Policy Report Note

Tanzania

This note summarizes a report prepared by Lighting Africa to identify key policy barriers to the adoption of modern lighting products and services in Tanzania, and offers recommendations for their mitigation. (Lighting Africa Policy Report: Tanzania, July 2010, prepared by Marge and Econoler with subsequent updates by the Lighting Africa Team.) The report involved consultations with a range of stakeholders—across the supply chain—to obtain an independent, objective assessment of the prevailing policy environment for low cost lighting and electrification services in the country. Tanzania is one of eight countries studied.

Energy Sector Overview

Tanzania's overall electrification access is very low relative to the African average, with grid access only reaching 14 percent of the country. Like many other countries in Sub-Saharan Africa, it is not evenly distributed between the urban and rural areas, and rural households suffer a three percent connectivity rate. Electricity demand is growing between 13 to 15 percent annually, but much of this growth is restricted to the urban centers, and is quickly approaching maximum production capacity. The rural energy sector is dominated by traditional biomass, mainly utilized for cooking (about 90 percent of end use), and including wood fuel, biomass wastes, and charcoal. These are produced in rural areas and sold primarily into urban markets.

Tanzania at a Glance

- Population: 42 million people
- GDP Per Capita: $1,400
- GDP Growth Rate: 7 percent
- Politically stable
- Steady economic growth
- Key Sectors: Agriculture, Industry, Tourism
- Expanding infrastructure
- Endowed with mineral resources
- Member of East African & Southern Africa Development Communities

About eight percent of Tanzania's energy comes from imported petroleum diesel, petrol, and jet fuel, which serve the transport and generation markets, while liquefied petroleum gas (LPG) serves the urban cooking fuel market. Tanzania has significant undeveloped energy resources, including hydropower, geothermal, natural gas, coal, uranium, wind, solar, and biomass. Tanzania's electricity is provided by the state-owned utility, TANESCO, which manages the grid. TANESCO has an installed capacity of about 1,273 MW with power derived from local hydro (54 percent) and natural gas (46 percent).

The National Energy Policy is governed by a 2003 document that guides the sector based on the liberalized economy and a will to increase national access. A new rural policy is in draft form; a renewable energy strategy is also in development. Key government agencies active in the energy market are summarized in Table 1.

Table 1. Key Government Agencies in Tanzania's Energy Sector

- **Ministry of Energy and Minerals (MEM).** Responsible for overseeing the development of energy and mineral resources. http://www.mem.go.tz
- **Rural Energy Agency (REA).** Government implementing agency for rural electrification and energy sector development programs. Also manages a Rural Energy Fund (REF). http://www.rea.go.tz
- **Energy and Water Utilities Regulatory Authority (EWURA).** Autonomous multi-sectoral regulatory authority responsible for technical and economic regulation of the electricity, petroleum, natural gas, and water sectors. Functions include licensing, tariff review, monitoring performance, and standards with regards to quality, safety, health, and environment. http://www.ewura.go.tz
- **Tanzania Electric Supply Company (TANESCO).** Responsible for the generation, transmission, and supply of electricity in the most effective, competitive, and sustainable manner possible. http://www.tanesco.co.tz
- Clearing and forwarding processes involve the facilitation of other institutions such as Clearing and Forwarding Agents, Tanzania Harbors Authority (THA), Customs Inspection Company (TISCAN), and shipping agencies.

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Tanzanian electrification initiatives can be divided broadly into four groups:

- **Grid based extension** efforts managed by TANESCO.
- **Rural based grid extension** efforts funded by the REA and REF and operated by TANESCO. The Swiss International Development Agency (SIDA) is also supporting grid-based expansion via REF. The Tanzania Energy Development and Access Program (TEDAP), with assistance of the World Bank and Global Environment Facility (GEF), is supporting low cost electrification pilots to reduce rural grid extension costs.
- **Independent Mini-Grids,** funded by REF and managed by TANESCO and Independent Power Producers (IPPs). TEDAP supports a large portion of this work, providing IPPs performance-based grants to connect rural customers.
- **Stand alone systems** led by the commercial sector, with modest support from REA/REF and private consumers. TEDAP is supporting much of this work.

