenses, while the remaining 20% of VETA's budget is covered by student fees. Any new development projects, such as the construction of training centres and capacity building of trainers, are financed through development aid or through government loans. The majority of centres operated by the private sector and faith-based organisations receive no financial or technical support from the Tanzanian government and limited support from donors.

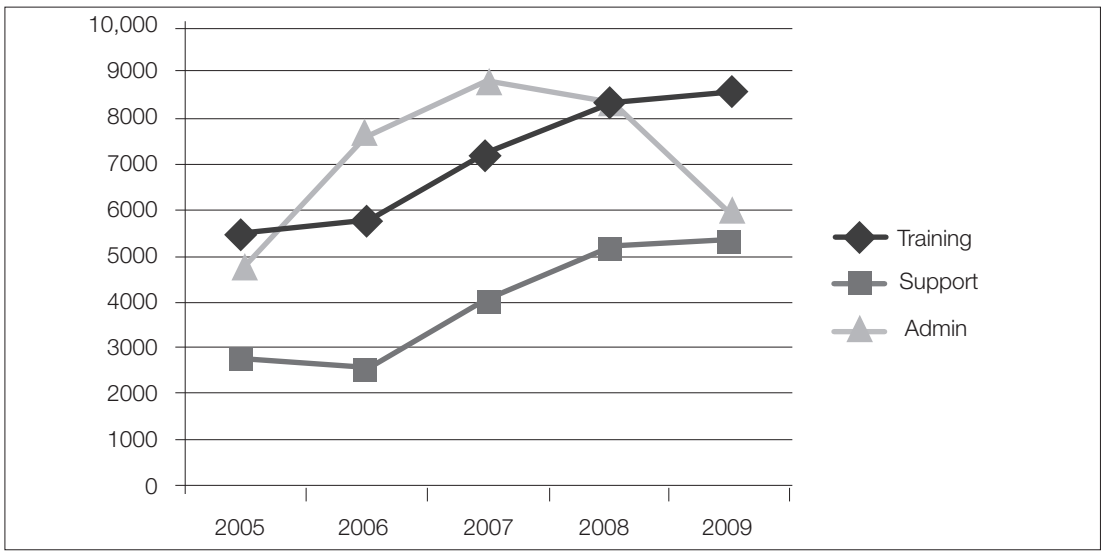
Figures 17 and 18 illustrate that VETA's income for the past five years has risen fairly steadily, and its expenses were sharply cut in financial year 2008/09. The institution appears to be making a healthy surplus each year, averaging 29% of its income per year and hitting a high of 40% of its income in 2009. It is unclear how the surplus is used.

Figure 17: VETA Budget (in TShs Billions)



Source: VETA, 2009

Figure 18: VETA Expenses by Category (in TShs Billions)



Source: VETA, 2009

Public Investment for Accelerating Electrification

In the Government's planning and budgeting framework, the energy sector has been treated as any other sector despite the adverse consequences to the economy from recurring power shortages resulting from periods of droughts. The critical power load shedding in 2006 and again in 2009 gave impetus to tackling power constraints in a more robust way. During the power shortages, the Government undertook emergency measures, providing enhanced budgetary resources for TANESCO. It is increasingly evident that the Government in collaboration with other stakeholders needs to develop a long-term, sustainable financing strategy for the energy sector, rather than face the continuing need for episodic allocations during emergencies. Such a strategy needs to be explicitly embodied in the Medium-Term Strategic Plan and Medium-Term Expenditure Framework of the Ministry of Energy and Minerals to ensure that the power sector achieves its full potential to contribute to national growth and poverty reduction.

6.1 Trends in Fiscal Allocations and Disbursements to the Energy Sector

Wide-ranging reforms undertaken from the mid-1980s involved all sectors and public utilities, and TANESCO as the vertically-integrated public utility for electricity was identified as a candidate for privatisation. During this time, the Government and development partners tended not to invest in utilities. In the case of TANESCO, investments were much needed for upgrading and expansion of the national grid, but relatively small amounts were allocated for rural electrification.

From the early to mid-2000s, there were large fluctuations in the amounts budgeted and wide variations between planned and actual development budget expenditures. As the 2004 Public Expenditure Review highlighted, the main reason for the deviations was the unpredictability of disbursement of development partners' support, which was largely due to: i) over-estimation and/or under-estimation of resource availability by MEM; ii) delay in the release of local funds by the Treasury; and iii) delayed benchmarks or documentation requirements by the development partners (MEM, 2004).

Table 13 shows that this erratic pattern of allocations and actual disbursements has continued from 2005/06 to 2008/09. MEM has not managed to secure consistent budgetary resources for electrification and energy development projects. In the quest to resolve energy constraints in the short, medium and long term, MEM has submitted budget requests according to ministerial plans. However, substantial budget allocations have been provided only during emergency situations, as in 2006/07. The data in Table 13 further highlight that:

i) A substantial proportion of earmarked allocations (both domestic and foreign) are not released in the years for which the allocations were intended. For instance, during 2006/07 only 0.4% of domestic funds intended for TANESCO and 11.6% intended for rural electrification were released that year, while only 13.4% of foreign funds for TANESCO and 4.6% for rural electrification were released that year. In stark contrast, domestic funds actually disbursed for TANESCO in 2008/09 were more than twice the amount budgeted. Such unpredictability may be attributed to many factors, including the need for emergency funding, incorrect projections, changes in national priorities, low implementation capacity, and uncertainty about prospects for mobilisation of foreign resources. Nonetheless, such unpredictability severely hampers efficient planning, contracting and implementation of major projects.

ii) The divergence between allocations and actual disbursements has been more pronounced in foreign funds for financing TANESCO projects during 2006/07-2008/09.

iii) Funds for rural and for alternative and renewable energy development have fluctuated considerably, which is likely to affect negatively sustained promotion and roll–out.

Table 13: Trends in Budgetary Allocation and Actual Disbursement for Energy Sector, 2005/06-2009/10 (in TShs millions)

Financial Year	Development Programme	Allocation		Actual Disbursement		Actual Disbursement as % of Allocation	
		Domestic	Foreign	Domestic	Foreign	Domestic	Foreign
2005/06	TANESCO	-	27,440.4	-	22,625.1	-	82.4
	Rural Electrification	1,850.0	26,169.5	1,850.0	19,761.0	100.0	75.6
	Renewable Energy	125.0	1,717.0	50.0	1,117.7	40.0	65.0
	Total	1,975.0	55,326.9	1,900.0	43,503.8	96.2	78.6
2006/07	TANESCO	191,936.0	113,588.0	900.0	15,230.3	0.4	13.4
	Rural Electrification	21,376.0	43,360.0	2,476.0	1,790.3	11.6	4.6
	Renewable Energy	484.0	4,822.0	336.0	525.6	69.4	10.9
	Total	213,496.0	161,770.0	3,712.0	17,546.2	1.7	10.8
2007/08	TANESCO	191,850.0	88,722.2	630.0	14,603.0	0.3	16.5
	Rural Electrification	1,720.0	8,929.7	1,680.0	8,101.3	97.7	90.7
	Renewable Energy	293.0	2,221.4	360.3	524.5	123.0	23.6
	Total	193,863.0	99,873.3	2,670.3	23,228.8	1.4	23.3
2008/09	TANESCO	78,712.5	59,530.0	164,570.2	17,951.2	209.1	30.1
	Rural Electrification	11,378.5	-	4,178.5	-	36.7	-
	Renewable Energy	198.0	1,636.3	198.0	1,010.7	100.0	61.8
	Total	90,289.0	61,166.3	168,946.7	18,961.9	187.1	31.0
2009/10	TANESCO	47,615.2	42,413.3	11,002.6	-	23.1	-
	Rural Electrification	29,031.0	7,833.0	12,000.0	-	41.3	-
	Renewable Energy	1,200.0	1,602.6	850.0	-	70.8	-
	Total	77,846.2	51,848.9	23,852.6	-	0.6	-

Source: Compiled from MEM, MTEF 2005/06-2009/10

Note: For financial year 2009/10, it is not easy to capture actual disbursement of foreign funds by June 2010 as final accounts are not yet completely prepared.

