

Policy Report Note

Ethiopia

This note summarizes a report prepared by Lighting Africa to identify key policy barriers to the adoption of modern lighting products and services in Ethiopia, and offers recommendations for their mitigation. (Lighting Africa Policy Report: Ethiopia, March 2011, 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. Ethiopia is one of eight countries studied.

Energy Sector Overview

In Ethiopia, overall electricity access is very low compared to the African average. The World Energy Outlook 2010 estimated national electricity access at 17 percent in 2009¹ compared to 15 percent in 2008. As in most Sub-Saharan Africa countries, the gap between urban access and rural access is huge. Urban electricity access is estimated at 80 percent while only two percent of rural households enjoy grid electricity.² Of the total number of connected customers, at least 40 percent are concentrated in the capital city of Addis Ababa.³

The power sector is dominated by large hydropower plants. The total generation capacity in Ethiopia was 2,060 megawatts (MW) in 2010, of which about 90 percent is hydro-based, 10 percent is thermal, and less than one percent is geothermal. Petroleum fuels include gasoline, diesel, jet fuel, and fuel oil for transportation and power generation. Kerosene is used for cooking and lighting.

Ethiopia's energy consumption was estimated at about 31,050 kilotons of oil equivalent (ktoe) in 2009⁴ with a per capita energy consumption of 0.4 ktoe. The national energy balance is dominated by a heavy reliance on traditional biomass energy (wood fuels, crop residues, and cattle dung), which accounts for 92 percent of total energy consumed. Petroleum and electricity contribute only seven percent and one percent, respectively.

Key government agencies active in the energy market are summarized in the Table I.

Ethiopia at a Glance

- Population: 90.8 million people
- GDP Per Capita: \$1,000
- GDP Growth Rate: 8 percent
- While GDP growth has remained high, per capita income is among the lowest in the world
- Key Sectors: Agriculture and Light Industry
- Endowed with natural resources
- Member of Common Market for Eastern and Southern Africa (COMESA)



¹ International Energy Agency (IEA) World Energy Outlook (WEO) 2010.

² IEA WEO 2009.

³ http://www.energy-ethiopia.org/downloads/Event_Pr_EEPCo.pdf

⁴ Ethio Resource Group, 2010: all biomass fuel consumption figures were obtained from the woody biomass study. Biomass fuels per capita consumption is assumed to have remained constant over the years. Other data were obtained from EEPCo and the Ethiopian Petroleum Enterprise.



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Table 1. Key Government Agencies in Ethiopia’s Energy Sector

- **Ministry of Water and Energy (MWE).** The MWE is the federal institution responsible for development, planning, and management of energy resources as well as for creation of policies, strategies, and programs. The MWE develops and implements laws and regulations for the energy sector, provides technical support to regional energy bureaus and offices, and signs international agreements (<http://www.mowr.gov.et/index.php>). Following the government’s restructuring of agreements in 2010, all duties and responsibilities of the former Ethiopian Rural Energy Development and Promotion Center (REDPC) were transferred to new departments under the MWE, including the Alternative Energy Development and Promotion Directorate (AEDPD).
- **Ethiopian Electric Power Corporation (EEPCo).** EEPCo is the national electricity utility engaged in the generation, transmission, distribution, and sale of electricity in Ethiopia.
- **Rural Electrification Executive Secretariat (REES).** Under the supervision of the AEDPD, REES is entrusted with the responsibility of supporting and promoting off-grid rural electrification projects through cooperatives and private sector operators acting outside the national grid. REES manages the Rural Electrification Fund (REF).
- **Ethiopian Energy Authority (EEA).** The EEA regulates all energy activities in Ethiopia, including operations in the electricity supply sector, such as licensing, safety, and quality standards.
- **Regional Energy Agencies.** Regional energy agencies are government bureaus responsible for promoting and facilitating programs that disseminate modern energy technologies.

In 2010, the country’s total electricity production was 3,982 gigawatt hours (GWh), with an installed capacity of 2,059 MW. State-owned utility EEPCo has a monopoly over electricity production, distribution, and sale. Much smaller private, cooperative, and municipal suppliers provide power to smaller towns in areas outside the national grid. Until 2004, the electricity production capacity of EEPCo had been very low (around 400 MW). However, this has been changing rapidly since 2005 due to EEPCo’s multi-donor supported Universal Electricity Access Program (UEAP). The generation system consists of Interconnected Systems (ICS) accounting for 98 percent of the installed capacity, and Self-Contained Systems (SCS) which contribute two percent of the existing production capacity. Table 2 presents an overview of EEPCo’s electricity production in Ethiopia as of 2010.