The Government has been aggressively promoting rural access through the REA, as evidenced, for example, by increases in funding for rural electrification – from $7.4 million in 2007/08 to $27 million in 2009/10. The REA and TANESCO are rapidly rolling out new approaches for grid based, isolated, and stand alone electricity services. Yet even with scale-up of these approaches, a large portion of the population will be left behind. The Government recognizes this and the imminent need to embrace approaches that will make lighting services available for those that are distant from the grid and/or cannot afford solar home systems (SHS).

Lighting Africa

Against this backdrop, Lighting Africa is targeting the lighting needs of rural, urban, and peri-urban customers without electricity—predominantly low-income households and micro businesses. Lighting Africa aims to mobilize the private sector to offer alternatives to conventional lighting options, which are typically costly, inefficient, poor quality, and hazardous. Recent advances in lighting technology, including Compact Fluorescent Lamps (CFL) and Light-Emitting Diodes (LEDs), promise clean, portable, durable, lower cost, and higher-quality lighting. For Lighting Africa, the challenge is to make these products accessible, affordable, and of good quality for the poor populations living in the unelectrified and unserved areas of Tanzania in an effort to parallel and complement the country's rural electrification programs.

Lighting Options in Tanzania

Lighting sources in Tanzania can be divided into grid connection, kerosene (and traditional methods), modern off-grid lighting technologies, and photovoltaic (PV)-battery based systems. As of 2002, kerosene is the predominant fuel for lighting in both rural areas and urban areas (with the exception of Dar es Salaam), accounting for 84 percent of total lighting fuel. (See Table 2.) Assuming an estimated 123 metric tons of kerosene used for lighting in 2002, this is the equivalent of about 2 liters per month per unelectrified family.

Table 2. Lighting Fuel Sources in Tanzania (Percent)

Source	Dar es Salaam	Other Urban Areas	Rural Areas	Mainland Tanzania
Electricity	56	29	1	9
Solar	1	0.5	1	0.6
Biogas	0.1	0.1	0.2	0.2
Kerosene	40	70	90	84
Candles	2	0.3	0.3	0.4
Firewood	0.1	0.4	7	5
Other	0.4	0.3	0.4	0.4
Total	**100**	**100**	**100**	**100**

Source: NBS, 2002; totals may not equal 100 percent due to rounding errors

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The modern lighting market is only beginning to open up. It is proceeding on three fronts: existing solar PV companies; the fast-moving goods market; and newly established companies that focus on modern off-grid lighting products.

- **Existing solar companies** tend to focus on large projects and equipment sales.
- **The fast moving goods market** for lighting products is largely unmeasured and unregulated. This market is predominately supplied from the Far East with low quality goods that move based on price. This market supplies several orders of magnitude more low cost lighting devices than the solar market. LED torches, fluorescent lamps, and multiple-purpose lighting/radio/cell phone charging devices are common in shops. In discussions with shop owners it was noted that they sold products consumers demanded and their suppliers offered. Price was a key factor in product choice, as they viewed their primary market to be back-up. Due to influence from the REA and the increasing profile of Lighting Africa in Tanzania, shops are starting to become aware of products which have passed Lighting Africa quality tests.
- **Newly established companies** focusing on high quality lighting products which have passed Lighting Africa quality tests have entered the market and are becoming firmly established in their target areas. Some of these have teamed up with solar suppliers. Others seek to develop new distribution channels that can achieve high market volumes. Thus far, market reach from this segment is expanding rapidly, primarily due to success of the REA Lighting Rural Tanzania Competition. (See Textbox.)

Lighting Rural Tanzania Competition 2010

The REA has been working with the World Bank and Lighting Africa to identify and implement strategies for rolling out modern lighting technologies to off-grid populations. A resulting program – the Lighting Rural Tanzania Competition 2010 (LRTC2010) – issued competitive Request for Proposals (RFPs) for innovative market deployment models in modern off-grid lighting. These projects sought scalable models to reach dispersed markets with lighting technologies. Of 81 proposals submitted, 10 were selected at a value of $982,000 (plus cost-share). The projects are near completion and yielding valuable information:

- Consumers will pay for high end products, including solar home systems (SHS), especially if consumer credit is available.
- A key market barrier relates to identifying efficient distribution channels to deliver quality products to markets at low mark-ups.
- More analysis is needed on the role of the informal market, which can be the "quickest" means for market entry and product supply to rural areas. Much can be learned from strategies and the business linkages of others who have been successful in distributing products to this market.