6.2 Financing Electrification and Energy Development

The main challenge to the rapid expansion of electrification and overall energy development is financing. Recent studies and reviews, including the PER, have emphasised the imperative for sustained financial resources for sector development so that it can drive broad-based growth for poverty reduction. The wide fluctuations in financing detailed in Section 6.1 are reflected in the overall share of the development budget which has been allocated to the energy sector. Data from 2005/06 to 2009/10 in Table 14 show that the percentage of the domestic development budget allocated to the sector has varied from 0.5% to 42.6%, and the corresponding percentage of the total development budget has varied from 2.0% to 24.6%. In 2009/10, the share of the development budget allocated to the energy was 5.4%, which is insufficient to address the minimum requirements for rehabilitation, upgrading and expansion of the existing grid infrastructure.

Table 14: Trends in the Allocation to Energy Sector in the Total Development Budget, 2005/06-2009/10

	Total Development Budget (TShs million)			Percentage allocated to Energy Sector		
	Domestic	Foreign	Total	Domestic	Foreign	Total
2005/06	297,469	1,060,721	1,358,190	0.5	2.5	2.0
2006/07	520,400	1,214,126	1,734,526	42.6	16.8	24.6
2007/08	739,203.5	1,461,892.4	2,201,095.5	26.2	7.7	13.9
2008/09	940,380	1,551,100	2,491,480	9.9	14.2	12.6
2009/10	960,028.4	1,857,403	2,825,431.4	9.5	3.3	5.4

Source: Compiled from MEM MTEF 2005/06-2009/10 and MFEA Development Budget books, 2005/06-2009/10

MEM estimates of funding requirements for meeting the MKUKUTA goals and the MDGs for energy are shown in Table 15, and compared with the funding which is currently available. Based on projected allocations, the Ministry estimates funding shortfalls of 40%, 21% and 38% in the next three fiscal years.

Table 15: Projections of Financial Resource Requirements for Meeting MKUKUTA Targets and MDGs for Energy, 2007/08-2012/13 (in US$ Million)

	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Requirements for MKUKUTA/MDGs	897.9	1,123.3	906.6	871.7	687.2	926.4
Projected budget allocation	384.5	414.0	443.9	478.6	503.3	533.0
Tentative MCC funds	N/A	41.2	41.2	41.2	41.2	41.2
Total funds available	384.5	455.2	485.1	519.8	544.5	574.2
Financing gap	513.4	668.1	421.5	351.9	142.7	352.2
Gap as % of requirement	57.2	59.5	53.5	40.4	20.8	38.0

Source: Joint Energy Sector Review (JESR) Reports, 2007, 2008

The challenge to sustainable financing of electrification, however, can be met through the Government's Medium-Term Public Investment Plan (MPIP) for the period 2010/11-2014/15. The MPIP provides the framework for a strategic direction for public investment. It ``seeks to unlock the country's vast economic potential largely through improvement of the infrastructure''. Furthermore, the Plan emphasises that `it is in Tanzania's best interest to focus resources on a few strategic areas but of significant impact on growth, for the realisation of the envisaged development path' (MoFEA, 2009).

The main objectives of the Plan are to improve infrastructure networks and attain low-cost energy services that would allow greater investment in the country. MPIP has prioritised the following energy projects for implementation: Malagarasi hydro-power plant, Ngaka, Mchuchuma, North West Grid extension and Rusumo hydro. In order to be consistent with the Power System Master Plan and the Guidelines for Preparation of Medium Term Plan and Budget for 2010/11-2012/13, as well as taking account of financial resource constraints, priority might be accorded to projects listed in Table 16, with an indication of costing and sponsors.

Table 16: Proposed Priority Projects during 2010-2016 (in US$ million)

Project	Cost	Sponsor		
		Government / DPs	PPP	Private
Ubungo EPP gas 100MW	100	100	-	-
Mwanza MS Diesel 60MW	80	80	-	-
Backbone NW Transmission 400Kv			-	-
Singida –Wind 50MW	50	-		50
Kiwira I coal 200MW	274	30	244	
Kinyerezi gas 240MW	216	100	140	
Rusumo hydro 21MW	86	86		
Ruhudji hydro 358MW	495	100	395	
Mnazi Bay gas 300MW	660	100	560	
Interconnector I 200MW	760	600	100	

Government commitment is needed over the next five years to facilitate the implementation of these priority projects by providing budgetary funding, participating in PPP arrangements, and enabling private investments. In addition, the completion of ongoing projects through TANESCO will need to be completed as per agreements with the main sponsors. The domestic component of funding will be required for:

- MCC Energy Projects: (i) Malagarasi hydro-power plant and distribution; and (ii) rehabilitation and expansion of transmission and distribution system in six regions;
- TEDAP;
- Electricity V ; and
- Mtwara Energy Project.

7 Further Critical Steps in Expanding Access to Electricity

7.1 Improving Energy Conservation and Efficiency

The challenge of accelerating the rate of electrification must also address the management of energy, its conservation and efficiency. The Ministry of Energy and Minerals, under a SADC Programme, has conducted energy audits in some large industries in Dar es Salaam, Tanga, Kilimanjaro, Mwanza and Mbeya, as well as in some Government buildings. The audits have shown that major energy losses are caused by use of sub-standard power equipment and poor power factor and low building standards including inefficient lighting systems, old equipment, use of inefficient air conditioners and transparent glass. Up to 40% of energy could be saved if these factors were addressed. A comprehensive strategy involving TANESCO could save up to 20% of the energy used, equivalent to about 120 MW which could be utilised elsewhere. TANESCO facilities also need improvement, both in maintenance of current facilities and replacement of motors, welding sets and bulbs. The recommendation is to have a sustained effort for conservation and efficient energy use embedded in national strategies, guidelines and legislation (including more rigorous building standards).

7.2 Institutionalising a Comprehensive Monitoring and Evaluation Framework in the Energy Sector

Until 2007, monitoring of the energy sector was undertaken in the context of the MKUKUTA Monitoring System. “Provision of reliable and affordable energy” was one of the six goals under MKUKUTA’s first cluster of desired outcomes related to Growth and Reduction of Income Poverty. With increased recognition by the Government and development partners of the critical role of energy in meeting the goals of Vision 2025, MKUKUTA and the MDGs, a framework for a joint review was initiated in 2007. Two Joint Energy Sector Reviews (JESRs) have been undertaken, and have produced two reports on the performance of the sector in 2008 and 2009. Although the review framework is in place, much more needs to be done to improve its efficacy. Despite the cross-sectoral nature of energy, actors besides MEM and TANESCO are yet to get involved effectively to strengthen linkages and alignment.

Baseline datasets in electricity and energy are also limited. Current data sources are those from TANESCO, REA (which is still in its early stages of operation), research, the World Bank and businesses in the energy sector. Official statistics from the National Bureau of Statistics to indicate growth and the contribution of electricity in the national economy need to be strengthened. Thus, priority should be accorded to the comprehensive collection, processing and production of energy statistics from all the main participants in the sector. A survey would enable a functional monitoring system with a credible baseline dataset. The National Statistical Master Plan should take on board this survey in a step towards production of robust information on energy. A technical working group on electrification and energy would be desirable, with rationalisation and harmonisation of the functioning and mandates of the JESR and the working group.

7.3 Developing Management Capacity

Capacity building programmes for key governmental institutions responsible for the energy sector – MEM, TANESCO, REA and EWURA – have not yet fully inculcated the expertise to manage the sector most effectively. Skills that are especially needed include financial modeling, contracting, commercial negotiations and monitoring. National expertise is still overwhelmed by international personnel who are deployed in consultations and interactions

concerning regulations, project development, and contract formulation and negotiations in the energy sector. Technical capacity needs to be developed for promoting and facilitating the participation of the private sector in the development and implementation of rural energy projects to ensure optimal outcomes for Tanzania.

8 Recommendations for Strategic Direction in the Energy Sector

Based on the evidence from this study, the following recommendations are proposed for the rapid development of the energy sector.

Investment in Energy, a Strategic Growth Driver

- MKUKUTA II and MPIP should address explicitly and strongly the central role of electrification expansion in accelerating growth, improving productivity and generating productive employment to meet the targets of poverty reduction by 2015 and 2025.