Table 2. Ethiopia Electricity Generation Capacity as of 2010⁵

Sources	Installed Capacity (MW)	Production (GWh)
Hydro	1,848	3,524
Geothermal	7	434
Diesel	203	24
Total	2,059	3,982

⁵ EEPCo. 2010. Facts in Brief 2009/2010. <http://www.eepco.gov.et/eepco.php>.



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Electricity transmission and distribution losses are estimated at 17 percent of the electrical energy produced.⁶ The number of residential connections has been growing at an average rate of seven percent over the past three years. This connectivity rate is only inclusive of households connected to EEPCo ICS and SCS through direct and shared meters.

One important feature of electricity access in Ethiopia is that while the grid coverage rate is high—the number of electrified towns has been growing rapidly over the last five years⁷ – the percentage of households that are actually connected is low. According to a recent background paper published by the World Bank, the low access rate is attributed to high connection costs. In 2010, about 45 percent of the population lived in electrified areas. The electricity coverage rate is projected to rise to 100 percent by 2020.

In Ethiopia, the responsibility for rural electrification is shared between EEPCo and REES. EEPCo undertakes all national grid extension projects under the UEAP and REES, via the Rural Energy Fund, which supports private off-grid electrification. In the last five years, under the UEAP and REF, the Government of Ethiopia (GoE) has managed to increase electricity access to 15 percent in the country, where access is defined as the number of households connected to the grid.

Ethiopian electrification initiatives can be broadly divided into two groups:

- **Grid Based Extension.** The UEAP is an umbrella program executed by EEPCo to provide grid-based electrification in rural towns and villages over a 10-year horizon. These rural towns and villages range in size from about 100 to 15,000 inhabitants. The UEAP has been financed mainly by the GoE but has also received support from several donors and financiers, including the World Bank, the African Development Bank (AfDB), the Kuwait Fund, the Arab Bank for Economic Development in Africa (BADEA), and the Indian Government. The UEAP officially commenced in 2005. The target set for the UEAP was to increase grid access by 50 percent over a five-year period (2005 to 2010); the ultimate objective is to connect 6,000 rural towns and villages from about 18,000 localities in a 10-year time frame (2005 to 2015). Moreover, grid connections were expected to grow to 2.6 million in 2010. The accomplishments of the UEAP over the past four to five years have been remarkable—both in terms of connecting new customers and electrifying new towns and villages. According to official EEPCo data,⁸ as of July 2010 the number of grid connected towns/villages stood at 5,163 compared to 648 in 2005. This represents an eight-fold increase. The actual number of grid connections in 2010 was about 1.9 million compared to 1.1 million in 2005.
- **Off-Grid.** The REF was established in 2003 to foster private sector participation in the industry and provide flexible and innovative financing for off-grid rural electrification projects. REF-supported projects are of a pilot nature only, each involving a few hundred households (usually less than 300).

The off-grid electrification program is progressing at a much slower pace than its grid-based counterpart. To date, there have been only a handful of decentralized projects serving to electrify a few thousand rural households. Presently, only 11,000 households are electrified with support from REF, 10,000 of which are estimated to use diesel generators, reflecting prior emphasis on thermal generation. Currently, however, the emphasis is on renewable energy, particularly solar photovoltaics (PV) and micro hydropower. Yet it is been noted that the resources available for the off-grid rural electrification component are far less numerous than those available for the grid-based program.

⁶ The percentage was derived from the kWh generated by EEPCo and its sales volumes, available at <http://www.eepco.gov.et/eepco.php>.

⁷ World Bank. 2010. Addressing the Electricity Access Gap.

⁸ EEPCo: Facts in Brief, 2008/09 available at <http://www.eepco.gov.et/eepco.php>.



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Lighting Africa

The Lighting Africa program in Ethiopia seeks to support the government in creating an enabling environment for phasing out traditional lighting sources, and complementing current grid extension and off-grid rural electrification efforts with innovative off-grid lighting solutions. Recent advantages in lighting technology, including Compact Fluorescent Lamps (CFLs) bulbs and Light Emitting Diodes (LEDs), promise improved lighting that is clean, portable, durable, lower cost, and higher quality than conventional lighting options. Lighting Africa aims to mobilize the private sector to provide affordable, renewable, and clean lighting to rural, urban, and peri-urban customers without electricity access—predominantly low-income households and micro businesses.