Based on its success, REA is undertaking a second competition in 2012 (LRTC2012) to support private enterprises in developing and delivering a wide array of lighting products for rural households, businesses, and community applications.

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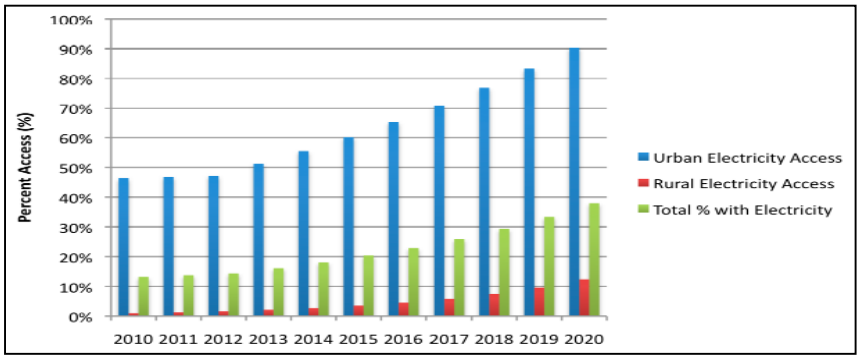
Where is the Off-Grid Market Going?

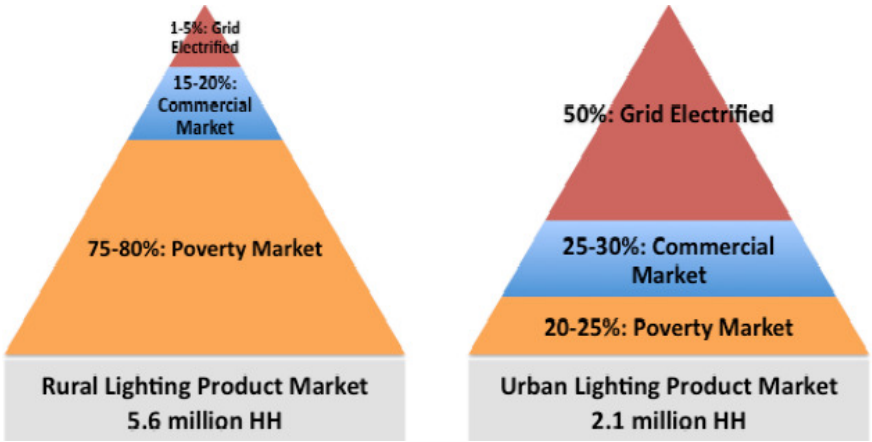
The Tanzania study employed a simple model to estimate electricity access rates through 2020. Figure 1 presents a projection in which urban connection rates increase 13 percent per year and rural connection rates increase 30 percent per year.[1] Under this scenario, urban access could exceed 90 percent by 2020 but rural access will still be below 20 percent. The point of the model is to demonstrate that even if grid-based rural electrification is scaled up exponentially, there will still be a large portion of rural families, and even some urban families, without access to electricity in the year 2020; the model is successful in articulating the need for off-grid lighting products to fill future electrification gaps, particularly in the rural areas. This is the primary market which Lighting Africa seeks to serve in Tanzania.

Figure 1. Modeled Growth of Tanzania Electricity Access



Using the above model, it is also useful to analyze which groups among the rural and urban populations would be most likely to be interested in lighting products—and whether they would be willing and able to pay for the products. Figure 2 shows how the urban and rural populations might be broken up as groups of potential target markets. This analysis is necessary because, as later policy sections will suggest, lower income groups will require a different set of policy prescriptions than middle and high income groups in order to be able to obtain modern lighting products.

Figure 2. Rural and Urban Lighting Products Markets



[1] These figures are based on the assumption that the Government annually increases the number of added customers by the given percentage over the number added the prior year. Note these figures represent an optimistic compromise between existing Government targets and past performance.