- Sustained and significant public investment is necessary to expand coverage of electricity for growth and rural transformation. Budget allocations for electrification in the MPIP with priority projects from the Power System Master Plan would go a long way towards this end. Government leadership will be crucial in the implementation of the PSMP and Rural Electrification Master Plan in order to cover a population of 20% by 2015 and 50% by 2025.

- Public-private partnerships will need to be promoted and skilfully negotiated for the development and implementation of the generation and transmission expansion projects identified in the PSMP.

- Much greater attention needs to be paid to the efficient use of energy and its conservation, with a sustained effort for conservation and efficient energy use embedded in strategy, guidelines and legislation, including more stringent building regulations.

- An effective monitoring and evaluation framework on electrification and energy development should be put in place, within MEM and affiliated institutions; between the Ministry and other MDAs; and between MDAs, development partners, energy developers and other stakeholders.

- A baseline study is required to establish the foundation for credible and inclusive energy and electricity statistics.

Rural Electrification

- Investment in rural electricity needs to be strategically and transparently undertaken by focusing on the economic as well as social benefits of electrification. To achieve this, the Rural Electrification Master Plan needs to be finalised as soon as possible and the criteria for selection of areas for electrification made publicly available. The plan should be based on a robust analysis of potential economic returns in different locations. Expansion of coverage should begin with those areas where returns are likely to be greatest and subsequently filtering out from there.

- Dynamic load promotion measures to encourage effective use of electricity for productive purposes will facilitate and sustain growth in the energy sector growth, and, in turn, economic growth and poverty reduction. Some load promotion strategies could be done by raising national awareness, but the most effective campaigns will be community-based, utilising local resources and local leaders, and educating populations on how their areas can benefit from electricity. Access to loans or other forms of capital should be made available to facilitate investments in electricity, particularly for grain mills and water pumps.

Employment, Productivity and Skills Development in the Electrical Trades

The number of direct and indirect jobs that may be created through the planned expansion of the national grid could reach as many as one million if the Government's goal of connecting 500,000 households progresses as planned over the coming five years. To realise these jobs, and related productivity gains, intensive preparation of the labour force is required. To rapidly up-skill the labour force in the energy sector, the following actions are recommended:

- A strategic programme to support the immediate expansion of trades training for electricians and related trades, especially at technician and artisan levels, through PPP, i.e., training delivery through strategic expansion of provision by non-State actors, overseen by VETA standards/certification. The programme should include an incentive system for private sector entities who provide their own training and professional development within the sector. This should be coordinated to geographically support regions where electrification is planned, and should provide for advanced levels of training (Trade Test 1). The programme should also include technical support to VETA to improve their role as a regulator of training provision and standards.

- Coordinated government and development partner resourcing of the training programme to avoid piecemeal approaches and ad hoc provision. Within this, a review of the business levy for vocational education training currently allocated to VETA is warranted but such a process should not delay the implementation of expanded training.

- A detailed rapid training needs assessment and plan of action to improve curriculum and certification of electricians and related trades to inform the design of the strategic training programme. This will also require the training of trainers to be enhanced rapidly.

- Re-introduction of formal apprenticeships and mentoring, especially for trades technicians and artisans.

- In the medium term, further research to assess the job and productivity gains from electrification expansion in Tanzania through tracer studies, as well as pre- and post-electrification research.

- In the medium term, the expansion of training in alternative energy systems in Tanzania, to meet the growing demand for off-grid rural electrification and the call for the use of energy efficient technologies.

9 Conclusion

This research has identified several key challenges that Tanzania faces in accelerating progress in the energy sector, in particular, securing the necessary financial resources and ensuring the supply of a skilled labour force to meet the opportunities that are expected to emerge from expanded electrification. The study found that forecast budget allocations for energy development are insufficient to meet the targets under MKUKUTA, and current demand for electrification clearly outstrips the capacity of the labour force to respond. The analysis highlights the immediate shortage of skilled electricians required to ensure that electricity generated is accessible to businesses and households, and safely installed and maintained.

However, the Government and key stakeholders are increasingly acknowledging the central role of electrification in accelerating growth, improving productivity and generating productive employment to reduce poverty. Strategic and sustained investment and political commitment at the highest levels are now needed to realise the energy sector's potential as a growth driver in Tanzania.

The main constraint to labour force preparedness is the limited provision and poor quality of vocational and technical training. Despite considerable increases in the overall education budget and direct aid projects from a range of donors, progress is slow. New approaches to educational and skills training are needed. Public-private partnerships to rapidly increase training opportunities and improve the quality of graduates need to be promoted and implemented on a large-scale. Expanding training opportunities in the private sector could begin to address the immediate short-term need and accelerate improvements in skills.

Connecting businesses and households to electricity holds the promise of social and economic transformation in rural communities of Tanzania. With the potential for more than one million direct and indirect job opportunities flowing from electrification over the next five years, the energy sector and accompanying skills training deserve priority attention. Public, private and donor investments in securing Tanzania's future energy needs and strengthening the labour force will be well spent.

10 Annexes

Annex A: List of Interviews and Meetings

Office	Name	Post
National Bureau of Statistics	Maurice Oyuke	Director for Economic Statistics
	James Mbongo	Senior Statistician, Labour and Enterprises
	Gambamala Lubili	Principal Statistician, Agricultural Statistics
	Fadhili Halfan	Senior Statistician, Industry Statistics
Ministry of Energy and Minerals	Eng.Theophilo Bwakea	Assistant Commissioner Electricity
	Eng. Ngosi Mwihava	Assistant Commissioner Renewable Energy
Rural Electrification Agency	Dr. Lutengano Mwakahesya	Director General
	Eng. Bengiel Msofe	Director Technical Services
	George Nchwali	Director of Finance and Administration
	Alphonce Kyagira	Monitoring and Evaluation Manager
Ministry of Labour, Employment, and Youth Development	Ernest Ndimbo	Director of Employment
	Josephat Ruyakingira	Assistant Labour Commissioner
	Joseph Nganga	Economist
World Bank	R. Schlotterer	Financial Analyst, Energy Team
TANESCO	Kabiruddin R. Abdulla	Senior Manager Strategic Planning and Projects
	Maneno J.J. Katyega	Manager Research and Environment
	Rajabu Mbiro	Manager Training
VETA	E. Kibindera	Director, Labour Market
Engineering Registration Board	Eng. P. Barozi	Registration Officer
JICA	M. Yamamoto	Representative
Private Sector	A. Komba	Electricians
	E. Kisaka	
	E. Mrope	
	M. Shirima	
	N. Mkumbwa	

Annex B: Institutional Evolution of Electricity Supply in Tanzania

Electrical energy was introduced in 1908 when the first power company was established by the Germans in Dar es Salaam to serve the railway industry and selected areas of the city. In 1920, the British established the electricity department. Tanganyika Electric Supply Company (TANESCO) was licensed and commissioned to supply electricity to sisal plantations and Tanga municipality in 1931. Also in that year, a generation and distribution private company, Dar es Salaam Distribution Electric Supply Company Ltd (DARESCO), jointly owned by the Government and TANESCO, was licensed to operate in Dar es Salaam, Dodoma, Tabora and Kigoma and to construct power stations at Kurasini, to upgrade and expand distribution networks in Dar es Salaam, Morogoro, Dodoma, Tabora, Mwanza, Moshi, Mbeya, Lindi and Mtwara. TANESCO also operated a diesel power station at Kange, Tanga and a hydro-power station at Pangani with a capacity of 17.5 MW by 1959 and was permitted to export surplus power to Mombasa.

More active Government involvement in the power sector started in 1964, when the existing small, horizontally separated and privately-owned companies were nationalised into one vertically integrated company in order to overcome the private sector's inability to increase access to electricity by the majority of the population and to stimulate industrial development

(Marandu, et al., 2000). The new TANESCO was established by buying shares of DARESCO and the former TANESCO. It was granted a 55-year license to generate, transmit and distribute electricity in Tanzania. In 1968, the company changed its name to the Tanzania Electric Supply Company (TANESCO) and was charged with the responsibility for generating, transmitting, distributing and selling electricity in Mainland Tanzania as well as providing bulk supply through a 132 kV sub-marine cable to the Zanzibar Electric Power Corporation (ZECO), formerly named Zanzibar State Fuel and Power Corporation (ZSFPC).