Lighting Options in Ethiopia

Lighting sources in Ethiopia can be divided between grid-connection, kerosene (and other traditional methods), modern off-grid technologies, and PV-battery based systems. Urban zones rely on an existing grid network, while in rural areas most lighting products are powered using kerosene fuel and conventional thermal generation. With 84 percent of Ethiopians living in rural areas, this represents more than 70 million people (15 million households) who do not have access to electricity. This study also estimated that even with tremendous investments to rapidly scale up grid connection in Ethiopia, more than 12 million families will still be living without electricity by 2025. For basic energy services like lighting, these families will continue to rely on carbon dioxide (CO₂)-emitting, hazardous, and unhealthy traditional lighting sources such as kerosene, fuelwood, and candles. The latest census data (2004) indicated that about 80 percent of households in rural towns and villages rely on kerosene for lighting, compared to 23 percent of urban dwellers. Moreover, 18 percent of rural families use firewood as their primary source for lighting.

Existing solar companies are few, with less than 15 PV equipment suppliers in Ethiopia.⁹ However, only five or six companies supply 90 percent of the market. The other suppliers sell PV systems along with many other products, with the solar business accounting for less than 5 percent of their annual turnover.¹⁰ While the private sector is the sole supplier of PV systems in the commercial market, it relies heavily on tenders from the public sector—REF, non government organizations (NGOs), and foreign aid missions. Only a few companies like Direct Solar, Ethio-Dutch Business, and Everbright sell off-grid lighting products to consumers. Many other small electronic shops offer only small LED lighting products as off-grid lighting technology options.

The fast moving goods market is largely informal and the main supplier of disposable battery LED-based torches. Hand torches with a few clustered LEDs have virtually displaced traditional torches with a single halogen-type lamp. LED torches are the preferred alternatives to candles for their better light intensity, lower running costs, and portability. Hand torches are sold primarily in rural areas, while rechargeable lighting devices are available from roadside vendors in urban areas. An ordinary hand torch requiring two D-type dry cells costs less than US\$1. The price of commonly available D-type dry cells in most peri-urban outlets is about US\$0.23, but varies depending on the brand. While the quality and performance of LED lighting units vary greatly, they have a high penetration rate because of their low price. The main disadvantage of the products available in the informal and formal markets is the poor quality of the devices.

⁹ Solar and related companies and players include the following: Lydetco, Beta Engineering, Direct Solar, Ethio-Dutch Business (SolarMan), Solar 23 Development, Tehadiso Ethiopia, Free Energy Import, Solar Tech, Volan Com, Solar and Information Technology (SIT), Megen Power, and Ethio Resource Group. These companies have formed their own association (Ethiopian Solar Energy Society) to lobby government on policy and related issues.

¹⁰ GTZ. 2009. Target Market Analysis: Ethiopia's Solar Market.



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From the interviews and market visits conducted by Lighting Africa, it has been noted that most small lighting systems found in both the formal and informal markets are of very poor quality. This is the case particularly for those products that are widely available in the informal markets. Consumers agree that these products are cheap and not durable. Also, replacement parts are not available for repair.

Newly established companies could play an important role in the market of good quality off-grid lighting products as these devices could complement current activities. Unfortunately, they are absent at present. It is important to highlight that only Solar Energy Foundation, an NGO, imports Solux and Suntransfer solar lanterns, which have passed the Lighting Africa quality tests. Some of the other solar-related companies have tried to import d.light products approved by Lighting Africa. However, importers have not yet entered the market due to the lengthy and uncertain importing procedures as well as quality certification issues by customs. Currently, the Lighting Africa program team is in discussion with the National Standards Authority (NSA) and customs authorities to allow imports of approved products without any further need for testing and certification. It is expected that this ongoing discussion will lead to initiatives that remove such barriers.

Lighting Africa has conducted several studies on the off-grid lighting market in Ethiopia to provide manufacturers, businesses, and project developers with a thorough understanding of consumer needs, preferences, and finances. This provides them with the necessary information to adjust product designs, identify appropriate business models, and prepare projects and marketing strategies. These market studies provide baseline information for use in quantifying the market, with respect to both volume and value terms.¹¹ The market intelligence study conducted in Ethiopia included an exploratory phase involving a qualitative product testing element, a quantitative survey on habits and attitudes of the population, and a quantitative lighting device test to document the acceptance and likely uptake of existing, new, and revised product ideas in the country. The main findings of the various studies are outlined below:

- The paraffin lamp is the most popular lighting device used in businesses and households. This is due to the fact that paraffin has a low upfront cost and is widely available.
- Most respondents believed their lighting problems would be solved if they had access to a number of solar products which they considered to be safe, attractive, and convenient. Respondents indicated that solar powered lighting products are the best way forward for lighting, given that the price is affordable and the products are sufficiently present in the market.
- Grid rechargeable lamps are deemed inconvenient because of the need for electricity to recharge them and the inefficiency of the batteries. This finding is very important for the promotion of off-grid lighting products since solar-based devices do not require the electric grid or fuel for recharging and the batteries used for charging are being improved in conjunction with the development of new, higher-quality products.
- The main challenges in the use of off-grid lighting devices include affordability, especially given the inability/willingness to pay among low income households. In general, most interviewed participants want a low price compared to the actual market price. However, they are willing to pay a higher price under certain conditions, such as if the quality of light is very good. In practice, they are already paying more than what they stated they could/would pay, but over a longer period of time. Most current lighting products used by rural consumers are fueled with kerosene. With the increase in world fuel prices, the running cost of lighting devices has become a common issue for households.

It should be noted that the initial purchase price for modern off-grid lighting devices could be a disincentive, particularly for low-income households. The rural Ethiopian average monthly income is estimated at US\$115¹² as per the Lighting Africa market study, which is less than US\$1 per day per person for a family of four.

¹¹ <http://www.lightingafrica.org/node/191>

¹² http://www.esmap.org/esmap/sites/esmap.org/files/Synthesis_report_FINAL_reduced_20110224.pdf, p.15



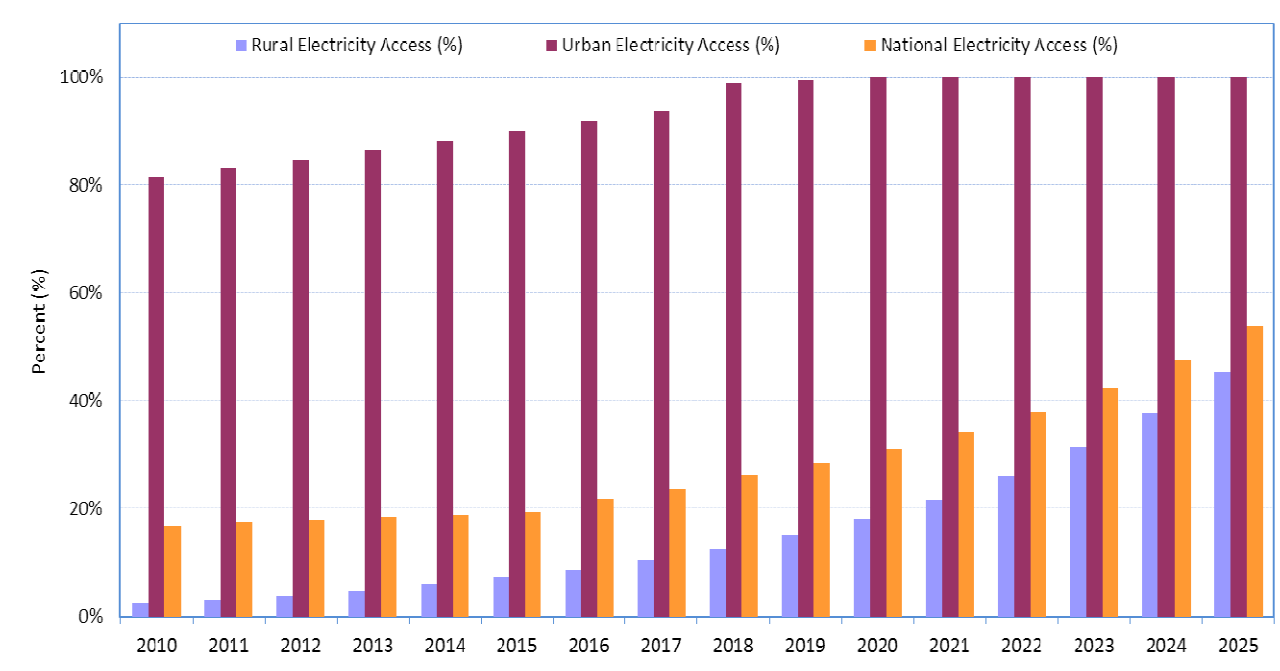
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Consequently, it will be important to create the most favorable framework and approach to make high-quality, off-grid lighting products available in the market, to educate the population about the performance of the devices, to reduce import taxes and duties, and to facilitate payment based on current purchasing habits with regard to kerosene and other lighting sources.

Where is the Off-Grid Market Going?