As Figure 2 demonstrates, the market for modern off-grid lighting products can be broken into six target market segments, as described below. Note that there are no "precise" figures to differentiate these market segments; Government grid connection figures, population figures, census reports, and a good deal of common sense were used to identify the market segmentation.[2]

- **Urban Grid Connected Market**. This market is a fully commercial market and interested in a lighting product that primarily serves as back-up when the grid fails. Thus, this market is important where grids are weak, undersized, or prone to brown-outs. Given the frequent load-shedding by TANESCO in recent years, this market is likely to be very relevant and significant for Tanzania.
- **Rural Grid Connected Market.** In rural areas, grid connectivity is often too expensive for rural households so off-grid lighting products can provide an alternative lighting solution.
- **Urban Off-grid Commercial Market.** A commercial market for lighting products has begun to develop in urban off-grid areas, and will continue to expand with or without Government intervention. That being said, this market could develop more quickly and in a more sustainable matter with product quality improvement measures and consumer awareness campaigns, such as the Lighting Africa program is implementing. In this market segment, customers would not necessarily require solar (or other off-grid) charging since they would likely be able to utilize grid-based charging services, which would also help to reduce the upfront costs of off-grid lighting systems.
- **Rural Off-grid Commercial Market.** Like the above segments, the Rural Off-Grid Commercial would be able to afford lighting products on a cash basis. The main difference from urban groups is: (i) these groups are more widely distributed and harder to reach commercially than urban markets; and (ii) they would require devices charged by off-grid power sources or charging stations such as solar PV, other renewable energy technologies, or diesel.
- **Urban Poverty Markets.** This off-grid market is heavily constrained by insufficient income and would not be likely to prioritize lighting products, due to the first cost barriers. This segment is characterized by consumers that use kerosene in small quantities; they cannot afford bulk kerosene, grid electricity, or other power sources that require initial investments beyond their means. Some type of policy/finance intervention would likely be required for this group to purchase modern lighting products. Generally, this market would not involve solar power solutions to charge lighting devices since grid-based charging services would most likely be available for lower costs.
- **Rural Poverty Markets.** Like the Urban Poverty Market, this off-grid market is constrained by income and would probably not prioritize the upfront costs needed to purchase modern lighting products above other needs. Much of this group either does not light their homes, or utilizes small amounts of biomass or kerosene for lighting. Due to geographic isolation and generally higher prices for lighting products that are common in rural areas, this group is the hardest to serve.

The first four market segments represent commercial markets, requiring more limited effort to develop. Commercial market development requires targeted measures to make quality products available in both urban and rural areas, inform potential customers of the benefits of modern lighting, and if needed, address other existing market development barriers. The final two market segments will require more heavy-handed interventions, focusing primarily on promoting financing opportunities that will help to improve the affordability of off-grid lighting products for those with restricted incomes.

[2] Figures are based on author's refined estimates of Tanzania Demographic Information from UN Human Development Reports, CIA Website, and the paper, "Market Characterization Study: Preparation of a Commercial PV Market Development Component in Tanzania 2006," CAMCO. The wide range in the figures reflects the lack of clear data on buying power and poverty in the market.

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Policy and Institutional Environment for Modern Off-Grid Lighting

Fiscal Measures

- **Kerosene and Fuels.** Tanzania spends US$190 million per year on the importation of petroleum products. A significant portion of this is for illumination kerosene. All petroleum products, with the exception of illumination kerosene, are levied with a value added tax (VAT). Because of its utility for rural lighting, kerosene receives a 25 percent price reduction in the form of exclusion from VAT. This measure, in force for at least the last 10 years, was designed to improve access to lighting services by rural people. However, an outcome of this policy is that it creates a competitive disadvantage for all types of modern lighting products that could otherwise provide improved off-grid lighting solutions.

- **PV and Lighting Products.** VAT and import duties were removed for PV products in 2005, including for solar modules, charge controllers, solar-specific batteries, lights, and associated products. Modern off-grid lighting devices fall within the general category of solar products that fall under the exemption, and companies interviewed for this study reported few if any problems with customs authorities misinterpretating the category. Thus, in general, the solar category seems to function well for modern off-grid lighting products in Tanzania; the lenient fiscal policy for solar is advantageous and needs to be protected.