TANESCO, as a public utility, has operated under the Companies Ordinance Act of 1931 and the Electricity Ordinance Act of 1957 with oversight by the Ministry of Energy and Minerals. The utility had an effective monopoly in the generation and supply of electricity until 1992 when independent generation plants were permitted. These include the Independent Power Company Limited (IPTL), SONGAS, TPC Moshi, Mgololo Mufindi, Sao Hill Mufindi, Kilombero and TANWATT Njombe.

Annex C: National Energy Policies

National Energy Policy, 1992
The main objectives of the Policy were:

- To have affordable and reliable energy supply covering the whole country
- To promote diversification of energy resources in order to optimise the hydro-thermal mix and to lessen dependence on hydro electricity
- To promote regional grid inter-connections through regional cooperation to ensure electricity reliability, security and quality as well as power exchange in the region
- To reform the market for energy services and establish an adequate institutional framework which facilitates investment, expansion of services, efficient pricing mechanisms and other financial incentives
- To enhance the development and utilisation of indigenous and renewable energy sources and technologies
- To adequately take account of environmental considerations for all energy activities
- To increase energy education and build gender-balanced capacity in energy planning, implementation and monitoring.

The weakness of the policy was that it did not fully take into account the global wind of change towards liberalisation and the reduced role of the state in production and commercial enterprise. The lack of a clear implementation strategy also contributed to its not taking off as envisaged.

Government Policy Framework, 1999
In the process of restructuring the power sector, the Government published a policy framework in 1999 to guide the reforms and the consequential entry of the private sector in the development of the electricity sub-sector. The main objectives of the framework were:

- To attract private capital investment in the development of the sector
- To expand access to electricity services to the majority of the population
- To reduce public expenditure for investment and operation of the sub-sector
- To ensure long-term economic viability and sustainability of the sub-sector
- To promote competition in the sector and in so doing create a basis for stabilising power tariffs during the short to medium term and reducing them in the long term.

To achieve these objectives, the strategy encompassed the following actions:

- Undertake vertical and horizontal unbundling of TANESCO. Vertical unbundling should ensure establishment of three distinctive businesses: generation, transmission and distribution, followed by the creation of several companies in generation and distribution
- Prepare new legislation to meet the demands and expectations of new industry players
- Put in place an independent sector regulator prior to the divestiture of TANESCO
- Put in place an appropriate institutional framework to support rural electrification
- Prepare a new master plan to guide the least-cost development of the power sector
- Restructure power tariffs so that they are cost-reflective to ensure sufficient revenue streams for the utility and for the sustainable development of the sector
- Re-define the roles of the Government and other players in the industry.

National Energy Policy, 2003
Taking into account the weaknesses in the National Energy Policy of 1992 and the thrust of the Policy Framework of 1999, the National Energy Policy of 2003 was promulgated. The major differences between the two policies are in the following areas:

- The 1992 policy was prepared during the era of central planning, while the 2003 policy is premised on market liberalisation and wide-ranging social, political and economic reforms
- The 1992 policy was characterised by a dominant publicly-owned and vertically-integrated utility in which commercial and social electricity were bundled, while the 2003 policy recognises the need for TANESCO to operate commercially and profitably and unbundles social electricity as the responsibility of the Government.

- While the roles of the Government and other players were not well defined in the 1992 policy, in the 2003 policy there is a clear definition and recognition of the participation of the private sector in the development of the power sector.

- The policy on power tariffs in 1992 was vague, while the 2003 policy recognises the need for rates to be revenue-sufficient and cost-reflective to allow the utility to operate without dependence on Government resources.

- The 1992 policy focused on maximising energy generation using local resources with priority for hydro power, while the 2003 policy has placed an emphasis on diversification of energy resources and effective participation in regional power exchange markets via power pools

- The 1992 policy did not embrace a strategy for restructuring the power sector, while the 2003 policy envisages new industry and market structures for attaining high levels of operational efficiencies.

Annex D: Rural Electrification Projects Financed by the REF for Implementation beginning Financial Year 2008/09

Region	District	Project area/ villages	Total Project Cost (TShs Mill)	2008/09 Allocated Funds (TShs Mill)	Balance of Required Funds (TShs Mill)	Expected number of customers
Arusha	Ngorongoro	District headquarters	6,000	1,500	4,500	1,000
Coast	Kisarawe	Maneromango				
		Mzenga, Msonga, Kazimzumbwi	2,000	500	1,500	400
	Mkuranga	Kimanzichana, Kiparanganda Mwalusende Kilimahewa Hoyoyo	700	300	400	500
Dodoma	Manyoni	Kilimatinde				
		Kintiku	3,500	200	3,300	700
	Mpwapwa	Mgandu	3,200	200	3,000	800
		Mgodegode, Berege	4,400	200	4,200	120
Kagera	Bukoba Rural	Ibwera, Kafunjo, Izimbya, Katoro	6,450	800	5,650	5,000
	Karagwe	Bisheshe, Ihembe Nyaishozi	740	200	540	350
Kigoma	Kasulu	District Headquarters	6,000	1,500	4,500	1,600
	Kibondo	District Headquarters	6,000	1,500	4,500	1,400
Kilimanjaro	Hai	Kandashi, Orilkili, Oromeri, Likremuni, Wiri, Magadini	3,520	400	3,120	600
	Mwanga	Kwakoa, Kigonigoni Toloha, Ngulu	1,700	200	1,500	400

Region	District	Project area/ villages	Total Project Cost (TShs Mill)	2008/09 Allocated Funds (TShs Mill)	Balance of Required Funds (TShs Mill)	Expected number of customers
	Same	Mhezi, Ijinyu, Kijom, Msindo, Mbwakeni, Kizungo, Dido	2,100	200	1,900	250
Manyara	Babati	Managha, Himiti, Haraa, Bonga	440	440	-	200
	Kiteto	Kitelesa, Chekenao, Kazingumu, Mdunga Chapakazi	1,800	300	1,500	400
	Mbulu	Gehandu	410	100	310	80
	Simanjiro	Msitu wa Tembo-Magadini	1,400	300	1,100	600
Mara	Bunda	Kungombe-Kabasa Salama-Kati Mcharo-Sizaki Chanjuge, Kichumbwa, Unyari	2,620	200	2,420	200
	Rorya Tarime	Masonga, villages Itiryo	1,700 700	250 120	1,450 580	350 600
Mbeya	Chunya	Makongorosi, Lupa Tingatinga Sangamba, Mlimanjiwa	1,100 960	800 250	300 710	300 150
	Mbeya	Santilya, Ilembo				
	Rural	Tembela, Imezu Horongo	2,300	250	2,050	310
	Mbozi	Luanda-Idwili Mahanje-Igunda Mlowo-Isansa, Vwawa-Hasamba	1,400	200	1,200	550
	Rungwe	Lutabe, Matamba	910	300	610	120
Morogoro	Kilosa	Berega	720	100	620	300
Ulanga	Malinyi	2,800	500	2,300	1,200	
	Mwaya	1,600	300	1,300	130	
Mwanza	Magu	Nyamikoma, Kalemera	560	500	60	200
	Sengerema	Buyagu	919	400	519	450
	Ukerewe	villages	1,520	200	1,320	150
Rukwa	Nkasi	District Headquarters	3,500	1,200	2,300	890
Shinyanga	Kahama	Mate, Makati Katunguru	924	200	724	120
	Meatu	Mwandoya, Water pump	1,500	275	1,225	150
	Shinyanga	Samuye, Solwa	120	120	-	160

Region	District	Project area/ villages	Total Project Cost (TShs Mill)	2008/09 Allocated Funds (TShs Mill)	Balance of Required Funds (TShs Mill)	Expected number of customers
Tabora	Nzega	Bukene	1,125	150	975	450
		Ndala, Shabela	3,000	400	2,600	360
	Urambo	Mabatini, Vumilia Usoke Mlimani Kalemera Urassa	390	250	140	400
		Urambo-Kaliua	540	500	40	200
Tanga	Handeni	Chanika Kibaoni Msasa, Magamba Komnyanganje	1,400	100	1,300	150
Total			**87,048**	**16,755**	**70,293**	**22,490**