The low electrification rate in the country outlines the importance of creating a modern off-grid lighting market in Ethiopia, where a large proportion of the population lives in non-grid connected areas or cannot afford connection fees. In addition, it is also essential to highlight that poor electricity distribution in electrified zones brings about a subsequent need for modern off-lighting products even in electrified areas. The assumptions used are based on an urban electrification scenario that considers an annual increase of two percent between 2010 and 2020 and one percent between 2020 and 2025. Considering the current low rural electrification rate and the ambitious UEAP, aggressive rural grid connection efforts were assumed with annual rural electrification rates of 25 percent between 2010 and 2015, and 20 percent between 2020 and 2025. Based on the aforementioned assumptions and the population growth rate, it is projected that overall access to electricity (grid connection) could reach 54 percent by 2025, with 100 percent of all households electrified in urban areas and almost 45 percent in rural areas. (See Figure 1.)

Figure 1. Modeled Growth of Electricity Access in Ethiopia by 2025



In collaboration with:

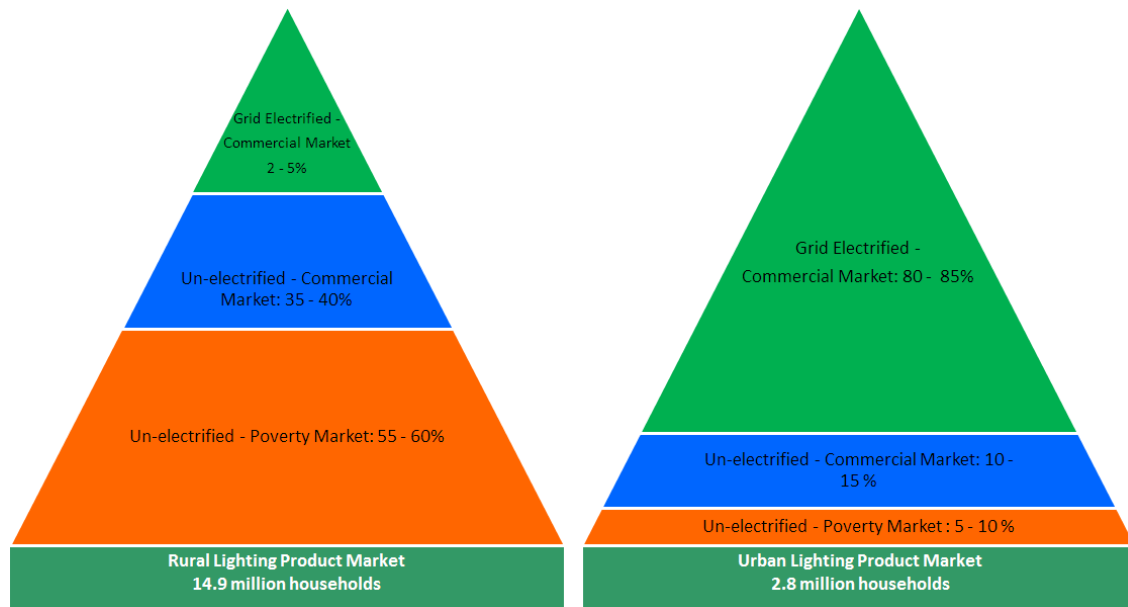


Africa Renewable Energy Access Program (AFREA)



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Figure 2. Potential Market for Grid and Modern Off-Grid Lighting



As the pyramids in Figure 2 demonstrate, the primary market is divided in six segments spread over rural and urban areas (three market segments per diagram). The features of each market are described below.

- Urban and Rural Electrified Market (two segments).** The rural and urban electrified market segments include households that currently have access to electricity (80 to 85 percent of urban households, and two to five percent of rural households). These percentages translate into 2.2 to 2.4 million urban households and 0.3 to 0.74 million rural households. This is a fully commercial market that might buy modern off-grid lighting products because of power outages (45 days per year in Ethiopia)¹³. Power outages are particularly severe when rainfalls are low as the power supply system is predominantly hydro based. Obviously, not all households in these groups will participate in the market depending on the electricity supply problems prevailing in their areas (i.e., power interruptions, poor grid electricity quality, and time of supply, particularly in isolated grids). Off-grid lighting products will be adopted on a temporary basis for the most part. For low-income electrified households, off-grid lighting products could also be purchased to reduce electricity bills, if they are affordable.
- Urban and Rural Unelectrified Commercial Market (two segments).** A commercial market is a market interested in a lighting product, while a poverty market is an off-grid market that is constrained by income and geographic isolation. This market comprises rural and urban households that have the capacity to pay for electricity services but are still not grid connected. Households in these two segments include those that are currently using other commercial sources of energy for lighting, mainly kerosene and small generators. Taking into account the relatively low price of off-grid products compared to grid connection and kerosene costs, it has been assumed that these market segments could attract 35 to 40 percent, and 10 to 15 percent, respectively of unelectrified rural and urban households (5.2 to 5.9 million and 0.28 to 0.42 million). In the two off-grid market segments, modern off-grid lighting products have already begun to develop, although on a very small scale. Further government interventions are needed to address market issues pertaining to off-grid lighting products, such as product quality, upfront costs, and availability of quality products. This market will adopt lighting products as a transition option before being electrified in the coming years. Furthermore, due to the size of this market, it has the potential to help the lighting product market develop rapidly.