Laws Governing Private Business Development

In general, Tanzania's business environment is perceived to be difficult for new businesses. As a result, businesses must pass investment and operational costs onto their customers. Private businesses interested in investing in the Tanzanian lighting product marketplace are concerned about tax and investment laws for a number of reasons. First, the 2006 revision of the Income Tax Act is, according to many businesses, "investor unfriendly." As an example, the law taxes retained profits which discourages reinvestment in the company. Second, the relatively small corporate tax base forces the Government to aggressively tax those companies that "play by the rules," while a large portion of the economy avoids taxes. Third, companies complain about the penalties—work permits for East Africans, a lack of true incentives, and multiple taxes, including high pension funds, municipal taxes, and payroll taxes. Finally, the high VAT registration threshold may mean that companies are negatively affected as expenditures grow, without being able to claim back VAT taxes.

Financing Mechanisms

In general, agricultural cooperatives and the banking sector are relatively "cash rich," and developing strength in their capacity to work with rural people. Nonetheless, high interest rates and a tendency for microfinance to be based in urban areas can create barriers for the expansion of modern off-grid lighting in rural regions. The REA/World Bank "Cluster Program" is seeking to introduce a new financing model with agricultural cooperatives that is yielding encouraging results. This could be a possible funding source for off-grid lighting in the future.

Other unresolved problems for stakeholders operating in modern lighting markets include: (i) lack of working capital and trade finance for players that operate in marginal markets; (ii) unwillingness of banks to lend and/or the unreasonable loan terms they offer, such as high collateral requirements and high interest rates; and (iii) lack of consumer finance for base of the pyramid customers, particularly in rural areas.

Private Sector Effectiveness

Tanzania's private sector lacks entrepreneurs and manpower in key areas, making the operational costs of companies relatively high. The Dar es Salaam port poses problems for companies as it is slow and requires companies to incur costly demurrage and storage charges. The cost of distribution to rural areas is high and supply logistics are difficult, since they entail predicting demand more than three months in advance, which makes investment risky.

Nonetheless, there are a number of factors that are improving the overall private sector capacity in the country. These are economic growth; membership in the East African Community, which will have a major effect on Tanzania when it comes into full force; and a steady growth in consumer groups, many of which are investing in rural areas. Well targeted government interventions may be helpful in supporting the private sector to develop more risky rural businesses and expensive rural distribution networks.

Product Quality

Product quality is an issue raised constantly by stakeholders in the modern off-grid lighting sector. In theory, products must conform to the National Standards that are now harmonized with the East African Standards (EAS). Although these standards have been approved by Parliament, they have not yet been officially published by the Ministry of Industry and Commerce. While these standards have been designed for SHS they would also apply to solar lighting products which contain several of the same components (e.g., panels, lights, and batteries). There is also a need for better enforcement of existing quality standards. In this regard, pressure is being put on the Tanzania Bureau of Standards (TBS) to provide such enforcement and already some imported consignments of low quality products have been seized.

In practice, products, and especially low quality LED flashlights, multiple function lighting devices, and modules are brought into the country in large numbers by opportunistic traders with no quality oversight or enforcement. Since February 2012, the Tanzanian government has introduced pre-shipment inspection rules to curb the importation of sub-standard goods, including renewable energy products.

Conclusions and Recommendations

- Tanzania has been undergoing constant economic growth over the past decade that is fueled by agriculture, mineral wealth, and tourism income. The long period of positive indicators has also resulted in rising prosperity and spending power, in and around rural centers.
- Nonetheless, the large size of the country and lack of economic activity in many areas has prevented the installation of an electric grid and other infrastructure to enable most of the rural population to access basic amenities, including lighting. The Government is committed to addressing this issue. However, alternative approaches to bring modern energy services to all Tanzanians in a shorter timeframe must be quickly implemented as energy access is a key national issue.
- The solar lighting market is growing rapidly and will be the main player in distribution of lighting products. This sector has begun to supply lighting products on a large scale yet the quality of goods is a major issue. This is being addressed by government policy and the REA with the assistance from Lighting Africa and its product Quality Assurance program.
- The kerosene subsidy, in terms of the existing VAT exemption, yields major losses for the Government in revenue, amounting to over US$40 million per year. It also creates artificial competition for modern lighting products.