Source: REA, Annual Report for the Financial Year ended June 30th, 2008

Annex E: Projects in the Power Sector Master Plan

Generation Expansion Plan, 2011-2030

Project	Capacity (MW)	Estimated cost (US$ Million)	Envisaged Commercial Operational Date (COD)	Resource
		Short term		
Ubungo EPP	100	100	2011	Gas
Mwanza MS Diesel	60	80	2011	Diesel
Wind	50	50	2012	Wind
Kiwira I	200	274	2013	Coal
Kinyerezi	240	216	2013	Gas
Rusumo falls	21	86	2015	Hydro
Interconnector I	200	760	2015	
		Medium term		
Ruhudji	358	495	2016	Hydro
Malagarasi	8	32	2016	Hydro
Mnazi Bay	300	660	2017	Gas
Mtwara Artumas	12	27	2017	Gas
Rumakali	222	456	2018	Hydro
Stiegler's Gorge I	300	873	2020	Hydro
Interconnector II	200	760	2021	
		Long term		
Stiegler's Gorge II	600	311	2023	Hydro
Ngaka	400	840	2024	Coal
Mchuchuma I+II	400	840	2025	Coal
Stiegler's Gorge III	300	255	2026	Hydro
Nyasa Coal	200	600	2027	Coal

Project	Capacity (MW)	Estimated cost (US$ Million)	Envisaged Commercial Operational Date (COD)	Resource
		Short term		
Kakono	53	90	2027	Hydro
Mpanga	144	249	2028	Hydro
Masigira	118	209	2028	Hydro
Ikondo -Mnyera	340	641	2029	Hydro
Taveta -Mnyera	145	380	2030	Hydro

Long Term Transmission Plan

From	To	kV	Length (km)	Estimated cost ($ Million)
Iringa	Singida	400	200	90
Singida	Dodoma	400	210	94.5
Dodoma	Iringa	400	130	58.5
Morogoro	Tanga	400	200	72.0
Arusha	Tanga	400	335	120.6
Kiwira	Mbeya	220	120	28.1
Kinyerezi	Ubungo	220	15	2.9
Babati	Arusha	400	162	58.3
Singida	Babati	400	150	54.0
Iringa	Mufindi	400	130	58.5
Mufindi	Makambako	400	73	20.4
Ubungo	Stieglers	400	200	56.0
Mbeya	Rumakali	220	150	28.8
Makambako	Rumakali	220	200	38.4
Mufindi	Ruhudji	220	100	19.2
Kihansi	Ruhudji	220	150	28.8
Bulyankuru	Geita	220	150	28.8
Geita	Nyakanazi	220	133	31.1
Nyakanazi	Rusumo	220	95	18.2
Mwanza	Shinyanga	400	140	50.4
Mbeya	Makambako	400	147	41.2
Makambako	Mchuchuma	400	200	56.0
Mufindi	Mchuchuma	400	220	61.6
Stieglers	Dar es salaam	400	160	44.8
Dar es salaam	Morogoro	400	179	64.4
Stieglers	Mtwara	400	400	144.0
Ubungo	Dar es salaam	400	50	14.0
Rusumo	Kakono	220	150	28.8
Rusumo	Kyaka	220	168	32.3
Masigira	Makambako	220	180	42.1
Taveta	Ikondo	220	5	1.8
Ikondo	Mufindi	400	150	54.0
Kihansi	Mpanga	220	40	9.4
Arusha	Kenya Borders	400	150	54.0
Zambia borders	Mbeya	400	120	43.2

Line Upgrades				
Shinyanga	Bulyankuru	220		42.1
Dodoma	Mtera	220		34.6
Iringa	Kihansi	220		34.6
Mbeya	Makambako	220		34.6
Makambako	Mufindi	220		14.0

Annex F: Vocational Education: A Historical and Policy Perspective[11]

Vocational and technical education in Tanzania has changed considerably since it began with two traditional trade schools in Ifunda and Moshi, inherited at Independence. These schools operated a three-year programme for youth who had completed primary school. The programme was established to address the lack of skilled workers and trainers in the country, and included a robust apprenticeship programme (as per the 1941 Apprenticeship Ordinance, Cap.81 of the Laws). Although the practical workshop model of instruction was used, the schools were not geared to meet the heavy demands of the private sector.

In 1969, the first Vocational Training Centre (VTC) was established in Dar es Salaam, catering mainly for soldiers and employees of the Ministry of Works. The Centre began by offering three trades (vehicle mechanics, fitter mechanics and carpentry) with just 46 student graduates annually. This was followed by the enactment of the first Vocational Training Act in 1974, and the establishment of the National Vocational Training Division (NVTD) under the Ministry of Labour in 1975. The NVTD's objectives were to ensure an adequate supply of properly trained manpower, and to improve the quality and efficiency of training in the country, primarily to meet the demands of industry. The NVTD began with ten trades and 258 students on 1-2 year training programmes followed by 2-3 year apprenticeships in industry, for which the graduates received a certificate. The courses offered by NVTD were heavily over-subscribed, because of the limited number of courses available in Tanzania at that time, and students tended to be men from relatively privileged backgrounds.

Decision making on the content of vocational training at this time did not involve the private sector. In 1981, a Government manpower training plan estimated an annual shortfall of more than 60,000 artisans, and the NVTD was driven to establish a VTC in each region. Over the subsequent 20 years up to 1995, the NVTD established 18 vocational training centres and a teacher training college. The number of courses expanded to include a total of 34 trades at different grade levels, and Trade Testing at three sequential levels (beginning with Trade Test III and going up to Trade Test I). Once individual VTCs had established themselves in each region, and had built up training capacity in particular trades, course offerings became primarily supply driven, rather than demand driven by companies and businesses seeking employees.

In 1990, a review of the vocational training system was undertaken which revealed major weaknesses. Centrally-dependent training centres were operating in isolation from the industries which they were meant to serve. This combined with an overly long training/apprenticeship cycle of four years and a Trade Testing system with high failure rates. Facilities for training in each region were uneven and dependent on regional budgets.

[11] Most of the discussion and data in this annex were drawn from Department for International Development, Vocational Education and Training in Tanzania and Zimbabwe in the Context of Economic Reform, Education Research Paper No. 28, 1999 (DFID, 1999).

Although some reforms were undertaken, including mandatory attendance at evening classes prior to sitting for Trade Tests, there were few changes to improve the relevance or quality of training. At the same time, pressure was put on the government to reduce budgets within the NVTD, and recurrent funding decreased as a result. The real value of salaries and wages had fallen by half by the early 1990s, and as a result instructors and support personnel became unmotivated, and were forced by circumstances to look for supplementary incomes. The quality of training declined significantly, evidenced through two different proxy indicators:

- In 1995, two years after they should have completed their training, between 20-40% of students had still not sat Trade Test I.

- Pass rates were between 30-60% for all trades, the rate of progression was only 15-20% between III and II, and it fell to between 1-5% for Trade Test I.

Enrolment in the VTCs, which had increased in the late 1980s (as new centres opened up) began to fall in the 1990s (e.g., from 406 in 1991 to 152 in 1996 at the Mwanza VTC) across all centres and all trades. The numbers of students taking up apprenticeships also declined during this time (from approximately 75% in 1990, to 10% in 1995), primarily because of the isolation of the private sector in VET development, and because no financial incentives were provided to the private sector to continue to engage with it. In the context of industrial stagnation, structural adjustment, fewer formal employment opportunities, declining credibility and quality of training, and the limited demand for trade tests in the growing informal sector at the time, it is not surprising that enrolment in apprenticeships also declined.