¹³ <http://www.assaf.org.za/wp-content/uploads/2010/11/eberhard1.pdf>

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- Urban and Rural Poverty Market (two segments).** The off-grid urban and rural market segments include people living below the poverty line (mainly constrained by income and geographic isolation) and people who would not prioritize lighting products due to upfront costs. It has been estimated that a total of 55 to 60 percent (8.17 to 8.92 million) of rural households and five to ten percent (0.14 to 0.28 million) of urban households considered in this market will remain unelectrified despite government efforts. The urban and rural off-grid poverty market is also characterized by people who could afford to buy modern off-grid lighting products with government help and those who will remain without modern lighting regardless of any government policy because of extreme poverty. Strong government interventions are required to lower upfront costs and facilitate payment, thus offering the possibility of opening the market to those currently using kerosene for lighting. Other people could only be indirect beneficiaries of modern lighting products or be offered lighting products for free by the government, NGOs, or donors.

In summary, the first four market segments could be quickly developed on a commercial basis with minimum policy support, whereas the development of solutions for the poverty markets would require more comprehensive policy support. Overall, the projections made with regard to country electrification show that about 68 million people will still not be grid-connected in 2025. This provides a strong rationale for the promotion of modern off-grid lighting products in the country.

Policy and Institutional Environment for Modern Off-Grid Lighting

Fiscal Measures

- Kerosene and Fuels.** Petroleum products are among the main goods imported into Ethiopia. These include fuel-super benzene, regular benzene, petrol, gasoline, and other motor spirits. In 2009, Ethiopia imported 266 kilotons of kerosene (295 million litres) representing expenses of ETB 2.9 billion (US\$177 million). This clearly shows the importance of kerosene in foreign exchange and household expenses. Kerosene is exempt from all taxes, however, other petroleum fuels such as gasoline and diesel are subject to all taxes. Taxes on these products amount to 30 percent, in addition to a value added tax (VAT) of 15 percent. Petroleum fuels (e.g., fuel oil), which are used for industrial applications, are exempt from excise taxes but other taxes still apply. The shift from kerosene-based lighting to modern off-grid lighting could require financial support to make the products more widely affordable by using the money saved on kerosene avoided. This government intervention could be on a temporary basis (two to three years) to create the market by making the products available, encouraging business development, and boosting the market to increase product affordability. Kerosene prices doubled between 2008 and 2010 from ETB 5.72 (US\$0.35) per litre in January 2008 to ETB 11.35 (US\$0.7)¹⁴ per litre in December 2010. Despite the increase in price, households are still paying for kerosene to fuel their cooking and lighting devices.
- PV and Lighting Products.** As a result of REF intervention, PV and other modern off-grid lighting products are now exempt from duty tax and surtax but the VAT applies.¹⁵ Modern off-grid lighting products are subject to duty, VAT, and surtax if they are not powered by renewable sources or identified as energy efficient. The surtax on duty-free goods was to be automatically eliminated, yet still applies on renewable energy technologies such as PV systems imported duty free.

¹⁴ Ethiopian Petroleum Enterprise

¹⁵ EEA had been verifying solar products for customs but has recently passed this function to the Ethiopia Standards Institute. EEA had been giving preferential duty free treatment to Lighting Africa products. The exemption duty remains though the process is changed under the Institute. At present, the Institute does not have a well established policy on what solar products are duty free, although this is in development.



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It should be noted that the surtax, in principle, is usually levied in national emergency situations or used to fund federal government development investments (i.e., power and road sector investments). This means that technologies meant for rural electrification in off-grid areas are cross-subsidizing grid electricity by supporting investments in large hydropower plants and contributing to grid expansion through taxation systems. Another important component of the Ethiopian taxation system is that electricity consumption is not subject to VAT. This exoneration is applied to encourage households to access electricity as a basic service. Similarly, modern off-grid lighting products are also basic energy services for those who are not currently connected to the grid. Therefore, it may be important to consider removing the VAT on high-quality off-grid lighting devices to allow low-income groups to abandon kerosene lighting. Table 3 summarizes the tax/duty situation.