Key Barriers

- Relatively slow rate of policy implementation.
- A lack of support for aggressive scale-up of rural energy initiatives.
- The high cost of doing business.
- Port issues which slow the movement of lighting goods to the market and increase product cost.
- Subsidies for kerosene as a lighting fuel make it difficult for modern lighting products to compete.
- Comparatively low priority of modern lighting products among consumers. For example, lighting is not valued as important a service as communications.

- Limited business knowledge about modern lighting products by retailers and lack of appetite to offer it as a solution.
- Lack of business capacity for distribution, marketing, and sales of off-grid products by retailers.
- Overwhelming competition from low-quality lighting products in the market.
- Low purchasing power of priority target households.
- Lack of consumer access to credit for product purchases.
- Inability of companies to make capital investment in stock and limited access to supplier finance.
- High cost of market development and lack of supply and distribution chains in rural areas.

Key Recommendations

- **Increase Awareness Raising and Publicity**. Commercial segments of the market require information about what products are available, where to get them, and quality status. Awareness that there are new lighting solutions available is still at an early stage; increased outreach would help to open and accelerate the market. All levels of the political spectrum—from national to council— need to be educated about the important role of modern lighting solutions.
- **Promote Product Quality Assurance and Enforcement.** Product quality in the market is, for some, a major issue. There are a number of approaches to solving the problem, yet no consensus exists on how to do this. Stronger standards, enforcement, and pre-approval of products with a "quality stamp" are some of the options under consideration. The Lighting Africa program, which conducts product testing (alongside consumer education campaigns), can also provide a solution.
- **Engage Financial Sector Support and Involvement.** Low income segments may not be able to purchase a modern lighting device without some type of financial assistance, be it a loan from an MFI, a subsidy (as is currently offered with SHSs), or other incentives. To open up this market will require different strategies and interventions than the commercial segment of the market is presently able to provide.
- **Advance Public Policy Initiatives**. As distribution is critical to the success of rural lighting ventures, targeted support of the REA to companies will need to include: (i) building awareness; (ii) providing financing for companies and their customers; (iii) building their capacity as well as that of their rural distributors and technicians; and (iv) overcoming the high costs of setting up distribution systems. The LRTC2010 program should also seek to learn from the first round of competition winners, by identifying ways that successful initiatives can be scaled up. This feedback will be important for the LRTC2012 program.

The REA, in collaboration with other government agencies, is working with Lighting Africa to mitigate common barriers and accelerate markets for modern lighting in Tanzania.

About Lighting Africa

Lighting Africa, a joint World Bank and IFC program, seeks to accelerate the development of markets for modern off-grid lighting products in Sub-Saharan Africa where an estimated 10 to 30 percent of household incomes are spent on hazardous and low quality fuel-based lighting products. The goal is to mobilize and provide support to the private sector to supply quality, affordable, clean, and safe lighting to 2.5 million people by facilitating the sale of 500,000 off-grid lighting units by 2012 (target achieved and exceeded with 4 million people reached), while at the same time creating a sustainable commercial platform that will realize the vision of providing 250 million people with modern off-grid lighting products by 2030.

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About the Public-Private Infrastructure Advisory Facility (PPIAF)

PPIAF is a multi-donor trust fund that provides technical assistance to governments in developing countries in support of the enabling environment conducive to private investment, including the necessary policies, laws, regulations, institutions, and government capacity. It also supports governments to develop specific infrastructure projects with private sector participation. PPIAF is a major donor of the Lighting Africa program, supporting off-grid lighting policy studies and international off-grid lighting conferences.

About the Africa Renewable Energy Access program (AFREA)

AFREA was established in 2009 to help meet energy needs and widen access to energy services in Sub-Saharan African countries in an environmentally responsible way. AFREA funds support the implementation of the World Bank's Africa Energy Unit (AFTEG) strategy and its clients, through analytical and advisory activities, while also providing recipient-executed technical assistance and investment grants that help speed up the deployment of renewable energy systems regionally. AFREA is a donor of the Lighting Africa program.