Annex G: VETA Long Courses, 2009

Standard VETA Cost: TZS 60,000 for day students; TZS 120,000 for boarding students

Course	Duration
Mechanical Trades	
Truck Driving	1 year
Fitter Mechanics	2 years
Motor Vehicle Mechanics	1 year 2 years
Truck Mechanics	2 years
Motorcycle Mechanics	6 months
Welding & Fabrication	1 year 2 years
Panel Beating & Vehicle Painting	2 years
Agro Mechanics	2 years
Automobile Electrics	2 years
Diesel Engine Mechanics	1 year
Instrument Mechanics	2 years
Civil Trades	
Plumbing & Pipe Fitting	1 year 2 years

Painting & Sign Writing	1 year 2 years
Graphic Design	1 year
Carpentry & Joinery	1 Year 2 years
Masonry & Bricklaying	1 year 2 years
Road Construction	2 years
Civil Draughting	2 years
Concrete Work & Products	6 months
Flooring Skills	6 months
Cladding Work & Stone Facing	6 months
Welding & Fabrication	2 years
Tool & Die making	2 years (Kilimanjaro only)
Blacksmith	1 year
Course	**Duration**
Other Trades	
Catering & Hotel Service	1 year 2 years
Watch & Clock Repair	6 months
Meter Gauge Repair	6 months
Office Machine Mechanics	2 years
IT	1 year
Secretarial & Office Management	2 years
Tailoring	1 year 2 years
Tour Guide	1 year
Computer & Secretarial	1 year 2 years
Pattern making	2 years (Kilimanjaro only)
Ginnery Fitters	1 year (Mwanza only)
Laboratory Assistants	2 years (Dar es Salaam & Mtwara only)
Wood Carving	1 year (Kigoma only)
Boat Making	1 year (Kigoma only)
Book Keeping	1 year (Kigoma only)
Handloom Weaving	1 year (Tabora only)
Electrical Trades	
Domestic Electrical Installation	2 years
Armature & Motor Rewinding	1 year
Air conditioning & Refrigeration	1 year 2 years
Industrial Electrical Installation	1 year
Electronics & Telecommunication	1 year
System Engineering	1 year

Source: VETA Catalog 2009

Annex H: VETA Electricians Curriculum

List of Modules Electrical Installation - Level I

S/No.	Modules	Units	Elements
1.	Performing bench work	1.1 Perform cutting	1.1.1 Carrying out drilling
			1.1.2 Carrying out reaming
		1.2 Perform cutting	1.2.1 Cut flat bars
			1.2.2 Cut round bars
		1.3 Perform filling	1.3.1 File flat materials
			1.3.2 File corner materials
			1.3.3 File round materials
		1.4 Perform bending	1.4.1 Bend flat materials
			1.4.2 Bend round materials
		1.5 Perform threading	1.5.1 Make external thread
			1.5.2 Make internal thread
		1.6 Perform soldering	1.6.1 Carry out soft soldering
			1.6.2 Carry out hard soldering
2.	Performing electrical joints	2.1 Perform hot	2.1.1 Make twist joint
			2.1.2 Make Tee joint
			2.1.3 Make married joint
		2.2 Perform cold electrical joints	2.2.1 Make eyelet joint
			2.2.2 Make crimp joint
			2.2.3 Make parallel groove clamp joint
			2.2.4 Make bolt joint
3.	Building simple electric circuit	3.1 Construct resistive circuits	3.1.1 Build single resistor circuit
			3.1.2 Build series circuit
			3.1.3 Build parallel circuit
			3.1.4 Build combination circuit
		3.2 Construct capacitive circuits	3.2.1 Build single capacitor circuit
			3.2.2 Build series circuit
			3.2.3 Build parallel circuit
			3.2.4 Build combination circuit
		3.3 Construct inductive circuits	3.3.1 Build a single inductor circuit
			3.3.2 Build a series circuit
			3.3.3 Build a parallel circuit
			3.3.4 Build combination circuit
		3.4 Construct (RCL) circuit	3.4.1 Build a resistance and capacitance circuit
			3.4.2 Build a resistance and inductance circuit
			3.4.3 Build a resistance, capacitance and inductance circuit
		3.5 Measure electrical quantities	3.5.1 Measure voltage in the circuit
			3.5.2 Measure current in the circuit
			3.5.3 Measure resistance in the circuit

S/No.	Modules	Units	Elements
4.	Constructing power supply circuits	4.1 Build rectifier circuits	4.1.1 Build half wave rectifier
			4.1.2 Build full wave rectifier centre tapped
			4.1.3 Build bridge rectifier
			4.1.4 Build a smoothing circuit
		4.2 Perform battery maintenance	4.2.1 Carry out battery charging
			4.2.2 Carry out battery service
5.	Drafting and operationalising wiring circuits	5.1 Install lighting circuits	5.1.1 Install lighting points controlled by one way one gang switch
			5.1.2 Install lighting points controlled by one two/ three way gang switches
			5.1.3 Install lighting points controlled by two-two way switches
			5.1.4 Install lighting points controlled by two-two way switches and intermediate switch
		5.2 Install power circuits	5.2.1 Install radial circuits
			5.2.2 Install ring circuits and spur
			5.2.3 Install electric cooker circuit
			5.2.4 Install electric water heater circuit
		5.3 Install alarm and signal circuits	5.3.1. Install single stroke bell
			5.3.2. Install bell/buzzer
			5.3.4. Install indicator board
		5.4 Perform metering and tariffing	5.4.1 Measure electric power
			5.4.2 Measure electric energy (kwh and Kvah)
			5.4.3 Carry out tariff costing
		5.5. Carry out earthing system	5.5.1 Perform earthing methods (TT, IT and TNS)
		5.6 Carry out electrical tests	5.6.1 Carry out verification of polarity test
			5.6.2 Carry out insulation test
			5.6.3 Carry out ring circuit test
			5.6.4 Carry out earthing test

List of Modules for Electrical Installation - Level II

s/n	Modules	Units	Elements
1.	Installing cable enclosure	1.1 Erect conduits	1.1.1 Erect PVC conduits
			1.1.2 Erect galvanized conduits
		1.2 Erect trunking	1.2.1 Erect PVC trunking
			1.2.2 Erect cable trays
		1.3 Construct ducts	1.3.1 Perform ducting
2.	Installing switch gears and protective devices	2.1 Install switch gears	2.1.1 Install three phase distribution board
			2.1.2 Install three phase isolators
			2.1.3 Install three phase distribution board
			2.1.4 Install three phase isolator
			2.1.5 Install three phase switch fuse

			2.1.6 Install change over switches
			2.1.7 Install three phase E.L.C.B
		2.2 Install fire detection and alarm system	2.2.1 Install digital system
			2.2.2 Install analogue system
		2.3 Install protective devices	2.3.1 Install single phase protective devices
			2.3.2 Install three phase protective devices
3.	Performing electrical maintenance	3.1 Carry out preventive maintenance	3.1.1 Carry out mechanical inspection
			3.1.2 Carry out electrical inspection
			3.1.3 Carry out remedial action
			3.1.4 Prepare schedules for each machinery
		3.2 Carry out corrective maintenance	3.2.1 Carry out inspection of mechanical and electrical
			3.2.2 Dismantling and assembling of electrical machines
			3.2.3 Replace and repair detective parts
		3.3 Carry out conditioning based maintenance	3.3.1 Prepare maintenance schedule and adhere operation manual recommendations
		3.4 Carry out trouble	3.4.1 Carry out physical check up shooting
			3.4.2 Carry out measurement
			3.4.3 Develop a trouble shooting chart as a reference for further fault finding

List of Modules for Electrical Installation - Level III

S/n	Modules	Units	Elements
1.	Installing electrical machines	1.1 Install AC machines	1.1.1 Install transformers
			1.1.2 Install induction motors
			1.1.3 Install synchronous motors
			1.1.4 Install generators
		1.2 Install control of AC machine	1.2.1 Install a DOL starter incorporating remote control
			1.2.2. Install DOL by using jogging method
			1.2.3. Install forward reverse starter
			1.2.4 Install manual star-delta starter
			1.2.5 Install automatic star-delta starter
			1.2.6 Install a rotor resistance starter for ship-ring motor with automatic starting
			1.2.7 Install an automatic starter-resistor/capacitor/inductor starter

Annex I: Terms of Reference

1. Context

In the current national development framework (MKUKUTA 2005-2010) the role of energy as an enabler for growth, productive employment and reduction of poverty is not well articulated. The framework makes references to energy investments, procedures and institutions that are yet to become fully operational. Yet there is growing recognition in Tanzania that the energy policy and related strategic plans (i.e., strategic expansion of the national grid, and the strategic plan for rural energy through the Rural Energy Agency) must be synchronised with other sectors if the national goals of growth and productive employment, as well as poverty reduction are to be achieved. Sectors, such as education, need to ensure a skilled labour force capable of taking up opportunities which arise from the expansion of energy, and electricity in particular. Conditions for the development of small and medium enterprises and self-employment on the base of energy expansion need also to be improved, in order to ensure the effectiveness of energy investments in generating productive employment. This requires alignment of sector strategic plans and budgets.