Table 3. Taxes/Duties for Renewable Energy, Energy Efficiency, and Modern Off-Grid Lighting

Tax/Duty	Renewables and Energy-Efficient Lighting (Percent)	Modern Off-Grid Lighting-Non-renewable (Percent)
Excise Tax	0	0
Duty	0	30
VAT	15	15
Surtax	0	10

Laws Governing Private Business Development

Ethiopia has set up an Investment Code to favor and stimulate private investment and the inflow of capital and technology to the country. In the power sector, the governing regulation is Electricity Proclamation N0.86/1997. It seeks to promote domestic and foreign private investment in power generation from all sources. Independent power producers could generate and sell electric power to EEPCo or establish independent distribution systems in areas not served by the grid. The Ethiopian Energy Agency, under the MWE, is the regulatory body mandated for issuance of operational licenses in the power sector. Moreover, the NSA has to approve the list of products before getting a tax exemption, although the basis for such approval is unclear. At the moment, however, sales of off-grid lighting products and systems are not regulated. The legal framework for private domestic and foreign investment in Ethiopia encourages companies that may be interested in manufacturing products, including off-grid lighting devices. Moreover, there are rules for the taxation of imported products that will need to be sorted out with the NSA and customs authorities. The restriction of retail and wholesale trade could be a strong barrier for foreign enterprises to invest in the off-grid lighting market. Options such as a joint venture with Ethiopian companies or co-enterprises could be considered in this situation.

Financing Mechanisms

Several financing mechanisms are already in place and could be replicated or expanded to support the development of the off-grid lighting market in Ethiopia. The REF is the main financial mechanism available in Ethiopia that could be used to disseminate off-grid lighting devices in the country. As mentioned previously, REF's mission is to support all off-grid rural electrification projects through government, NGO, and private sector channels.

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REF has successfully advocated for duty exemption on PV systems and all other modern off-grid lighting products as well as lobbied the Rural Electrification Board (REB) to reduce the equity contribution of the private sector to only 5 percent. REF is considering making the REF loan interest-free.

The REF loan is currently administered by the Development Bank of Ethiopia (DBE), which is the financial intermediary between the REF and project promoters. The DBE disburses funds during project implementation and later recovers loans pursuant to the loan agreement entered into between REES and project promoters. Loan conditions under REF-supported projects are described in Table 4.

Table 4. Credit Conditions of the REF

System	Maturity	Grace Period	Rate of Interest (Percent)	Equity Self-Finance (Percent)
Distribution System	7 years	1 year	7.5	15
Diesel Power Plant	6 years	0.5-1 year	7.5	15
Micro-Hydro Plant	10 years	1-3 years	0	5
PV-SHS	5 years	0.5 year	0	5
PV-Grid System	10 years	1 year	7.5	5
Institutional PV System	N/A	N/A	100 (grant)	0

As can be seen in the table above, the maximum annual interest rate is 7.5 percent. For solar home systems, there is no interest and equity is only 5 percent for renewable energy projects (2 percent in cash and 3 percent in kind).¹⁶ Compared to the interest rate offered in commercial banks (12-15 percent), the low interest rate offered by REF is a strong incentive to encourage private investment.

Other available financing mechanisms offered to connected customers are indirect financing to grid electricity; payments for connection fees extended over a specific period of time; and pre-paid meter systems allowing consumers to recharge with amounts lower than US\$0.4.

Some microfinance institutions (MFIs) have provided loans to households for fuel-efficient biomass stoves. The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) EnDev Program, Rural Energy Foundation, and Solar Energy Foundation have also developed financing schemes that could be further investigated to determine how these mechanisms can be used for the diffusion of modern off-grid lighting products in Ethiopia.

Private Sector Effectiveness

The private sector is the key player in rolling out off-grid renewable energy technology options, including modern off-grid lighting products. There are only a few private enterprises that do business in solar energy and lighting product imports. The private sector has been distributing off-grid lighting products across rural and urban Ethiopia for the past two to three years.

However, because of the low purchase power of customers and the lack of knowledge about quality lighting, the products offered in the market are primarily sub-standard. Moreover, the business environment for the private sector is

¹⁶ http://www.dbe.com.et/Programs/Rural_Electrification.htm

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very challenging. Enterprises interviewed for the Ethiopia Country Report identified critical issues such as difficulties in accessing finance (more than 75 percent of enterprises use internal funds), excessive loan collateral requirements, and a predominant informal sector, which has constrained the growth of private companies. In addition, determination of the value of goods is performed by customs officials, not by consulting the value presented on shipping documents. As a result, the value assigned to goods is often arbitrary.