A 2008 study of Tanzanian budget allocations and its employment implications showed "the absence of employment orientation in budget planning and the lack of employment priorities in the Budget". The study further explained that:

> *"current budget planning and implementation processes do not explicitly reflect the importance assigned to employment in the stated priorities of the Government and there are no specific measures in place to implement the National Employment Creation Programme (NECP) nor have NECP sectoral priorities been adequately reflected in the budget" (Review of the NECP, Kibria, 15 January 2008, p. 29).*

Pro-employment budgeting can be strengthened through using established mechanisms in Tanzania for Public Expenditure Reviews. These link increasingly to MKUKUTA priorities, and institutional arrangements are in place through multi-stakeholder working groups at cluster and thematic levels, including a Thematic Working Group on Employment.[12] PERs generally analyse past performance (backward looking) and future performance (forward looking) in an effort to determine the optimal allocation of resources for reaching specific targets.

The challenge for an employment PER is that employment by its nature is multi-sectoral, and largely delivered through the private sector. According to Government, it is important to address this challenge through an approach involving a series of sector-specific PER-employment studies, defined by national growth drivers. The energy sector is one of these. In undertaking such studies, special attention will need to be given to the forthcoming Public Investment Plan, to public/private partnerships which support the sector's development, and to the views and engagement of workers and employers.

The energy sector is a key growth enabler for Tanzania, and a priority in terms of public investment (MPIP). It has direct impact on competitiveness gains and high potential for generating direct and indirect jobs, especially for young people. It has also high potential for

[12] Chaired by Ministry of Labour, Employment and Youth Development, but somewhat moribund to date in part due to its positioning as a 'cross-cutting' rather than a growth issue.

productivity gains, including in delivering on commitments to improve agriculture under the Kilimo Kwanza, the new strategy in the agriculture sector. According to the PHDR 2007, the energy sector has comparative and competitive advantages, high impact on job creation and then on poverty reduction, but also scale potential (regional level), as well as many synergies with the development of economic activities. Moreover, the lack of reliable electricity was ranked by business executives in Tanzania as the top constraint to business growth. These factors provide a strong rationale for making this the first sector to be studied.

Main objective
This study sets out to assess the potential productivity and job growth of the energy sector's main strategies, which include the expansion of the national main grid for electricity, as well as the expansion of alternative energy sources through the Rural Energy Agency. The study will need to examine in detail the past and future strategic plans of the sector (especially alongside national strategic thinking and patterns of 'growth hub' locations), to overview the public expenditure of the sector, and to evaluate the impacts on decent jobs and productivity (past and future).

In making this assessment it will also be necessary to consider in detail labour supply and demand constraints, like issues of human resource capacity, including the availability of skilled persons to take up the opportunities generated directly and indirectly from the expansion of the national grid and rural energy sources. Constraints in the labour supply side (skills, employability and mobility, especially for youth), are expected to be determined in detail, as well as constraints in the labour demand side (labour-intensive versus capital-intensive technologies, production costs, and institutional environment, in both formal and informal enterprises). Suggestions for adjustments and investments should be provided through this analysis. The PER on energy focused on employment will be available, with recommendations for the sector and the Budget Guidelines 2010/11.

2. Analysis (key questions and sub-questions)
The first PER employment study, on the energy sector (and electrification specifically) should provide the following analysis:

1. **Backward-looking analysis** given the existing national policies and strategic plans for energy and especially electrification expansion providing:

   (i) Overview of public expenditure in the energy sector according to national policies and strategic plans for energy, from budget data analysis (of the last five fiscal years or more if relevant), in order to analyse four issues:

   a. the consistency of budget allocations to energy sector priorities;

   b. the consistency of budget execution to budget allocation;

   c. the efficiency and effectiveness of public expenditure in energy sector; and

   d. private investments linked to public investments in this sector.

The analysis will focus on main programmes and projects, in terms of expenses and employment impacts as follows:

- Budget composition (recurrent and development investments), investment expenditure allocation (programmes, activities), budget distribution (departments, services, regions), budget allocation to traditional energy sources versus modern energy services (with a focus on main programmes)
- Consistency of budget allocation with national priorities set in MKUKUTA and CCM Manifesto (including targets) as well as energy sector policy and strategy (planned vs actual to calculate budget allocation gaps)
- Budget evolution (trends over last five years and more if relevant)
- Level of reliability and availability of budget data and participation in transparency initiatives (e.g., Extractive Industries Transparency Initiative)
- Sources of funding by project and activity, in terms of the importance and contribution of the provision of modern energy services in both urban and rural areas per energy source: public (national budget, loans), domestic private investment, foreign private investment, public-private partnerships, private and industrial clients, etc., planned and actual sources of funding (funding gap), with a focus on main programmes
- Strengths and weaknesses of budget formulation process, budget execution process and budget transparency procedures
- Compliance of resources allocation with strategic priorities (external aid, budget allocation and level from MoFEA)
- Budget execution analysis according to budget allocation (with a focus on main programmes)
- Efficiency and effectiveness of public expenditure and private investments in the energy sector (efficiency according to non-public expenditure in similar investments, effectiveness according to programmes objectives; degree of achievement of targets (energy capacity and production, coverage rate of population, costs)
- Case studies on cost/benefit analysis of alternative sources of energy as projected by the REA, matched with skills analysis and information about potential productivity and job creation (to link with the second component)
- Reliability and affordability analysis according to impacts on jobs creation and productivity gains (especially for informal sector, SMEs, self-employed).

Standard methodology of PER will be applied on the main programmes in the energy sector (the most important in terms of funding and jobs/productivity impacts).

- Effectiveness: analysis of which have been achieved according to targets of main investment programmes in the energy sector (specific objectives by component/activity, according to input, output and impact indicators from sector plan).
- Efficiency: unit costs evolution analysis, comparative analysis of consumption prices of public services/private services, or cost-benefit analyses, comparative analysis of countries which have expanded their power grid and invested in other energy sources, and if possible from public/private partnerships.

These analyses will be done in collaboration with international consultants (IDEA).

(ii) Evaluation of the impacts on decent job creation and productivity gains (during last MKUKUTA), given the past and current budget allocation and execution and productive performances (achieved outputs) in the energy sector: direct and indirect impacts on jobs creation and quality and productivity gains and resources required, to evaluate resource gaps, investments with high jobs potential inadequately financed, efficiency/effectiveness gaps as follows:

- What have been the direct and indirect impacts on employment (quantity and quality) and productivity gains in main areas where investments have been realised and electricity has been expanded? (specific employment indicators to be produced, including jobs quality and impacts on national jobs, gender and youth, equity, employability)
- What resources have been required for which impacts on employment and productivity (level, allocations and sources: local/central, external/internal, public/private)? (see also first component)
- What value-for money has been obtained? What have been the impacts of similar investments from other actors in energy sector (private sector, NGOs)?
- According to this evaluation, how can improvements be made in public expenditure impacts (especially investments expenditure) in energy sector on productivity gains, on employment and equity (by sex, age, areas)?
- What are the resource gaps in terms of employment impacts (investments in specific areas or specific technologies with high jobs potential inadequately financed)? What adjustments in resource allocation and public/private investment patterns could make the greatest difference to the potential of energy sector to support productive employment?
- Which local employment content requirements should be introduced in energy sector to improve the impacts on local jobs and local development?
- How public expenditure efficiency and effectiveness could be improved in activities/areas with high potential on jobs creation and productivity gains? What improvements in resource execution in terms of efficiency and effectiveness could make the greatest difference?

2. Analysis of labour supply and demand constraints: which are the possible bottlenecks that reduce direct and indirect impacts of energy sector investments on employment and productivity, focusing on the following issues:

- What are the main labour supply constraints to energy sector past and future development in order to improve productive jobs creation: skills gaps (level, type, location in sub-sectors/areas), manpower employability, labour mobility, etc?
- What are the resource implications for addressing these constraints for the energy sector and mutually reinforcing sectors, such as education and professional training?
- An analysis of skills requirements for jobs directly created and potential skills gaps in existing labour supply will be conducted which would provide insights on further priority training needs.
- An analysis of skills requirements of labour-intensive technologies in the energy sector will be conducted. An analysis of skills requirements of new technologies and alternatives sources of energy will be conducted. How the skills gap should be reduced to encourage labour intensive technologies (according to the skills constraint)?

- Analysis of the labour force and skills levels for future demand emerging from the projected expansion of the national grid and other investments projects, including estimates on job creation, estimates on change in labour productivity (urban/rural) year-on-year. This will be coupled with analysis of current and new entrants in terms of qualified people (graduate electricians at all levels), and empirical evidence from company/agency discussions about the type, levels and constraining factors on labour. Public/private initiatives on education and vocational training could be also analysed.
- How the Government could improve resource allocations to the education and TEVT (technical and vocational training), to public/private partnerships and incentives to private sector? How TEVT programmes should be adapted to the needs of future labour market in energy sector?
- What are the main labour demand constraints within energy sector and linked sectors/sub-sectors: public/private partnerships, domestic private sector and SMEs development? What are the constraints into business and institutional environment that reduce national capacities to take opportunities created by energy sector investments? Are there other constraints (the study should analyse all specific constraints according to the Tanzanian context).

3. Forward-looking analysis given the future national policies and strategic plans for energy and the next MTEF on energy (Budget 2009/10 to 2011/12) and the new MPIP (2009-12):

   (i) Overview of next budget in energy sector given the strategic plan for energy, the future budget programming (MTEF on energy) and the new MPIP, during the coming five years (and more if relevant): analysis of resource allocation according to sector priorities and impacts on productive employment.

   (ii) Forecasting on direct and indirect jobs impacts and productivity gains in the energy sector over the forthcoming MKUKUTA next five years (given the backward looking analysis)

   - What is likely to be the productivity and job gains from investments in energy sector during the coming five years (to fifteen years in the case of long-term impacts)?
   - What are the specific employment targets in energy sector: a realistic system of monitoring these targets to be provided (with specific employment indicators)?
   - What are the indirect impacts on productive employment and on SMEs development in other sectors and sub-sectors linked to energy sector development (in both rural and urban areas)?

4. Main recommendations in terms of adjustments in resource allocation (level, direction) and improvements in budget execution and management, from the backward and the forward looking analysis of public expenditure on the energy sector and evaluation of employment impacts

   - What are the priority locations (sub-sectors, spatial) for energy investments (especially electrification expansion) when considering the national development strategy and its potential priority growth hubs? Which of them could have the higher employment potential? What synergies need to be developed?

- How do potential productivity gains and jobs creation impact from innovative rural approaches (i.e., through the Rural Energy Agency) compare and contrast with those planned through the expansion of the main national grid?
- What are the allocated resources to programmes and areas with high potential on job and productivity gains (MTEF)? What resources will be required to improve direct and indirect jobs creation impacts?
- Which reforms should be taken by MEM to mainstream employment targets and especially labour-intensive technologies (subsidies to private sector encouraging these technologies, specific measures to encourage private actors and SMEs in energy sector and linked sub-sectors, measures to improve local skills corresponding to labour intensive technologies needs)?
- Which regulations in energy sector could improve decent jobs creation and enhance labour equity and protection (Labour Clauses in Public Contracts, like Convention N°94/1949)?

5. Action plan to integrate employment targets into MTEF of energy sector and Budget Guidelines to improve budget allocation and execution system according to employment targets in energy sector and other linked sectors.

    - According to main results of the analysis and formulated recommendations, which operational action plan could be adopted to improve budget allocation and execution system according to employment targets in energy sector and other linked sectors?
    - Employment targets should be included in MTEF of the energy sector (with sub-targets for private partners and agencies. Main programmes (decomposed by component and activity) in the energy sector's plan and budget, will include employment indicators to be achieved (input, output, outcome indicators). Monitoring and evaluation system on direct and indirect impacts on jobs creation and productivity will be set up to be implemented.

3. Methodology

The study should develop a clear methodology for determining the productivity and labour multipliers of the energy sector in Tanzania. This may require consideration of methods used in other similar contexts, by researching empirical studies that have been undertaken. The study should share the methods of determining the multipliers with informed stakeholders to gain consensus, and follow this by implementing its use in answering questions related to the impacts of energy sector investments on employment at the macro and micro levels and to an employment monitoring and evaluation system and skills gap evaluation.

4. Technical team and work organization

The proposed review is grounded on a demand-driven approach, based on the needs of the Government of Tanzania. Ensuring the full participation of all actors relevant to the realisation of this study, at all important phases and at all levels will be central. This will include the Ministry of Finance and Economic Affairs, Ministry of Labor, Employment and Youth Development and the Ministry of Energy and Minerals as well as REPOA (fully involved in PER/MKUKUTA studies and in several energy studies), and of course relevant MDAs such as the Rural Energy Agency and TANESCO, private sector partners, and other specialists on energy sector.

Human Resources

- One Senior Economist national consultant from REPOA, expert on public finance, PER and MTEF, leading the national team analysis with support of a Junior Economist specialised in public finance and national accounts from REPOA and under supervision of the Director of REPOA.
- One international consultant (senior specialist on energy from IDEA International), responsible for providing overall guidance to the work, draft write-ups of analysis.
- One national consultant coordinator of technical team and facilitator. This role is to ensure synchronised efforts of all team members, and coordination between the three ministries and with the PER/MKUKUTA Cluster 1 working group; the coordinator will function as first point of contact between Dar es Salaam and ILO Geneva.
- National technical team composed of three focal points from Ministries of Energy, Finance, and Labour as well as points of contact in REA and TANESCO. Their roles will be to facilitate meetings, gather information, and comment on analysis.

International consultant will work in full partnership with the national team composed of consultants and public officials. The international consultants will be expected to work as a team and guide the national process, including ensuring detailed discussions throughout in order to contextualise the analysis and ensure it is a specific and relevant to the Tanzanian context and the energy sector as possible.

Reports

- Intermediate report by end of the first month
- Full draft report to present in roundtable discussion by end of the second month
- Final report (with recommendations to feed into Energy MTEF), to be submitted to PER Committee and PER Cluster 1 by end the beginning of the third month
- Final report with comments of PER Committee, workshop, publication/dissemination during the third month.

5. Focus of Work and outputs for the REPOA Consultants

The contribution of REPOA consultants will focus on Component 1 of the analysis (overview of public expenditure in energy sector from past and next budgets), a part of Component 2 (evaluation of impacts on jobs creation), part of Component 4 (recommendations) and Component 5 (action plan to integrate employment targets into MTEF of the energy sector and Budget Guidelines), in collaboration with the international consultants and the technical team (three focal points of MoFEA, MEM and MoLEYD, and two from REA and TANESCO under the coordination of the national consultant facilitator.

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Research on Poverty Alleviation, REPOA, is an independent, non-profit organization concerned with poverty and related policy issues in Tanzania. REPOA undertakes and facilitates research, enables monitoring, and promotes capacity building, dialogue and knowledge sharing.

REPOA's research agenda is concerned with poverty and its alleviation. Our objectives are to:

- develop the research capacity in Tanzania;
- enhance stakeholders' knowledge of poverty issues and empower them to act;
- contribute to policy dialogue;
- support the monitoring of the implementation of poverty related policy;
- strengthen national and international poverty research networks, and forge linkages between research(ers) and users.

It is our conviction that research provides the means for the acquisition of knowledge necessary for improving the quality of welfare in Tanzanian society.

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