The hurdles identified by the private sector are also confirmed by the IFC/World Bank's *Doing Business 2011*, which depicts the ease of doing business in 183 countries around the world. Ethiopia ranked 104 out of the 183 economies studied. Ethiopia's scores reveal a disadvantage for private investment in major indicators such as starting a business (rank 89/183), getting credit (rank 128/183), protecting investors (rank 120/183), and trading across borders (rank 157/183). It takes 45 days to clear customs after the arrival of import goods and 620 days to enforce contracts because of lengthy procedures.

It is obvious that such an environment represents a challenge for private businesses (not only for those interested in the off-grid lighting market). However, the issues pertaining to the assignment of value to imported goods have to be addressed as this could negatively affect the price of off-grid lighting devices. Therefore, it is important to make concerted efforts aimed at building capacity and creating a more inclusive policy environment for the private sector to adequately serve the emerging, modern, off-grid lighting market in Ethiopia.

Product Quality

The market is dominated by low cost, low quality products, the latter of which can spoil the market. Consumer dissatisfaction with the services could lead to a loss of trust in the technology itself thereby damaging the whole market for modern off-grid lighting systems. However, the low purchase power of consumers and the high initial cost of good quality modern off-grid lighting devices favor the presence of low quality products in the market. Further, the lack of quality in the market is linked, to some extent, to the inability of most unelectrified households to pay the upfront costs of these products. Accordingly, the private sector is unwilling to bring quality products into the market.

Conclusions and Recommendations

Market development could take advantage of many aspects of the existing investment environment in the country. The main favorable elements of the prevailing policy environment are: (i) tax exemptions on kerosene and electricity as well as duty exoneration for renewables and energy-efficient lighting; and (ii) the Rural Electrification Fund, which offers an opportunity for the dissemination of solar-powered lighting devices through its financing and awareness mechanisms. Key policy barriers and recommendations to off-grid lighting in Ethiopia, in order of priority, are summarized below.

Key Barriers

- Insufficient recognition of off-grid lighting products as a complementary, interim option to electricity access.
- High cost due to the business environment in Ethiopia.
- Slow process of policy implementation.
- Difficulty accessing foreign currency.
- Low priority of off-grid lighting products among consumers.
- Low-quality products in the market.
- Low purchase power of a large portion of off-grid lighting users.
- Financial inability of companies to make capital investments in stock.
- Lack of financing access.
- Lack of incentives to select modern lighting solutions that offer a clean energy option and are superior to kerosene and other fuel-based lighting.



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Key Recommendations

- **Enhance Political Participation.** Explicitly recognize modern off-grid lighting in overall government policy documents, including the country's overall rural electrification policy.
- **Increase Awareness and Education.** Educate government officials and customs on the complementarity of off-grid lighting solutions to rural electrification. Develop simplified guidelines and capacity building to help customs' officials increase their efficiency. Promote capacity building and awareness raising at all levels, with involvement of NGOs and other market players. Design and develop roll-out project models appropriate for the wide-scale dissemination of modern off-grid lighting products to major stakeholders, such as MFIs, which would help lubricate the market.
- **Address Product Quality Issues.** Adopt international standards supported by world-renowned organizations such as Lighting Africa. Establish a national quality standard with testing capacity.
- **Make High-Quality Products Available in the Market at Affordable Prices to Consumers.** Provide support (e.g., including tax exemptions) for quality products only. Also, include only quality programs in any subsidy plan. Offer flexibility mechanisms for upfront cost payment.
- **Create an Enabling Environment for Private Sector Participation.** Establish a dedicated fund in a foreign currency account which can be accessed for the purpose of importing modern off-grid lighting products and off-grid capital goods only. Extend loans—with no excessive collateral and other requirements—to suppliers with strong business plans that demonstrate a viable return on investment. Expand REF collaboration on modern off-grid lighting products beyond traditional solar industry players. Supply matching grants through REF to help companies expand their outreach programs.
- **Subsidize the Bottom of the Pyramid.** Subsidize poor rural and peri-urban families to reach people who live below the poverty line.

Modern off-grid lighting could represent a market of about ETB 1.5 billion (US\$89 million) within three years. The gain for the country is significant in terms of foreign exchange savings from kerosene imports, taxes for the government in the long run, and the enhancement of living conditions for families (e.g., reduced energy expenses, better health, and enhanced education). The REES, in collaboration with other government agencies, is working with Lighting Africa to mitigate the barriers and accelerate markets for modern lighting in Ethiopia.

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), 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.

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.

In collaboration with:



Africa Renewable Energy
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Lighting Africa Policy Report Note—Ethiopia

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